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Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management Plan Update

September 25, 2019

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Monterey Peninsula Water Management District

in cooperation with:

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on behalf of the Regional Water Management Group

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Addendums and Changes since November 2007 (date of adoption)

June 2008 - add Resolutions of Adoption (Appendix 1-c), clarify Planning Region description (Executive Summary and Chapter 3)
August 2008 – add copy of fully executed Memorandum of Understanding to form a Water Management Group (Appendix 1-a)
February 2009 – update project descriptions and prioritization for Prop. 84/1E expedited implementation grant round
2012 - 2014 – update entire document in accordance with new governance, new project solicitation and ranking, and in compliance with updated guidance from DWR
2018 - 2019 – update entire document in accordance with new governance, new project solicitation and ranking, and in compliance with updated guidance from DWR

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This document is available on the web:

http://www.mpirwm.org

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Acronyms

AB – Assembly Bill

ACS – American Community Survey

AF – acre-feet

AFA – acre-feet per annum

AFY – acre feet per year

AGO – America's Great Outdoors Initiative

ALERT – Automated Local Evaluation in Real Time

AMBAG – Association of Monterey Bay Area Governments

ARRA – American Recovery and Reinvestment Act of 2009

ASBS – Areas of Special Biological Significance

ASR – Aquifer Storage and Recovery

AWT – advanced wastewater treatment

BIRP – Begonia Iron Treatment Plant

BRP – Base Reuse Plan

BMP – best management practice

BSLT – Big Sur Land Trust

CALTRANS – California Department of Transportation

CARB – California Air Resources Board

CAS – Climate Adaptation Strategy

CAT – Cost Assessment Team

CAW – California American Water

CAWD – Carmel Area Wastewater District

CCA – Critical Coastal Area

CCAMP – Central Coast Ambient Monitoring Program

CCC – California Coastal Commission

CCR – Central Coast Region

CCRWQCB – Central Coast Regional Water Quality Control Board

CDFW – California Department of Fish and Wildlife

CDO – cease and desist order

CDP – Coastal Development Plan

CDPH – California State Department of Public Health

CDPR – California Department of Parks and Recreation (see also CSP)

CEDEN – California Environmental Data

CEIC – California Environmental Information Clearinghouse

CEQA – California Environmental Quality Act

CERES – California Environmental Resources Evaluation System

CFR – Code of Federal Regulations

CIFP – Capital Implementation and Financing Plan

CIP – capital improvement project

CNDDB – California Natural Diversity Database

CNRA – California Natural Resources Agency

COS – Center for Ocean Solutions

CPUC – California Public Utilities Commission

CRAM – Carmel River Area Management

CRB – Carmel River Basin

CRLF – California red-legged frog

CRMP – Carmel River Management Plan

CRRDR – Carmel River Reroute and Dam Removal

CRTF – Carmel River Task Force

CRWC – Carmel River Watershed Conservancy

CSA – County Service Area

CSIP – Castroville Seawater Intrusion Project

CSP – California State Parks

CSU – California State University

CSUMB – California State University Monterey Bay

CVA – Carmel Valley Association

CVSIM – Carmel Valley Simulation Program

CWA – Clean Water Act

CWC – California Water Code

CWP – California Water Plan

CWSRF – Clean Water State Revolving Fund

CZARA – Coastal Zone Act Reauthorization Amendment

DAC – Disadvantaged Community

DMA – Disaster Mitigation Act of 2000

DMS – Data Management System

DPB – disinfection by-product

DPH – State Department of Public Health

DPS – Distinct Population Segment

DSOD – California Division of Safety of Dams

DWR – California Department of Water Resources

EDU – Equivalent Dwelling Unit

EIR – Environmental Impact Report

EIS – Environmental Impact Statement

EJ – Environmental Justice

EPA – US Environmental Protection Agency

EPB – Environmental Protection Barrier

EQIP – Environmental Quality Incentives Program

F – Fahrenheit

FEMA – Federal Emergency Management Act

FORA – Fort Ord Reuse Authority

GAMA – Groundwater Ambient Monitoring and Assessment

GHG – greenhouse gas

GIS – Geographic Information Systems

GPD – gallons per day

GPM – gallons per minute

GRP – Groundwater Recharge Project

GWR – Groundwater Replenishment Project

ICWM – Integrated Coastal Watershed Management

ICWMP – Integrated Coastal Watershed Management Plan

IMS – Internet Mapping Site

IPCC – Intergovernmental Panel on Climate Change

IRWM – Integrated Regional Water Management

IRWMP – Integrated Regional Water Management Plan

IWRIS – Integrated Water Resources Information System

LAFCO – Local Agency Formation Commission

LCP – Local Coastal Plan

LID – low impact development

LIDAR – Light Detection And Ranging

LUP – Land Use Plan

MBEST – Monterey Bay Education, Science, and Technology Center

MBNMS – Monterey Bay National Marine Sanctuary

MCRCD – Monterey County Regional Conservation District

MCRMA – Monterey County Resource Management Agency

MCWD – Marina Coast Water District

MCWRA – Monterey County Water Resources Agency

MCWRP – Monterey County Water Recycling Project

MF/RO – Microfiltration/Reverse Osmosis

MGD – million gallons per day

MHI – median household income

MM – management measures

MOA – memorandum of agreement

MOU – memorandum of understanding

MPA – National Marine Protected Areas

MPIRWM – Monterey Peninsula Integrated Regional Water Management

MPRPD – Monterey Peninsula Regional Parks District

MPRWA – Monterey Peninsula Regional Water Authority

MPWMD – Monterey Peninsula Water Management District

MPWRS – Monterey Peninsula Water Resource System

MPWSP – Monterey Peninsula Water Supply Project

MRSWMP – Monterey Regional Storm Water Management Program

MRWPCA – Monterey Regional Water Pollution Control Agency

MS4 – Municipal Separate Stormwater Sewer Systems

MSR – Municipal Service Review

MURP – Model Urban Runoff Program

NEPA – National Environmental Policy Act

NFIP – National Flood Insurance Program

NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration

NOI – notice of intent

NOP – notice of preparation

NPDES – National Pollutant Discharge Elimination System

NPS – non-point source

NRCS – National Resources Conservation Service

NTU – nephelometric turbidity units

OCEN – Ohlone/Costanoan-Esselen Nation

PAC – Policy Advisory Committee

PBC – Pebble Beach Company

PBCSD – Pebble Beach Community Services District

PM10 – particle pollution

PRC – Pacific Rivers Council

RCD – Resource Conservation District

RCDMC – Resource Conservation District of Monterey County

RLP – Repetitive Loss Properties

RM – river mile

RMAP –Regional Monitoring and Assessment Plan

RMS – resource management strategies

RTP – Monterey Regional Water Pollution Control Agency Regional Treatment Plant

RURWP – Regional Urban Recycled Water Project

RUWAP – Regional Urban Water Augmentation Project

RWMG – Regional Water Management Group

RWQCB – Regional Water Quality Control Board

SAC – science advisory committee

SAM – sustainable asset management

SB – Senate Bill

SBGMP – Seaside Basin Groundwater Management Plan

SCC – State Coastal Conservancy

SCCS – south-central California steelhead

SCRCD – Santa Cruz Resource Conservation District

SCSD – Seaside County Sanitation District

SEP – Supplemental Environmental Protection

SFBCDC – San Francisco Bay Conservation and Development Commission

SGB – Seaside Groundwater Basin

SIRP – Seawater Intrusion Response Plan

SMWD – Seaside Municipal Water District

SNMP – salt and nutrient management plans

SSAMP – Sewer System Asset Management Plan

SVIGSM – Salinas Valley Integrated Ground and Surface Water Model

SVRP – Salinas Valley Reclamation Plant

SVRP – Salinas Valley Reclamation Project

SVWP – Salinas Valley Water Project

SWAMP – Surface Water Ambient Monitoring Program

SWAMP – Surface Water Ambient Monitoring Program

SWFM – Surface Water Flooding Managers

SWQPA – State water quality protection area

SWRCB – State Water Resources Control Board

TAC – technical advisory committee

TAMC – Transportation Agency of Monterey County

TDS – total dissolved solids

TMDL – total maximum daily load

UI – user interface

USACE – United States Army Corps of Engineers

USDA – United States Department of Agriculture

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Service

UWMP – Urban Water Management Plan

VOC – volatile organic compounds

WDR – waste discharge requirement

WDS – water distribution system

WMI – Watershed Management Initiative

WSA – water service agreements

WQPP – Water Quality Protection Program

Executive Summary

Introduction

This update to the Monterey Peninsula, Carmel Bay, and South Monterey Bay (Monterey Peninsula) Integrated Regional Water Management Plan (IRWMP or IRWM Plan) addresses the major challenges and opportunities related to managing water resources within the Monterey Peninsula IRWM region (Region) and serves as an update to the plan adopted in 2014.

The IRWM Plan follows the criteria established by the Department of Water Resources (DWR) 2019 Integrated Regional Water Management Grant Program Guidelines (Guidelines) that establish the general process and criteria that DWR uses to implement each IRWM Grant Program. This Plan also follows the protocol set forth in the 2016 IRWM Planning Standards (Volume 2 of the 2016 Guidelines). DWR designed the IRWM planning process to be consistent with the California Water Plan: the overarching document that integrates all regional planning efforts and provides a collaborative planning framework for elected officials, agencies, tribes, water and resource managers, businesses, academia, stakeholders, and the public to develop findings and recommendations and make informed decisions for California's water future.

Integrated regional water management in California is established as a way to increase regional self-sufficiency by encouraging local water resource managers to take a proactive role in solving water management problems through collaboration with stakeholders to create innovative strategies and effective actions to achieve water management objectives. California voters have passed 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," approving the IRWM Program and authorizing $500 million in grant funds for IRWM projects.

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 authorized $5.4 billion in bond funds. Administered by DWR, Proposition 84 includes an additional $1 billion in funding for the IRWM Grant Program. Of that $1 billion, $52 million has been allocated specifically for projects within the Central Coast Funding Area. Proposition 1E, the "Disaster Preparedness and Flood Prevention Bond Act of 2006," was also passed in 2006, authorizing $4.09 billion in bonds to rebuild and repair California's most vulnerable flood control structures to protect homes and prevent loss of life from flood-related disasters; and to protect The previous IRWM Plan Update prepared in 2014, responded to the requirements of Proposition 84 and Proposition 1E.

On November 4, 2014, California voters approved Proposition 1, the "Water Quality, Supply, and Infrastructure Improvement Act of 2014." Proposition 1 authorized $510 million in IRWM funding. This Plan Update will allow project proponents in the Monterey Peninsula IRWM region to receive up to $4.2 million from Proposition 1 funds. The Proposition 1 IRWM Grant Program, administered by DWR, provides funding for projects that help meet the long-term water needs of the state, including:

- Assisting water infrastructure systems adapt to climate change;
- Providing incentives throughout each watershed to collaborate in managing the region's water resources and setting regional priorities for water infrastructure; and
- Improving regional water self-reliance, while reducing reliance on Sacramento-San Joaquin Delta.

The following sections describe the contents of the Monterey Peninsula IRWM Plan Update document.

Chapter 1 Governance

The Monterey Peninsula Regional Water Management Group (RWMG), the body responsible for the development and implementation of the IRWM Plan, includes 17 local agencies and organizations:

- Big Sur Land Trust
- California State University Monterey Bay
- Carmel Area Wastewater District
- Carmel River Watershed Conservancy
- Carmel Valley Association
- City of Carmel-by-the-Sea
- City of Del Rey Oaks
- City of Monterey
- City of Pacific Grove
- City of Sand City
- City of Seaside
- County of Monterey
- Marina Coast Water District
- Monterey County Water Resources Agency
- Monterey One Water
- Monterey Peninsula Water Management District
- Resources Conservation District of Monterey County

Members of the RWMG are required to enter into a memorandum of understanding (MOU) that acknowledges their cooperative efforts to form an institutional structure to develop and implement the IRWM Plan. A clearly defined governance structure and process creates a transparent working relationship with all stakeholders that participate in the creation of the IRWM Plan.

The RWMG was created to be a "working" group: its members expected to actively participate in RWMG meetings and committees. The RWMG ensures public involvement in its decision-making processes through various means, including regular email updates to stakeholders on the IRWM planning process; occasional public workshops; a regularly updated website (www.mpwmd.net).

Broad stakeholder involvement is crucial to ensure that the Plan identifies local issues, reflects local needs, promotes the formation of partnerships, and encourages coordination with state and federal agencies. The IRWM Plan lead agency, Monterey Peninsula Water Management District, works to ensure that stakeholders, project proponents, and the general public are well informed of the latest IRWM activities and accomplishments.

The RWMG will continue to meet on an ongoing basis to implement the IRWM Plan and to carry out IRWM planning. The IRWM Plan is intended to be a long-term planning document with a minimum 20- year planning horizon. As such, the Plan will need to undergo periodic updates and revisions to reflect changing conditions. A review of the IRWM Plan may occur with each IRWM Plan project solicitation, which is expected to occur in response to stakeholder requests or with IRWM Grant application solicitation(s). The review would be consistent with DWR Guidelines and would reflect any significant changes that are relevant to the Region. It is expected that the RWMG meet periodically and that each member ensure that adequate staff resources are available to implement the IRWM Plan.

Chapter 2 Region Description

The Monterey Peninsula IRWM Plan region is approximately 350 square miles and includes the coastal cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside. Also included are the unincorporated portions of Monterey County in Carmel Valley, Pebble Beach, the Carmel Highlands, the Laguna Seca area, and a portion of the Ord Community (**Figure ES-1**). The region includes numerous state and federal marine and coastal protected areas, the Monterey Bay National Marine Sanctuary, and portions of the Ventana Wilderness and Fort Ord National Monument, all of which are extremely valuable for their ecological and socio-economic characteristics. The Pajaro River Watershed, Greater Monterey County, San Luis Obispo County, Santa Cruz County, and Santa Barbara County IRWM regions, form the Central Coast IRWM Funding Area (**Figure ES-2**).

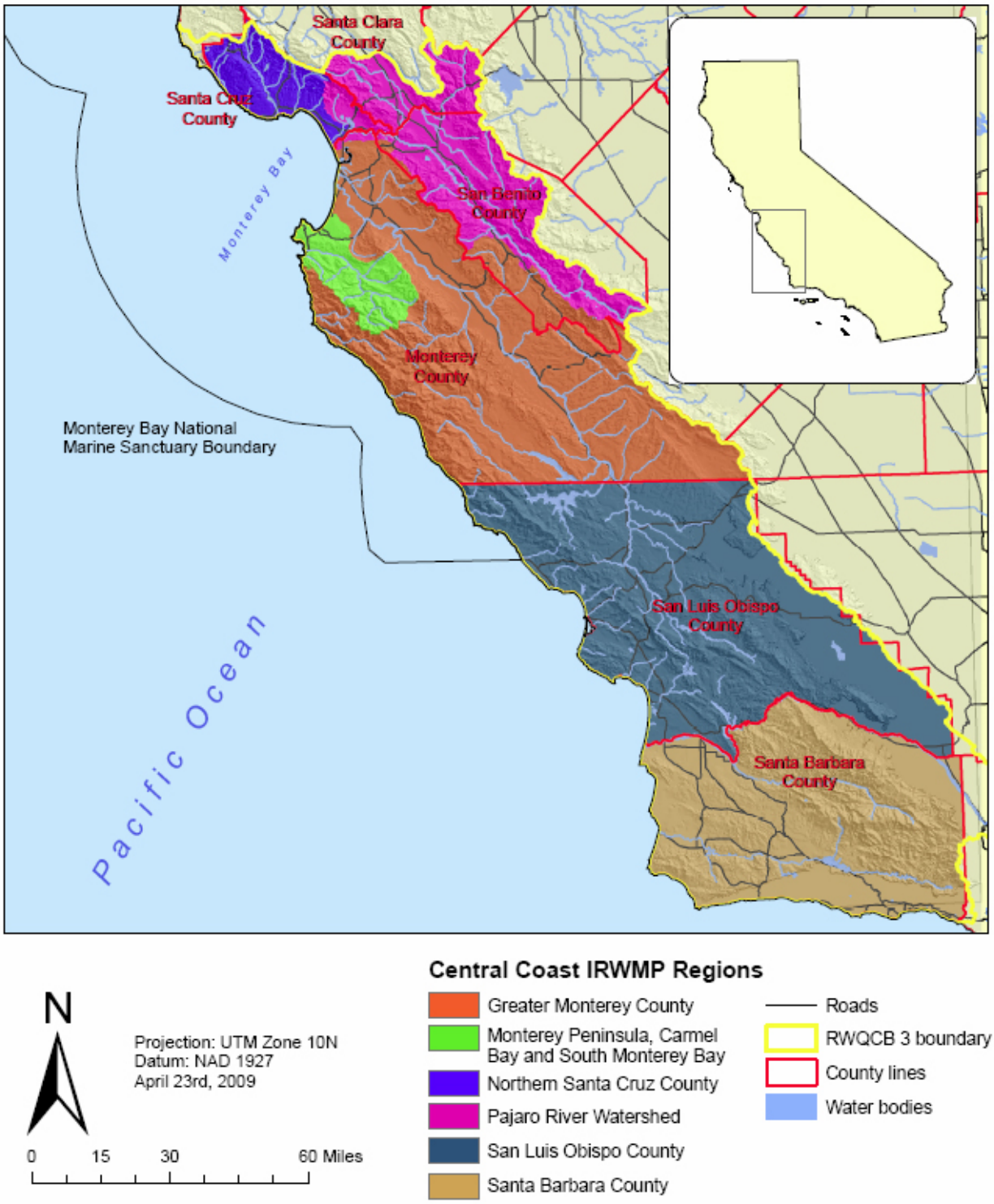
The planning area was established based on watershed and groundwater basin limits, while taking into consideration jurisdictional limits and political boundaries. The largest watershed in the region is the 255-square mile Carmel River Basin watershed. The two major groundwater resources within the region are located in the Carmel River Basin (also described by DWR as the Carmel Valley Groundwater Basin) and in the Seaside Basin that was described by DWR in Bulletin 118 as a sub-basin of the Salinas Valley Groundwater Basin. Surface water and groundwater conditions, water supply infrastructure, and wastewater and recycled water infrastructure are described in Chapter 2.

Figure ES-1: Map of Monterey Peninsula Integrated Regional Water Management Planning Region

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

- IRWMP Area
- MPWMD Boundary
- Rivers
- Cal-Am Pipelines
- Roads
- Watershed Boundaries
- Seaside Groundwater Basin
- Carmel Valley Alluvial Aquifer
- Areas of Special Biological Significance
- City Limits

Figure ES-2: Central Coast IRWM Funding Area



Chapter 3 Goals and Objectives

A key step in the IRWM Plan Update process was for the RWMG and stakeholders to reassess the 2014 IRWM Plan goals and objectives. Goals are established for broadly outlining the IRWM Plan direction, whereas objectives provide a reasonable basis for decision making, guide work efforts, and may be used to evaluate project benefits. For this update, the Monterey Peninsula Water Management District (MPWMD) coordinated additional stakeholder meetings to reassess the goals and objectives from the June 2014 IRWM Plan in-light of locally changed conditions and new guidance from the DWR, the State Water Resources Control Board, and the Central Coast Regional Water Quality Control Board. Regional goals are organized into eight general categories:

Goal Categories	
Water Supply	Water Quality
Flood Protection	Coastal and Streamside Erosion
Watershed Management	Environmental Protection and Enhancement
Climate Change	Regional Communication

These eight goals encompass the shared regional vision for accomplishing integrated regional water resource plans and other future planning efforts in the area.

The objectives give focus to the IRWM Plan, help determine appropriate resource management strategies, guide project development, and are used to evaluate project benefits. In addition, the objectives are used to help the RWMG rank projects in the IRWM Plan. The process of developing and updating objectives was based on the new DWR Guidelines as well as the following overarching policy documents and laws:

- Central Coast Basin Water Quality Control Plan
- California Water Plan Update 2015
- IRWM Planning Act
- Sustainable Management Groundwater Act (SGMA)
- 20 x 2020 Water Efficiency Goals
- Requirements of California Water Code §10540(c)

Prioritized regional objectives follow the same general categories as the regional goals. Stakeholders prioritized the following eight of the 25 total objectives:

- Improve regional water supply reliability through environmentally responsible solutions that promote water and energy conservation. Protect the community from drought and climate change effects with a focus on interagency cooperation and conjunctive use of regional water resources.
- Protect and improve water quality for beneficial uses consistent with regional community interests and the RWQCB Basin Plan through planning and implementation in cooperation with local and state agencies and regional stakeholders.

- Ensure that flood protection strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects and maximize opportunities for comprehensive management of water resources.
- Ensure that erosion management strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects.
- Develop watershed scale management strategies, considering climate change effects and maximizing opportunities for comprehensive management of water resources.
- Preserve the environmental health and well-being of the Region's streams, watersheds, and the ocean by taking advantage of opportunities to assess, restore and enhance these natural resources when developing water supply, water quality, and flood protection strategies. Seek opportunities to conserve water and energy, and adapt to the effects of climate change.
- Adapt the region's water management approach to deal with impacts of climate change using science-based approaches, and minimize the regional causal effects related to water resources.
- Identify an appropriate forum for regional communication, cooperation, and education. Develop protocols for encouraging integration and reducing inconsistencies in water management strategies between local, regional, State, and Federal entities. Provide balanced access and opportunity for the public, stakeholders, and Disadvantaged Communities (DACs) to participate in IRWM efforts.

To create a system whereby the RWMG can monitor the achievement of the objectives, a quantitative and qualitative measurement matrix was created to enable future monitoring.

Chapter 4 Resource Management Strategies

A resource management strategy (RMS) is a project, program or policy that helps local agencies manage their natural resources. The intent of the RMS standard is to encourage a region to diversify its water management portfolio to become more resilient to uncertain future circumstances- including the effects of climate change and mitigate, if necessary. The RWMG developed an updated set of strategies based on the strategies included in the 2014 IRWMP, the most recent set of statewide strategies developed by DWR as part of the California Water Plan Update process, and future uncertainties, including the effects of climate change. The Monterey Peninsula RWMG chose to include 26 strategies through a process that was based primarily on the region's goals and objectives:

Resource Water Demand	**Practice Resource Stewardship**
• Agriculture Water Use Efficiency	• Agriculture Lands Stewardship
• Urban Water Use Efficiency	• Economic Incentives
Improve Operational Efficiency and Transfers	• Ecosystem Restoration
• Conveyance - Regional/Local	• Forest Management
• System Reoperation	• Land Use Planning and Management
• Water Transfers	• Recharge Area Protection
• Infrastructure Reliability	• Water-Dependent Recreation

Increase Water Supply	• Sediment Management
• Conjunctive Management & Groundwater Storage	• Watershed Management
• Desalination	• Environmental and Habitat Protection and Improvement
• Precipitation Enhancement	• Wetlands Enhancement and Creation
• Recycled Municipal Water	**People and Water**
• Surface Storage	• Economic Incentives (Loans, Grants, and Water Pricing)
• Stormwater Capture and Management	• Outreach, Engagement, and Education
Improve Drinking Water Quality	• Water and Culture
• Drinking Water Treatment and Distribution	• Water-Dependent Recreation
• Groundwater Remediation/Aquifer Remediation	• Regional Cooperation
• Matching Quality to Use	• Recreation and Public Access
• Pollution Prevention	**Other Resource Management Strategies**
• Salt and Salinity Management	• Dewvaporation and Atmospheric Pressure
• Urban Runoff Management	• Fog Collection
• Water and Wastewater Treatment	• Rainfed Agriculture
Improve Flood Management	• Monitoring and Research
• Flood Risk Management	

Chapter 5 Integration and Coordination

As allowed by the Guidelines, the RWMG has chosen to address Guideline standards five (5) and fifteen (15) comprehensively as one chapter. The Integration standard in the Guidelines was created to ensure that the RWMG process is collaborative. Specifically, Chapter 5 centers on three types of integration: 1) stakeholder and institutional integration, 2) resource integration, and 3) project integration.

The intent of the Coordination standard in the Guidelines is to ensure that RWMG: (1) coordinate their activities with local agencies and stakeholders to avoid conflict within the region and to best utilize resources; (2) are aware of adjacent planning efforts and are coordinating with adjacent RWMGs; and (3) are aware of state, federal, and local agency resources and roles in the implementation of their plans and projects. Federal, state, and local agency consultation enables the RWMG to coordinate the IRWM planning effort closely with the mission of these agencies and helps to avoid regulatory or other conflicts in the planning and the implementation stages.

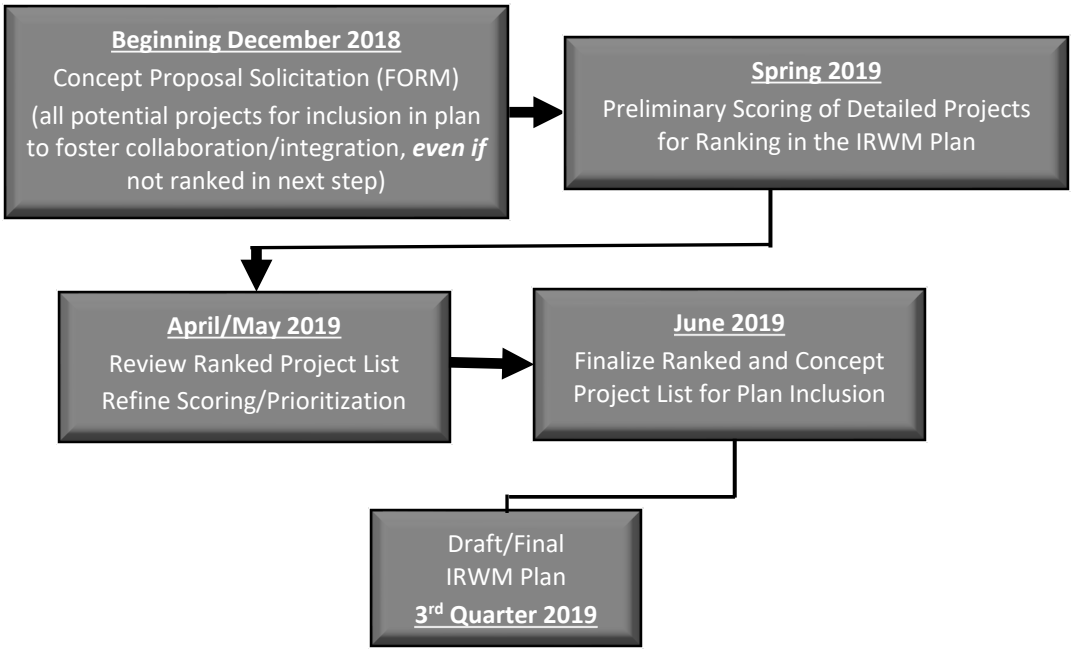
The planning process is designed to enable diverse stakeholder participation; the decision-making body incorporates disparate experts on water management, who collectively represent the geographic area. The RWMG members lend their expertise and unique perspectives through the ongoing planning process, and call in outside expertise from stakeholders as needed. Another way in which the RWMG promotes resource integration in the IRWM planning process is through designated data management systems. The RWMG promotes project integration both by encouraging stakeholders to collaborate on projects that

meet regional needs and produce regional benefits, and by finding opportunities to integrate projects—such as combining projects into regional programs—during the project review process. The IRWM website (hosted at http://www.mpwmd.net) is a coordinating tool for the IRWM planning effort and serves as a resource for project proponents and stakeholders to stay informed on local IRWM-related activities. Collaborative efforts have been undertaken with the adjacent region (Greater Monterey County) regarding DACs and overall Plan status. The Monterey Peninsula region also worked extensively with all the Central Coast funding area lead agencies to prepare for Funding Area Meetings. For the previous Plan Update, additional project coordination and integration between the Monterey Peninsula and the Greater Monterey County regions occurred through the activities and reporting for the 2014 IRWM Plan Update, a summary of which is provided in Chapter 5 and the summary report is included in **Appendix 5-a**.

Chapter 6 Project Review Process

The RWMG solicited projects and proposals for the Monterey Peninsula IRWM Plan Update with the intent to create a comprehensive list that includes those that were prioritized and ready to implement. All projects submitted for inclusion in the IRWM Plan must undergo a thorough review process before being adopted. The following figure captures the process used by the RWMG for the recent project solicitation and review for the Region.

Figure ES-3: Project Review Process



All implementation projects that meet minimum standards are ranked relative to one another. The project ranking process takes into account not only how well projects address regional objectives, but how well they address IRWM program criteria and preferences, and other factors such as "project need." The ranking is to ensure that the IRWM Plan project list is competitive for the purposes of the IRWM Grant Program. This plan and the website contain the projects that were submitted to the plan, including concept proposals aimed at increasing collaboration and integration and projects that were submitted using the detailed solicitation form to be ranked. The project ranking process and methodology was developed in collaboration with the stakeholders, vetted through RWMG members, and is described in this chapter. The results of the 2018 project rankings were sent to key stakeholders on March 5, 2019.

Chapter 7 Impacts and Benefits

The anticipated impacts and benefits of individual projects in the IRWM Plan differ greatly: some projects will provide local benefits, others regional benefits; some will focus in just one resource area, such as flood control, while other projects will integrate different resource areas, such as flood control, groundwater recharge, environmental restoration, and recreation. However, combined over time, the projects implemented through the IRWM Plan will provide multiple benefits across the entire Region—and on a variety of resource areas.

All projects included in the IRWM Plan are reviewed for potential impacts to DACs and for potential environmental justice concerns; to date, no potential impacts to DACs or environmental justice concerns have been found in any project submittal. Impacts of the ranked projects would be primarily construction-related, temporary, and able to be mitigated to avoid adverse long-term effects. Numerous benefits to DACs are expected to result from implementation of the IRWM Plan. A list of projects included in the IRWM Plan that may benefit, either directly or indirectly, DACs as well as the community at large, is provided in **Table 7-1**.

Furthermore, some of the more "intangible" benefits of the IRWM planning effort overall are described. The IRWM planning process fosters a spirit of positive collaboration among public, private, and non-profit agencies and organizations within the region, and ultimately results in increased efficiencies and cost savings. These more "intangible" benefits of the IRWM planning effort should be recognized equally alongside the numerous, significant, on-the-ground environmental and water resource benefits of project implementation.

Chapter 8 Plan Performance and Monitoring

Each project submitted for inclusion in the IRWM Plan is carefully reviewed by the RWMG to ensure that it would be able to comply with all applicable rules, laws, and permit requirements before it can be approved for inclusion in the plan. Progress toward meeting Plan objectives is directly tied to implementation, which will be tracked using the Data Management System (DMS), described below. Two tables will be generated with each Plan Performance Review: 1) Status of Project Implementation; and 2) Progress toward Achieving IRWM Plan Objectives. Approximately every five years, the RWMG will conduct a Plan Performance Review, which will include the tables and a narrative, summarizing the overall progress to date in achieving IRWM Plan goals and objectives and describe areas that need further attention. The analysis will include data submitted to the statewide databases and to the Conservation Action Tracker tool, if available. Based on this analysis, the RWMG will evaluate how to fill the gaps and help achieve regional goals.

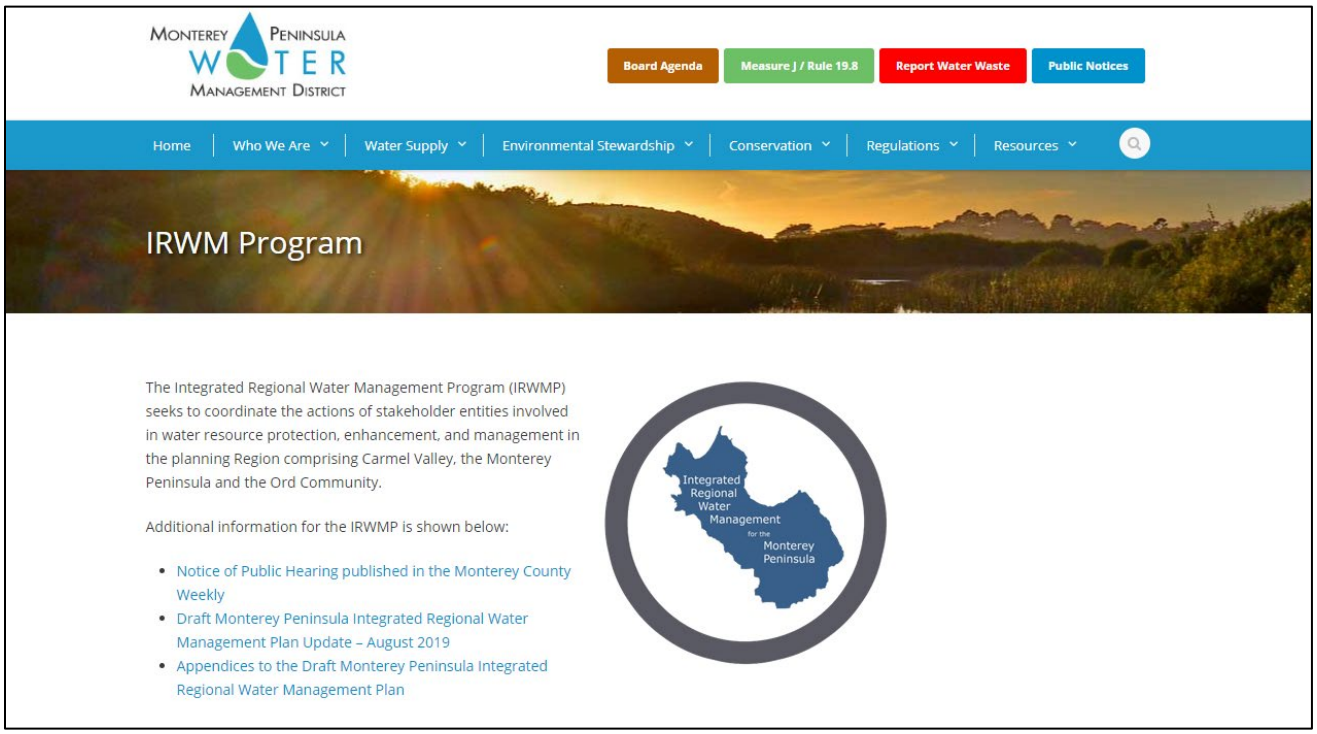
The IRWM Plan is a dynamic document and its success is related to how well its goals and objectives are accomplished, at both the plan and project levels. IRWM Plan objectives and regional priorities will continue to be reviewed for relevance and modified as needed to ensure the Plan reflects changing regional needs and continues to be effective.

Chapter 9 Data Management

The IRWM Plan adopted in 2014 included a component that described a publicly available web site that allowed users to access the IRWM Plan and documents associated with water resources planning and management in the Region. Similarly, a GIS internet mapping and collaboration tool was used for grant applications, project planning, project monitoring, and coordination with local, state and federal agencies. The equipment used to host this site was purchased in 2011 and is no longer supported; thus, this site is not safe to operate and is now defunct. MPWMD now hosts an IRWM web page at www.mpwmd.net,

provides a forum for sharing information, publicizing meeting dates, agendas, meeting minutes, and/or annual reports.

Figure ES-4: Image of the IRWM Website



Chapter 10 Finance

The purpose of the Finance IRWM standard is to demonstrate that the RWMG has considered financing- not necessarily to document that all funding has been secured. In most cases, substantial funding uncertainty exists. More specifically, the finance chapter looks at how the financing of the IRWM Plan has been considered at a programmatic level by the RWMG, and that the strategy for financing the IRWM Plan is transparent.

The RWMG has identified the following potential alternative, non-IRWM sources of grant funds and other means to help implement projects and programs in the IRWM Plan.

Funding Sources		
Federal grant programs	Private grants	Bonded debt service
State grant programs	User fees	Non-profit sources
Proposition 218 Tax Assessments	Development impact fees	Mitigation fees
Local funds	Loans (such as Clean water State Revolving Fund loans)	

Chapter 11 Technical Analysis

A critical aspect of the regional planning process is the amalgamation of existing plans, reports, and studies as a basis for understanding current water resource conditions in the Region and for developing the IRWM Plan. The technical library allowed the RWMG as much information as possible- and provided an opportunity for each member to supplement his/her own expertise- to determine the goals, objectives,

and priorities of the plan. The background information and technical data—including land use information, population studies and demographic information, economic data, water supply and water use data, watershed characteristics, hydrologic data, water quality data, environmental resources, and projected water demand—have been derived from a diverse set of documents.

Sources listed in the chapter were used to describe historic and existing conditions in the Region, as well as estimate future conditions and future water demand. Population data derived from the U.S. census, local/regional governmental forecasts and specific technical memoranda have also been used throughout the development of this plan.

Chapter 12 Relation to Local Water Planning

Ensuring that the IRWM Plan is congruent with other resource planning documents in the Region is important to the principles of integration and coordination that are the foundation of interregional water management planning.

IRWM planning does not replace or supersede local planning; rather, local planning elements are used as the foundation for the regional planning effort. This chapter describes how the RWMG has coordinated its water management planning activities to address or incorporate a myriad of planning documents. Although this chapter is dedicated to local water planning, there are a number of federal and regional plans relevant to the Region.

Federal and Regional Plans		
Groundwater management	Watershed management	City and County general planning
Water supply assessments	Stormwater management	Emergency response and disaster plans
Urban water management	Low impact development (LID)	Monterey Bay National Marine Sanctuary Management Plan
Flood management		

The RWMG conducted a comprehensive analysis of the Region's water systems. This approach resulted in the formation of goals being driven by the perceived issues surrounding local water resource management. The RWMG has also developed a rapport with Central Coast regional water and land managers, which will ensure collaborative and proactive solutions regarding climate change.

Chapter 13 Relation to Local Land Use Planning

The guideline standards for chapter 13 are the basis for all resource management planning. This chapter includes discussion on:

- Current relationship between local land use planning, regional water issues, and water management objectives.
- Future plans o further a collaborative, proactive relationship between land use planners and water managers.

- Demonstrate information sharing and collaboration with regional land use planning in order to manage multiple water demands throughout the state, adapt water management systems to climate change, and potentially offset climate change impacts to water supply in California.

One of the goals of the *California Water Plan Update (December 2018, Public Review Draft)* is to ensure that water managers and land use planners make informed, collaborative water management decisions. Therefore, this standard helps meet this statewide goal. The relationship between the RWMG and land use decision-makers can significantly influence how both water management decisions and land use decisions are made. Opportunities may exist for the RWMG to provide input to land use planners in the following areas:

- Floodplain management
- Flood control planning
- Groundwater recharge and conjunctive water use
- Treatment and conveyance facilities
- Stormwater and runoff management
- Water conservation efforts
- Watershed management and restoration
- Municipal landscaping programs
- Public access and recreational area management
- Changes in land use that affect water resources
- General plan updates and long-term planning
- Planning review
- Development review
- Water supply for public safety and emergency planning
- Habitat management

While the level of coordination between land use planners and water managers varies considerably in the Region, it is clear that there is much room for improvement. The chapter provides some suggestions for improving communication and coordination between water managers and land use decision makers.

Chapter 14 Stakeholder Involvement

Along with the Regional Water Management Group (RWMG), over 300 stakeholders were identified and invited to be involved in the planning process, including federal, state, dozens of regional and local agencies, municipalities and special districts, non-profits (environmental, disadvantaged communities, and community groups), academic educational institutions, private companies and landowners, and individuals. **Appendix 1-d** contains the list of stakeholders and the record of stakeholder meetings conducted for the IRWM Plan Update.

The RWMG and stakeholders continue to identify groups, individuals, entities and other stakeholders who can benefit from participating in the IRWM planning process. Throughout the life-cycle of the IRWM Plan, an outreach effort will continue to identify any additional stakeholders that have not participated in plan development. Environmental justice is addressed by ensuring that all stakeholders have access to the

decision-making process, additional outreach is conducted, and that minority and/or low-income populations do not bear disproportionately high and adverse human health or environmental impacts.

Chapter 15 Climate Change

The intent of the Climate Change standard in the IRWM Program Guidelines is to ensure that IRWM Plans describe, consider, and address the effects of climate change on their regions and disclose, consider, and reduce when possible greenhouse gas (GHG) emissions when developing and implementing projects. This chapter describes the anticipated impacts of climate change for the Monterey Peninsula region, including a vulnerability analysis and risk assessment, and offers preliminary adaptation measures and climate change mitigation and GHG reduction strategies for the planning region. These strategies will be refined as more climate change data, and more refined analysis tools, become available.

The chapter summarizes potential vulnerabilities in the Monterey Peninsula IRWM region due to climate change impacts, which include (among others) higher temperatures, changes in rainfall patterns, higher flow rates leading to increased erosion and flooding, more frequent and more severe droughts, sea level rise, increased coastal erosion, increased coastal inundation, and increased seawater intrusion.

Much of the work for the chapter was conducted by the Central Coast Wetlands Group at Moss Landing Marine Laboratories (CCWG), in collaboration with a Climate Task Force comprised of local scientists, land use managers, water resource managers, and coastal policy experts. The Regional Water Management Group (RWMG) will continue to seek to partner with these entities, as well as with other RWMGs in the Central Coast region, and to participate in other regional climate change efforts in order to collectively and proactively address the issue of climate change on the Central Coast.

The RWMG conducted an initial climate impact risk assessment to help water resource managers evaluate these risks and to consider potential adaptation measures. The climate risk analysis and priority impact assessment indicate the following climate risks to be top priority for the RWMG and other water managers in the Monterey Peninsula IRWM region for considering how to adapt the region's water management systems for climate change impacts:

- Decreased water supply due to changes in precipitation, more frequent and severe droughts, increased surface and groundwater consumption, and increased seawater intrusion (due to sea level rise affecting coastal aquifers).
- Increased flooding and erosion of creeks and rivers due to more intense storm events (higher river flow rates), and overburdening of conveyance systems, levees, and culverts.
- Coastal inundation of urban development and other land uses, and impacts to river and wetland ecosystems due to changes in rainfall patterns, storm intensity, storm surges (due to increased storm intensity) and sea level rise.

The chapter provides an initial adaptation strategy for the Monterey Peninsula IRWM region, discusses the region's adaptive capacity, and describes possible strategies to reduce vulnerabilities, including specific assets that lie within various future climate hazard zones according to climate scenarios for the years 2018-2030, 2030-2060, and 2060-2100. The chapter also discusses greenhouse gas emissions reduction strategies.

Chapter 1 Governance

IRWM Standard 1

The IRWM Plan must document a governance structure that ensures the IRWM Plan will be updated and implemented beyond existing State grant programs. The IRWM Plan must include:

- The name of the RWMG responsible for development and implementation of the Plan. A RWMG must meet the definition of Water Code §10539, which states:

  "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 requirements of CWC §10540 and §10541, 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."

  The IRWM Plan must include a description of the RWMG and explain how the makeup of the RWMG meets Water Code §10539 and is sufficient in breadth of membership and participation to develop and implement the IRWM Plan.
- The RWMG and individual project proponents who adopted the Plan
- A description of the IRWM governance structure; including a discussion of whether or how Native American Tribes will participate in the RWMG.
- A description of how the chosen form of governance addresses and ensures the following:
  - Public outreach and involvement processes
  - Effective decision making
  - Balanced access and opportunity for participation in the IRWM process
  - Effective communication – both internal and external to the IRWM region
  - Long term implementation of the IRWM Plan
  - Coordination with neighboring IRWM efforts and State and federal agencies
  - The collaborative process(es) used to establish plan objectives
  - How interim changes and formal changes to the IRWM Plan will be performed
  - Updating or amending the IRWM Plan

1.1 Introduction

The Guidelines require that the IRWM Plan document the governance structure. This section of the IRWM Plan includes the following, as required by the Guidelines:

- *Section 1.2, Regional Water Management Group*
  - The name and description of the RWMG responsible for development and implementation of the Plan.

- How the makeup of the RWMG meets the definition of CWC Section 10539.[1]
- The RWMG and individual Project Proponents who have adopted or will adopt the Plan.

- *Section 1.3, Governance Structure*
  - Effective decision making and communication
  - Long term implementation of the IRWM Plan
  - How interim changes and formal changes to the IRWM Plan will be performed
  - Updating or amending the IRWM Plan
- *Section 1.4, Revisions to the Regional Water Management Group*
  - Balanced access and opportunity for participation in the IRWM process
- *Section 1.5, Internal Coordination for Updates to and Adoption of the IRWM Plan*
  - How interim changes and formal changes to the IRWM Plan will be performed
  - Updating or amending the IRWM Plan
  - A summary of the collaborative process used to establish plan objectives
- *Section 1.6, External Coordination: Central Coast IRWM and Interregional Coordination*
  - Effective communication external to the IRWM region
  - Coordination with neighboring IRWM efforts and State and federal agencies

In addition, a detailed discussion of the 2018-2019 IRWM Plan Stakeholder Involvement and Outreach is provided in **Chapter 14, Stakeholder Involvement,** including how the plan update process has addressed and ensured the following:

- Balanced access and opportunity for participation in the IRWM process
- Public outreach and involvement processes
- The collaborative process(es) used to establish plan objectives

Development of this 2019 Update to the IRWM Plan is a collaborative effort of public, non-profit, and for-profit (commercial) entities in the region, collectively, the stakeholders. The MPWMD is the lead agency for facilitating the development and implementation of the Plan.

1.2 Regional Water Management Group

The Monterey Peninsula RWMG represents the diverse interests of the Region and meets the definition of CWC section 10539. For the IRWM Plan first adopted in 2007, the RWMG was comprised of representatives from the Big Sur Land Trust (BSLT), the City of Monterey, the Monterey County Water Resources Agency (MCWRA), the Monterey Regional Water Pollution Control Agency, and the MPWMD. In the 2014 Plan Update, Marina Coast Water District (MCWD) and the Resource Conservation District of Monterey County (RCDMC) were added to the RWMG. As part of this 2019 Plan Update, California State

[1] RWMG is defined by DWR: "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 requirements of CWC §10540 and §10541, participate by means of a joint powers agreement, Memorandum of Understanding , or other written agreement, as appropriate, that is approved by the governing bodies of those local agencies" (DWR, 2014).

University Monterey Bay, Carmel Area Wastewater District, Carmel River Watershed Conservancy, Carmel Valley Association, the City of Carmel-by-the-Sea, the City of Del Rey Oaks, the City of Sand City, the City of Pacific Grove, the City of Seaside, and the County of Monterey, are proposed to become members of the RWMG.

1.2.1 Big Sur Land Trust

Founded in 1978, The Big Sur Land Trust has worked in collaboration with partners and the community to conserve more than 40,000 acres of land in Monterey County. The mission of the Land Trust is to inspire love of land across generations, conservation of our unique Monterey County landscapes, and access to outdoor experiences for all. We see a future where natural landscapes, working lands, urban open spaces and healthy communities are cared for by people who share a love of nature and a deep appreciation for the richness of their diverse cultures. Since its inception, the BSLT has become a national leader in land conservation forging partnerships with willing landowners to protect land through acquisition or the establishment of conservation easements. Creating an effective private sector alternative for land preservation, the BSLT also serves as a bridge between private and public sectors.

Its efforts include habitat and nature restoration, watershed management, and land conservancy. The BSLT protects shoreline, wildlife habitat, streams, forests, grasslands and awe inspiring views. BSLT's vision includes leaving a remarkable legacy for all generations.

The Land Trust also works on multi-benefit projects that serve people and nature. These projects focus on ecological considerations and community needs in a variety of places throughout Monterey County. With their acquisition of 73 acres at Carr Lake in Salinas in 2017, their approach continues to evolve, expanding to new communities and new ways of connecting conserved lands to people. Other multi-benefit projects include partnering with the County of Monterey on the Carmel River FREE project in Carmel. The Lobos-Corona Parklands project involves several partners in landscape-scale planning to knit together conserved properties spanning from Carmel Valley to Big Sur. The Land Trust is currently collaborating with California State Parks, Monterey Peninsula Regional Park District, and the Point Lobos Foundation on planning and developing San Jose Creek Trail – a 1½-mile trail connecting Point Lobos Ranch with Palo Corona Regional Park. The BSLT brings a unique perspective to the Stakeholder group with their contacts and extensive experience with the private sector.

It should be noted that BSLT is also part of the RWMG in the Greater Monterey County IRWM Region.

1.2.2 California State University Monterey Bay

CSUMB was founded in 1994 and is located on the former site of Fort Ord. Cal State Monterey Bay provides over 7,500 students an extraordinary opportunity to learn on a residential campus just one mile from the shores of the beautiful Monterey Bay. Their diverse student body receives personal attention in small classes while pursuing degrees in 25 undergraduate and seven graduate majors.

According to the 2017 Draft Master Plan Update, the campus will continue to support sustainable regional water projects that treat and distribute wastewater for reuse, supplementing water pumped from the Salinas Valley Groundwater Basin. The campus has installed recycled water irrigation piping for all newly created landscapes. As a purveyor of existing campus water supplies, the Marina Coast Water District (MCWD) will continue to be an important conservation and water management partner. The campus will also consider public/private partnerships as a way to fund and build campus water infrastructure. The goals included in the Master Plan related to water systems include:

- Achieving net zero water;

- Promoting resiliency;
- Integrating low impact design into all landscaping and outdoor areas; and
- Percolating all stormwater within the campus footprint.

1.2.3 Carmel Area Wastewater District

The Carmel Area Wastewater District is a special district dedicated to the protection of the public health and the environment through the cost-effective collection and treatment of wastewater and the return of clean water to the environment.

Carmel Area Wastewater District is owned, operated, and managed by the community via an elected Board of Directors. The District is a Publicly Owned Treatment Works or POTW. The Elected Board sets policy, determines budget, plans for expansion or upgrade, hold decision-making over for large purchases, and in general, control the overall direction of the operation. Any resident of the District has the right to run for and be elected to serve office on our Board.

The primary function of the District is the treatment of wastewater – or the flow of used water from the community which includes household wastes, commercial and industrial waste stream flows, storm water and ground water.

The Carmel Area Wastewater District is managed on site by wastewater professionals who are certified by the State of California and are specialized in wastewater treatment, collection, source control, maintenance, or laboratory analysis. Operations at Carmel Area Wastewater District are funded solely by user fees. A smaller component of their revenues comes from property taxes which are utilized for capital replacement, repair or improvement projects.

1.2.4 Carmel River Watershed Conservancy

The mission of the Carmel River Watershed Conservancy (CRWC) is to preserve and eventually restore the Carmel River and watershed to its former health and beauty. The Conservancy protects and helps to restore populations of threatened species especially steelhead and California red-legged frogs (CRLF). The Conservancy balances environmental protection and the diverse needs of the Community. This is accomplished by exemplifying integrity, inclusiveness, education and mutual respect.

The Conservancy conducted the first assessment of the Carmel River watershed in 2004-5, out of which came an Action Plan to restore the river and watershed. This Assessment and Action Plan were updated in 2015-16.

In addition, the Conservancy and MPWMD collaborate to organize and host the Carmel River Task Force (CRTF) meetings. The CRTF is a group that meets quarterly to discuss issues concerning the Carmel River Watershed. The CRTF includes representatives from local, state, and federal agencies, from non-governmental organizations (NGOs), and individuals with a special interest in the watershed, such as researchers and graduate students. The CRTF constitutes an exceptional opportunity for the watershed stakeholders to get together and learn about all the projects and programs that are taking place within the watershed and provides a unique platform for networking and collaboration.

1.2.5 Carmel Valley Association

The Carmel Valley Association (CVA) is one of the oldest and largest community organizations in Monterey County. They are entirely volunteer, with no paid employees. The mission of CVA is to preserve, protect

and defend the natural beauty, resources and rural character of the Carmel Valley. This is accomplished it by working with residents, businesses, and government.

CVA was instrumental in the adoption of the Monterey County Carmel Valley Master Plan. Their volunteer experts represent Carmel Valley's interest, testifying before governmental bodies concerning development, water, traffic, road signs, and other environmental issues. CVA keeps valley residents informed about important issues and events with their weekly email Bulletin, which is sent to over 1,200 residents, and their quarterly Newsletter, which is mailed to over 7,000 valley addresses.

1.2.6 City of Carmel-by-the-Sea

The City of Carmel-by-the-Sea is located in northwest Monterey County, California, along the Pacific Ocean. To the north of the City's planning area beyond Pescadero Canyon are the unincorporated area of Pebble Beach and the communities of Pacific Grove, and Monterey. Unincorporated Carmel Valley lies to the east and the mouth of the Carmel River, Point Lobos, and the unincorporated Carmel Highlands area are to the south. Also east of the City, Highway 1, one of two major north/south state routes in the county, is the primary roadway linking Carmel to the surrounding cities. Carmel is an area rich in coastal resources and cultural heritage in California and an area of nationwide visitor and historical interest.

Approximately one square mile in area, the City's elevation ranges from sea level to 500' above sea level, sloping gently from Carmel Bay up to Highway 1. Vegetation generally consists of evergreen trees in the City and along the coast, deciduous trees along the Carmel River, and coastal chaparral on the Carmel Valley hills. Various species of wildlife inhabit the area, especially in the reserves and in the undeveloped valley areas.

1.2.7 City of Del Rey Oaks

The City of Del Rey Oaks was incorporated on September 3, 1953. The City currently has over 1,650 residents. Their most recent development was the Stone Creek Village Shopping Center located at the intersection of Canyon Del Rey Road and Highway 68. They also have the largest Safeway in the County.

Del Rey Oaks also has many natural habitats including The Frog Pond located along Canyon Del Rey Road, and Del Rey Park located at the end of Angelus Way.

The City of Del Rey Oaks has a full city government including a City Council, Planning Commission, Police Department, City Clerk’s Office and Maintenance Department. Their fire service is provided by Seaside Fire Department and they are very involved in the city and its residents for fire safety and prevention as well as emergencies.

1.2.8 City of Monterey

The City of Monterey, founded when an expedition by land and sea brought Gaspar de Portolá and Franciscan Father Junipero Serra to Monterey in 1770, provides a range of services to its population including maintenance and development of outdoor recreation facilities (parks), management of historic Monterey Harbor, maintenance of sewers, and storm water management. Monterey is one of more than 300 California cities operating under the Council-City Manager form of government.

Monterey represents the interests of the six Monterey Peninsula cities that constitute a major urban service area in the MPWMD district boundary. Monterey and other cities provide various municipal services to their respective populations as well as to a significant tourist industry valued at an estimated $2 billion per year. The City of Monterey is represented on the Board of M1W and is a participating entity

in the Monterey Regional Stormwater Management Program (see the description of the program, under Monterey One Water).

1.2.9 City of Pacific Grove

The City of Pacific Grove, incorporated in 1889, is a Monterey County city located on the northern edge of the Monterey Peninsula. The city was founded in 1875 by a group of Methodists who modeled the community after the popular religious retreat town of Ocean Grove. Pacific Grove and the rest of the peninsula communities became a popular destination for artists who preferred the outdoors and attributed it to the natural beauty of the area. Known as "Butterfly Town U.S.A." because of the annual migration of the Monarch butterfly, Pacific Grove is popular for its Victorian style homes and historic architecture where the official Historic Register includes over 1,200 structures. Tourism is a key economic driver for Pacific Grove and many historic homes have been converted into bed & breakfasts inns and restaurants.

It shares borders with the Monterey Bay, City of Monterey, Pacific Ocean, and the Del Monte Forest and provides services to the community including: a monarch butterfly habitat sanctuary; sandy beaches; the oldest continuously-operating lighthouse on the west coast; excellent emergency, fire, and ocean rescue services; the lowest crime rate of any city in Monterey County; an award-winning natural history museum; and a nationally-recognized 18-hole golf course. It is known for small-town hospitality and friendliness in a place many locals and visitors call "P.G."

The City is represented on the Board of Monterey One Water and is a participating entity in the Monterey Regional Stormwater Management Program (see the description of the program, under Monterey One Water).

1.2.10 City of Sand City

The City of Sand City encompasses approximately 350 land acres located on the Monterey Peninsula, approximately 120 miles south of San Francisco. With 1½ miles of coastal frontage along the Monterey Bay, the City lies on the scenic Highway One freeway which bisects the city lengthways from north to south.

The City has a clear vision of its future as a progressive, sustainable community that encourages the kind of economic and mixed-use development that enables businesses to grow, while also maintaining a friendly, walkable community.

The long-term goal is to build on the City's existing qualities to create a vibrant community where people can live, work and play. The City uses streetscape designs, planting trees and installing comfort-oriented street furniture (benches, ornamental street lights and the undergrounding of utility lines), the City hopes to make downtown more pedestrian-friendly, attractive and accessible to visitors from all walks of life.

A window to the beautiful Monterey coast, Sand City is a green conscious and artistic community that lives, works and plays by the sea. Residents and tourists alike enjoy biking through town or spending the day shopping and visiting one of the local eateries, artists' studios or magnificent coastal amenities.

1.2.11 City of Seaside

The City of Seaside is situated on Monterey Bay in western Monterey County in the northern portion of the Monterey Peninsula. The City is surrounded by the cities of Monterey and Del Rey Oaks to the south, Sand City to the west, and Marina to the north. A small strip of unincorporated land under the jurisdiction

of Monterey County borders the northwestern portion of Seaside, as well as Seaside's eastern boundary. Urban land uses typify the incorporated lands, while uses in the unincorporated lands to the east of the planning area include agricultural production, open space, and very low density rural development. The City contains approximately 8 square miles of land.

The City is represented on the Board of M1W and is a participating entity in the Monterey Regional Stormwater Management Program (see the description of the program, under Monterey One Water).

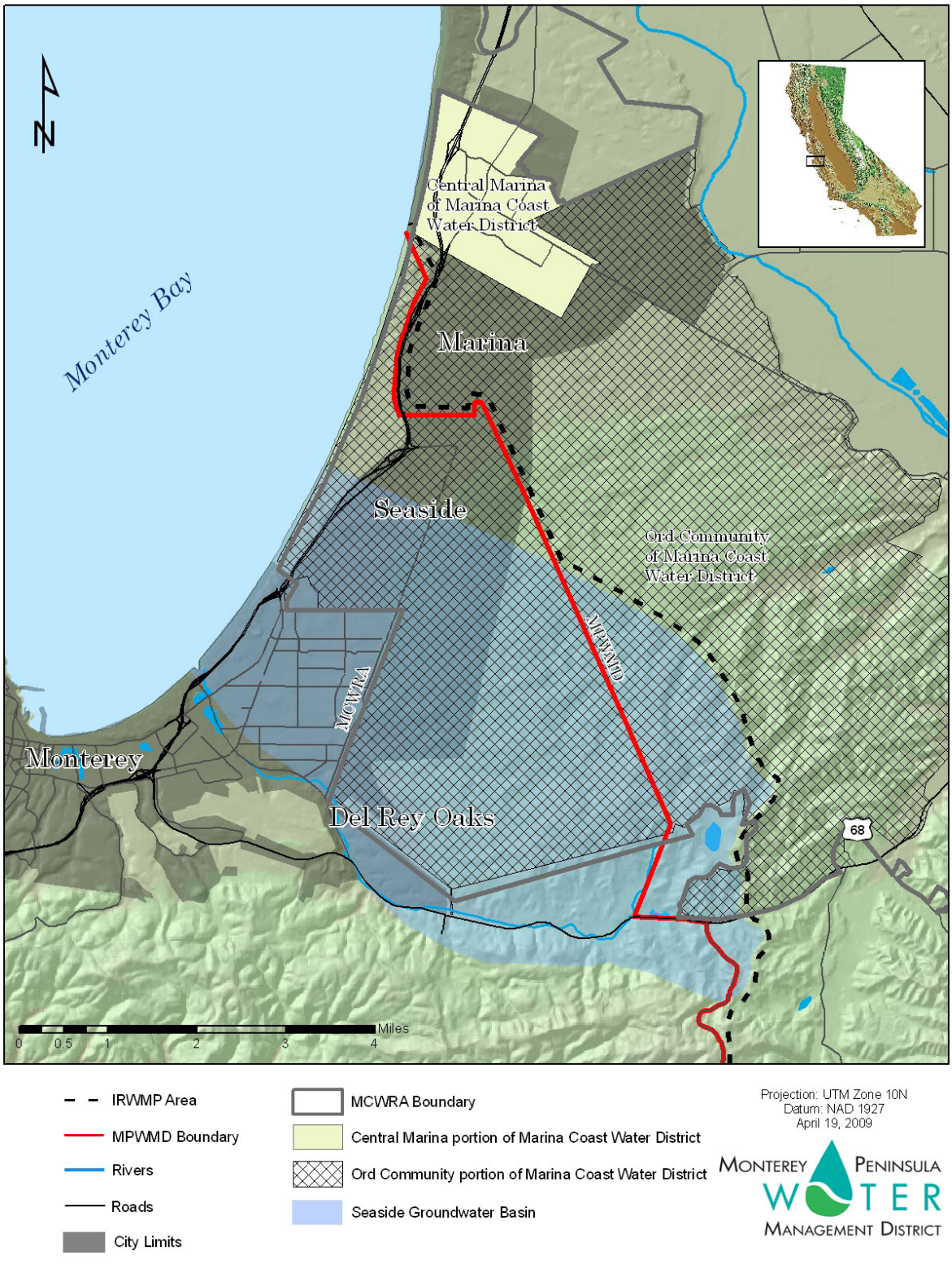
1.2.12 Marina Coast Water District

The MCWD was originally formed in 1960 to provide potable water service to all residential, commercial, industrial, environmental, and fire protection uses in the unincorporated community of Marina, an area of approximately six square miles located on the coast of the Monterey Bay at the northwest end of the Salinas Valley (**Figure 1-1**). The original boundary was coincident with the Marina Fire District. In 2001, the Army transferred the water and wastewater systems in the former Fort Ord area to MCWD and the 44-square mile area was renamed the Ord Community. In 2011, MCWD proposed formal annexation of the Ord Community into the MCWD boundary.

In 1970, MCWD constructed a wastewater treatment plant and installed a wastewater collection system to serve the community. The City of Marina incorporated in 1975, but MCWD remained separate. In 1991, MCWD constructed a pilot recycled water system providing tertiary treated wastewater for irrigation of public streetscapes and parks near the wastewater plant. This system operated only until 1992, when the wastewater collection system was connected to the regional wastewater system operated by the MRWPCA. The Marina wastewater treatment plant was retired, and MCWD now provides wastewater collection services only, with treatment performed at the regional plant. In 1996, MCWD constructed a seawater desalination facility to explore the feasibility of extracting seawater through shallow wells along the beach. The District also provides potable water delivery and wastewater conveyance services within the boundaries of the former Fort Ord Army Base, known as the Ord Community. The Ord Community encompasses a 44 square mile area, of which about 20 square miles is designated for redevelopment, with the balance being parks and open space.

In 1991, the former Army base was downsized and realigned pursuant to the Defense Base Closure and Realignment Act of 1990, with closure in 1994. Portions of the base were retained for use by the U.S. Army under the control of the Presidio of Monterey (Presidio Annex), with the balance being converted to civilian use under the guidance of the Fort Ord Reuse Authority (FORA), a public agency created for this purpose by the State of California. FORA's membership includes the land use jurisdictions encompassed by the former Fort Ord lands and others on the Monterey Peninsula. Redevelopment of the former Fort Ord has been focused on the development of several institutes of higher education, specifically, California State University, Monterey Bay (CSUMB), University of California, Monterey Bay Environmental Science and Technology Center, and Monterey Peninsula College.

Figure 1-1: Jurisdictional Boundaries in the Fort Ord Area



FORA has the statutory authority to provide for public capital facilities, including but not limited to, stormwater, water and wastewater facilities on the former Fort Ord. However, FORA has a limited statutory life and needed a reliable, long-term entity to provide public services to the area. In May 1997, the FORA Board approved the preparation of a Public Benefit Conveyance application to the federal government for transfer of the water distribution and wastewater collection systems to MCWD. In June 1997, the U.S. Army and MCWD signed a caretaker agreement authorizing MCWD to operate the water and wastewater collection systems. In February 1998, MCWD and FORA executed an agreement for water and wastewater facilities, providing for the ownership and operation of water and wastewater facilities acquired from the federal government for the benefit of FORA. The Water and Wastewater Oversight Committee of the FORA Board oversees the operation of these facilities by MCWD. Title for these systems was transferred to MCWD in 2001, and the systems were subsequently interconnected. In 2007, MCWD combined the water system permits for the Central Marina and Ord Community service areas into a single California Department of Public Health permit.

The FORA Board retains the authority to allocate Salinas Valley groundwater supplies as provided for under an agreement between the federal government and the MCWRA dated September 1993. This agreement provides for groundwater extraction rights of 6,600 acre-feet per year (AFY), an amount consistent with the former average groundwater use at Fort Ord while under military operation. Consistent with this agreement, MCWD operates the Ord Community service area under a separate water allocation and cost center.

The District is represented on the Board of M1W and is a participating entity in the Monterey Regional Stormwater Management Program (see the description of the program, under Monterey One Water). It should be noted that MCWD is also a member of the RWMG in the Greater Monterey County IRWM Region and is a key partner in providing advanced treated recycled water to the Monterey Peninsula through the Pure Water Monterey project.

1.2.13 County of Monterey

The County of Monterey brings together a range of Land Use and Capital services, including Building Services, Planning, Public Works, Facilities, and Parks to ensure reasonable and safe development, plan for the future needs of the County, manage infrastructure and county facilities, and protect natural resources. The County of Monterey, Resource Management Agency consists of three Divisions:

- Land Use & Community Development Division- Provides management oversight for land use functions within the County of Monterey and coordinates with outside agencies. Includes Building Services, Planning, Permit Center, Development Services, County Surveyor, Environmental Services, Special Programs, Code Compliance, Park Planning.
- Public Works & Facilities Division - Maintains the County's infrastructure including roads, bridges, County facilities, and Parks operations.
- Administrative Services Division - Provides services that support County of Monterey operations.

The Vision of the County of Monterey is to enhance the quality of life and economic health of the community by providing responsive, efficient, and high-quality public services and to promote good stewardship of natural and man-made resources.

1.2.14 Monterey County Water Resources Agency

The MCWRA was formed under Chapter 699 of the Statutes of 1947 as the Monterey County Flood Control and Water Conservation District. In 1990, the District was renamed the Monterey County Water

Resources Agency.[2] The agency is governed by a nine-member Board of Directors, five appointed by the Monterey County Board of Supervisors (one by each supervisor), four directors appointed by a majority vote of the supervisors from nominees submitted by three Monterey County agricultural groups and one from the Monterey County Mayors Select Committee.

Within the Monterey Peninsula IRWM Planning Region, MCWRA is responsible for providing flood protection and stormwater management to the unincorporated areas. The Agency develops regional stormwater management plans, regulates activities in the 100-year floodplain of the Carmel River, and administers the National Flood Insurance Program (NFIP) in Monterey County. Monterey County has been a voluntary participant in the Community Rating System since October 1, 1991, and the County was upgraded to Class 5 on May 1, 2007 (one of only a handful with this rating in the United States). With the improved rating, buildings located in a Special Flood Hazard Area receive a 25 percent discount for new or renewed NFIP policies. In the late 1970s, Monterey County developed the first ALERT (Automated-Local-Evaluation-in-Real-Time) flood warning system. The system consists of self-reporting remote sensors, located throughout the County, that transmit rain and stream level data by radio to the MCWRA and the county courthouse base station computers in Salinas. A few of the stations are also connected to the web and allows for the earliest possible flood warnings and river flow forecasts. Currently, the Monterey County ALERT system consists of 24 rain gages, 10 combination rain and stream gages, and 20 stream or reservoir/lagoon level sensors.

MCWRA is a member of the Seaside Basin Watermaster. It should be noted that MCWRA is also a member of the RWMG in the Greater Monterey County IRWM Region and is a key partner in coordinating the use of recycled water from Monterey County's largest treatment plant, which is located on the Salinas River and operated by Monterey One Water. MCWRA is a key partner in providing advanced treated recycled water to the Monterey Peninsula through the Pure Water Monterey project.

1.2.15 Monterey One Water

M1W, formerly the Monterey Regional Water Pollution Control Agency (MRWPCA), is a joint powers agency formed in 1972 to provide wastewater collection and treatment to the Monterey Peninsula cities (except Carmel-by-the-Sea). M1W also serves communities within its boundaries that are outside of the Monterey Peninsula Region (Salinas and Castroville). M1W is governed by a Board of Directors representing each of the jurisdictions that it serves. The agency has a regional treatment plant on the Salinas River and discharges treated wastewater effluent into the Monterey Bay near the Salinas River mouth in addition to producing recycled water for agricultural irrigation; however, M1W has a long-term plan to eliminate wastewater discharges to the Monterey Bay. Member agencies include Del Rey Oaks, Monterey, Pacific Grove, Salinas, Sand City, Seaside, Boronda, Castroville, Moss Landing, Fort Ord, Monterey County, and Marina.

In 1992, M1W and the MCWRA formed a partnership to build two projects: a water recycling facility at the Regional Treatment Plant; a distribution system including 45 miles of pipeline and 22 supplemental wells. Its objective was to slow the advance of seawater intrusion by supplying irrigation water to nearly 12,000 acres of farmland in the northern Salinas Valley. The MCWRA partnered with the Salinas Valley community (primarily agricultural users in the northern portion of the County) to help build the projects. The $75 million dollar projects were funded by U.S. Bureau of Reclamation and State of California low-

[2] Chapter 52 Monterey County Water Resources Agency Act (former Chapter 52, Monterey County Flood Control and Water Conservation Act, Stats. 1947, c. 699, editorially classified as Water Code Appendix §§ 52-1 to 52-36, was repealed by Stats. 1990, c. 1159 (S.B.2580), § 49)

interest loans, plus local funding. Construction costs are being paid back using water delivery charges and assessments.

In addition, M1W is currently constructing the Pure Water Monterey Groundwater Replenishment Project (PWM Project). The PWM Project is an advanced water recycling project, jointly developed by two public agencies – MPWMD and M1W. The PWM Project is a multi-benefit, integrated, regional solution that will provide a water recycling model for other regions in California. Using proven, advanced, multi-stage treatment to provide a safe, reliable and sustainable drinking water supply that will comply with or exceed strict state and federal drinking water standards, the project will reduce water taken from the Carmel River and the Seaside Basin. In doing so, it will help meet regulatory orders and enhance water supply reliability by diversifying local water sources. The purification process includes membrane filtration, reverse osmosis, oxidation with hydrogen peroxide and ultraviolet light. After treatment, the purified water will be piped approximately seven (7) miles south were it will be injected into the Seaside Groundwater Basin. The PWM Project is expected to begin operation in 2020. M1W has plans to expand the PWM Project to provide additional water for use on the Peninsula. The Public Draft Supplemental EIR for the Expanded Capacity PWM Project is expected to be released in late 2019.

M1W is the Program Manager for the Monterey Regional Storm Water Management Program (MRSWMP) and is responsible for program management and administration, permit management, technical program management, and related duties. Participating entities in the MRSWMP include the cities of Pacific Grove, Monterey, Seaside, Sand City, Del Rey Oaks, and Marina, and the County of Monterey. M1W is also a member of the RWMG in the Greater Monterey County IRWM Region.

M1W's mission statement: "Monterey One Water is dedicated to meeting the wastewater and water recycling needs of our member agencies while protecting the environment." and their Vision Statement is: "Monterey One Water will be a model customer service provider for the efficient, innovative utilization of wastewater." M1W's Core Values include the following (not in priority order):

- Cost-efficient, consistent and reliable service and business practices
- Open, honest lines of communication between and among board, public and staff
- Ethical behavior
- Customer-focused and centered
- Helpful and timely responses
- Loyalty and dedication

1.2.16 Monterey Peninsula Water Management District

The MPWMD (or District) is a special district formed in 1978 under the California Water Code, Chapter 118 to manage, augment, and protect water resources for the benefit of the community and the environment. Approximately 104,000 people live within the jurisdictional boundary of MPWMD, which includes the six Monterey Peninsula cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Seaside, and Sand City, and unincorporated communities within Monterey County including Pebble Beach, the Carmel Highlands, a portion of Carmel Valley, and areas adjacent to Highway 68 between Del Rey Oaks and the Laguna Seca area (also known as Arroyo Del Rey or Canyon Del Rey).

The District is governed by a seven-member Board of Directors, five elected from voter divisions, one member of the Monterey County Board of Supervisors, and one elected official or chief executive officer appointed by the City Selection Committee comprised of mayors from all Cities within Monterey County.

The Legislature granted the MPWMD broad powers in order to carry out its mandates. This special district authority gives the MPWMD the power to adopt ordinances and resolutions, and promulgate rules governing the use of surface and groundwater resources. These powers exceed those of most water agencies or other special districts in California. Accordingly, the District has promulgated a set of Rules and Regulations that provide the governing foundation for the District's groundwater management authority. MPWMD's legislative functions are to:

- Augment the water supply through integrated management of surface and ground water resources;
- promote water conservation (including rationing, if needed);
- promote water reuse and reclamation of storm and wastewater; and
- foster the environmental quality, native vegetation, fish and wildlife, scenic values and recreation on the Monterey Peninsula and in the Carmel River basin.

This has allowed the District to exercise the following functions in the Region:

- local, integrated control of resources, including groundwater
- obtain surface water right permits from the State Water Resources Control Board
- set production goals for each of California American Water's (Cal-Am) major sources of supply (Cal-Am supplies 95 percent of potable water users in the Region from Carmel River surface water, upper Carmel Valley groundwater, lower Carmel Valley groundwater, and coastal Seaside basin groundwater) through the Quarterly Water Supply Strategy and Budget process
- determine the release rate of surface water diversion at Cal-Am's Los Padres Dam and the minimum instream flow requirement below San Clemente Dam through the annual MOA process, which involves regular consultations between Cal-Am, the California Department of Fish and Game (CDFG), MPWMD, and National Oceanic and Atmospheric Administration (NOAA) Fisheries
- annual MOA process to manage the production of surface and groundwater by Cal-Am
- allocation program for water supply to the eight local jurisdictions: cities of Carmel, Del Rey Oaks, Monterey, Pacific Grove, Sand City, Seaside, and the Monterey Peninsula Airport District and unincorporated portions of Monterey County in Carmel Valley and Pebble Beach
- metering program for all wells and other water supply sources
- computer modeling of the water resources system
- hydrologic monitoring (surface and groundwater)
- water connection permit and inspection programs
- water conservation programs
- drought emergency and water rationing programs
- Carmel River environmental monitoring and mitigation programs
- river works projects (erosion control)
- regulation of new water distribution systems and expansions, including single-system supply sources
- annual reporting of water demand, production and environmental programs

MPWMD manages the production and use of water from the Carmel River stored in Los Padres Reservoir (the San Clemente Reservoir is no longer used to provide municipal supply), water production in the Carmel Valley aquifer, and groundwater pumped from municipal and private wells in Carmel Valley and the Seaside Groundwater Basins. Portions of MPWMD's jurisdictional area include watersheds and groundwater basins with area that is outside of the MPWMD political boundary, but that directly influences the quantity and quality of water resources within the MPWMD boundary.

Through its Water Distribution System permitting system, MPWMD regulates public fresh water supply systems including systems owned by Cal-Am, the largest purveyor of water in the Region. MPWMD monitors the production of water from approximately 1,200 public and private wells, of which approximately 750 are currently active. MPWMD regulates the creation of new water distribution systems and expansions, water connection permits, allocation of water to jurisdictions (cities and unincorporated areas), water conservation ordinances and inspections, determines drought emergencies and can impose rationing programs. The District also regulates activities within the streamside corridor of the lower 15.5 miles of the Carmel River.

Since the mid-1980s, Cal-Am and MPWMD have cooperated on a number of projects in the public interest including Carmel River restoration projects, water supply projects, and water conservation programs. A partnership was formed to carry out Aquifer Storage and Recovery projects to augment the water supply for the Region. MPWMD also works extensively with MCWRA and the County of Monterey in the unincorporated areas of the Region. Cooperative efforts include regulation of wells, monitoring and management of Carmel River resources, and management of the Seaside Groundwater Basin. MPWMD was involved with the financing of the Pebble Beach Reclamation project and sales of reclaimed water through the Carmel Area Wastewater District. In the lower 15.5 miles of the Carmel River streamside corridor, MPWMD is often the lead agency in coordinating regulatory actions and issuance of authorizations for streamside alterations from the California Department of Fish and Wildlife (CDFW), the U.S. Army Corps of Engineers, the Regional Water Quality Control Board, and Monterey County.

The MPWMD is guided by their Mission Statement, Vision Statement, and Strategic Goals, including the following:

> Mission Statement: The Monterey Peninsula Water Management District's mission is to promote or provide for a long-term sustainable water supply, and to manage and protect water resources for the benefit of the community and the environment.
>
> Vision Statement: The Monterey Peninsula Water Management District will: (1) Strive to ensure a public role in development, ownership, and oversight of water supply solutions in collaboration with private or other public entities, resulting in sustainable, legal, affordable, and environmentally responsible water supply, consistent with adopted general plans. And Shall: (2) Carry out its leadership role in water resource management in a fiscally responsible, and professional manner.
>
> *One-Year Strategic Goals (adopted in May 2019):*
>
> - Continue to advance water supply projects
> - Complete Measure J/Rule 19.8 Feasibility Analysis
> - Continue to Raise Profile of District at Local, State, and Federal Level
> - Establish Clear Requirements for Water Distribution Systems within the District
> - Develop Comprehensive Strategy for Permit 20808-B

- Examine Requirements for Fiscal Sustainability and Long-Term Financial Planning
- Review Organizational Issues

Three-Year Strategic Goals (adopted in April 2017):

- Prepare for Measure J/Rule 19.8 Next Steps
- Establish a Long-Term Strategy for Los Padres Dam
- Prepare for allocation of "new water"
- Continue to Examine Revising or Streamlining Rules and Regulations
- Determine Scope of Carmel River Mitigation Program

MPWMD maintains a web site with IRWM planning information. It should be noted that while MPWMD does exercise authority over water resources, it does not exercise authority over land use except in a certain limited area along the Carmel River. Land use is governed by the Monterey Peninsula cities and Monterey County.

1.2.17 Resource Conservation District of Monterey County

The Resource Conservation District (RCD) has been at the forefront of natural resource management and protection in Monterey County and the Central Coast. The RCD works extensively with growers, ranchers, landowners, and partner organizations and agencies throughout the Central Coast to accomplish their mission. The RCD works closely with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) to provide technical assistance to Monterey County landowners, growers and ranchers. The USDA Service Center in Salinas hosts an NRCS staff of nine with expertise in agronomy, range management, engineering, soil science, hydrology, plant science, and biology.

The RCD staff includes technical specialists with expertise in a variety of areas, including permitting, project funding, hydrology, engineering, weed management, erosion control, and species protection. In accordance with the current 5-Year Strategic Plan, the RCD provides landowners and growers assistance with conservation planning and design, project funding, permitting and implementing management practices. The RCD works with local researchers to develop new ways to improve water quality, and to evaluate the effectiveness of management practices. The RCD also assists landowner and grower applications to funding sources such as the USDA Environmental Quality Incentives Program.

The RCD has demonstrated success in education, outreach and conservation and restoration project design and implementation.

It should be noted that MCWRA is also a member of the RWMG in the Greater Monterey County IRWM Region.

1.3 IRWM Governance Structure

This section summarizes the formalized IRWM governance structure embodied in the Memorandum of Understanding (MOU). The MOU acknowledges the collaborative approach to planning and is written to ensure that the chosen form of government can address the following items as part of its structure:

- Public outreach and involvement process
- Effective decision making
- Opportunity of participation in the IRWM Plan process

- Communication within and outside the IRWM Region
- Long term implementation of the IRWM Plan
- Coordination with other IRWM efforts
- Coordination with state and federal agencies
- How interim changes and formal changes to the IRWM Plan will be performed
- Updating or amending the IRWM Plan
- The collaborative process(es) used to establish plan objectives

The original MOU was approved in June 2008 by the Regional Water Management Group to acknowledge cooperative efforts in the planning Region and to form an institutional structure to develop and implement the IRWM Plan. The MOU formalizes the collaborative planning effort that these agencies have been involved in for several years, describes the processes for completing the IRWM Plan and make amendments in the future, and also describes the role of stakeholders in carrying out the Plan. A draft MOU for the 2019 Update to the IRWM Plan has been prepared and is included in **Appendix 1-b, Draft Memorandum of Understanding, 2018.**

As discussed in the draft MOU, the IRWM Plan may be amended or changed should any member of the RWMG or Stakeholder request that the Lead Agency convene for the purposes of amending the IRWM Plan or the prioritized project list. However, the IRWMP may only be amended once a year, unless more frequent amendments are required to meet state IRWM standards or grant application cycles. An amended IRWM Plan must be consistent with state IRWM standards.

The status of adoption of the MOU is shown in **Table 1-1.** In 2018, a number of additional organizations requested approval to become part of the MOU, including California State University Monterey Bay, Carmel Area Wastewater District, Carmel River Watershed Conservancy, Carmel Valley Association, City of Carmel-by-the-Sea, City of Del Rey Oaks, City of Pacific Grove, City of Sand City, City of Seaside, and County of Monterey. New and existing members are currently in the process of approving the MOU.

Table 1-1: Regional Water Management Group MOU Status

RWMG Organizations/Agency	Acronym	Existing or New Member	Adopted amended MOU?
Big Sur Land Trust	BSLT	Existing	Yes
California State University Monterey Bay	CSUMB	New	Yes
Carmel Area Wastewater District	CAWD	New	Yes
Carmel River Watershed Conservancy	CRWC	New	TDB
Carmel Valley Association	CVA	New	Yes
City of Carmel by-the-Sea	Carmel	New	Yes
City of Del Rey Oaks	Del Rey Oaks	New	TBD

RWMG Organizations/Agency	Acronym	Existing or New Member	Adopted amended MOU?
City of Monterey	Monterey	Existing	TBD
City of Pacific Grove	Pacific Grove	New	Yes
City of Sand City	Sand City	New	Yes
City of Seaside	Seaside	New	Yes
Marina Coast Water District	MCWD	Existing	TBD
County of Monterey	Monterey County	New	TBD
Monterey County Water Resource Agency	MCWRA	New	TBD
Monterey Peninsula Water Management District	MPWMD	Existing	Yes
Monterey One Water	M1W	Existing	Yes
Resource Conservation District of Monterey County	RCDMC	Existing	Yes

1.4 Long-term Implementation of the IRWM Plan

The RWMG will continue to meet on an ongoing basis to implement the IRWM Plan and to carry out IRWM planning. The IRWM Plan is intended to be a long-term planning document with a minimum 20-year planning horizon. As such, the Plan will need to undergo periodic updates and revisions to reflect changing conditions. RWMG membership and governance processes may also evolve over time, and the IRWM Plan will be revised to reflect those changes. This section describes how the governance structure allows for periodic formal and informal changes to the IRWM Plan.

A review of the IRWM Plan may occur with each IRWM Plan project solicitation, which is expected to occur in response to Stakeholder requests or with IRWM Grant application solicitation(s). The review would be consistent with DWR Guidelines and would reflect any significant changes in the issues and conflicts in the region, the goals and objectives, resource management strategies, and other IRWM Plan "milestones." In addition, with each new IRWM Plan project solicitation, all projects, both existing and new, will get re-ranked and a new project list will be generated and available for viewing on the website. All amendments resulting from reviews of the IRWM Plan will be officially incorporated into the Plan upon approval by the RWMG, as determined by vote at a regularly scheduled RWMG meeting open to the public and according to the decision-making protocols outlined in this plan and the RWMG MOU. However, revisions to the prioritized project list would not require re-adoption of the plan, as long as the prioritization is consistent with the IRWM Plan (**Chapter 6, Project Review Process)**.

Plan review may include a review and re-assessment of RWMG composition, regional boundaries, and other "big picture" issues related to IRWM planning in Monterey Peninsula region. A plan review may also include re-assessment of IRWM Plan "milestones," as described above. Formal updates and re-adoption of the IRWM Plan, requiring the approval of the governing boards of each RWMG entity, will occur only

as required by the State (for example, in the case of a Region Acceptance Process) or as deemed necessary by the RWMG. Ideally the RWMG would formally review, revise, and adopt the IRWM Plan no less frequently than every five years; however, a formal review is an intensive process and the frequency of this type of review will depend on whether adequate funding is available and the need to reflect updated conditions.

Finally, a Plan Performance Review is to be conducted periodically. The intent of the Plan Performance Review is not to review the "content" of the Plan per se but to determine the extent to which project implementation is achieving Plan objectives (further description in **Chapter 8, Plan Performance and Monitoring**). Project data from all projects implemented through the Plan will be tracked using the data management system as described in **Chapter 9, Data Management**. Monitoring the projects over time will not only enable the RWMG to determine its success in implementing the IRWM Plan but will keep the Plan alive and help drive it forward.

1.5 Revisions to the Regional Water Management Group

Any qualified stakeholder may petition to become a member of the RWMG. A qualified stakeholder must demonstrate the following: a) an interest, responsibility or authority over resources within the region; or b) a unique interest, responsibility, authority, or asset not shared by any other entity within the RWMG. The RWMG considers such requests for a change to the RWMG and votes by majority to accept or reject the request.

Members of the RWMG may change from time to time, depending on the level of resources available to each entity. However, there is no required minimum or maximum length of time required as a member of the RWMG. If an entity withdraws from the RWMG, the remaining entities attempt to replace the interest, responsibility or authority lost by the withdrawal.

It is expected that the RWMG meet periodically and that each member ensure that adequate staff resources are available to implement the IRWM Plan.

1.6 Interim Changes and Formal Changes to the IRWM Plan

1.6.1 Balanced Access and Opportunity

The IRWMP and prioritized project list may be amended from time to time. Any member of the RWMG or stakeholders group may request that the Lead Agency convene a meeting of the RWMG and Stakeholders for the purposes of amending the IRWMP or the prioritized project list. However, it is anticipated that the IRWMP or prioritized project list will be amended no more frequently than annually, unless more frequent amendments are required to meet State IRWM standards or grant application cycles. An amended IRWMP must be consistent with State IRWM standards as described in the IRWM Guidelines (July 2019)[3]. Decisions within the RWMG are normally made by consensus and the plan itself will be subject to adoption by the RWMG and Project Proponents. Lead agencies for each project must adopt the IRWM Plan in order to receive grant funds. Should it become necessary to broaden or establish a different procedure for changing, updating and amending the plan, the MOU will be revised to describe the procedure.

[3] 2019 Guidelines were approved in April 2019; the 2019 IRWM Grant Project Guidelines are available at https://water.ca.gov/-/media/DWR-Website/Web-Pages/Work-With-Us/Grants-And-Loans/IRWM-Grants/Files/Prop-1-Implementation/2019GuidelinesFinalforWeb4172019.pdf?la=en&hash=D35657D0001F320E6631B7FC5372E4C2C506369A

The Monterey Peninsula RWMG is a truly "democratic" group made up of diverse organizations with differing expertise, perspectives, and authorities of various aspects of water management. There is no one leadership position on the RWMG, and no hierarchy of decision-making. All major IRWM planning decisions and IRWM Plan "milestones" are decided by vote at the regularly scheduled RWMG meetings. Each RWMG organization is allowed one vote regardless of whether or not they have contributed financially to the Plan or to other RWMG activities. A simple majority (50 percent plus one) of the RWMG constitutes a quorum for the transaction of business, and action requires a simple majority vote of those present (in person or via conference call) at a meeting. All votes are counted equally.

Project Proponents are responsible for completing proposed projects and providing project reports to the lead agency. The RWMG is responsible for monitoring the implementation of the IRWMP. MPWMD will be the lead agency for facilitating information exchange among the Stakeholder Group and other interested parties. All projects included in the IRWM Plan will incorporate monitoring components.

Each project sponsor that receives grant funding is required to adopt the IRWM Plan. The Resolutions of Adoption will be provided in **Appendix 1-c, Resolutions of Adoption**, prior to finalization of this plan.

1.6.2 Public Outreach and Involvement

This 2019 Update to the IRWM Plan includes ample opportunity for stakeholders, including the RWMG and disadvantaged communities (DAC), to provide public input concerning changes to objectives, priorities, and existing regional efforts. Therefore, this update process includes a strenuous public and stakeholder outreach component that will be vetted by the stakeholder group and is further detailed in **Chapter 14, Stakeholder Involvement**.

1.6.3 Native American Tribal Participation

Activities funded under the IRWM Grant Program must comply with the California Environmental Quality Act (CEQA) (Public Resources Code §21000 et seq.). Public Resources Code §21080.3.1 requires the CEQA lead agency to consider project effects on Tribal cultural resources and to conduct consultation with California Native American Tribes. Before releasing a CEQA document, lead agencies must give notice to California Native American Tribes that have submitted a written request for notice and that are traditionally and culturally affiliated with the geographic area of the project.

MPWMD is lead agency for the IRWM Plan under CEQA. It is anticipated that the MPWMD Board of Directors will adopt the IRWM Plan under a CEQA Statutory Exemption for Feasibility and Planning Studies (Guideline § 15262). For this reason, Tribal Consultation is not required as part of this IRWM Plan Update. In an effort to foster coordination and communication with all relevant stakeholders, a representative from the Ohlone/Costanoan-Esselen Nation (OCEN) was invited to RWMG meetings and was given the opportunity to review this Plan.

1.7 Coordination and Communication

This section provides a description of how the planning process addresses and ensures the following:

- Effective communication external to the IRWM region
- Coordination with neighboring IRWM efforts and state and federal agencies

The RWMG governance structure fosters effective communication both within the RWMG and externally with Project Proponents, neighboring RWMGs, government agencies, and the general public. Internally, the RWMG strives to create an environment of open communication, cooperation, collaboration, and

respect among its members and at the monthly RWMG meetings. Time has been devoted at RWMG meetings for individual RWMG members to discuss their projects, their water management issues, and any concerns.

The IRWM Plan lead agency, MPWMD, works to ensure that stakeholders, Project Proponents, and the general public are well informed of the latest IRWM activities and accomplishments. MPWMD sends regular email communications to interested stakeholders about IRWM news and events; the emails always contain contact information (email address and phone number) for the IRWM Plan lead at MPWMD so that stakeholders can voice their comments, concerns, or questions about the IRWM planning process.

The RWMG communicates with federal and state government agencies as needed. Numerous federal and state agencies are included on the IRWM Plan Update stakeholder list provided in **Appendix 1-d, Current Stakeholders List**. The IRWM Plan Coordinator and RWMG members participate in the statewide Roundtable of Regions meetings, a forum for discussion between all RWMGs in the state, and regionally, in Central Coast Funding Area meetings to coordinate IRWM planning activities between the Central Coast IRWM regions and to discuss potential funding strategies. See **Chapter 5, Integration and Coordination,** and **Chapter 6, Project Review Process**, for a more detailed description of how the RWMG communicates with neighboring regions and government agencies.

The Monterey Peninsula, Carmel Bay, and South Monterey Bay (Monterey Peninsula) IRWM Plan region shares a border with the Greater Monterey County region. Along this border, the 45 square-mile area of the former Ford Ord is a geographical transition zone containing areas and resources that are managed by many agencies, including some that are in both IRWM RWMGs. Fundamental challenges are: 1) determining which regional IRWM Plan proposed projects should be described in each IRWM Plan; 2) prioritizing projects in each region; 3) cooperating between regions in order to ensure that Ord Community projects do not fall into a “no man’s land” between the regions; and 4) moving projects forward that benefit both regions. A detailed analysis of the inter-regional issues and coordination of the two regions is included in the report titled: “Integrated Regional Water Management Inter-Regional Coordination: Greater Monterey County and Monterey Peninsula, Carmel Bay, and South Monterey Bay Regions” that is summarized in **Chapter 5, Integration and Coordination**, and included in **Appendix 5-a**. That report describes the relationship between regions, identifies resource challenges, and outlines areas of potential cooperation between the regions.

1.8 Adoption of the Plan

A notice of intent (NOI) to prepare the IRWM Plan was published in the Monterey County Weekly on July 25, 2019 and August 1, 2019 (**Appendix 1-e**) in accordance with §6066 of the Government Code. A Notice of Public Hearing to receive input on the Draft IRWM Plan Update was published in the Monterey County Weekly on August 8, 2019 (**Appendix 1-e**). Each of the RWMG members have received a Draft amended MOU, found in **Appendix 1-b,** which includes a requirement to adopt the Monterey Peninsula IRWM Plan through resolution by their governing boards or by other means according to organizational protocol. **Appendix 1-c** (pending) contains the formal resolutions signed by the governing boards of each member of the RWMG to adopt the IRWM Plan. In addition, each project proponent named in an IRWM grant application is also required to adopt the IRWM Plan in order to be eligible to receive IRWM grant funds. Each project proponent will be required to submit a formal, signed resolution adopting the IRWM Plan, prior to submission of an IRWM grant application.

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Chapter 2 Region Description

IRWM Standard 2

An IRWM Plan must include a description of the region being managed by the RWMG. This description should include a comprehensive inclusion of the following:

- A description of the watersheds and the water systems, natural and anthropogenic (i.e. "man-made"), including major water-related infrastructure, flood management infrastructure, and major land-use divisions. Also include a description of the quality and quantity of water resources within the region (i.e. surface waters, groundwater, reclaimed water, imported water, and desalinated water). As relevant, describe areas and species of special biological significance and other sensitive habitats, such as marine protected areas and impaired water bodies within the region.
- A description of internal boundaries within the region including the boundaries of municipalities, service areas of individual water, wastewater, flood control districts, and land use agencies. The description should also include those not involved in the Plan (i.e. groundwater basin boundaries, watershed boundaries, county, State, and international boundaries).
- A description of water supplies and demands for a minimum 20-year planning horizon. Include a discussion of important ecological processes and environmental resources within the regional boundaries and the associated water demands to support environmental needs. This includes a description of the potential effects of climate change on the region as determined from the IRWM Plan vulnerability assessment.
- A descriptive comparison of current and future (or proposed) water quality conditions in the region. Describe any water quality protection and improvement needs or requirements within the area of the Plan. If the IRWM region has areas of nitrate, arsenic, perchlorate, or hexavalent chromium contamination, the Plan must include a description of location, extent, and impacts of the contamination; actions undertaken to address the contamination, and a description of any additional actions needed to address the contamination (Water Code §10541.(e)(14)).
- A description of the social and cultural makeup of the regional community. Identify important cultural or social values. Identify DACs in the management area. Describe economic conditions and important economic trends within the region. Describe efforts to effectively involve and collaborate with Tribal government representatives to better sustain Tribal and regional water and natural resources (if applicable).
- A description of major water-related objectives and conflicts in the defined management region, including clear identification of problems within the region that lead to the development of the objectives, implementation strategies, and implementation projects intended to provide resolution.
- An explanation of how the IRWM regional boundary was determined and why the region is an appropriate area for IRWM planning.
- Identification of neighboring and/or overlapping IRWM efforts (if any) and an explanation of the planned/working relationship that promotes cooperation and coordination between regions.
- For IRWM regions that receive water supplied from the Sacramento-San Joaquin Delta, an explanation of how plan will help reduce dependence on the Sacramento-San Joaquin Delta for water supply. Public Resources Code 29700-29716. *NOTE: NOT APPLICABLE TO THIS REGION*.

2.1 Environmental Setting

The planning region is located in Central Coast Regional Water Quality Control Board (RWQCB) Region 3 and lies between the Salinas River Groundwater Basin and the Big Sur coast. The planning region was established based on watershed and groundwater basin limits and takes into consideration jurisdictional limits and responsibilities for water resource management. A map showing the Integrated Regional Water Management (IRWM) region is presented in **Figure 2-1**. The planning region is approximately 347 square miles and consists of coastal watershed areas in Carmel Bay and south Monterey Bay between Pt. Lobos to the south and Sand City to the north – a 38.3-mile stretch of the coast that includes three Areas of Special Biological Significance (Pt. Lobos, Carmel Bay, and Pacific Grove), which are described in more detail in **Section 2.1.4,** below. The region encompasses the six Monterey Peninsula cities of Carmel-by-the Sea, Del Rey Oaks, Pacific Grove, Monterey, Sand City, Seaside, and extends into portions of the unincorporated area of Monterey County at the former Fort Ord, the Carmel Highlands, Pebble Beach, the inland areas of Carmel Valley and the Laguna Seca area.

The IRWM region is adjacent to the Monterey Bay National Marine Sanctuary (MBNMS), which is described in greater detail in **Section 2.1.4,** below.

The region also includes watersheds and groundwater basins that are outside of the MPWMD political boundary, which is discussed in more detail in **Section 2.2.1**, but that directly influence the quantity and quality of water and water resources.

Climate in the region is considered Mediterranean, with wide annual swings in precipitation and surface runoff that can result in near desert-like, arid conditions or in periodic downpours resulting in large floods. The mean annual rainfall varies from about 14 inches along the northeast perimeter of the basin, to over 40 inches in the high peaks of the southernmost portion of the basin.

2.1.1 Regional Watersheds

Except for the Laguna Seca, a sub-basin in the Seaside Groundwater Basin which has no surface outlet, all the watersheds within the region flow directly into the Pacific Ocean. Thus, the main stem streams in these watersheds are considered waters of the United States (33 Code of Federal Regulations (CFR) Part 328).

The largest watershed in the region is the 255-square mile Carmel River Basin watershed. For the purposes of this Plan, the Carmel River Basin is defined as the Carmel River Alluvial Aquifer, described below, the surface waters of the Carmel River and its tributaries, and the Los Padres reservoir. The headwaters of the Carmel River Basin originate in the Santa Lucia Mountains at 4,500 to 5,000-foot elevations, descend and merge with seven major stream tributaries along a 36-mile river course, and discharge into Carmel Bay about five miles south of the City of Monterey. About 70 percent to 80 percent of the surface runoff in the Carmel River watershed is generated from rainfall within the Los Padres National Forest and Ventana Wilderness. The average annual runoff on the Carmel River at U.S.G.S gage Near Carmel (3.56 River Miles upstream of the Pacific Ocean) was 73,080 acre-feet (AF) for the period of record WY 1962-2018.

The Carmel River Basin currently supplies about 75% of the annual municipal demand within the planning region (Cal-Am and non-Cal-Am). But, appropriative diversions in the basin are required by the State Water Resources Control Board to be reduced by 2022 such that the basin will supply about a third of annual municipal demand in the future.

Figure 2-1: IRMW Planning Region and Key Boundaries

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

- IRWMP Area
- MPWMD Boundary
- Rivers
- Cal-Am Pipelines
- Roads
- Watershed Boundaries
- Seaside Groundwater Basin
- Carmel Valley Alluvial Aquifer
- Areas of Special Biological Significance
- City Limits

The region also contains twelve other stream basins including Wildcat Canyon, Gibson Creek, San Jose Creek, Pescadero Creek, Stillwater Creek, Fan Shell Creek, Seal Rock Creek, Sawmill Gulch Creek, Josselyn Canyon Creek, Aguajito Canyon, Iris Canyon, and Arroyo del Rey. Riparian forest/woodland and meadow habitats are distributed along the bottomland of most stream courses in these watersheds, with exceptions where roads, housing, commercial development and other human activities have encroached or displaced native flora. Low rainfall and inflow during the Mediterranean-type dry season limits the extent of aquatic habitats, but four coastal lagoons and surrounding wetlands persist throughout the year, including the Carmel River Lagoon, El Estero Lake, Del Monte Lake, and Laguna del Rey (Robert's Lake).

2.1.2 Groundwater Basins

The two major groundwater resources within the region are the Carmel Valley Alluvial Aquifer (also described by the Department of Water Resources, or DWR, as the Carmel Valley Groundwater Basin) and the Seaside Groundwater Basin.

Carmel Valley Alluvial Aquifer

The Carmel Valley Alluvial Aquifer (CVAA, also described in Bulletin 118 by the Department of Water Resources as the Carmel Valley Groundwater Basin, Basin Number 3-7) has been defined by the MPWMD and the State Water Resources Control Board (SWRCB) as the water-bearing strata directly associated with the Carmel River. It was originally mapped by the U.S. Geological Survey (USGS) in 1984. The map of the alluvial aquifer is subject to refinement over time based on updated hydrologic information.

The CVAA is about six square-miles and is approximately 16 miles long. It varies in width from 300 to 4,500 feet and in thickness from about fifty feet near Carmel Valley Village to greater than 150 feet near Highway 1. The thickness of the alluvium averages 75 feet and is adequately defined by well logs (U.S.G.S., 1984).

Groundwater levels within the aquifer are influenced by pumping or production at supply wells, evapotranspiration by riparian vegetation, seasonal river flow infiltration and subsurface inflow, outflow from the basin, and reservoir releases to augment summer low flows. During the dry season, pumping of wells causes significant declines in the groundwater levels and leads to decreased surface flows in the Lower Carmel River along as much as nine river miles. Complete recharge of this aquifer generally occurs quite rapidly after winter rains commence and the Carmel River begins flowing into the dry reaches.

Seaside Groundwater Basin

The Seaside Groundwater Basin underlies a hilly coastal plain that slopes northward toward the Salinas Valley and westward toward Monterey Bay. The water-bearing aquifers used for potable water supply extend offshore under the Monterey Bay, but the extent of the aquifers under the bay has not been fully explored. The basin area includes a 19 square-mile area of Sand City, and much of the cities of Seaside and Del Rey Oaks, as well as unincorporated parts of Monterey County, including a portion of the Ord Community in the former Fort Ord. The physiography is characterized by young, active dunes near the coast and mature dunes to the east on the former Fort Ord. Land surface elevations range from sea level at the beach to approximately 900 feet near the eastern boundary of the basin. Until recently, recharge to the groundwater system was primarily from infiltration of precipitation, with minor additional amounts contributed by deep percolation of irrigation water, leaky pipes, septic systems, and possibly stream flow. With the introduction of the Aquifer Storage and Recovery project, excess winter flows from the Carmel River are periodically injected into the basin and subsequently recovered during dry periods.

The extent of this basin is not well defined under Monterey Bay and the most recent comprehensive investigation describes the location of the flow divide that forms the northern and eastern boundaries of

the basin as a broad swath, reflecting the uncertainty regarding its exact location and variation in its location with depth.

Groundwater conditions in the Seaside Basin have deteriorated in the past several decades. Groundwater extraction near the coast increased in the 1960s and was significantly boosted beginning in 1995, resulting in declining water levels and depletion of groundwater storage. Until the basin was adjudicated in 2006, basin-wide groundwater withdrawals were up to 5,600 AFY. The Final Decision of the adjudication set a ramp down schedule aimed at reducing annual extractions to 3,000 AFY, which is termed the "natural safe yield," by 2021, see **Section 2.2.4,** below for more information about the adjudication of the Seaside Groundwater Basin.

Salinas Valley Groundwater Basin

The southern portion of the Ord Community is within the planning region and is supplied from the Salinas Valley Groundwater Basin under a 1993 agreement between the United States and MCWRA. In 1997 MCWD took over the responsibility of operating the Ord Community water and wastewater systems.

2.1.3 Biological Resources

The region, along California's central coast, includes a diverse assemblage and mosaic of plant and animal species. The wide range of topography, rainfall patterns, different soils, geologic processes, episodic wildfires and landslides, and proximity to marine air in the region has created ideal conditions for endemism and localized genotypic variations in plant and animal species. The planning region is also adjacent to the MBNMS.

Terrestrial vegetation within the region ranges from rocky onshore Coastal Bluff Scrub and Active Dune at elevations near zero to Maritime Coast Range Ponderosa Pine Forest and Santa Lucia Fir Woodland at elevations above 3,000 feet in the upper Carmel Valley watershed. As highlighted by the California Native Plant Society (CNPS) and CDFW, several rare, endemic tree species occur in the region including Santa Lucia Fir, Monterey Cypress, Gowen Cypress, Bishop Pine and Monterey Pine.

Threatened, Endangered and Species of Special Concern in the Region

Evolutionary patterns and modern man's tendency to simplify habitats and restrict the range of many species have led to lower reproductive success, survival rates and restrictions of some species' distribution and abundance. As a consequence, there are species within the region that are threatened or endangered.

An assessment of the flora and fauna in this region shows there are 115 special status species including 55 species of plants, ten plant communities, 19 species of birds, ten species of reptiles and amphibians, three species of fish, nine species of insects, and seven species of mammals classified by CDFW. Of these special status species, 10 plant species and 11 animal species are formally listed as threatened or endangered under State or Federal endangered species laws. In relation to the IRWM Plan, 12 special-status animal species are particularly important, including California red-legged frog, South-Central California steelhead, Southwestern pond turtle, black legless lizard, California tiger salamander, Western snowy plover, California horned lizard, yellow warbler, black swift, common loon, barn swallow and double-crested cormorant. These animal species inhabit aquatic systems, depend directly on food produced in aquatic habitats, or are distributed in areas where water projects may be planned and constructed.

Appendix 2-a contains a complete list of special status species known to occur within the planning region as identified by the CDFW, the National Marine Fisheries Service (NMFS), the United States Fish and Wildlife Service (USFWS), the California Natural Diversity Database (CNDDB) and the CNPS.

The Carmel River provides a habitat for CRLF and the south-central California Coast steelhead (SCCCS), both of which are threatened species. Since 1996, Federal involvement in water resource management within the region has increased, with special attention given to these two aquatic species. Historical water development has reduced potential habitats and along with it, survival and population numbers. CRLF and SCCS were listed as threatened under protection of the Federal Endangered Species Act in 1996 and 1997, respectively. The following is a brief description of the status of each species and its relationship to water development in the region.

California Red-Legged Frog

At just over five inches long as an adult, CRLF (*Rana aurora draytonii*) is the largest native frog in the western United States. The historic range of CRLF extends from the Sierra foothills to the coast and from Shasta County to the boarder of Mexico, excluding the Coast Range north of Marin County. It is estimated that CRLF have disappeared from over 99 percent of the inland and southern California localities within its historic range and have been extirpated from at least 70 percent of all localities within its entire historic range (Jennings, Hayes, and Holland 1992). The area from Ventura County south to the border of Mexico is the most depleted in California (Jennings, Hayes, and Holland 1993). Populations of CRLF in the Coast Range from Marin County south to Santa Barbara are more intact than populations in the rest of the state. The estimated disappearances of historical populations in the Coast Range are 50 percent. USFWS listed this species as Threatened in 1996. The Carmel River Watershed and the Santa Lucia mountain range have been identified as a core area (number 20), where recovery actions will be focused (USFWS, 2002). Critical habitat throughout California was designated in 2006. In the Monterey Peninsula region, a little more than one-quarter of the Carmel River watershed (primarily, areas adjacent to the main stem and in the Garzas Creek and San Clemente Creek watersheds) and a portion of the nearby San Jose Creek watershed is designated as critical habitat for California red-legged frogs.[1]

Surveys and incidental sightings in the Carmel River Basin indicate that CRLF is well distributed throughout the drainage, especially in the main stem (MPWMD, 2004). But mapping of potential reproductive sites and actual sightings of egg masses and larvae in the main stem during 2003 indicates that the population is not fully utilizing the potential or available reproductive habitat. Sampling in selected tributaries within the basin during 1999-2003 surveys also indicates patchy utilization of suitable habitat, as known reproductive sites are not used consistently on a year-to-year basis. Although the distribution and abundance of CRLF may be limited, there is general agreement that the Carmel River Watershed is extremely important to the current distribution of CRLF.

Many factors contributed to the historical decline or loss of CRLF populations in their native range, including introduction of predators, loss of habitat and degradation from urbanization, agriculture, mining, overgrazing, recreation, timber harvesting, invasion from nonnative plants, impoundments, water diversion, and degraded water quality (65 FR 54893). Of special interest in relation to planning in this region are the impoundments and water diversions in the Carmel River Basin. The existing reservoir, created by the Los Padres Dam, and water extractions are opined to affect CRLF in the following ways:

[1] See Map 14 California Red-Legged Frog April 2006 Final Critical Habitat Unit MNT-2 and 19244 Federal Register / Vol. 71, No. 71 / Thursday, April 13, 2006 / Rules and Regulations.

- The Los Padres Dam fragments habitat in the basin by blocking or hindering dispersal of individuals.
- In most years, summer releases from Los Padres Reservoir contribute enough water to the lower alluvial Carmel Valley to help prevent premature draw down of reproductive sites in a portion of the lower Carmel River.
- Water diversions via well pumping in the lower Carmel Valley can significantly impact CRLF by rapidly dewatering reaches of the Carmel River, as the combined well production during late spring through summer is often 2 to 4 times the stream flow.

South-Central California Coast Steelhead

Steelhead (*Oncorhynchus mykiss*) inhabit two coastal streams in the region, San Jose Creek and the Carmel River. Very little is known or published on the population in San Jose Creek, but the population in the Carmel River Basin is well studied. The Carmel River supports one of the stronger steelhead populations in the South-Central California Coast distinctive population segment, extending from the Pajaro River in Santa Cruz County south to streams north of the Santa Maria River in Ventura County. While the population is relatively strong compared to other streams, the numbers of adult fish returning to the basin have declined by about 50 percent-75 percent since the mid-1970s. This decline is opined to have been related to several factors, but paramount was the effect of dam construction, reservoir operations, out-of-basin exports, and extensive well pumping from the alluvial portions of Carmel Valley (Carmel River Watershed Assessment, MPWMD, 2004). In particular, the increase in water pumping associated with expansion of California American Water (CalAm) well fields after 1964, and other private wells in the lower Carmel Valley affected habitat in the Carmel River and the success of fish migration and several life phases of steelhead.

To complete their life cycle, steelhead depend on perennial stream flow and suitable spawning and rearing habitat. In December 2013, the NMFS issued the "South-Central California Steelhead Recovery Plan," citing dams and diversions (including groundwater extractions) on the Carmel River as having the most severe adverse impacts to steelhead in the Carmel River. Increased groundwater production beginning in the mid-1960s directly jeopardizes most life stages including upstream and downstream migration of adults, incubation of larvae, emergence of fry, rearing of juveniles, and the downstream migration of smolts. Upstream adult migration from the ocean into the river is delayed in fall and early winter as runoff fills main stem reservoirs and recharges the depleted Carmel River Aquifer. In relation to the IRWM Plan and meeting the Statewide priority of restoring steelhead populations, projects in the Plan should implement strategies that reverse the historical pattern of exporting water during periods of low flow in the Carmel Basin, reduce impacts from groundwater extraction throughout the region and mitigate for impacts to spawning and rearing habitat from retention of sediment in the main stem reservoir.

USFWS and NMFS contend that any entity that pumps water from the Carmel River Alluvial Aquifer may be liable for a "take" because such pumping may alter the riparian habitat, affect the SCCCS's ability to migrate, and affect the CRLF's ability to mature. CalAm has entered into agreements with USFWS and NMFS with the long-term goal of procuring an alternative water supply source to reduce withdrawals from the Carmel River Alluvial Aquifer.

2.1.4 Designated Areas of Importance

Ventana Wilderness Area

This rugged portion of the beautiful Santa Lucia Range was established as an official Primitive area in 1931 and Congress designated it a formal wilderness area in 1969. Its topography is characterized by steep-sided canyons and sharp-crested ridges with remarkably remote streams and valleys, despite its proximity to major human population centers. Within the region, elevations in the Ventana Wilderness range from about 1,055 feet near the upstream end of Los Padres Reservoir to nearly 5,000 feet at South Ventana Cone along Chews Ridge at the upper boundary of the Carmel River Basin. Streams in the Wilderness Area fall rapidly through narrow canyons, over bedrock, exposed boulders, and several waterfalls spill into deep pools. Many springs flow from cracks in the underlying granitic rock. The vegetation is dominated by chaparral series, but grassy meadows, ponderosa pine forests, several unique stands of Santa Lucia fir and virgin coastal redwood trees are located in the area. Importantly, future water development is tightly restricted, and human intervention in natural processes is discouraged. The area functions as a major source of water for the region.

Areas of Special Biological Significance

In the mid-1970s, 34 areas on the coast of California were designated as areas requiring protection by the SWRCB and were called Areas of Special Biological Significance (ASBS) and include Pacific Grove, Carmel Bay, and Point Lobos Ecological Reserve, discussed below, see **Figure 2-1.**

Critical Coastal Area (CCA) No. 42a flows into the Pacific Grove ASBS and forms a State Water Quality Protection Area (SWQPA) 3.3 miles in length along the Pacific Grove shoreline. The southern portion of the Monterey Bay coastline, including Pacific Grove, is listed as impaired for metals, based on historical mussel water data.[2] However, the Coastal Commission has set a low priority for determining a total maximum daily load.

The Carmel Bay SWQPA is roughly 5.0 miles in length encompassing the area of Carmel Bay between Pescadero Point and Monastery Beach. The Carmel River and San Jose Creek watersheds, which include storm water from the City of Carmel-by-the-Sea and the Pebble Beach area, drain into the Carmel Bay ASBS.

The California State Parks Department described this area as "…one of the richest marine habitats in California" and quotes landscape artist Francis McComas as saying this area is "…the greatest meeting of land and water in the world." The ecological reserve area is the first underwater reserve in the nation and comprises approximately 775 acres of tide and submerged land lying at the south end of Carmel Bay. The underwater reserve is adjacent to the Point Lobos State Reserve, which includes about 554 acres of coastal lands immediately south and west of Carmel River State Beach.

Marine Protected Areas (MPAs)

Marine protected areas (MPAs) along the central California coast (Pigeon Point to Point Conception) have been in effect in state waters since September 21, 2007. State waters in this area cover approximately 1,144 square miles of ocean, estuary, and offshore rock/island waters. The central coast network includes 29 new or modified areas (28 MPAs and one marine recreational management area), covering

[2] California Coastal Commission, California's Critical Coastal Areas, State of the CCAs Report, June 2, 2006, CCA #42a.

approximately 204 square miles or about 18 percent of the central coast. Various restrictions are in place on the taking of fish within these areas.

There are several MPAs are within the planning including:

1. Four contiguous designations from approximately the Coast Guard pier in Monterey to Point Joe in Pebble Beach.
2. Four areas in the vicinity of the Carmel River Bay and Point Lobos.[3]

Monterey Bay National Marine Sanctuary

The MBNMS was designated in 1992 as a federally protected marine area offshore of California's central coast. Stretching from Marin to Cambria, the MBNMS encompasses a shoreline length of 276 miles and 5,322 square miles of ocean, extending an average distance of 30 miles from shore. At its deepest point, the MBNMS reaches 10,663 feet (more than two miles). It is our nation's eleventh Marine Sanctuary. The MBNMS was established for the purpose of resource protection, research, education and public use. Its natural resources include our nation's largest kelp forest, one of North America's largest underwater canyons and the closest-to-shore deep ocean environment in the continental United States. It is home to one of the most diverse marine ecosystems in the world, including 33 species of marine mammals, 94 species of seabirds, 345 species of fishes, and numerous invertebrates and plants. This remarkably productive marine environment is fringed by spectacular coastal scenery, including sandy beaches, rocky cliffs, rolling hills and steep mountains.

2.2 Regulatory Setting

2.2.1 Internal Boundaries

The internal boundaries of the region include political boundaries of cities and special districts, boundaries for groups within the region, watershed boundaries that define areas of interest for groups and regulatory agencies, groundwater basins, and other boundaries influencing land uses. They are summarized below and shown in the Regional Land Use Map and Monterey Peninsula, Carmel Bay, and South Monterey Bay Map in **Figure 2-1.**

Outside of the MPWMD boundary, Monterey County has proposed goals and policies in a 2010 General Plan. These include assuring an adequate and safe water supply to meet the County's current and long-term needs. A program to eliminate overdraft of water basins will be developed as part of the Capital Implementation and Financing Plan (CIFP) in the General Plan using a variety of strategies, including but not limited to:

a. Water banking;
b. Groundwater management and aquifer recharge and recovery;
c. Desalination;
d. Pipelines to new supplies; and
e. A variety of conjunctive use techniques.

[3] More details and maps are at http://www.dfg.ca.gov/marine/mpa/ccmpas_list.asp

The CIFP will be reviewed every five years in order to evaluate the effectiveness of meeting the strategies noted in this policy. Areas identified to be at or near overdraft will be a high priority for funding. Proposed new developments will be required to demonstrate "… that there is a long term, sustainable water supply, both in quality and quantity, to serve the development." (Monterey County, 2010). The plan, when adopted, is intended to cover an approximate 20-year period. It should be noted that this plan update was the subject of several competing measures on the June 2007 Monterey County ballot. Voters said no to a measure to approve the Board of Supervisors-approved update, but also said no to a measure to repeal that update. It is unclear at this time when or how the General Plan may change and if this IRWMP would be affected by the changes.

For proposed developments that depend on diversions in the CVAA, MPWMD has adopted regulations that parallel the requirements for demonstrating a long-term sustainable water supply.

Political Boundaries

- The region includes the coastal incorporated cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside.
- Also included are the unincorporated portions of Monterey County in Carmel Valley, Pebble Beach, the Carmel Highlands, the Laguna Seca area and a portion of the Ord Community.

Special Districts and Agencies in the Region

- Monterey Peninsula Water Management District – formed in 1977 by the California State Legislature for the integrated management of ground and surface water supplies (AB 1329);
- Monterey Peninsula Regional Park District – formed in 1971 to acquire and maintain open space land. MPRPD's current boundaries cover over 500 square miles and extend beyond the region up to Marina on the north and south along the Big Sur Coast;
- Monterey Peninsula Airport District – created in 1936. This district is not incorporated into the City of Monterey or Monterey County nor is it a public utility. The Airport District includes portions of Monterey, Pacific Grove, Del Monte Forest, Pebble Beach, Carmel-by-the-Sea, greater Carmel, Del Rey Oaks, Seaside, Sand City, the Monterey-Salinas Highway to Laureles Grade, and the west end of Carmel Valley. The District owns and operates Monterey Airport, a 598-acre facility, serving as a "Medium Non-Hub" airport.
- Fort Ord Reuse Authority – FORA was created to facilitate conversion of the former Fort Ord from military to civilian activities that support our local and regional communities. Known now as the Ord Community, the area is an important "border region" between the Greater Monterey County and Monterey Peninsula IRWM regions.
- Carmel Area Wastewater District (CAWD) – formed in 1908 to provide wastewater collection and treatment in the Carmel and Pebble Beach area;
- Monterey One Water – a joint powers agency formed in 1972 to provide wastewater collection and treatment to the Monterey Peninsula cities (except Carmel-by-the-Sea). M1W also serves areas within its boundaries that are outside of the Monterey Peninsula region (e.g. Salinas, Moss Landing, and Castroville).
- Pebble Beach Community Services District (PBCSD) – formed to provide wastewater collection in the Pebble Beach area (PBCSD contracts with CAWD for treatment).

- Community Services Area 50 – benefit assessment area formed in the lower Carmel River area (Mission Fields/Crossroads) to carry out flood control improvements.
- Seaside County Sanitation District – the Seaside County Sanitation District (SCSD) is a special district responsible for the maintenance and operation of the sanitary sewer collection system serving the Cities of Del Rey Oaks, Sand City and Seaside. The District's sanitary sewer collection system serves an area of approximately 2,400 acres with a population of about 30,000.
- Marina Coast Water District – the District was formed in 1960 by a vote of the registered voters within the original service area, which was expanded in 1998 from 3.2 square miles to encompass the Ord Community in the former Fort Ord, which is 44 square miles. MCWD provides water and sewer services and has the latent power to provide fire protection, recreational, and sanitation (garbage) services.
- Monterey Peninsula Regional Water Authority – The Monterey Peninsula Regional Water Authority (MPRWA) is a Joint Power Authority that consists of six cities, the Cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City and Seaside. The purpose is to study, plan, develop, finance acquire, construct, maintain, repair, manage, operate, control and govern water projects either alone or in cooperation with other public or private non-member entities.

Groups

- Monterey Regional Storm Water Management Program Participating Entities – this group includes the cities of Monterey, Del Rey Oaks, Sand City, Seaside, Pacific Grove, Carmel-by-the-Sea, Marina, and the County of Monterey. The group developed a storm water program to comply with the National Pollutant Discharge Elimination System (NPDES) requirements for obtaining a permit to discharge storm water. The Pebble Beach Company, the Monterey Peninsula Unified School District, the Pacific Grove Unified School District and the Carmel Unified School District participate in the group as coordinating entities to implement specific Best Management Practices. M1W acts as the group's administrative agent, holding meetings and working with the group to develop this regional program.
- Carmel River Watershed Conservancy (CRWC) – The Conservancy is a 501(c)(3) Non-Profit corporation formed in 2005 by the Carmel River Watershed Council, which itself was formed in 1999. This group represents diverse watershed community interests in managing the water resources in the Carmel River Basin. The role of the Conservancy is to raise funding to support the programs, projects and activities of the Council.
- Big Sur Land Trust – formed in 1978 to conserve the significant lands and waters of California's Central Coast for all generations. BSLT has protected thousands of acres of important open space throughout the planning region through land purchase and conservation easements, as well as partnerships with other agencies for habitat restoration and similar objectives. The mission of BSLT is to inspire love of the land and conservation of our treasured landscapes.
- Others (see Current Stakeholder List in **Appendix 1-d**)

Table 2-1 summarizes responsibilities for water management in the region.

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Table 2-1: Public Entities and Water Purveyors with Water Resources Authority in the Region

	MPWMD	CalAm	CAWD	CDFW	Coastal Commission	CDPH	DWR	Jurisdictions	MBNMS	MCHD	MCWD	MCWRA	MRSWMG	M1W	NMFS	PUC	RWQCB	Seaside Watermaste	SWRCB	USACE	USFWS
Directly Accountable to Local Voters for Water Management Issues	✓																				
Plans and Constructs Water Supply Projects	✓	✓									✓	✓				✓					
Manages and Protects Regional Water Supply for Monterey Peninsula	✓																				
Conveys/Stores/Treats/Distributes Drinking Water		✓						✓			✓										
Regulates/Monitors CalAm Water Production Levels/Sources	✓			✓											✓			✓	✓		✓
Regulates/Monitors Private Water Production Levels/Sources	✓														✓			✓			
Monitors Carmel Valley for Seawater Intrusion	✓																	✓			
Reviews/Evaluates Water Development Proposals for Water Production Impacts	✓			✓	✓	✓			✓	✓	✓				✓		✓				✓
Monitors/Conducts/Funds Environmental Mitigation Programs Required	✓	✓							✓												
Secures Water Rights for Water Sources	✓	✓									✓	✓						✓			
Approves CalAm Water Rates																✓					
Facilitates CAWD/PBCSD Reclaimed Water Project	✓		✓																		
Monitors Local Surface and Ground Water Quality	✓	✓						✓										✓			
Monitors Local Surface and Ground Water Flows and Storage	✓	✓																✓			
Administers Comprehensive Water Conservation and Retrofit Program, Including Rebates and On-Site Inspection	✓										✓										
Issues Water Distribution System Permits	✓									✓											
Monitors Compliance with Surface and Ground Water Discharge Permit Conditions										✓			✓	✓			✓				
Regulates Drinking Water Quality						✓				✓											
Implements and Manages Water Rationing, as Necessary	✓										✓							✓			
Monitors/Restores Carmel River Riparian Habitat	✓														✓						
Monitors CalAm Compliance with Endangered Species Act & Other Laws				✓											✓						✓
Manages Steelhead Fishery	✓	✓		✓											✓						
Conducts Land Use Planning								✓				✓									
Regulates Activities in Streams and Riparian Corridors	✓			✓	✓		✓	✓				✓			✓		✓		✓	✓	✓
Monitors Seaside Basin for Water Quantity and Quality	✓	✓										✓						✓			
Plans and Constructs Recycled Water Projects			✓								✓	✓		✓							

CalAm= California American Water Company; MBNMS=Monterey Bay National Marine Sanctuary; NMFS = National Marine Fisheries Service; CAWD = Carmel Area Wastewater District; MCHD=Mont. County Health Department; PUC = Public Utilities Commission; CDFG= Calif. Department of Fish & Game; MCWD= Marina Coast Water District; RWQCB=Regional Water Quality Control Board; Coastal Commission = California Coastal Commission; MCWRA = Mont. County Water Resources Agency; SCSD = Seaside County Sanitation District; DPH = State Department of Public Health; MPWMD = Monterey Peninsula Water Management District; SWRCB = State Water Resources Control Board ; DWR/DSOD= Dept. of Water Resources/Division of Safety of Dams; MRSWMG = Monterey Regional Storm Water Management Group; USACE = U.S. Army Corps of Engineers; JURISD= Cities, County and Airport District; MRWPCA = Monterey Regional Water Pollution Control Agency; USFWS = U.S. Fish & Wildlife Service

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2.2.2 Major Land Uses

The Monterey Peninsula and its surrounding areas are composed of a wide range of land uses that serve residential, commercial, industrial, recreational, and open space purposes. See **Appendix 2-b** for land use designations within the cities and County area plans in the region. While Monterey County, as a whole, is dominated by open space and agriculture uses—together they comprise 85 percent of countywide land—only a small fraction of the IRWM planning region is used for agriculture.

Similar to many watersheds along the central coast of California, commercial and residential development is the densest near the coast and progressively lessens in the upstream direction of the watershed. Land use in the Carmel River watershed includes wilderness, viticulture, grazing, recreation (golf courses and park areas), and sparse residential, suburban, commercial and light industrial. Very little of the watershed is currently in traditional agricultural use. Urban development in the region is concentrated primarily in the coastal cities - the Monterey Peninsula is dominated by low density residential lots with some medium density areas within the Cities. Outside of the Cities, low to rural density residential areas dominate, especially along the Carmel Valley and Highway 68 corridors.

Resource conservation makes up another important use of land throughout the region. Parts of the planning area include the Ventana Wilderness and Los Padres National Forest. BSLT, MPRPD, State Parks and others have actively promoted land conservation in the watershed through property acquisition and management. CRWC has sought to educate the public about resource conservation and has actively participated in various restoration projects.

2.2.3 State Water Resources Control Board Cease and Desist Order

In 1995, when the SWRCB issued Order No. WR 95-10, CalAm was initially limited to 11,285 acre-feet of diversions from the Carmel River Basin and ordered CalAm to maximize diversions (to the extent feasible) from the Seaside Groundwater Basin. In 2009, SWRCB issued Order No. 2009-0060, which ordered CalAm to cease and desist its unauthorized diversions in the Carmel River Basin by 2017 and reduce authorized diversions to 3,376 AFY. In July 2016 the SWRCB adopted Order 2016-0016, which amends Orders 95-10 and 2009-0060. Order 2016-0016 extends the date by which CalAm must terminate all unlawful diversions from the Carmel River from December 31, 2016 to December 31, 2021. The revised Cease and Desist Order set an initial diversion limit of 8,310 AFY for Water Year 2015-2016 (October 1, 2015 - September 30, 2016) and establishes annual milestones toward replacement supplies that CalAm must meet in order to maintain the 8,310 AFY diversion limit through 2021.

2.2.4 Seaside Groundwater Basin Adjudication

Adjudication of the Seaside Groundwater Basin occurred in 2006 with a Final Statement of Decision filed on March 27, 2006. The Decision was amended on February 9, 2007. The court ordered the formation of a Watermaster and mandated a “physical solution” to the overdraft problem. The operating yield for three (3) years beginning in March 2007 for the Seaside Basin as a whole was defined as 5,600-acre feet (Coastal Sub area is 4,611-acre feet and 989-acre feet for the Laguna Seca Sub area). The judgment required that the operating yield for coastal subareas be decreased by 10 percent every three years starting in year four, e.g. 10 percent decrease at the start of the fourth year for years four, five, and six, and an additional 10 percent decrease at the start of the seventh year for years seven, eight and nine, etc. These decreases will continue until production reaches the “natural safe yield”, which was initially set at 3,000 AFY, unless the Watermaster (1) has secured an equivalent amount of “non-native” replacement water and added it to the basin, or (2) the Watermaster has secured an equivalent amount of recycled water and contracted

with one or more of the producers in the basin to use this quantity of recycled water in lieu of their production allocation with the producers agreeing to forego their right to claim a storage credit for their forbearance, or (3) any combination of replacement or recycled water results in the required decrease in production of "native water" in the basin, or (4) water levels in the aquifers are sufficient to ensure a positive offshore gradient to prevent seawater intrusion.

In the event the Watermaster cannot procure replacement water to offset operating yield over-production in an administrative year, production in the following administrative year must be curtailed to the targeted operating yield or a replenishment assessment may be levied on the producers. In recent years, the Watermaster has allowed CalAm to combine production from sub-areas into a single basin report and has allowed CalAm to overproduce from the basin (relative to the natural safe yield and operating safe yield amounts) without incurring a monetary penalty. However, CalAm must replenish the overproduced water in the future and has agreed to forego production of 700 AFA from the basin for 25 years, once replacement water supplies are available. This is referred to as "in-lieu recharge."

In compliance with the judgment entered in the Seaside Groundwater Basin adjudication, the final "Seaside Monitoring and Management Program" (Program) was adopted by the Seaside Basin Watermaster in September 2006 to ensure that the Seaside Groundwater Basin is protected and managed as a perpetual source of water for beneficial uses. The Program was approved by the court with the Amended Decision on February 9, 2007. The Program sets forth actions that will be taken to: (a) monitor current overdraft conditions and the present threat of potential seawater intrusion into the Coastal Subarea of the Basin; (b) develop and import supplemental water supplies for the purpose of eliminating Basin overdraft and the associated threat of seawater intrusion, and (c) establish procedures that will be implemented to address seawater intrusion should seawater intrude into the onshore portions of the Basin. Key elements of the Basin Management Program include: a) a monitoring component that builds on MPWMD's efforts to collect and organize data regarding groundwater production, water levels, water use, land use, rainfall, and other pertinent information; b) development of an enhanced Seaside Basin groundwater model; c) development of recommendations regarding implementation of strategies to import supplemental water supplies into the basin; and d) development of strategies for redistribution of pumping to avoid various adverse impacts within the basin.

2.3 Major Water Related Infrastructure

The wastewater treatment plants serving the IRWM Region are operated by M1W and CAWD. In addition to these facilities, several water supply projects have been completed or are under construction and are discussed in **Section 2.3.3,** below.

2.3.1 Monterey One Water Regional Treatment Plant

Wastewater from all the cities in the region (except Carmel-by-the-Sea), unincorporated areas along Highway 68, a portion of the Ord Community, and from communities outside of the planning region—including Castroville, Marina, Moss Landing, and Salinas—is treated at the M1W Regional Treatment Plant near the mouth of the Salinas River. This plant services a total population of about 250,000 and processes up to about 18.5 million gallons per day (MGD).

Peak dry weather flow capacity of the M1W Regional Treatment Plant is calculated at 29.6 MGD, and peak wet weather flows are estimated at 75.6 MGD. Treated municipal wastewater not recycled is discharged to the Pacific Ocean through an 11,260-foot (3,432 m) outfall/diffuser system. The outfall terminates in the Monterey Bay in approximately 100 feet (30.5 m) of water. The minimum dilution of the outfall is 145:1 (parts seawater to effluent).

Water supply projects located at the M1W Regional Treatment Plant including the PWM Project, and the Salinas Valley Reclamation Plant (SVRP) are discussed in **Section 2.3.3,** below.

2.3.2 Carmel Area Wastewater Treatment Plant

Wastewater from Carmel-by-the-Sea, parts of unincorporated Carmel Valley, and Pebble Beach is treated at the CAWD treatment plant located at the mouth of Carmel Valley adjacent to the Carmel River. As of 2016, CAWD daily dry weather flows were between 1.2 and 1.4 MGD, which is less than 50 percent of the permitted capacity of 3.0 MGD. There are possibly 520 lots within the CAWD sphere of influence that could connect to CAWD. At a capacity reserve of 235 gallons per day (GPD) per unit, that would result in another 117,500 GPD. Plant capacity is shared with the PBCSD, which has rights to one-third of the plant capacity or about one MGD. The CAWD-only flow is currently about one MGD, which leaves about one MGD of capacity for additional service. CAWD is aware of potential developments at the Highlands and in the lower Carmel Valley at September Ranch and Rancho Cañada Village and believes there is enough capacity presently to serve those developments. There are no plans to expand capacity at this time.

According to a 2016 Municipal Service Review, CAWD provides wastewater collection, treatment, and disposal services to approximately 11,000 customers within CAWD boundaries, plus 4,500 Pebble Beach residents contractually served for wastewater treatment.

Treated municipal wastewater not currently recycled is discharged to the Pacific Ocean through a 600-foot (183 m) outfall diffuser system. See **Section 2.3.3** for more information on the CAWD Reclamation Project. The plant outfall terminates in Carmel Bay within the MBNMS in approximately 36 feet (11 m) of water. The minimum initial dilution of the outfall is 121:1. The maximum design flow of the plant and outfall is 4.0 MGD.

Areas in Carmel Valley outside of the CAWD service area are on individual septic systems. Monterey County does not have information on the number of septic systems in Carmel Valley; however, it is estimated that there may be several thousand.

2.3.3 Water Supply Projects

Carmel Area Wastewater District Reclamation Project

The CAWD treatment plant supplies recycled water (approximately 650 AFY) to irrigate turf at several Monterey Peninsula golf courses and at one local school. Use of this reclaimed water has resulted in a one-for-one decrease in CalAm system demand. The reclamation project was completed in 1994, the Forest Lake Reservoir facility was rehabilitated for storing the reclaimed water in 2004-2005, and an advanced tertiary treatment process was added to the plant in 2009 to reduce the sodium concentrations in the reclaimed water (due in part to residential water softeners). The advance treatment included a Microfiltration/Reverse Osmosis (MF/RO) system, located at the CAWD plant site to reduce the sodium content of the tertiary reclaimed water from 150 mg/L to less than 55 mg/L to reduce the stress on the golf greens and eliminate the need for flushing the courses with potable water. The retrofit eliminated the existing use of 300 AFY of potable water on Pebble Beach area golf courses and athletic fields.

Castroville Seawater Intrusion Project and the Salinas Valley Reclamation Plant

M1W treats up to 25,000 AFY of municipal wastewater, with nearly 9,000 AFY coming from within the Monterey Peninsula region. A portion of this treated water is used to slow seawater intrusion in the Salinas Valley Groundwater Basin and to irrigate agricultural land in the northern Salinas Valley.

In 1992, M1W and the MCWRA formed a partnership to build two projects: a water recycling facility at the Regional Treatment Plant (currently known as the Salinas Valley Reclamation Plant or SVRP) and a distribution system including 45 miles of pipeline and 22 supplemental wells. The distribution system is called the Castroville Seawater Intrusion Project (CSIP). Its objective was to slow the advancement of seawater intrusion by supplying recycled water for irrigation to nearly 12,000 acres of farmland in the northern Salinas Valley in lieu of groundwater that was currently in use. This would significantly reduce the draw of water from the underground aquifers. The $75 million projects were completed in 1997 after three years of construction, and highly treated wastewater (meeting Title 22 requirements for unrestricted reuse) is currently used for irrigation.

Monterey Peninsula Water Supply Project Desalination Plant

In 2018, the California Public Utilities Commission (CPUC) certified an Environmental Impact Report (EIR) for the Monterey Peninsula Water Supply Project (MPWSP)proposed by CalAm. The MPWSP would include:

- A source water intake system consisting of subsurface slant wells extending offshore into the Monterey Bay, and appurtenant facilities. The preferred site for the subsurface slant wells is a 376-acre coastal property located north of the city of Marina and within the CEMEX retired mining area. New pipelines would convey the source water from the slant wells to the MPWSP desalination plant.
- A 6.4 million gallon per day desalination plant and appurtenant facilities on a 46-acre vacant parcel near Charles Benson Road, northwest of the Monterey Regional Water Pollution Control Agency's (MRWPCA) Regional Wastewater Treatment Plant and the Monterey Regional Environmental Park. Facilities proposed at the MPWSP desalination plant include pretreatment, reverse osmosis, and post-treatment systems; chemical feed and storage facilities; a brine storage basin; and an administrative building. Brine produced during the desalination process would be conveyed to the existing MRWPCA ocean outfall and discharged to the Monterey Bay. Approximately 6,250 afy of potable water supplies would be produced by the desalination facilities and 3,500 acre-feet per year would be purchased from the Pure Water Monterey (PWM) Groundwater Replenishment (GWR) Project.
- Up to 21 miles of desalinated water conveyance pipeline and mains, and associated facilities including a pump station, and clearwells.
- Improvements to the existing Seaside Groundwater Basin ASR system, including two additional injection/extraction wells, and associated pipelines.

Aquifer Storage and Recovery

MPWMD and CalAm own and operate two injection/extraction sites in the coastal area of the Seaside Groundwater Basin that are used to inject excess winter flows from the Carmel River via the CalAm distribution system, called the Aquifer Storage and Recovery (ASR) project. The average annual yield of this system is anticipated to be 2,000 AFY; however, yield is highly dependent upon rainfall and river flows due to permit requirements for the river to achieve minimum flow conditions in order to divert water for

the ASR system. A third injection/extraction site (ASR 5 and 6) is currently proposed as part of the MPWSP, which is described in more detail above. The third site would inject desalinated water into the groundwater basin.

Pure Water Monterey Groundwater Replenishment Project

In 2015, M1W in partnership with MPWMD prepared an EIR for the PWM Project. This project includes diversions from source waters throughout the region to the M1W Regional Treatment Plant, an advanced water purification facility at the Regional Treatment Plant, product water conveyance facilities, and injection wells in the Seaside Groundwater Basin. The PWM Project will generate 3,500 AFY of water to offset an equal amount of water currently being diverted from the Carmel River. The project is currently under construction and is expected to be operational by the end of 2019. M1W is proposing an PWM Expansion Backup Project, which would generate 2,250 AFY of water and would move forward in the event that the Desalination Plant component of the MPWSP, which is described above, cannot be constructed.

Pacific Grove Local Water Project

In 2017, the City of Pacific Grove completed construction of the Local Water Project. The Local Water Project produces and distributes high quality recycled water to replace potable water used for non-potable water demands. The project recycles and reuses a portion of the wastewater generated within the City. Wastewater is diverted from a gravity sewer in Asilomar Avenue that collects wastewater from the City's western-most sewershed[4]. Wastewater is collected from existing sewer trunks and pipelines through a new diversion structure located in Asilomar Avenue. Diverted wastewater is conveyed from this structure to the Satellite Recycled Water Treatment Plant (SRWTP) through a 1,300-foot-long pipeline. The SRWTP produces disinfected tertiary treated water, the highest grade of recycled water suitable for landscape irrigation described by the State of California in Title 22 Water Recycling Criteria (California Department of Health Services, 2009). Following treatment at the proposed SRWTP, recycled water is distributed through a new 2,800-foot long transmission pipelines to the Pacific Grove Golf Links and El Carmelo Cemetery.

Regional Urban Water Augmentation Project

The purpose of the Regional Urban Water Augmentation Project (RUWAP) is to supply the water demands of the redevelopment of the former Fort Ord. The RUWAP project was originally a component of Phase 1 of the Regional Water Project proposed by MCWD. While the water produced by the RUWAP Project will primarily be delivered to MCWD customers outside of the Monterey Peninsula IRWM Region, some of the project facilities are within the Region.

[4] "Sewershed" means, for the purposes of this plan, all the land area drained by a network of municipal sewer system conveyances to a single identifiable point.

Table 2-2: Major Water Infrastructure by Entity

Agency Name	Major Water Infrastructure and/or Resources
California State Parks	Carmel River Lagoon and vicinity, Point Lobos State Reserve and Hatton Canyon property
Carmel Area Wastewater District	conveyance facilities, pumping plants, wastewater treatment plant, water recycling plant
Monterey One Water	conveyance facilities, pumping plants, wastewater treatment plant, water recycling plant, advanced water purification facility (currently under construction)
Marina Coast Water District	wells, conveyance facilities, pumping plants (Ord Community), product water conveyance pipeline for water product from PWM Project
Pebble Beach Community Services District	conveyance facilities, pumping plants (contracts with CAWD for wastewater treatment)
Cities of Carmel-by-the-Sea, Del Rey Oaks, and Pebble Beach Company	stormwater and wastewater conveyance facilities, open space (turf, landscape)
City of Pacific Grove	recycled water treatment plant, distribution pipelines
City of Monterey	water bodies, flood control facilities, wastewater conveyance facilities, pumping plants, storm water conveyance facilities, open space (turf, landscape)
City of Seaside	Storm water conveyance facilities, groundwater production wells, municipal supply conveyance facilities, water treatment plant, pumping facilities, open space (turf, landscape)
Monterey County Service Area 50	Carmel River property and levees
Big Sur Land Trust	Carmel River property, levee, major landholder in Carmel River watershed, including wetland areas
California State University at Monterey Bay	Storm water conveyance facilities
California American Water	groundwater production wells, municipal supply conveyance facilities, water treatment plants, injection wells, pumping facilities, dams and reservoirs (open lakes)

Agency Name	Major Water Infrastructure and/or Resources
Monterey Peninsula Water Management District	Injection/extraction wells in Seaside Basin operated in cooperation with California American Water; four miles of active Carmel River restoration projects
Monterey Peninsula Regional Park District	Carmel Riverfront property, major landholder in Carmel River watershed, including wetland areas
Seaside County Sanitation District	Wastewater conveyance system

2.4 Water Supply and Demand within the IRWM Region

2.4.1 Water Supply

The population of the region, is estimated to be about 114,400, is entirely dependent on local rainfall and runoff for its potable water supply, with no connections to California state or federal water supply sources outside of the region.

The average annual runoff of the Carmel River, was 73,080 acre-feet (AF) for the period of record 1962-2018 (U.S. Geological Survey, measured at U.S.G.S Near Carmel gage, 3.56 River Miles upstream of the Pacific Ocean). No flow reached this station for a 16-month period during the drought of 1976-77 – a condition that was a factor in the destabilization of streamside areas along the Carmel River during subsequent high flows in the years following this drought. The greatest amount of runoff recorded was estimated by the U.S.G.S. at nearly 368,000 AF during the 1982-83 el Niño event. As shown in **Figure 2-2**, total water production from all sources within the MPWMD boundary in Water Year 2018 was 12,859 AF.[5] The average from during Water Years 2010 through 2018 (October 1 to September 30) was 15,058 AFY.

Yates et al. (2005), hydrology consultants for MPWMD, completed a detailed analysis of water level trends and groundwater budgets and estimated the natural safe yield of the Seaside Groundwater Basin at 2,880 AFY. An overview of groundwater conditions in the Seaside Basin is given in **Table 2-3,** below.

[5] The *2017-2018 Annual Report for the MPWMD Mitigation Program*, dated April 2019, was used as a primary source for much of the information included in this section. That document is included in this Plan as **Appendix 2-c**.

Table 2-3: Current Groundwater Conditions of Seaside Basin

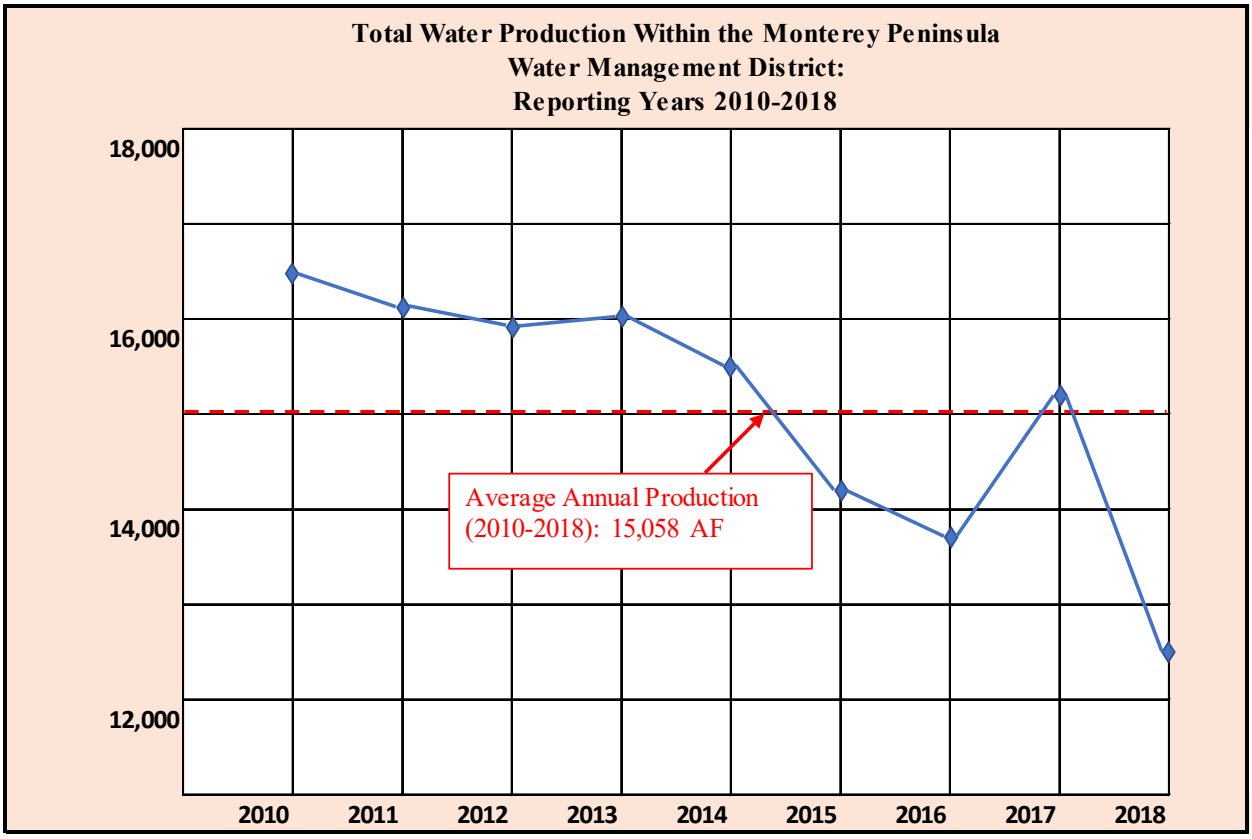
Subbasin	Subarea	Current Groundwater Conditions	Natural Safe Yield (AFY)
Northern	Northern Inland	There are very few wells for water-level analysis. There is also no production from this subarea, but groundwater levels have been declining steadily since 1988 at a rate of about 0.7 ft/yr because of pumping in adjacent areas. In other words, the yield from this subarea is already fully used.	1,840
	Northern Coastal	Most of the basin groundwater production is in this subarea. Increased production beginning in 1995 has been mostly from the Santa Margarita aquifer. Pumping troughs have developed in both the Paso Robles and Santa Margarita aquifers, with water-level declines averaging more than 1 ft/yr near the centers of the troughs. Water levels are continuously below sea level in the Santa Margarita aquifer throughout the subarea, with gradients from the ocean boundary toward the pumping trough. The pumping trough in the Paso Robles aquifer is separated from the coastline by a strip where water levels are above sea level.	
Southern	Laguna Seca	Almost all groundwater production is from the Santa Margarita aquifer in the eastern half of the subarea. Water levels in that aquifer have been chronically declining, and Paso Robles water levels are level or slightly declining. There is little production from the western half of the subarea, and a significant amount of groundwater flows from there into the Southern Coastal Subarea. Increased production from the western half would decrease the yield of the Southern Coastal Subarea.	1,040
	Southern Coastal	The basin is relatively thin in this subarea and there are few production wells. There are no noticeable or widespread water-level declines. There appears to be significant outflow from this subarea, some of which flows to the ocean and some to the Northern Coastal Subarea.	
Entire Basin		Basin-wide average annual storage depletion is approximately 1,540 ac-ft/yr.	**2,880**

The updated 2018 Basin Management Action Plan prepared by Montgomery and Associates found that in spite of recent pumping at levels less than those established by the adjudication natural safe yield of 3,000

AFY, water levels in some portions of the Basin are continuing to drop. It is expected that once MPWSP, which in discussed in more detail in **Section 2.3.3** above, becomes operational, CalAm will further reduce its pumping from the Basin by 700 AFY through its 25-year overpumping repayment program[6]. This combined with the final triennial reduction to the Operating Yield in 2020, should substantially slow, if not eliminate, declines in groundwater levels.

Groundwater is produced by 22 wells in the Seaside Groundwater Basin. California American Water (CalAm), an investor-owned public utility that serves approximately 38,480 customer accounts in the Monterey Peninsula area, owns 6 wells and currently pumps approximately 65 percent of the water produced in the basin. The City of Seaside is the second largest producer in the basin with three wells that pump about 20 percent of the water that is produced in the basin. The City of Seaside operates two systems; the Municipal Water System that serves approximately 790 customers within the city and a Golf Course System that provides water to Black Horse and Bayonet golf courses.

Figure 2-2: Total Water Production within Monterey Peninsula Water Management District Boundary



Although the region generates a significant quantity of wastewater, the majority of it is currently transported out of the region and is used for CSIP in Northern Salinas Valley.

Total usable storage in the region, including surface and groundwater, is estimated to be about 37,500 AF in the Carmel River Alluvial Aquifer and approximately 52,030 AF in the confined aquifers of the Seaside

[6] Prior to the Seaside Basin adjudication, Cal-Am's pumping from the Coastal subarea was 4,000 AFY. Cal-Am must also repay the Seaside Basin for overdrafts and has therefore assumed a reduction of supply of 700 AFY over 25 years, resulting in a net supply available to Cal-Am of 774 AFY from the Seaside Basin.

Groundwater Basin[7]. Storage in the Carmel River Alluvial Aquifer fills to capacity nearly every year due to Carmel River streamflow, whereas available storage in the unconfined aquifers above sea level in the Seaside Groundwater Basin ranges from 2,000 AF to 3,000 AF. However, production limits have been imposed in both basins that substantially reduce the annual amount of water that can be produced. Eventually, extraction of native water in these basins will be reduced to an authorized sustainable level.

Direct diversions from surface storage in Carmel Valley are no longer relied on to meet municipal demand. Instead, stored water is released during dry periods from the Los Padres Reservoir to meet instream flow requirements and partially offset environmental damage from groundwater extractions. Winter season diversions along the Carmel River for injection into the Seaside Basin and which are recovered in the summer season (see description of the Aquifer Storage and Recovery Project, in **Section 2.3.3**) could provide an average of about 2,000 AFY. Thus, the region is mostly dependent on a system of wells to extract groundwater and meet municipal demand for potable water.

Monterey Peninsula Water Resources System (MPWRS)

The Monterey Peninsula Water Resources System (MPWRS)[8] includes: surface water in the Carmel River and in Los Padres Reservoir and groundwater in the Carmel Valley Alluvial Aquifer, which are in the Carmel River Basin; and groundwater in the coastal subareas of the Seaside Groundwater Basin. The MPWRS contains the majority of water resources within the planning region.

During WY 2018, Cal-Am produced 9,956 acre-feet (AF) of water for customer service from all sources in its Carmel River, Seaside Coastal and Laguna Seca Subarea systems. This production consisted of 6,111 AF from Carmel River source wells, 2,229 AF of native water from Seaside Coastal wells, 303 AF from Laguna Seca Subarea wells, 190 AF from the Sand City desalination plant, 153 AF from Table 13, 1,210 AF from ASR Recovery, and 64 AF produced from the Malpaso well and delivered to the Cal-Am system, see **Appendix 2-c** for more detailed on water production.

2.4.2 CalAm Water Supply Infrastructure

There is one main stem reservoir in Carmel Valley; the Los Padres Dam and Reservoir (located at RM 24, measured from the ocean) is currently estimated to have approximately 1,667 AF of usable storage, based on 2017 survey data, which is less than 2 percent of the annual runoff in the watershed. Usable storage is projected to reach zero within 100 years at historic rates of sedimentation. Flows released from this facility are used to augment instream flows during the dry season.

About 80 percent of produced water within the MPWMD boundaries is collected, stored, and distributed by CalAm, which serves 95 percent of the residents and businesses in the Peninsula. CalAm owns and operates a series of production wells along the Carmel River and in the Seaside Groundwater Basin, and a network of pipelines extending through Carmel Valley to the Monterey Peninsula and Seaside communities. The CalAm Service Area Map in **Appendix 2-d** shows CalAm satellite system areas outside of the main Carmel Valley and Monterey Peninsula system.

[7] February 3, 2010 Seaside Watermaster Board Report.

[8] Defined by MPWMD as lands that overlie or are contiguous to (in whole or in part) water in the Carmel River (mainstem and tributaries), ground water within the alluvial aquifer, and groundwater within the Seaside Coastal Ground water Subbasin, as identified on MPWMD Boundary Map #1; or the ground water and surface water supplies which serve Cal-Am, other water distribution systems, and private well owners within the District, including the surface water and groundwater resources of the Carmel Valley (both the Carmel River and the Carmel Valley Aquifer) and the resources of the Seaside Coastal groundwater subbasin. This definition excludes resources of the Seaside Inland groundwater subbasin, and the Carmel Valley upland formation.

CalAm also owns and operates the Ryan Ranch, Hidden Hills, and Bishop systems in the Laguna Seca Subarea. CalAm acquired these systems in 1990, 1993, and 1997, respectively. Presently, only the Ryan Ranch Unit has an emergency interconnection with CalAm's main system. None of these smaller units are interconnected with each other, although the Hidden Hills Unit has an emergency interconnect with the adjacent Toro Water System, also operated by CalAm. These distribution systems are dependent on groundwater extraction.

2.4.3 Surface and Groundwater Sources of Supply

The Carmel River Basin, which has an average annual runoff of 73,080 AFY, currently supplies about 75 percent of the MPWMD area domestic water supply.[9] The water supply reservoir on the main stem of the Carmel River is owned by CalAm, but generally water from this source flows through the Carmel River and is pumped by CalAm to the Monterey Peninsula through a well field in the alluvial aquifer. During the rainy season, river flow is often unregulated by the Los Padres Reservoir, described in more detail above in **Section 2.4.2**. To reduce impacts to streamside areas from water extraction, flow diversions for municipal supply generally occur at the farthest downstream production wells and progress upstream in response to demand.

To meet municipal demand greater than what can be supplied from the Carmel River Basin, water is pumped from a well field in the Seaside Groundwater Basin. To the extent feasible, production from the Seaside Basin is maximized to reduce pumping from Carmel Valley. Although the Seaside Groundwater Basin has significant storage, groundwater production in the Seaside Groundwater Basin is limited due to depressed water levels in the basin and the adjudication described in **Section 2.2.4.**

Groundwater production in Carmel Valley outside of the MPWMD boundary is not as well quantified as within the MPWMD area. However, within the MPWMD boundary, groundwater production records for Water Year 2013 (October 1, 2012 to September 30, 2013) for the Carmel Valley upland area show that production is about seven percent of the volume produced in the alluvial aquifer.

2.4.4 Stormwater as Water Supply

Several water supply projects within the IRWM Region propose to use stormwater as a source of water supply, see **Section 2.3.3** above for more details.

In 2018, the Monterey Regional Stormwater Management Program (MRSWMP) worked with partners and stakeholders to develop the Stormwater Resource Plan (SWRP) for the IRWM Region. This effort was funded by a Prop 1 Planning Grant from the SWRCB, the City of Monterey's Neighborhood Improvement Program, and MPWMD.

The Stormwater Resource Plan is a planning document that identifies public lands (i.e., streets, parks, and municipal properties) where stormwater capture projects could potentially be located to provide the most benefit. Stormwater capture projects collect, store, and treat stormwater runoff as well as dry weather flows such as excess irrigation runoff. Potential environmental and community benefits include:

- Providing water for other uses, such as irrigation,
- Recharging groundwater,
- Reducing local flooding, and

[9] This percentage will be reduced upon completion of the PWM Project.

- Improving water quality in local creeks.

The Stormwater Resource Plan for the Monterey Peninsula IRWM Region is included in this Plan as **Appendix 2-e.**

2.4.5 Other Sources of Water

Other named creeks included in the region are San Jose Creek and Canyon del Rey Creek. San Jose Creek discharges directly to the south end of Carmel Bay. Because of the presence of steelhead in the watershed and the intermittent nature of flow, diversions from this source have not been pursued. Additional information about the watershed and steelhead habitat is contained in **Appendix 2-f**, **San Jose Creek Watershed Assessment**. The Canyon del Rey watershed is a 13.8-square-mile watershed within the Seaside Basin with an average annual runoff of 499 acre-feet for the period of record from 1967 to-1978. The creek discharges seasonally to Monterey Bay near the Monterey/Seaside boundary. It is not thought to contribute significantly to groundwater recharge in the Seaside Groundwater Basin and does not provide a reliable source of water, although it may influence the salinity of brackish water contained in the shallow dune aquifer near the coast. Additional information is available in **Appendix 2-g**, **Canyon Del Rey Master Drainage Plan Update**.

2.4.6 Water Demand within the IRWM Region

The region's annual potable water use has dropped steadily since the late 1980s due to permanent changes such as mandated installation of water-saving fixtures across all user types, landscape audits and retrofits, and permanent retirement of certain water diversions.

Quantifying future residential and commercial water demand in the region was the subject of a significant amount of testimony given to the CPUC by several interested parties as part of the CalAm application for the Monterey Peninsula Water Supply Project that was approved in September 2018. In September 2019, MPWMD reviewed available data on supplies and demands and concluded that the long-term needs of the Monterey Peninsula may be less than previously thought. For more information about future water demand, See **Section 9.1.2.**

Ord Community Existing Supply and Future Demand

Within the Ord Community, the 6,900 AFY of existing Salinas Valley groundwater supply has been allocated among the land use jurisdictions by FORA, as shown in **Table 2-4**, below. The municipal jurisdictions (Cities and Monterey County) formally sub-allocate this supply to developments. Until additional water supplies are developed and allocated within the Ord Community, MCWD will only allow new service connections up to the usage totals allocated by the respective jurisdictions. **Table 2-4** shows projected water demands for the District through 2030, taken from the 2015 UWMP.

Table 2-4: Urban Water Demands by Jurisdiction (AF)

	Jurisdiction	2012*	2015**	2020	2025	2030	2035	Notes	Allocation
Ord	U.S. Army	620	633	663	825	825	825		1,577
	CSUMB	404	404	442	632	755	779		1,035
	Del Rey Oaks	0	0	186	551	551	551		243
	City of Monterey	0	0	0	130	130	130		65
	County of Monterey	8	52	377	539	539	539		720
	UCMBEST	3	3	94	299	515	515	3	230
	City of Seaside	657	657	997	1,852	2,447	2,876	1	1,012
	State Parks and Rec.	0	0	12	18	20	25		45
	Marina Ord Comm.	264	285	901	1,572	1,702	1,704	2	1,625
	Assumed Line Loss	395	348	348	348	348	348		348
Marina	Armstrong Ranch	0	0	0	680	680	680		920
	Cemex	0	0	0	0	0	500		500
	Marina Central	1,823	1,823	2,184	2,491	2,606	2,725		3,020
	Subtotal - Ord	2,351	2,382	4,021	6,766	7,833	8,293	4	6,900
	Subtotal - Marina	1,823	1,823	2,184	3,171	3,286	3,905		4,440
	Total	4,174	4,204	6,205	9,937	11,119	12,197		11,340

*Actual demands from calendar year 2012 used to represent a non-drought year.

** Projected 2015 demands. Actual use was lower due to mandatory drought restrictions

1 Seaside includes Seaside Resort Golf Course (250 AFY temp use).

2. Allocation includes 1325 AFY groundwater and 300 AFY existing pilot desalination plant

3. MBEST commented that they may develop up to 230 AFY as soon as the market allows it.

4. Allocation includes 6600 AFY groundwater and 300 AFY existing pilot desalination plant.

FORA has also formally allocated the recycled water supply from the RUWAP Recycled Water Project, described in **Section 2.3.3.** These allocations are included in **Table 2-5**.

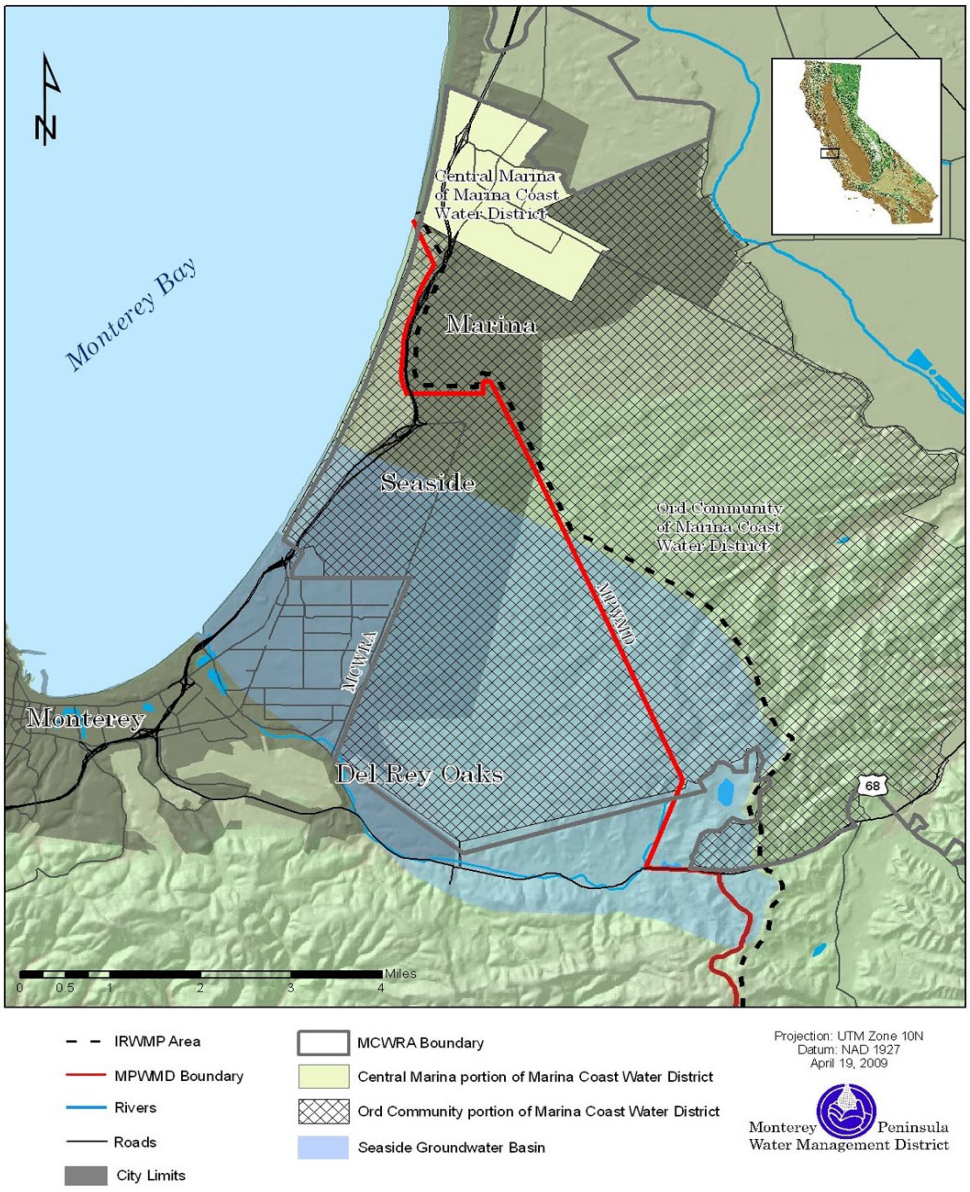
Table 2-5: FORA Allocations in the Ord Community

Jurisdiction	Allocation
U.S. Army	0
CSUMB	87
Del Rey Oaks	280
City of Monterey	0
County of Monterey	134
UCMBEST	60
City of Seaside (Ord Portion)	453
State Parks and Rec.	0
City of Marina (Ord Portion)	345
Assumed Line Loss	68
Total	1,427

The Ord Community consists of areas in both the Monterey Peninsula IRWM Plan and the Greater Monterey County IRWM Plan. It should be noted that in the Ord Community, only University of California Monterey Bay Education, Science, and Technology Center and Marina Sphere (existing use) appear to have 100 percent of their areas located in the Greater Monterey County planning region. The City of Seaside, County of Monterey and CSU Monterey Bay jurisdictions appears to be shared between the two regions, although there is not an equal weighting geographically for each jurisdiction. The remainder appears to be entirely within the Monterey Peninsula region. **Figure 2-3** shows the former Fort Ord area boundaries.

MCWD provides water supplies to all areas within the Ord Community. The source of supply is from groundwater in the Salinas Valley Groundwater Basin (180-ft. and 400-ft. aquifers) and the Salinas Valley deep aquifer. Although some areas of the Ord Community overlie the Seaside Groundwater Basin, no water from this basin is allowed to be used for municipal supply in the Ord Community. By agreement, MPWMD has no authority over water supply within the Ord Community.

Figure 2-3: Former Fort Ord Area Boundaries



2.4.8 Effects of Climate Change on Water Resources

Numerous tools are available to assist local water resource managers in evaluating the potential impacts of climate change on local infrastructure and populations. DWR provides a list of potential impacts to water resources associated with changes in climate variables. The State of California has also provided guidance on possible impacts to infrastructure and resources due to changing climate variables. These resources were used to identify local impacts that are most likely to occur in the Region, due to local changes in rainfall patterns, temperature increases, evapotranspiration, storm intensity and runoff rates, and urban and agricultural water use, **Chapter 15** of this Plan discusses this in further detail.

The following list includes potential impacts to water resources associated with changes in climate variables, based on the State's guidance as applied to the Monterey Peninsula region:

- Water Supply and Demand
- Water Quality
- Flooding
- Aquatic Ecosystem Vulnerabilities
- Reservoir Storage

2.5 Quality and Quantity of Water Resources within the Region

2.5.1 Water Quality

Regional efforts have focused on monitoring water supply levels and water quality changes over time. Existing monitoring efforts in the region have been very successful in generating data necessary for the public, water managers, and relevant regulatory agencies to understand and plan.

Water quality monitoring has taken place in four main areas of the planning region:

- Carmel River Basin Surface Water
- Carmel River Alluvial Aquifer
- Seaside Groundwater Basin
- Monterey Bay National Marine Sanctuary

MPWMD maintains groundwater and surface water monitoring in the Carmel River Basin and Seaside Groundwater Basin Coastal sub-areas. Ambient conditions in surface waters are measured by dissolved oxygen, carbon dioxide, pH, temperature, turbidity, conductivity, and salinity, while groundwater is monitored for specific conductance, total alkalinity, pH, chloride, sulfate, ammonia nitrogen, nitrate nitrogen, total organic carbon, calcium, sodium, magnesium, potassium, iron, manganese, orthophosphate, and boron. MPWMD will continue to track future data for trends that might indicate significant changes in concentrations of these or other constituents in surface and groundwater resources.

Carmel River Basin Surface Water

MPWMD has found that, in general, dissolved oxygen, carbon dioxide, and pH levels in the main stem of the Carmel River have met Central Coast Basin Plan objectives set by the SWRCB. However, average daily water temperature during the late summer and fall commonly exceeds the range for optimum steelhead growth (50-60°F). Monitoring stations along the river show that water temperature during these months

remains in a stressful range and can reach levels that threaten aquatic life (above 70°F). Linear trend analysis of data from the eight-year period between 1996 and 2004 at the Garland Park station, where water temperature annually exceeded 70°F, showed a slight downward trend in maximum daily water temperature. This may have been due to the recovery of the riparian zone upstream and the shade it provides along the river. Additional data collected between 2004 and 2008 showed temperatures exceeding objectives, particularly at or downstream of the existing reservoir. Water temperature in winter and spring is frequently in the range that is considered optimum for steelhead growth.

Turbidity in the main stem is normally low, except during winter when storm runoff events can elevate turbidity for several days during and after a storm event. Very wet years, such as in 1998 and 2017, can cause extensive landslides and bank erosion, which can increase turbidity in the main stem for up to several months.

Water quality in the Carmel River Lagoon typically declines during late summer and fall as freshwater inflows cease and ocean waves start to overtop the sandbar at the mouth of the river. Water temperature often exceeds 70°F, which is above Central Coast Basin Plan guidelines. Dissolved oxygen levels also periodically drop below guidelines (not less than 7.0 mg/L), probably due to a combination of increasing water temperature and decomposition of marine organic material washed into the lagoon by high Ocean waves (MPWMD, 2004).

Carmel Valley Alluvial Aquifer

Monitoring activities in this basin have indicated only minor changes in overall water quality in recent years. MPWMD is particularly interested in monitoring for potential sea-water intrusion in the lower portion of the CVAA. At this time, there are no indications of long-term water quality changes that would be indicative of seawater intrusion.

Seaside Groundwater Basin Coastal Subareas

Monitoring results indicate no remarkable changes in general constituent concentrations in the Seaside coastal subarea over the period of record for the existing monitoring wells. Although portions of the basin aquifers show groundwater levels are below sea level, there is also no indication of seawater intrusion in the two principal aquifer units - the Paso Robles Formation (i.e., shallower unit) and Santa Margarita Sandstone (i.e., deeper unit) - in this area of the Seaside Basin at the present time. For additional information, see the Seaside Basin Salt and Nutrient Management Plan in **Appendix 2-h**.

Monterey Bay National Marine Sanctuary

Monitoring and analysis in both the near shore environment and coastal watersheds has pointed to urban runoff as the leading cause of water pollution affecting the MBNMS. This monitoring has revealed high concentrations of nutrients, metals, pathogens, detergents and other contaminants in local creeks and rivers as well as in the numerous urban outfalls that drain into the MBNMS. Growing evidence suggests that these contaminants are having an adverse impact on MBNMS resources. Toxicity analysis has shown that in most locations sampled, urban runoff is toxic to test organisms representative of those found in the MBNMS, and research into increased mortality among the threatened southern sea otter population suggests that protozoa introduced to the marine environment via runoff from land-based sources may contribute to this mortality rate.

The cities participating in the MRSWMP and the MBNMS Water Quality Protection Program (WQPP) have sought to reduce non-point source urban runoff through a combination of end-of-pipe treatments and source control programs through the implementation of the Sanctuary's Urban Runoff Plan, the Model

Urban Runoff Program (1996), and the MRSWMP. The projects contained in these plans and programs recognize that certain pollutants associated with urban runoff can partially be controlled by end of pipe best management practices such as swales, filters and retention basins. A cost-effective and comprehensive program must also target contamination at its source by addressing the multitude of behaviors and activities that introduce this type of pollution.

2.6 Social and Cultural Makeup and Values of the Community

Approximately 38 miles of coastline offer scenic value and access to coastal resources. The Carmel River and many streams, creeks, lagoons, and other water bodies are also available to the public. The entire coastline of the planning area is located within the Monterey Bay National Marine Sanctuary. Several public and non-profit institutions have programs and resources related to marine science, such as Monterey Peninsula College, the local community college, Monterey Bay Aquarium, Friends of the Sea Otter, Stanford University's Hopkins Marine Laboratory, and the National Weather Service. The community actively participates in protecting and enhancing local natural resources through volunteer work projects, informational forums, and cash donations in support of these activities.

The current estimated population of the region is about 114,400[10] or about 26 percent of the total 2018 estimated population of Monterey County (435,594). In the next 20 years, population in the six cities in the region (not including areas in the Ord Community) is projected to add less than 8,000 people (AMBAG, 2008)[11]. The unincorporated portion of the region has essentially five distinct population segments. These are located along the Highway 68 corridor, in the Pebble Beach/Carmel Highlands area, the valley portion of the Carmel River watershed between the mouth of the river and Carmel Valley Village, in the Cachagua area (also in the Carmel River watershed), and in the Ord Community.

Population growth in the unincorporated portions of the region (former Ord Community) over the next 20 years is difficult to estimate. However, population growth in this area may be similar to incorporated portions of the region (i.e. almost level), as development constraints are similar between the two areas.

Most of the population growth in the region over the next 20 years is expected to be in the Ord Community. The Final Fort Ord Reuse Plan Reassessment, published in December 2012, does not describe future population estimates, but does have this to say about growth:

> The ultimate build out of the former Fort Ord, as guided by the BRP [Base Reuse Plan], is constrained by three primary variables: 1) a cap on the volume of water allocated to base reuse (6,600 acre-feet per year) and availability of an augmented (i.e., reclaimed/desalinated) water supply; 2) a cap on the number of new housing units (6,160); and 3) a cap on new population (37,700).
>
> Since adoption of the Base Reuse Plan, 446 residential units have been constructed (including 65 units under construction at East Garrison). Another 4,549 new residential units have been approved, but not yet constructed.[12] About 1,100 units have been continuously inhabited or rehabilitated since the former Fort Ord was closed. According to the reassessment's Market

[10] Population figure estimated from a population of 112,000 served within the MPWMD boundary with the following additions: 1) add 2,000 for Cachagua Valley; 2) add 400 for population in the Carmel River watershed south of the river; note: no estimate made for Tularcitos Creek watershed.

[11] This information is from the most recent housing Regional Needs Allocation Plan prepared by AMBAG in 2008. As of July 2019, an update to the AMBAG Plan has not been prepared.

[12] These figures are from 2012, the number of residential units that have been construction and approved has increase since this time.

Study, the existing un-built lots represent an estimated 20 to 30 years of inventory at projected population growth/housing demand rates for Monterey County.

The Ord Community area has recently been the focus of efforts to redirect development away from current open space areas and toward the blighted regions of the Ord Community. As in many areas in California, community attitudes concerning growth are divided. Owners of undeveloped property, business representatives, and construction tradespersons are generally in favor of growth, while existing homeowners and environmentalists are often opposed. Within the California American Water service area[13] (i.e., much of the planning region), the public – as reflected in the positions of local elected officials and voting on ballot measures – appears to support construction or development of existing legal lots of record, but often expresses concern regarding new property subdivisions. In the Ord Community, where Marina Coast Water District is the provider, the Fort Ord Reuse Plan was reassessed, and a Final Reassessment Plan was prepared in 2013.

Large portions of the planning area are currently dedicated to recreation and conservation through federal, state, regional, and local parks, and through protected privately-owned properties, such as those owned by BSLT and The Nature Conservancy.

2.7 Economic Conditions and Important Trends

The economic base in the region is made up of tourism, government, education, and the military. More than 80 percent of Monterey County's visitor services facilities are located in the planning region and account for about $2 billion in economic activity. It is estimated that about 8 million people visit the region each year. Tourism suffered a downturn after 2007 and has slowly rebounded. Housing prices in the region between 2007 and the present suffered the most in lower cost areas, where home prices plunged more than 50 percent during the housing crash. More upscale areas, such as Carmel, Carmel Valley, Pebble Beach, and Monterey saw lesser declines and have begun appreciating to a level last seen at the peak of the housing boom.

Monterey County is projected to see a slightly higher percentage increase in population and housing than in jobs. The region as a whole is expected to see about a 25 percent increase in the number of jobs in the next 20 to 25 years. It should be noted that job growth will likely be limited if unincorporated areas and the cities are constrained by limited water supplies. With the exception of CSUMB and the Ord Community, most areas are expected to see little or no growth in population and housing units.

The region contains some of the most expensive housing in the County in areas along the coast in the Carmel Highlands, Pebble Beach, Pacific Grove, Monterey and further inland in Carmel Valley and Hidden Hills. water supply constraints as one of the factors in contributing to an acute shortage of affordable housing County-wide and described the Monterey Peninsula area as even less affordable than the rest of the County.

Median household incomes are summarized in **Table 2-6**.

[13] Within the planning Region, the Monterey District of California American Water includes the cities of Monterey, Carmel-by-the-Sea, Del Rey Oaks, Pacific Grove, Sand City, most of Seaside, and the unincorporated communities of Carmel Valley, Del Monte Forest (Pebble Beach), Carmel Highlands, Robles Del Rio (in Carmel Valley), Rancho Fiesta (in Carmel Valley), Ryan Ranch (Hwy 68 corridor), Bishop Ranch (Hwy 68 corridor), and Hidden Hills/Bay Ridge (Hwy 68 corridor).

Table 2-6: Median Household Income (MHI) by Area [a]

Location	Number of Households	Total Population	MHI
California	13,996,299	38,982,847	$63,783
City of Carmel-by-the-Sea	3,631	3,876	$81,607
Carmel Valley Village	2,029	4,407	$90,813
City of Del Rey Oaks	724	1,555	$86,806
City of Monterey	13,371	28,671	$86,511
City of Pacific Grove	8,425	15,617	$81,304
City of Sand City	172	355	$45,000
City of Seaside	11,057	34,259	$53,406
Del Monte Forest	2,833	4,575	$105,208

[a] Based on ACS 2012-2016 data

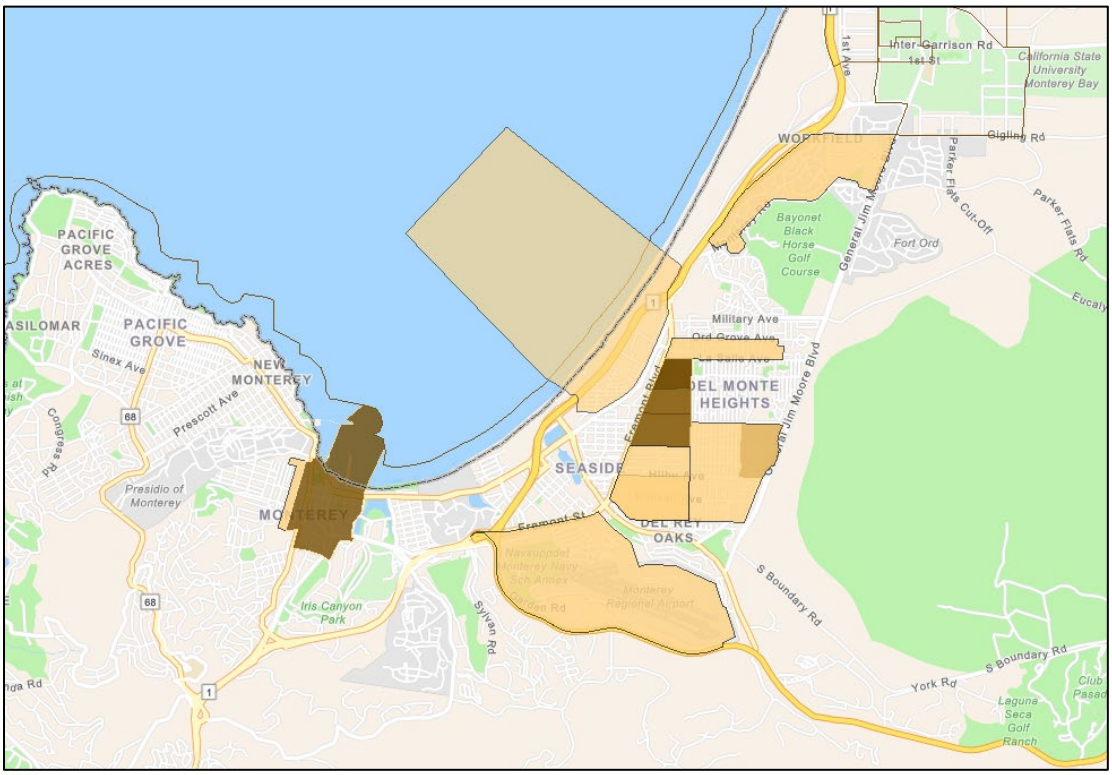
2.8 Disadvantaged Communities

State IRWM guidelines require that water resources planning identify any disadvantaged communities in the region, the specific critical water-related needs of such communities, and what mechanisms were used in development of the Plan to ensure participation of disadvantaged communities. A "disadvantaged community" is defined by the State of California as a community with an annual median household income (MHI) that is less than 80 percent of the statewide MHI [CA Water Code, Section 79505.5(a)]. ACS 2013-2017 data indicated that the MHI for California was $67,169; therefore, communities with an average MHI of $53,735 or less are considered disadvantaged communities. In addition, the Plan must identify any water-related Environmental Justice concerns for the region and describe how implementation of the Plan addresses Environmental Justice.

When income data within the region is analyzed, there are multiple communities can be considered disadvantaged. These communities are shown in **Figure 2-4.**

The population of these areas is represented in the Stakeholder Group and additional outreach to these groups was conducted prior to each stakeholder meeting for the development of this updated plan (see **Chapter 14, Stakeholder Involvement,** and **Appendix 14-a**). During discussions at stakeholders meetings, no additional critical water-resource related issues were identified that related directly to disadvantage communities or environmental justice concerns.

Figure 2-4: Disadvantaged Communities Map for South Monterey Bay, Monterey Peninsula, and Carmel Bay



2.9 Native American Tribes

MPWMD is lead agency for the IRWM Plan under CEQA. It is anticipated that the MPWMD Board of Directors will adopt the IRWM Plan under a CEQA Statutory Exemption for Feasibility and Planning Studies (Guideline § 15262). For this reason, Tribal Consultation is not required as part of this IRWM Plan Update. In an effort to foster coordination and communication with all relevant stakeholders, a representative from OCEN was invited to RWMG meetings and was given the opportunity to review this Plan.

Chapter 3 Goals and Objectives

IRWM Plan Standard 3

The Integrated Regional Water Management (IRWM) Plan must clearly present objectives and describe the process used to develop the objectives. Plan objectives must address major water-related issues and conflicts of the region. In addition, objectives must be measurable by some practical means so achievement of objectives can be monitored. The IRWM Plan must contain an explanation of the prioritization or reason why the objectives are not prioritized.

3.1 Monterey Peninsula Regional Goals

3.1.1 Background- 2007 and 2014 Goals and Objectives

A key step in the IRWM Plan update process is for the RWMG to reassess the most recent IRWM Plan goals and objectives, which was last done for the 2014 update. Goals are established for broadly outlining the IRWM Plan direction, whereas objectives provide a reasonable basis for decision making, guide work efforts, and may be used to evaluate project benefits. These represent achievable goals but may not represent the highest function attainable for any particular goal due to present-day legal, financial, and physical constraints. However, an important function of the IRWM Plan is to outline a process for adaptive management, including a process to change goals based on new information and/or conditions.

In 2005, MPWMD coordinated several stakeholder meetings that focused on creating goals and objectives. Stakeholders appointed a Technical Advisory Committee (TAC) comprised of staff representatives from the RWMG and other stakeholders within the Region including California State University Monterey Bay, Carmel River Watershed Committee, Monterey Bay National Marine Sanctuary, Seaside, Carmel River Steelhead Association, the Planning and Conservation League, and Pebble Beach Company.

After DWR funded a planning grant for the Region in 2006, based in part on the DWR and SWRCB review of regional goals and objectives, stakeholders were asked to re-evaluate the goals and objectives. The result was a set of regional goals based on statewide priorities, previous water management efforts, stakeholder involvement, and experience in regional issues. Between December 2006 and July 2007, MPWMD coordinated a series of workshops to finalize the goals and objectives for inclusion in the 2007 IRWM Plan.

The goals for the 2014 Plan were based on improving existing water resource conditions in the Region at the time the IRWM Plan was developed and were modified (2012 through 2014) as a result of the consideration of the 2013 DWR Proposition 84 & 1E Guidelines. For the 2014 update, MPWMD coordinated additional stakeholder meetings and solicited input via email to reassess the goals and objectives from the November 2007 IRWM Plan in light of locally changed conditions and new guidance from the state and Regional Water Quality Control Board, Central Coast (CCRWQCB or RWQCB). Goals

The goals for this Plan update were based on improving existing water resource conditions in the Region at the time the IRWM Plan was developed and were modified (2018 through 2019) as a result of the consideration of the 2016 DWR Proposition 1. For this update, the RWMG held meetings and solicited input via email to reassess the goals and objectives from the 2014 IRWM Plan in light of locally changed conditions and new guidance from the state and Regional Water Quality Control Board, Central Coast (CCRWQCB or RWQCB). The goals included herein best illustrate the shared regional vision for accomplishing integrated regional water resource plans and other future planning efforts in the area.

Regional goals are organized into six general categories: water supply, water quality, flood protection and erosion prevention, environmental protection and enhancement, climate change (added for this IRWM Plan Update), and regional communication and cooperation. The goals for each of these categories are summarized in **Table 3-1**.

Table 3-1: Monterey Peninsula Regional Goals

Water Supply	Water Quality
Improve regional water supply reliability through environmentally responsible solutions that promote water and energy conservation. Protect the community from drought and climate change effects with a focus on interagency cooperation and conjunctive use of regional water resources.	Protect and improve water quality for beneficial uses consistent with regional community interests and the RWQCB Basin Plan through planning and implementation in cooperation with local and state agencies and regional stakeholders.
Flood Protection	**Coastal and Streamside Erosion**
Ensure that flood protection strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects and maximize opportunities for comprehensive management of water resources.	Ensure that erosion management strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects.
Watershed Management	**Environmental Protection & Enhancement**
Develop watershed scale management strategies, considering climate change effects and maximizing opportunities for comprehensive management of water resources.	Preserve the environmental health and well-being of the Region's streams, watersheds, and the ocean by taking advantage of opportunities to assess, restore and enhance these natural resources when developing water supply, water quality, and flood protection strategies. Seek opportunities to conserve water and energy and adapt to the effects of climate change.
Climate Change	**Regional Communication**
Adapt the region's water management approach to deal with impacts of climate change using science-based approaches, and minimize the regional causal effects related to water resources.	Identify an appropriate forum for regional communication, cooperation, and education. Develop protocols for encouraging integration and reducing inconsistencies in water management strategies between local, regional, State, and Federal entities. Provide balanced access and opportunity for the public, stakeholders, and DACs to participate in IRWM efforts.

3.1.2 Objectives

Revisions to the objectives were aimed at meeting new guidelines for regions to consider climate change, an increased emphasis on disadvantaged community issues and outreach, statewide priorities in the 2013

California Water Plan,[1] the revised CCRWQCB Basin Plan dated June 2019, and other regulations and guidance. The plan objectives have been developed and modified by the region's stakeholders iteratively since 2006 through the processes described below. The objectives are more specific than regional goals, and they have consistently addressed major water-related issues and conflicts of the region. Within subsequent chapters of this Plan, the following are presented to assist the Region in achieving the objectives:

- Resource Management Strategies (**Chapter 4**)
- Planning grant projects approved in 2018 (**Chapter 10**)
- IRWM plan implementation projects from a 2018 solicitation on ranking process (**Chapter 6**)

Development of Objectives and Priorities for 2019 IRWM Plan

The process followed by the RWMG in 2018 for identifying pertinent goals and objectives and then prioritizing regional projects under those goals and objectives consisted of the following key steps.

1. ***Describe water-related issues.*** There are several issues that the Region has grappled with for many years including limited water supply, declining habitat for sensitive species, storm water management, groundwater management, flooding, and erosion (coastal and streamside). Through a community outreach program, workshops, and deliberation with stakeholders, the RWMG and the TAC identified the specific water-related issues to be addressed by this IRWM Plan.
2. ***Develop List of Objectives.*** This effort built upon ongoing planning efforts in the region, including the Carmel River Watershed Action Plan prioritization process, the development of the Monterey Regional Storm Water Management Program, the ongoing water supply planning processes, and the Carmel River Parkway Plan. Like the regional goals, the plan objectives are organized under eight categories of water supply, water quality, flood protection, coastal and streamside erosion, watershed management, environmental protection and enhancement, climate change, and regional communication and cooperation.
3. ***Develop Criteria.*** The RWMG and TAC considered the following criteria in setting regional priorities. Projects in the IRWM Plan should:
    - benefit multiple agencies and stakeholders or large portions of the Region;
    - meet water supply goals, improve or protect environmental resources, and improve existing infrastructure;
    - avoid negative impacts to infrastructure, water supply, or environmental resources;
4. ***Develop and Refine Priorities.*** The RWMG developed a draft set of priorities based on individual entity responsibilities, strategic plans, and short- and long-term goals. At a RWMG meeting in September 2018, a TAC was appointed to refine the priorities using the Priority Criteria.
5. ***Prioritization.*** The TAC met regularly to deliberate and refine priorities and develop a project scoring process. As a result of these workshops, a suite of projects was identified for inclusion in the plan and a process to modify the Plan and project list in the future was determined.

[1] The California Water Plan is currently being updated; a Draft Plan has been released for public review and a Final Plan is expected by the end of 2019.

3.1.3 Objective Prioritization Process for the IRWM Plan Update

In August of 2018, a RWMG meeting was convened to introduce stakeholders to the 2019 IRWM plan update and the 2016 IRWM Plan Guidelines (DWR, July 2016),[2] and to revisit the 2014 IRWM objectives and priorities for the region in order to make the plan compliant with DWR guidelines. The process of developing and updating objectives considered the following overarching policy documents and laws that apply to the region in addition to considering the new guidelines.

- Central Coast Basin Water Quality Control Plan
- 20 x 2020 Water Efficiency Goals
- Requirements of California Water Code §10540(c)

These overarching policies/regulations are described in the following sections.

Central Coastal Basin Water Quality Control Plan

Central Coastal Basin Water Quality Control Plan, known as the Basin Plan, was updated in June 2019. It is the water quality control plan formulated and adopted by the CCRWQCB. The objective of the Basin Plan is to manage surface and ground water in the Central Coast region to achieve the highest water quality reasonably possible. The Central Coast region includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties, most of San Benito County, and parts of San Mateo, Santa Clara, and Ventura counties. 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. In addition, the CCRWQCB established the following water quality planning goals (RWQCB 2019):

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 freshwater 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 objectives for the Monterey Peninsula IRWM region promote actions to meet the water quality standards outlined in the Basin Plan and are consistent with the overarching Basin Plan goals.

[2] During this prioritization process, DWR released the 2019 IRWM Grant Program Guidelines. The 2016 IRWM Grant Program Guidelines are comprised of two volumes. Volume 1 contains the general process, procedures, and criteria that DWR will use to implement the Proposition 1 IRWM Grant Program, which includes the IRWM Planning and Disadvantaged Community Involvement Grant Programs. Volume 2 contains the IRWM Plan Standards and related guidance, and the region acceptance and plan review procedures. The 2019 IRWM Grant Program Guidelines contain the general process, procedures, and criteria that DWR will use to implement the Proposition 1 IRWM Grant Program, which includes the IRWM Implementation Grant Program and any future grant programs pending another update to the guidelines.

20x2020 Water Efficiency Goals

The 20x2020 Water Conservation Plan (20x2020 Plan) sets forth a statewide road map to maximize the state's urban water efficiency and conservation opportunities starting in 2009. It aims to set in motion a range of activities designed to achieve a 20 percent per capita reduction in urban water demand by 2020. These activities include improving an understanding of the variation in water use across California, promoting legislative initiatives that incentivize water agencies to promote water conservation, and creating evaluation and enforcement mechanisms to assure regional and statewide goals are met. The 20x2020 Plan discusses these many activities in detail. It should be noted that the baseline year for the conservation goals set in the 20x2020 Plan was 2005. The Region has implemented aggressive water conservation programs since the mid-1980s, which has resulted in one of the lowest per capita water consumption of any comparable community in the State of California at approximately 58 gallons per person per day. This can be compared to the California statewide average in 2018 of about 85 gallons per person per day (estimates vary depending on the source).

Requirements of CWC §10540(c)

At a minimum, all IRWM Plans must ensure that the Plan objectives are consistent with the overarching goals, as they apply to the Region. The following is from the California Water Code §10541(c), presented to the region's stakeholders at the August 2018 meeting to be addressed in the IRWM Plan:

- 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 in the area within the boundaries of the Plan.

Program Preferences and Statewide Priorities by Objectives

In accordance with Water Code §79707(b and e) and §79742 (a and f), the 2016 DWR Guidelines state that preference will be given to proposals that:

- Leverage Funds – Give priority to projects that leverage private, federal, or local funding or produce the greatest public benefit.
- Employ New and Innovative Technology or Practices – Give special consideration to projects that employ new or innovative technology or practices, including decision support tools that support the integration of multiple jurisdictions, including, but not limited to, water supply, flood control, land use, and sanitation.

- Implement IRWM Plans with Greater Watershed Coverage – Give priority to projects in IRWM Plans that cover the greater portion of the watershed.
- Multiple Benefits – Give special consideration to projects that achieve multiple benefits.
- In addition to the Program Preferences contained in the Water Code, DWR has compiled various statewide priorities that will be utilized for the Proposition 1 IRWM Grant Program. The Statewide Priorities are based on the 2014 California Water Action Plan, issued by the California Natural Resources Agency, California Department of Food and Agriculture, and the California Environmental Protection Agency (January 2016).

At the September 2018 RWMG meeting, stakeholders were asked to provide general comments and input to a draft set of goals and objectives revised in accordance with the 2016 Guidelines from DWR and new regional circumstances and conditions.

Based upon RWMG input (including verbal and written comments) and the Objectives Feedback/Prioritization Exercise, the draft objectives were modified and re-ordered. The 2018 objectives review process resulted in thirty-three (33) total objectives. The result of the objectives review and prioritization effort is shown in **Table 3-2**.

Table 3-2: IRWM Plan Update Prioritized Regional Objectives

Water Supply (WS) Goal: Improve regional water supply reliability through environmentally responsible solutions that promote water and energy conservation. Protect the community from drought and climate change effects with a focus on interagency cooperation and conjunctive use of regional water resources.	
WS-1.	Meet existing water supply replacement needs of the Carmel River system and Seaside Groundwater Basin.
WS-2.	Maximize use of recycled water and other reuse and where feasible, expand sewer services to areas with onsite systems to increase sources of water for recycling. *
WS-3.	Develop opportunities for stormwater capture and reuse pursuant to the Stormwater Resource Plan.
WS-4.	Evaluate, advance, or create water conservation throughout the Region. *
WS-5.	Improve water supply needs to achieve multiple benefits, beneficial uses and environmental flows.
WS-6.	Seek long-term sustainable supplies for adopted future demand estimates.
Water Quality (WQ) Goal: Protect and improve water quality for beneficial uses consistent with regional community interests and the RWQCB Basin Plan through planning and implementation in cooperation with local and state agencies and regional stakeholders.	
WQ-1.	Improve inland surface water quality for environmental resources (e.g. steelhead), including headwaters and tributaries of streams, and to protect potable water supplies. *
WQ-2.	Improve ocean water quality, including, but not limited to, Areas of Special Biological Significance (ASBS), by minimizing pollutants in stormwater discharges.
WQ-3.	Protect and improve water quality in groundwater basins, especially where at risk from seawater intrusion.
Flood Protection (FP) Goal: Ensure that flood protection strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects and maximize opportunities for comprehensive management of water resources.	
FP-1.	Develop regional projects and plans necessary to protect critical infrastructure and sensitive habitats from flood damage and sea level rise, in particular, along the Carmel Bay and South Monterey Bay shoreline.*

FP-2.	Develop approaches for floodplain restoration or adaptive management that minimize maintenance and repair requirements (sustainable flood management systems).
FP-3.	Promote floodplain restoration that protect quality and availability of water while preserving or restoring ecologic and stream function.
FP-4.	Provide community benefits beyond flood protection, such as public access, open space, recreation, agricultural preservation, and economic development. *
Coastal and Streamside Erosion (CSE) Goal: Ensure that erosion management strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects.	
CSE-1.	Manage areas along the shoreline susceptible to erosion, including long-term strategic retreat where appropriate.
CSE-2.	Identify opportunities to restore natural stream function, including meandering, in the lower 15 miles of the Carmel River and selected tributaries.
CSE-3.	Reduce or prevent adverse downcutting in the main stem Carmel River and its tributaries.
Watershed Management (WM) Goal: Develop watershed scale management strategies, considering climate change effects and maximizing opportunities for comprehensive management of water resources.	
WM-1.	Reduce human-induced sources of non-point fine sediment runoff.
WM-2.	Restore natural fire frequency in headwater forests.
WM-3.	Restore the natural hydrologic flow regime in disturbed watersheds where appropriate, including low impact development strategies in urbanized areas.
WM-4.	Re-establish a natural level of sediment supply within the Carmel River and its tributaries.
Environmental Protection and Enhancement (EV) Goal: Preserve the environmental health and well-being of the Region's streams, watersheds, and the ocean by taking advantage of opportunities to assess, restore and enhance these natural resources when developing water supply, water quality, and flood protection strategies. Seek opportunities to conserve water and energy and adapt to the effects of climate change.	
EV-1.	Protect and enhance sensitive species and their habitats in the regional watersheds*; including, but not limited to, promoting the steelhead recovery by meeting accepted or approved environmental flows within the regional watersheds.
EV-2.	Assess, protect, enhance, and/or restore natural resources, including consideration of climate change, when developing water management strategies and projects. *
EV-3.	Minimize adverse effects on biological and cultural resources when implementing strategies and projects.
EV-4.	Identify opportunities for open spaces, trails and parks along streams and other recreational areas in the watershed that can be incorporated into projects. *
EV-5.	Identify and integrate elements from appropriate Federal and State species protection and recovery plans.
EV-6.	Promote watershed activities for fire fuel management and adaptive management strategies to protect water quality and water supplies from catastrophic wildfires. *
Climate Change (CC) Goal: Adapt the region's water management approach to deal with impacts of climate change using science-based approaches, and minimize the regional causal effects related to water resources.	
CC-1.	Implement adaptation measures and mitigation solutions to climate change effects, including increased large storm intensity and/or frequency, sea level rise, drought and wildfire.
CC-2.	Support increased education, monitoring and research to increase understanding of long-term impacts of climate change in the region.
CC-3.	Increase energy conservation measures and alternatives to fossil fuel and non-renewable resources to reduce greenhouse gas emissions associated with water and wastewater facility operations and IRWM projects.

Regional Communication and Cooperation (RC) Goal: Identify an appropriate forum for regional communication, cooperation, and education. Develop protocols for encouraging integration and reducing inconsistencies in water management strategies between local, regional, State, and Federal entities. Provide balanced access and opportunity for the public, stakeholders, and DACs to participate in IRWM efforts.	
RC-1.	Identify cooperative, integrated strategies for protecting both infrastructure and environmental resources, including from climate change impacts.
RC-2.	Foster collaboration among regional entities as an alternative to litigation through ongoing meetings of the RWMG and regional data sharing.
RC-3.	Identify and pursue additional opportunities for public education, outreach, and communication on water resource management and climate change, including to disadvantaged communities and stakeholders with interests in water management issues.
RC-4.	Build relationships with State and Federal regulatory agencies and other water forums and agencies.
NOTE: * = Objective is closely aligned with Statewide Priorities (see **Table 3-4**).	

3.1.4 Measuring Attainment of Objectives

The IRWM Guidelines require that objectives must be measurable by some practical means to enable monitoring of the achievement of the objectives and thus the success of IRWM Plan implementation. Because the IRWM Plan is implemented primarily through projects, these measures, or "metrics" apply to projects that seek to achieve the objectives. **Table 3-4** suggests potential qualitative and quantitative measurement metrics that will be further developed when projects under the plan have been implemented. Although this Plan attempts to identify the most appropriate measures for a given objective, the suggested measures do not encompass the full breadth of possible ways to measure success in meeting the Plan goals and objectives. See **Chapter 8, Plan Performance and Monitoring** for additional detail about the future process for measuring achievement of goals and objectives.

Table 3-3: Statewide Priorities versus 2019 IRWM Plan Objectives

Statewide Priority Name/Description	Objective
Make Conservation a California Way of Life • Building on current water conservation efforts and promoting the innovation of new systems for increased water conservation. • Expand agricultural and urban water conservation and efficiency to exceed SBX7-7 targets. • Provide funding for conservation and efficiency. • Increase water sector energy efficiency and greenhouse gas reduction capacity. • Promote local urban conservation ordinances and programs.	WS-4, EV-2, CC-3, RC-3
Increase Regional Self-Reliance and Integrated Water Management Across All Levels of Government • Ensure water security at the local level, where individual government efforts integrate into one combined regional commitment where the sum becomes greater than any single piece. • Support and expand funding for Integrated Water Management planning and projects. • Improve land use and water alignment. • Provide assistance to disadvantaged communities. • Encourage State focus on projects with multiple benefits. • Increase the use of recycled water.	WS-1, WS-2, WS-3, WS-4, WS-5, WS-6, FP-1, FP-4, EV-4, EV-5, RC-1, RC-2, RC-3, RC-4

Statewide Priority Name/Description	Objective
Achieve the Co-Equal Goals for the Delta • This action is directed towards State and federal agencies; however, consideration will be afforded to eligible local or regional projects that also support achieving the co-equal goals providing a more reliable water supply for California and to protect, restore, and enhance the Delta ecosystem.	NA
Protect and Restore Important Ecosystems • Continue protecting and restoring the resiliency of our ecosystems to support fish and wildlife populations, improve water quality, and restore natural system functions. • Restore key mountain meadow habitat. • Manage headwaters for multiple benefits. • Protect key habitat of the Salton Sea through local partnership. • Restore coastal watersheds. • Continue restoration efforts in the Lake Tahoe Basin. • Continue restoration efforts in the Klamath Basin. • Water for wetlands and waterfowl. • Eliminate barriers to fish migration. • Assess fish passage at large dams. • Enhance water flows in stream systems statewide.	WQ-1, WQ-2, FP-1, FP-3, CSE-2, CSE-3, WM-3, WM-4, EV-1, EV-1, EV-3, EV-4, EV-5, EV-6
Manage and Prepare for Dry Periods • Effectively manage water resources through all hydrologic conditions to reduce impacts of shortages and lessen costs of state response actions. Secure more reliable water supplies and consequently improve drought preparedness and make California's water system more resilient. • Revise operations to respond to extreme conditions. • Encourage healthy soils.	WS-1, WS-2, WS-3, WS-4, WS-5, WS-6, FP-1, FP-2, EV-2, CC-1, CC-2, CC-3, RC-1, RC-2, RC-3
Expand Water Storage Capacity and Improve Groundwater Management • Increase water storage for widespread public and environmental benefits, especially in increasingly dry years and better manage our groundwater to reduce overdraft. • Provide essential data to enable Sustainable Groundwater Management. • Support funding partnerships for storage projects. • Improve Sustainable Groundwater Management. • Support distributed groundwater storage. • Increase statewide groundwater recharge. • Accelerate clean-up of contaminated groundwater and prevent future contamination.	WS-1, WS-2, WS-3, WQ-3, CC-1, RC-1
Provide Safe Water for All Communities • Provide all Californians the right to safe, clean, affordable and accessible water adequate for human consumption, cooking, and sanitary purposes. • Consolidate water quality programs. • Provide funding assistance for vulnerable communities. • Manage the supply status of community water systems. ○ Additionally, as required by Water Code §10545, in areas that have nitrate, arsenic, perchlorate, or hexavalent chromium contamination, consideration will be given to grant proposals that included projects that help address the impacts caused by nitrate, arsenic, perchlorate, or hexavalent chromium contamination, including projects that provide safe drinking water to small disadvantaged communities.	WS-1, WS-2, WQ-1, WQ-3, RC-1

Statewide Priority Name/Description	Objective
Increase Flood Protection • Collaboratively plan for integrated flood and water management systems, and implement flood projects that protect public safety, increase water supply reliability, conserve farmlands, and restore ecosystems. • Improve access to emergency funds. • Better coordinate flood response operations. • Prioritize funding to reduce flood risk and improve flood response. • Encourage flood projects that plan for climate change and achieve multiple benefits.	WS-3, FP-1, FP-2, FP-3, FP-4, CC-1, CC-2, CC-3, RC-1, RC-4
Increase Operational and Regulatory Efficiency • This action is directed towards State and federal agencies; however, consideration will be afforded to eligible local or regional projects that also support increased operational of the State Water Project or Central Valley Project.	NA
Identify Sustainable and Integrated Financing Opportunities • This action is directed towards State agencies and the legislature.	NA

Table 3-4: Measuring Attainment of IRWM Plan Objectives

Objective	Qualitative Measurement	Quantitative Measurement
Water Supply		
WS-1. Meet existing water supply replacement needs of the Carmel River system and Seaside Groundwater Basin. *	Identification of, and proposals for, implementation of projects and initiatives/programs that will result in achieving water supply replacements for the Carmel River system and Seaside Groundwater Basin.	Measurable increase in water supply replacement amounts (i.e., in acre-feet per year, AFY) for the Carmel River system and Seaside Groundwater Basin.
WS-2. Maximize use of recycled water and other reuse and where feasible, expand sewer services to areas with onsite systems to increase sources of water for recycling. *	Identification and implementation of projects and initiatives/programs designed to increase use of recycled water on individual properties as well as by regional wastewater treatment entities.	Measurable increase of use of recycled water in lieu of potable water (AFY); number of individual properties benefitted.
WS-3. Develop opportunities for stormwater capture and reuse pursuant to the Stormwater Resource Plan.	Implementation of projects identified in the Stormwater Resource Plan.	Measurable improvements in water supply from reuse and capture resulting from implementation of projects included in the Stormwater Resource Plan.
WS-4. Evaluate, advance, or create water conservation throughout the Region. *	Identification of projects and initiatives/programs meant to evaluate, advance, or create water conservation.	Quantitative increase in water conservation; or number of new or enhanced conservation programs/projects.
WS-5. Improve water supply needs to achieve multiple benefits, beneficial uses and environmental flows.	Identification of projects and initiatives/programs meant to evaluate, advance, or create water conservation in the region.	Quantitative increase in water conservation; or number of new or enhanced conservation programs/projects.
WS-6. Seek long-term sustainable supplies for adopted future demand estimates.	Identification and implementation of projects designed to protect, enhance, and increase long-term sustainable supplies for adopted future demand estimates.	Measurable improvements in long-term sustainable supplies for adopted future demand estimates.
Water Quality		
WQ-1. Improve inland surface water quality for environmental resources (e.g. steelhead) and potable water supplies. *	Identification of needs and opportunities to improve surface water quality for environmental resources. Design and implementation of projects or programs to improve conditions.	Results of projects or programs implemented to improve conditions. Measurable improvement in water quality (i.e., reduced pollutant concentrations) attributed (at least in part) to the implementation of new projects/programs. Pounds of pollutants eliminated from discharges.
WQ-2. Improve ocean water quality, including Areas of Special Biological Significance (ASBS), by minimizing pollutants in stormwater discharges. *	Identification of sources of existing pollutants potential increases in runoff that may impact ocean water quality, including ASBS, and implementation of innovative and effective projects or programs to improve existing runoff conditions.	An increased percentage of projects that include BMP, LID standards, or other alternatives to minimize runoff that may impact ocean water quality. Number of projects or programs implemented to improve existing runoff conditions.

Table 3-4: Measuring Attainment of IRWM Plan Objectives

Objective	Qualitative Measurement	Quantitative Measurement
WQ-3. Protect and improve water quality in groundwater basins, especially where at risk from seawater intrusion.	Identification of projects and initiatives/programs designed to protect and improve groundwater quality.	Measurable improvements to groundwater quality (i.e., lowering of salinity, pollutant concentrations) through implementation of projects/programs. Pounds of pollutants eliminated from discharges.
Flood Protection and Erosion Prevention		
FP-1. Develop regional projects and plans necessary to protect critical infrastructure and sensitive habitats from flood damage and sea level rise, in particular, along the Carmel Bay and South Monterey Bay shoreline. *	Demonstrated progress in eliminating potential for properties to flood damage.	Acreage of property (or square feet of habitable buildings) removed from flood zones identified in flood insurance study updates; reduction in annual losses/damages from flooding in dollars; number of properties removed from mapped flood hazards.
FP-2. Develop approaches for floodplain restoration or adaptive management that minimize maintenance and repair requirements (sustainable flood management systems).	Identification of policies and programs that will require all new development to implement adaptive management methods (i.e., LID).	Estimated reduction in annual maintenance/repair costs; presence/absence of LID program; number of projects implementing LID.
FP-3. Promote floodplain restoration that protect quality and availability of water while preserving or restoring ecologic and stream function.	Identification of natural stream/river ecological and hydrological functions and eliminating/minimizing threats to function.	Acres of enhanced or reconnected floodplains; acres of newly created treatment wetland areas; acres of upland enhanced through BMPs, revegetation, number of projects implementing LID.
FP-4. Provide community benefits beyond flood protection, such as public access, preservation or creation of open space, recreation, agricultural preservation, and economic development.	Identification of opportunities to provide community benefits and design of projects or programs to provide them.	Results of projects or programs implemented for community benefits such as miles of new trails or acres of 1) new publicly accessible open space; 2) preserved agricultural land; or 3) increased number or appeal of recreational and tourism industry opportunities/benefits.
Coastal and Streamside Erosion (CSE)		
CSE-1. Manage areas along the shoreline susceptible to erosion, including long-term strategic retreat where appropriate.	Identification and implementation of policies and projects that minimize and/or stabilize shoreline erosion. Identification and implementation of projects that disburse high runoff flows into the shoreline.	Measurable (in linear distance) reduction or pause in shoreline erosion.
CSE-2. Identify opportunities to restore natural stream function, including meandering, in the lower 15 miles of the Carmel River and selected tributaries.	Identification, design, and implementation of projects or programs intended to restore natural stream function of the Carmel River and its tributaries.	Acreage (or lineal feet of stream or river) of restored river habitat. Measurable increase in meandering of the Carmel River and its tributaries.

Table 3-4: Measuring Attainment of IRWM Plan Objectives

Objective	Qualitative Measurement	Quantitative Measurement
CSE-3. Reduce or prevent adverse downcutting in the main stem Carmel River and its tributaries.	Identification, design, and implementation of projects or programs to reduce streamside erosion.	Acreage (or lineal feet of stream or river) of stable streambanks, compared to previous years of streambank stability. Periodic measurement of cross-sections and stream thalweg slope.
Watershed Management (WM)		
WM-1. Reduce human-induced sources of non-point fine sediment runoff.	Identification and implementation of projects or programs that reduce non-point source runoff.	Measurable decrease in areas susceptible to human-induced sediment runoff within the region.
WM-2. Restore natural fire frequency in headwater forests.	Identification and implementation of policies and programs that foster natural fire frequency in headwater forested areas.[3]	Comparison of historical fire frequency established with tree-ring studies to recorded fire history in the watershed.
WM-3. Restore the natural hydrologic flow regime in disturbed watersheds where appropriate, including low impact development strategies in urbanized areas.	Implementation of outreach events, distribution of educational materials, and communications to raise awareness about LID.	Number of acres improved. Comparison of pre-LID and post-LID storm runoff hydrographs to estimated natural runoff.
WM-4. Re-establish a natural level of sediment supply within the Carmel River and its tributaries.	Identification (and prioritization) of problem areas within the Carmel River, and of opportunities for improvements. Tracking and documentation of BMPs related to sedimentation.	Measured reduction in turbidity in high-sediment streams. Measured changes in sediment substrate.
Environmental Protection and Enhancement (EV)		
EV-1. Protect and enhance sensitive species and their habitats in the regional watersheds*; including, but not limited to, promoting the steelhead recovery by meeting accepted or approved environmental flows.	Identification, design, and implementation of projects or programs intended to protect and enhance sensitive species and habitats.	Increase in area (or lineal feet of stream or river) of conserved, protected and enhanced sensitive species habitats, including length of stream opened during key seasons/months to fish and other aquatic species for migration and watershed areas opened to upland habitat for other species. Measured increases in numbers of species populations.
EV-2. Assess, protect, enhance, and/or restore natural resources, including consideration of climate change, when developing water management strategies and projects. *	Identification, design, and implementation of projects or programs intended to protect and enhance natural areas.	Increase in area of assessed, protected, enhanced, and/or restored natural areas.

[3] Historical studies of "natural" fire frequency are no longer applicable as climate change occurs.

Table 3-4: Measuring Attainment of IRWM Plan Objectives

Objective	Qualitative Measurement	Quantitative Measurement
EV-3. Minimize adverse effects on biological and cultural resources when implementing strategies and projects. *	Consider and mitigate potential adverse effects on biological and cultural resources when implementing strategies and projects or developing alternatives to avoid impacts.	Quantifiable measurement is specific to the project and type of resource affected. At a minimum, a no net loss policy should be implemented for potential adverse effects on sensitive biological and cultural resources (i.e., significant impacts should be mitigated).
EV-4. Identify opportunities for open spaces, trails and parks along streams and other recreational areas in the watershed that can be incorporated into projects.	Identification of opportunities to provide community recreational benefits along streams or in watersheds.	Area, miles of trails, and/or number of projects or programs implemented providing community recreational benefits along streams or in watersheds.
EV-5. Identify and integrate elements from appropriate Federal and State species protection and recovery plans. *	Requirement to integrate Federal and State species protection and recovery plans into design of all projects, programs, or initiatives.	Number of projects implemented integrating Federal and State species protection and recovery plans.
EV-6. Promote watershed activities for fire fuel management and adaptive management strategies to protect water quality and water supplies from catastrophic wildfires. *	Improved understanding of effects of wildfire events on water resources. Identify research/monitoring programs to document effects of wildfire events on water resources.	Number of projects implemented that protect water resources from fire and/or analysis of water quality data prior to and after wildfires.
Climate Change		
CC-1. Implement adaptation measures and mitigation solutions to climate change effects, including increased large storm intensity and/or frequency, sea level rise, drought and wildfire.	Reports, plans, and projects that address adapting to these changes (e.g., Storm Water Resource Plan).	Number of projects implemented incorporating consideration of future climate change impacts and or/reporting of mitigation effectiveness over time.
CC-2. Support increased education, monitoring and research to increase understanding of long-term impacts of climate change in the region.	Improve access to data, reports on current science, documenting trends in climate change (rain fall, temperature, sea level rise, river flows). Development of clearinghouse of proposed and current monitoring programs related to climate change impacts.	Number of research/monitoring programs implemented to obtain greater understanding of long-term impacts of climate change in the Region, and/or monetary investment in research and monitoring programs.
CC-3. Increase energy conservation measures and alternatives to fossil fuel and non-renewable resources to reduce greenhouse gas emissions associated with water and wastewater facility operations and IRWM projects.	Compile data reports on current science, documenting trends in resource conservation and alternative energy sources. List of proposed additions for current monitoring programs to decrease resource demands of potential projects.	Number of research/monitoring programs implemented to decrease resource demands of potential projects in the Region, and/or monetary investment in research and monitoring programs.
Regional Communication		

Table 3-4: Measuring Attainment of IRWM Plan Objectives

Objective	Qualitative Measurement	Quantitative Measurement
RC-1. Identify cooperative, integrated strategies for protecting both infrastructure and environmental resources, including from climate change impacts. *	Meetings between local, regional, state, and federal entities to identify and resolve infrastructure and environmental resources problem areas.	Agreements between local, regional, state, and federal entities.
RC-2. Foster collaboration among regional entities as an alternative to litigation. *	Meetings convened between regional entities and stakeholders to discuss and plan regional water initiatives and/or resolve water-related conflicts. Positive indication of public support for implementation of water-related projects and/or programs that demonstrate collaborative efforts.	Number of lawsuits or threatened litigation over proposed projects, programs, or initiatives.
RC-3. Identify and pursue additional opportunities for public education, outreach, and communication on water resource management and climate change, including to disadvantaged communities and stakeholders with interests in water management issues. *	Implementation of targeted programs to educate the public about water resources, with an emphasis on high priority geographic areas or demographic groups.	Number of presentations and outreach events which increase public education about water resources issues and needs; number of diverse, typically under-represented groups attending stakeholder meetings.
RC-4. Build relationships with State and federal regulatory agencies and other water forums and agencies.	Meetings convened and agreements reached between State and Federal regulatory agencies and other water agencies to facilitate the permitting, planning, and implementation of water-related projects.	Number of projects, programs, or initiatives successfully designed, permitted, or implemented as a result of improved relationships and communication with state and federal regulatory agencies.

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Chapter 4 Resource Management Strategies

IRWM Plan Standard 4

The IRWM Plan must document the range of RMS considered to meet the IRWM objectives and identify which RMS were incorporated into the IRWM Plan. The effects of climate change on the IRWM region must factor into the consideration of RMS. RMS to be considered must at least include the RMS, listed in Table 2 below and discussed in detail in the current CWP Update, which may be found at https://water.ca.gov/Programs/California-Water-Plan/Water-Resource-Management-Strategies.

Table 2 – CA Water Plan Resource Management Strategies

• Agricultural Water Use Efficiency • Urban Water Use Efficiency • Crop Idling for Water Transfers • Irrigated Land Retirement • Conveyance – Delta • Conveyance – Regional/local • System Reoperation • Water Transfers • Flood Risk Management • Agricultural Lands Stewardship • Economic Incentives (Loans, Grants and Water Pricing) • Ecosystem Restoration • Forest Management • Recharge Area Protection • Sediment Management* • Outreach and Engagement*	• Conjunctive Management and Groundwater Storage • Desalination • Precipitation Enhancement • Recycled Municipal Water • Surface Storage – CALFED • Surface Storage – Regional/local • Drinking Water Treatment and Distribution • Groundwater Remediation/Aquifer Remediation • Land Use Planning and Management • Matching Quality to Use • Pollution Prevention • Salt and Salinity Management • Urban Runoff Management • Water-Dependent Recreation • Watershed Management • Water and Culture

The IRWM Plan must identify and implement, using vulnerability assessments and tools such as those provided in the Climate Change Handbook, RMS and adaptation strategies that address region-specific climate change impacts, including:

- Demonstrate how the effects of climate change on its region are factored into its RMS.
- Reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions.
- An evaluation of RMS and other adaptation strategies and ability of such strategies to eliminate or minimize those vulnerabilities, especially those impacting water infrastructure systems.

As required by the Guidelines, all strategies recommended in the Department of Water Resources IRWM guidelines were initially considered for inclusion in the IRWM plan update, but not all strategies were found to be feasible or applicable to this region. Once the strategies were considered, they were evaluated based on how they could, in combination or individually, align with the planning objectives. This section describes the strategies contained in this IRWM Plan.

The California Water Plan (CWP) defines a resource management strategy as a project, program, or policy that helps local agencies and governments manage their water and related resources. For example, urban water use efficiency and pricing policies with incentives for customers to reduce water use are strategies. New water storage to improve water supply, reliability, and quality is another strategy.

4.1 Resource Management Strategy Consideration

4.1.1 Strategy Consideration Process

As shown in **Table 4-1**, all required strategies were considered to meet IRWM plan standards. Appropriate water management strategies for this plan were identified based on a review of strategies, actions and opportunities identified in local plans and in discussions at stakeholder workshops. The strategies listed in **Table 4-1** were each considered based on their applicability to the planning Region and their ability to fulfill the planning objectives. Integrated planning must include several RMS to achieve regional objectives. However, it was also understood that not all of the strategies considered would necessarily be included in the plan. This chapter summarizes the consideration and integration of the RMS.

Table 4-1: Resource Management Strategies Incorporated in the IRWM Plan

Resource Management Strategies by CWP Management Outcome	Included in 2007 Plan	Included in 2014 Plan Update	Included in 2019 Plan Update	Considered as Req. to Meet Min. Plan Standards
Reduced Water Demand				
Agriculture Water Use Efficiency	-	X	X	X
Urban Water Use Efficiency	X	X	X	X
Improve Operational Efficiency and Transfers				
Conveyance – Delta	N/A	N/A	N/A	N/A
Conveyance – Regional/Local	X	X	X	X
System Reoperation	-	X	X	X
Water Transfers	X	X	X	X
Increase Water Supply				
Conjunctive Management & Groundwater	X	X	X	X
Desalination – Brackish and Seawater	X	X	X	X
Precipitation Enhancement	-	X	X	X
Recycled Municipal Water	X	X	X	X
Surface Storage –CALFED	-	-	-	N/A
Surface Storage – Regional/local	X	X	X	X

Resource Management Strategies by CWP Management Outcome	Included in 2007 Plan	Included in 2014 Plan Update	Included in 2019 Plan Update	Considered as Req. to Meet Min. Plan Standards
Improve Flood Management				
Flood Management	X	X	X	X
Improve Water Quality				
Drinking Water Treatment and Distribution	X	X	X	X
Groundwater /Aquifer Remediation	-	X	X	X
Matching Quality to Use	-	X	X	X
Pollution Prevention	X	X	X	X
Salt and Salinity Management	-	X	X	X
Urban Stormwater Runoff Management	X	X	X	X
Practice Resources Stewardship				
Agriculture Lands Stewardship	-	X	X	X
Ecosystem Restoration	X	X	X	X
Forest Management	X	X	X	X
Land Use Planning and Management	-	-	X	X
Recharge Area Protection	-	X	X	X
Sediment Management	-	-	X	X
Watershed Management	X	X	X	X
People and Water				
Economic Incentives	-	X	X	X
Outreach and Engagement	-	-	X	X
Water and Culture	-	-	X	X
Water-Dependent Recreation	X	X	X	X

Resource Management Strategies by CWP Management Outcome	Included in 2007 Plan	Included in 2014 Plan Update	Included in 2019 Plan Update	Considered as Req. to Meet Min. Plan Standards
Other Strategies				
Crop Idling	-	-	-	X
Dew Vaporization	-	X	X	X
Fog Collection	-	X	X	X
Irrigated Land Retirement	-	-	-	X
Rainfed Agriculture	-	-	-	X
Waterbag Transport	X	-	-	X

4.2 Strategies from the California Water Plan Update

The Final 2018 CWP Update was released in July 2019.

4.2.1 Reduced Water Demand

The intent of this category of RMS is to reduce water demand. Improvements in efficiency will translate into a more sustainable demand for the Region. The management strategies that were considered are listed below. Those marked with an asterisk were not included in the plan; section 4.3 includes a discussion on items not included. Those included in the plans are described in detail below.

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency

Agriculture Water Use Efficiency

Water use efficiency and conservation measures serve to reduce water use, reduce energy consumption and therefore emissions of pollutants and greenhouse gas, reduce wastewater and potentially polluted runoff, and reduce the economic and environmental costs associated with water use and water treatment. The Region's agricultural uses are limited to a few small pockets of privately owned vineyards, located primarily in the Cachagua Valley, and small scale farming operations located along the Carmel River main stem. Water use efficiency and conservation measures strategies are already common practice in agricultural areas. Common water conservation best management practices (BMP) implemented in the region include, for example, use of a time clock/pressure switch, water flowmeters, leakage reduction, sprinkler improvements, pre-irrigation reduction, reduced sprinkler spacing, micro irrigation systems, land leveling/grading, and soil moisture sensors. Small farming operations occupy a small fraction of land in Carmel Valley and rely almost exclusively on the Carmel River alluvial aquifer for irrigation water; however, this accounts for a minor amount of water use in the IRWM planning region. Thus, promoting agricultural water use efficiency is not critical for helping the region meet its goal of improved water supply reliability.

Urban Water Use Efficiency (Conservation)

Given the legal and physical constraints to water supply in the Region and the demonstrated effectiveness of conservation, urban water use efficiency is considered an important ongoing strategy for the region, especially in the area of landscape and outdoor irrigation uses and is a proven strategy in reducing reliance on limited local water supplies. The Monterey Peninsula area has one of the lowest per capita water consumption levels of any urban area in California and is aggressively pursuing a water conservation program that includes education and conservation incentives.

Urban water use efficiency measures have been widely implemented throughout much of the region, including, for example, plumbing retrofits, surveys of large landscape areas, development of water efficient landscape guidelines, high-efficiency washing machine rebates, public information campaigns, school programs, residential ultra-low-flow flush toilet replacement programs, other appliance retrofit rebates, commercial, industrial, and institutional audits to identify water conservation opportunities, and internal water distribution system audits. Although many planning regions around the state should achieve substantial benefits from implementing urban water use efficiency and conservation programs in the future, the benefits of an aggressive conservation program for the Monterey Peninsula region will be incremental in comparison to other regions around the state, rather than substantial. It is expected that the region can achieve an annual reduction of at least 25 AFY for the foreseeable future. This strategy is considered an important means for helping the region meet its water supply objectives.

4.2.2 Improve Operational Efficiency and Transfers

The following RMS were considered to achieve the CWP management outcome of improved operational efficiency and transfers. This management outcome aims to create a new water sources, and supplement, increase allocations of, or better utilize, existing water sources within the region. The following RMS to improve operational efficiency and transfers were considered; however, the RMS identified with (*) was not chosen, as discussed in Section 4.3. Those included in the plan are discussed in more detail below.

- Conveyance – Delta*(not applicable to this region)
- Conveyance – Regional/local
- System Reoperation
- Water Transfers

Conveyance – Regional/Local

Conveyance is the control, capture, and storage of water when it is available in the wet winter and spring for use during the dry summer and fall. It includes both natural watercourses (including groundwater aquifers) and constructed facilities. The agencies managing the water supply in the Region have considered and implemented this strategy on an ongoing basis in the Carmel River and Seaside Basins. The PWM Project is currently under construction, which will provide highly treated recycled water to the region from a variety of sources including agricultural runoff, wastewater flows, and excess winter storm flows.

System Re-operation

System re-operation entails changing existing operation and management procedures for reservoirs and conveyance facilities in order to increase environmental benefits and optimize operations. CalAm has progressively re-operated its water supply system in Carmel Valley due to regulatory orders associated with protecting environmental resources. Beginning in the early 1980s, MPWMD required CalAm to move

well production downstream to wells closer to the coast and rely less on the higher quality water upstream of the mid-Carmel Valley area. Producing water from the lower-most wells was further codified with SWRCB Order 95-10 that reduced the amount of water CalAm could divert from the Carmel River. In the early 2000s, NMFS required CAW to cease diversions at the former San Clemente Dam in order to provide additional flow to the Carmel River downstream of the former dam site. CAW then concentrated water production in the lower portions of Carmel Valley portion).

The operational changes in municipal well production have resulted in increased summer habitat for steelhead downstream of the former San Clemente Dam and natural recovery of streamside riparian habitat affected by stream diversions during the 1970s and 1980s; however, transferring well production downstream also transferred and increased streambank instability in the seven nine miles of river due to a shift downstream of nearly annual dewatering of the river to meet municipal demand.

The ongoing ASR Program is a re-operation project wherein winter and spring flows in the Carmel River above those required to support steelhead are diverted and conveyed through the existing potable water supply system for injection into the Seaside Groundwater Basin (SGB). Additional optimization of this program will require significant upgrades in production, treatment, and pipeline capacity at certain points in the system.

Water Transfers

A water transfer is defined in the Water Code as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer or exchange of water or water rights. Water transfers typically occur in five ways:

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. [1]

Intra-regional transfer of potable water is already a proven strategy between the Carmel River Basin (CRB) and the SGB and is expected to be a significant component in resolving both regional supply and water quality issues in the SGB. One-way inter-regional transfer of wastewater currently occurs from the Monterey Peninsula to the M1W Regional Treatment Plant. Importation of highly treated wastewater (recycled water) back into the Region from this plant is currently under construction and will provide additional water for injection and recovery in the SGB aquifers (the Pure Water Monterey Groundwater Replenishment Project). Intra-regional transfer of recycled water currently occurs between the mouth of the Carmel River (from the Carmel Area Wastewater District treatment plant) to irrigate golf course areas in Pebble Beach.

[1] This list is a generalized statement about water transfers; each region is different and some of these means are not appropriate for the Monterey Peninsula IRWMP Region.

4.2.3 Increase Water Supply

The CWP management outcome to increase water supply can be achieved through programs and projects that provide a new water supply that would, first and foremost, replace a portion of existing water diversions in the Carmel River Basin and meet the requirement to ramp down production in the SGB and increase water levels to protect against seawater intrusion. Additional supplies would be required for new water entitlements. The dependence on rainfall to replenish water-bearing aquifers and lack of adequate surface storage puts the Region at risk of severe cutbacks in water use during drought periods lasting two or more years. Increased recycling and reuse of municipal wastewater and conjunctive use of storm water and/or other surface water may help to diversify the water supply sources. Securing a reliable water supply is one of the highest priorities in the Region and is critical to reducing impacts to the environment such as seawater intrusion and low surface flows for environmental needs.

Several water supply projects are currently under construction or being pursued by local agencies and California American Water Company to directly improve water supply reliability, eliminate unlawful diversions from the Carmel River, and reduce the potential for seawater intrusion in the SGB. In these projects, surplus surface and recycled water (Carmel River winter flows, advanced treated wastewater, treated dry weather flows, and storm water runoff) can be used to recharge the SGB. Water injected into the SGB during winter can be extracted at a later time and reduce diversions from the Carmel River Basin during the dry season.

The following RMS (listed below) are intended to provide additional water resources to the region and were considered for inclusion in this IRWM Plan; however, strategies involving the Bay-Delta Program (CALFED) are not included in this plan (identified with an *) for reasons discussed in section 4.3. Those that are included are described in detail, below.

- Conjunctive Management & Groundwater
- Desalination – Brackish and Seawater
- Precipitation Enhancement
- Recycled Municipal Water
- Surface Storage – CALFED*
- Surface Storage – Regional/local

Conjunctive Management & Groundwater

Optimizing conjunctive use of excess flows in the Carmel River Basin and storage/extraction in the SGB is critical for the region's water supply as well as for the quality of both the surface and groundwater in the region. The region currently lacks sustainable surface water storage in Carmel Valley and use of the Carmel River Alluvial Aquifer to extract water is currently restricted. The average annual outflow of the Carmel River is about six to seven times the municipal demand, but a majority of the excess flow occurs at levels well above what can be economically captured for later reuse. The SGB is an effective storage and extraction medium within the region. Use of the CRB water resources conjunctively with storage and extraction in the SGB is an important aspect of the region's water supply but is weather-dependent. Therefore, this strategy is best used to provide water supply during dry years and droughts.

Because the Region relies on groundwater production and subterranean alluvial streamflow for virtually all of its water supplies, a sound groundwater management strategy is both critical and necessary. In the Carmel River Basin, the State Water Resources Control Board (SWRCB) determined that it has jurisdiction over the water flowing in the Carmel River Alluvial Aquifer, which supplies about 70 percent of potable

water for the Region. SWRCB has set a requirement of reducing diversions from that aquifer by approximately 75 percent over the historical usage, by 2017 (SWRCB Order No. WR 95-10 and WRO 2009-0060). In July 2016 the SWRCB adopted Order 2016-0016, which amends Orders 95-10 and 2009-0060. Order 2016-0016 extends the date by which CalAm must terminate all unlawful diversions from the Carmel River from December 31, 2016 to December 31, 2021. The revised Cease and Desist Order (CDO) set an initial diversion limit of 8,310 AFY for Water Year 2015-2016 (October 1, 2015 - September 30, 2016) and establishes annual milestones that CalAm must meet in order to maintain the 8,310 AFY diversion limit through 2021.

In the SGB, which supplies about 20 percent of the potable water in the Region, the Superior Court of California adjudicated rights in the basin in 2006 and instituted a schedule for bringing the groundwater budget into balance by 2021. The Court's decision also includes requirements for managing groundwater transfers and water quality in the basin and plays a key role in how this strategy is implemented overall in the Region.

Desalination – Brackish and Seawater

Desalination has been used in the Region and surrounding area at a small scale, with plants located in the Monterey Bay Aquarium, Sand City, and City of Marina. While a large-scale plant has yet to be built and operated, this strategy is being actively pursued by California American Water. The Monterey Peninsula Water Supply Project (of which the desalination plant is a component) is currently the subject of litigation but has been approved by the CPUC for construction. The MPWSP Desal Plant would be located outside of the Region. Land-based desalinating facilities would require locating treatment, pumping, and pipeline facilities outside of the Region to deliver water to the area and would require modifications to existing infrastructure within the Region. Sea-based facilities, which would be located several miles offshore and would require significant infrastructure upgrades at the coast and within the MBNMS, have been investigated but have not moved forward.

Desalination could be combined with other water supply projects within the Region, such as ASR and injection of advanced, or highly-treated, recycled water in the SGB, to meet the Region's potable water supply needs.

Precipitation Enhancement

Precipitation enhancement, commonly called "cloud seeding," artificially stimulates clouds to produce more rainfall than they would naturally. Cloud seeding injects special substances, typically silver iodide, into the clouds to enable the raindrops to form more easily. Cloud seeding has been practiced in California since the 1950s. The MCWRA used precipitation enhancement as a resource management strategy from 1990 to 1995 and again in 2004. MCWRA retains this strategy in its portfolio as an option for future implementation. Precipitation enhancement has not been used historically within the planning Region, but remains an option for the region to consider in providing additional water on a cost-effective basis.

Recycled Municipal Water

Recycling of up to 1,000 AFY of wastewater from the CAWD plant for Pebble Beach golf course irrigation has proven to be effective in reducing potable water demand. The Pure Water Monterey Groundwater Replenishment Project is currently under construction. Upon completion the project will produce 3,500 AFY of highly treated recycled water from the Regional Treatment Plan for injection into the SGB to meet replacement water supply needs. In addition, M1W has begun perusing an expanded Pure Water Monterey Project that would produce an additional 2,250 AFY of water.

Surface Storage – Regional/local

Enlarging the capacity of Los Padres Reservoir (e.g., dredging or building a higher spillway) is currently under consideration as is removal of Los Padres Dam and restoration of the Carmel River within the reservoir inundation area. Studies concerning either removal of the dam or improvement of steelhead passage and improvement of downstream habitat were identified in the 2013 Recovery Plan for Steelhead (NMFS, 2013) as an action for recovery of the species in the Carmel River. In general, other areas in the Region are either environmentally challenging to locate new storage, would displace current economically productive land, or are urban areas that are not suitable for surface storage.

4.2.4 Improve Flood Management

The CWP management outcome to improve flood management is achieved in the following RMS.

Flood Management

The Monterey County Water Resources Agency is responsible for flood management throughout the unincorporated portions of Monterey County. Flood protection along the Carmel River and in the Canyon Del Rey watershed is a significant challenge and an important aspect of surface water related planning in those areas. Portions of the Carmel Valley floodplain have the highest repetitive loss rate in the County (defined as two or more flood insurance claims in a ten-year period). The March 10, 1995 flood (estimated peak magnitude of 16,000 cubic feet per second or about a 70-year return flood) damaged 700 residences and 68 businesses and caused the evacuation of most people in the floodplain. In addition, two 80-foot spans of the Highway 1 Bridge across the Carmel River, Bridge No. 5 at Rancho Cañada, and the Stonepine Resort Bridge were washed away. Several other bridges incurred erosion near abutments or supports including Ward's (Lower Circle), Rosie's (Esquiline Road), Schulte Road, Rancho San Carlos Road, Via Mallorca Road, and Bridges No. 2 and 3 at Rancho Cañada. Projects to reduce flooding in Carmel Valley are expected to be a high priority in the Region.

The Ramona Avenue Stormwater Runoff Infiltration Project, the Del Monte Manor Park LID Improvements Project, and the West End Stormwater Management Improvements Project incorporate flood management improvements.

In the six Monterey Peninsula Cities and in Pebble Beach, flooding problems appear to be localized and typically affect far fewer residents and structures than in most of the unincorporated areas. However, storm drain systems in these areas discharging to ASBS are often overwhelmed by high flows, presenting a significant challenge in reducing or ceasing wet weather discharges to ASBS.

4.2.5 Improve Water Quality

The CWP management outcome to improve water quality is very important for integrated planning. Projects that include these aspects of water management are anticipated to be high priority for the region:

- Drinking Water Treatment and Distribution
- Groundwater/Aquifer Remediation
- Matching Quality to Use
- Pollution Prevention
- Salt and Salinity Management
- Urban Stormwater Runoff Management

Drinking Water Treatment and Distribution

Providing a reliable supply of safe drinking water is the primary goal of municipal water supply systems in the region. Critical to achieving that goal is ensuring a safe raw water supply and well-maintained water treatment facilities. Beyond the treatment plant, a high level of water quality must be maintained as the water passes through the distribution system to customer taps. Contaminants can enter the distribution system, or water quality may deteriorate within the distribution system, for example, as a result of microbial growth and biofilm, nitrification, corrosion, water age, effects of treatment on nutrient availability (contributing to microbial growth and biofilm), and sediments and scale within the distribution system. Improvements to water treatment and distribution facilities are continually needed as infrastructure ages, populations grow, water quality stressors increase (such as seawater intrusion and chemical contaminants), and water quality standards become more stringent. This is considered an ongoing and critical resource management strategy for the region.

As water supplies change in the Region, water and recycled water treatment plants may need to be built depending on the quality and source of water supplies.

Groundwater/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. While groundwater is the primary water supply source for most of the region active groundwater remediation is not an important resource management strategy for the region. As a precaution, the Department of Health requires a 60-day residence period in the Seaside Groundwater Basin prior to extraction of injected water in order to dissipate any disinfection byproducts that might form in the aquifer. This is a type of passive treatment.

Matching 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 shallower, 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. In the Monterey Peninsula IRWM region, water is currently reclaimed and treated for golf course irrigation purposes. In addition, upon completion of the PWM Project, municipal wastewater (mixed with water from other sources) will be treated to advanced levels to enable indirect potable reuse.

Due to environmental concerns, the highest quality water in the region (surface water in the Carmel River Basin) is not diverted for use in the CalAm system.

Pollution Prevention

Non-point source pollution control is important for maintaining surface and groundwater quality in this biologically sensitive region. Several entities within the Region are implementing a storm water management program in the urban portions of the Region in compliance with Phase II requirements of the National Pollution Discharge Elimination System for storm water.

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 natural or anthropogenic origin) that carry an electrical charge are present. In February 2009, the SWRCB adopted a Recycled Water Policy that aims to promote and increase the use of recycled water. The policy requires local stakeholders, such as local water and wastewater entities and members of the public, develop salt and nutrient management plans for groundwater basins. The purpose of the plans is to protect groundwater from accumulating concentrations of salt and nutrients that would degrade the quality of groundwater and limit its use. Historical strategies for mitigating the impacts of excess salinity include desalination as well as salt dilution and displacement. For example, agricultural operations typically displace soil salts by applying more irrigation water than the crop is able to take up to flush salts out of the root zone and relocate them in a lower part of the soil profile. The salt and nutrient management plans are intended to go beyond these historical strategies (which essentially address impacts) by evaluating the initial sources and loading of salts and nutrients in a groundwater basin, and work to manage excessive loading on a regional scale. Salt and salinity management has taken on greater prominence among the Region's RMS and the Monterey Peninsula IRWM region has prepared a salt and nutrient management plan for the SGB as required by the SWRCB's Recycled Water Policy.

Urban Stormwater Runoff Management

Storm water runoff is described by the Environmental Protection Agency as "That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, underflow, or channels or is piped into a defined surface water channel or a constructed infiltration facility (Washington Department of Ecology, 1992)." These types of flows can be contaminated with pollutants that are generated through a multitude of sources, but are typically lumped into two categories—urban and agricultural runoff.

Typical pollutants detected in urban and suburban runoff include trash, metals, detergents, pesticides, sediment, nutrients and pathogens. Agricultural activities, including animal grazing, can produce nitrates, other nutrients, pathogens, and unnatural turbidity levels in nearby water bodies. The effects of storm water runoff can be seen when beaches are closed or in the case of foam coffee cups and plastic bags that wash into storm drains and mounds of trash that pile onto local beaches during storm events. Or they can be less noticeable, such as when runoff creates toxic conditions for wildlife.

According to the MBNMS, volunteer monitoring in several Monterey Bay area cities has shown that urban runoff contains some of these pollutants and may be contributing to increased mortality among marine mammals. The effects are not restricted to the environment, and can affect public health and cause economic losses from repeated beach closings and water quality warnings resulting from pathogens leaked from failing infrastructure or from human or animal wastes in the watersheds.

The RWQCB approved the MRSWMP and issued a Phase II NPDES permit for storm water discharges within the Region in Sept 2006. BMPs contained in MRSWMP should lead to an improvement in the future of near-shore water quality along the coast and in streamside areas affected by storm water discharges.

This IRWM Plan contains several projects in the planning stages for capturing and/or managing storm water. There are multiple project scopes include infiltration of runoff in local watersheds. When fully implemented, these projects could percolate into local aquifers to improve water quality and increase water quantity. See **Chapter 7, Impacts and Benefits,** for detailed project descriptions.

4.2.6 Practice Resources Stewardship

Practice Resources Stewardship is an important aspect of water related planning and the following related RMS are included in this plan:

- Agricultural Lands Stewardship
- Ecosystem Restoration
- Forest Management
- Land Use Planning and Management
- Recharge Area Protection
- Sediment Management
- Watershed Management

Agriculture Lands Stewardship

Agricultural lands stewardship broadly means the conservation of natural resources and protection of the environment on agricultural lands. Examples of agricultural lands stewardship include windbreaks, irrigation tailwater recovery, filter strips, grassed waterways, contour buffer strips, conservation tillage, noxious weed control, riparian buffers, streambank protection, and the use of cover crops and other soil-building and stabilization practices.

The primary agricultural land uses within the planning region are range lands, a handful of small-scale viticulture areas, and a few farms in Carmel Valley. The IRWM Plan may have limited benefits from including this RMS; however, there has been some interest in working to conserve these areas. One example of an ongoing program that implements this RMS is the Environment Quality Incentives Program (EQIP) that is currently being implemented by the Natural Resources Conservation Service (NRCS).

EQIP provides financial and technical assistance to agricultural producers in the State of California (NRCS 2012). In the Carmel River Watershed, the NRCS works primarily with rangelands. Through this yearly program, the NRCS assists landowners with the implementation of BMP tailored to address each site's concerns. The NRCS assists with practices that improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland (NRCS 2012). Examples of activities in the Carmel River Watershed that are implemented through the EQIP include fencing off riparian areas, installing troughs out of the streams, and pasture and hay planting.

Ecosystem Restoration

The Carmel River Floodplain Restoration and Environmental Enhancement Project (concept proposal) is one project that directly incorporates ecosystem restoration by allowing river flows to occupy areas of the floodplain that are currently in agricultural use and are disconnected from the main stem in all but the highest magnitude floods by a levee. Other projects effect ecosystem restoration indirectly, such as the projects in the Seaside Basin to increase percolation into the aquifers and reduce dependence on Carmel River sources.

State and Federal species recovery plans for steelhead and the CRLF describe several important resource areas to enhance and conserve including habitat along the Carmel River, its tributaries, and at the Carmel River Lagoon. MPWMD has an ongoing program that began in 1984 to protect, restore, and enhance steelhead habitat along the lower 25 miles of the Carmel River.

Protection of the MBNMS and State designated Areas of Special Biological Significance are also of key importance. As described in the Water Quality Objectives, the six Minimum Control Measures being implemented as part of the MRSWMP will improve near-shore water quality. However, the level and type of protection for ASBS is currently under discussion between RWQCB 3 and the ASBS dischargers in the planning Region.

Forest Management

Upper portions of the Carmel River Watershed are located within the Los Padres National Forest and Ventana Wilderness. Other forest areas within the IRWM planning area include Del Monte Forest. Protecting forests that support the watershed within the IRWM planning areas is an important aspect of water related planning. Projects associated with this IRWM Plan may not directly contribute to changes in forest management or land uses. Currently, Federal, State, and local policies for management of forestlands are considered effective for the purpose of protecting water resources. Climate change is expected to directly affect forests through increased drought stress, making trees more vulnerable to insect attack; wildfires are also likely to increase in frequency, size, and severity as climate warms. These stresses on forests will affect their capacity to naturally regulate streamflow and buffer water quality. Portions of streams that are now perennial may become intermittent with the resulting loss of riparian zones, aquatic habitats, and other beneficial uses of water that depend on perennial flows.

Some forest areas are habitat for threatened and endangered species of plants and animals in the Region.

Land Use Planning and Management

Land use directly affects water supply and water quality, and water supply and water quality is an important consideration within the region in making land use decisions. Integrating land use decisions with water and watershed management consists of sustainably planning for the housing and economic development needs of a growing population while keeping in mind the carrying capacity and other limits of the water system and watershed ecosystem. This strategy will naturally call for more sustainable land use practices, including intelligent site design, source control (e.g., low-impact development), and land use decision making that aims to both reduce and mitigate the potential impacts of climate change. Land use planning and water management planning are still treated largely as separate functions in the Monterey Peninsula region, though integration does occur to some extent. MPWMD Rules and Regulations concerning water use within a large part of the region has resulted in a de facto moratorium on most new development that has been reinforced through SWRCB and Superior Court orders. In addition, the Monterey County 2010 General Plan update requires all but single-family projects to demonstrate a sustainable water supply.

In 2018, many new entities joined the RWMG, including: California State University Monterey Bay, Carmel Area Wastewater District, Carmel River Watershed Conservancy, Carmel Valley Association, the City of Carmel-by-the-Sea, the City of Del Rey Oaks, the City of Sand City, the City of Seaside, and the County of Monterey. These groups, along with the existing RWMG members, seek to bring a greater land use perspective to the group. The RWMG is continuing its efforts to better coordinate and integrate these inextricably linked aspects of regional planning.

Recharge Area Protection

The recharge area protection has specific goals: 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. There are currently no areas within the

IRWM planning region that are specifically designated as "recharge protection areas," though there are many areas of open space and wetland that could be considered areas of natural recharge. In particular, the areas overlying the SGB have sandy qualities that enable efficient percolation of stormwater. Much of the Region is either somewhat arid rolling hills in the rain shadow of the Santa Lucia range or very rugged terrain with sedimentary deposits in canyon bottoms or low-gradient areas. There may be areas along Carmel River that would allow for the development, restoration, or enhancement of wetlands (in public lands adjacent to the lower Carmel River), in the Canyon Del Rey watershed, and in small streams within the Del Monte Forest.

Sediment Management

Sediment and sediment movement is an important function of the watershed contributing to many positive outcomes, such as beach restoration and renewal of wetlands and stream habitat. However, the potential impacts of excessive sediment are many, and include (among other things) degraded surface water quality and wildlife habitat, barriers to fish passage, and reduced storage capacity in Los Padres Reservoir, which affects the ability to maintain steelhead rearing habitat in the dry season. In addition, pollutants may be absorbed onto fine-grained sediments, potentially impairing water quality and aquatic life if they are remobilized. Sediment management is critical for the entire region, beginning with the headwaters and continuing into the coastal shores. Within the region, sediment can be managed in three ways: 1) source management involves preventing soil loss from land use activities that may, without proper management, cause erosion; 2) main stem and tributary streambanks can be stabilized against episodic avulsion during high flows that results in deposition of significant quantities of sediment within active channels; ; and 3) restricting developments that increase coastal retreat or alters the balance of coastal sand supply. Sediment deposition management aims to achieve optimum benefits from sediment deposits and prevent and mitigate negative impacts. Many agencies, organizations, and individuals throughout the Monterey Peninsula region regularly engage in sediment management activities. Sediment management is and will continue to be a critical resource management strategy for the region.

Watershed Management

The Carmel River Watershed can be managed for recreation, water supply, water quality, and environmental habitat considerations. Watersheds within the Seaside Basin can be managed for water supply, water quality, and may have some environmental habitat and recreation components. Other watersheds that drain directly to the Pacific Ocean (e.g., within Pebble Beach and the Cities of Carmel-by-the-Sea, Pacific Grove and Monterey) can be managed for recreation, water quality, and environmental habitat. All of these watershed planning strategies should be included in the planning process as it relates to surface and groundwater supply.

4.2.7 People and Water

The following RMS from the CWP are included in this Plan:

- Economic Incentives
- Outreach and Engagement
- Water and Culture
- Water-Dependent Recreation

Economic Incentives

Economic incentives include financial assistance, water pricing, and water market policies intended to influence water management. Examples of economic incentives include water rates and rate structures, free services, rebates, and the use of tax revenues to partially fund water services. As opposed to incentives, fines are a type of economic disincentive that can be used to discourage undesirable water user behavior. Economic incentives, such as turf replacement, plumbing retrofits, washing machine rebates, and residential and commercial ultra-low flow flush toilet replacement programs, have been used and continue to be used at different times by water suppliers in the region. This strategy is a particularly good option for encouraging urban water use efficiency and for assisting disadvantaged communities in attaining water services, facilities, and appurtenances. CalAm and MPWMD have implemented this RMS for many years in the region to reduce urban water use. CalAm, which supplies about 95 percent of potable water use, uses a tiered water rate structure that has significant financial incentives to minimize water use.

Outreach and Engagement

Many local agencies and organizations sponsor public education and outreach programs to educate citizens about such issues as water conservation, nonpoint source pollution prevention, and the importance of healthy watersheds. Public outreach and engagement involves community members in decision-making and can also help garner community support for projects. The Monterey Peninsula RWMG engages in outreach and engagement with disadvantaged communities in the region to support improved drinking water and wastewater management. The need for outreach and education will become all the more critical throughout the region as new data and information become available regarding climate change. Supporting education, outreach, and engagement efforts is considered one of the higher priorities for the region.

Water and Culture

“Water and Culture” presents the emerging thinking of the State and other stakeholders regarding the importance of linking cultural considerations to water management. Increasing the awareness of how cultural values, uses, and practices are affected by water management, as well as how they affect water management, will help inform policies and decisions. “Culture” in this context includes mindsets, spirituality, lifeways (including, for example, fishing towns and villages, ranching and agricultural communities, the surfing and beach culture, the environmental movement), creation stories, livelihoods, personal and community histories, and artistic and other practices that represent the diversity of California’s social fabric. Cultural practices and perspectives may result in special management needs. For example, a food supply based on subsistence fishing may expose a community to high levels of contaminants. In addition to ensuring compliance with relevant legal mandates to consider culture (for example, consultation with Native American Tribes), the consideration of culture and cultural activities can help frame and ensure sustainable management decisions. The Monterey Peninsula RWMG recognizes the importance of cultural values and practices in regard to water resource management, and supports the consideration of “culture” to the extent practicable in water resource decision-making.

Water-Dependent Recreation

The Region has wide appeal to those who enjoy sport fishing, kayaking, sailing, hiking, camping, surfing, cycling, photography, or other water-related activities. Recreation and public access are important aspects of water resource planning and are integral to the economic base of the Region, particularly as related to access in the Carmel River watershed and to the coast. Access to the Los Padres National Forest

and the Ventana Wilderness offers some of the most breathtaking settings for outdoor recreation in the State. Maintaining and expanding access to beaches, as required by the California Coastal Act, and to other recreational areas will continue to be an important consideration in future water resources projects.

4.2.8 Other Strategies

Dewvaporation

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. The technology for dewvaporation is still too new to be of significant value for the IRWM Plan region.

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 (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. Monterey County's coastal location is ideally suited for fog collection; however, as long as other viable water sources exist, fog collection will be considered a low-priority strategy for the region. However, like dewvaporation, the RWMG remains open to its potential use as a resource management tool in the future.

4.3 Strategies Considered but not Included in the IRWM Plan

The following RMS from the CWP were considered but are not recommended for inclusion in the MP IRWM Plan for the reasons provided below.

Conveyance – Delta

Since the California Delta does not extend to the IRWM Planning region, Delta conveyance improvements are not an option. Importation of water from the Delta is not viable as evidenced by previous alternative screening analyses conducted between 1996 and 2009[2]. Therefore, this resource management strategy is not applicable and will not be included in the IRWM Plan.

Crop Idling for Water Transfers

Due to the small amount of agricultural land uses within the Region, there are no significant opportunities for this resource management strategy to be pursued. Also, there is no financial incentive for growers to employ this strategy in the Region. Therefore, this resource management strategy will not be included in the IRWM Plan.

[2] Previous alternative analyses evaluating various water supply options include: MPWMD, Draft Supplemental EIR on the New Los Padres Dam and Reservoir Project, 1998; CPUC/EDAW, Plan B Component Screening Report, August 2000; the CPUC/RMC Carmel River Dam Contingency Plan Final Report, July 2002; MCWD/FORA, Regional Urban Water Augmentation Project Alternatives Analysis, March 2003; MPWMD, Monterey Peninsula Water Supply Project, Draft EIR, December 2003; and CPUC/ESA, Coastal Water Project EIR, December 2009.

Irrigated Land Retirement

For the reason stated in the preceding strategy, there are no significant opportunities for this resource management strategy to be pursued and therefore, will not be included in the IRWM Plan.

Rainfed Agriculture

For the reason stated in the preceding strategy, there are no significant opportunities for this resource management strategy to be pursued and therefore, will not be included in the IRWM Plan.

Surface Storage – CALFED

Since the California Delta does not extend to the IRWM Planning region, the CALFED Bay-Delta Program is not an option. Therefore, this resource management strategy is not applicable and will not be included in the IRWM Plan.

Waterbag Transport/Storage Technology

Due to the lack of practicability of using Waterbag Transport/Storage Technology as a sustainable water source in the IRWM planning region, the IRWM Plan did not consider this resource management strategy as a viable option. Importation of water using waterbag or similar storage is not viable as evidenced by previous alternative screening analyses conducted between 1996 and 2009 (MPWMD, 2000).

4.4 How RMS are Implemented in the Plan

Projects chosen for inclusion in the IRWM Plan represent a broad mix of the RMS (listed above in section 4.2). The RWMG encourages stakeholders to develop projects that employ a diverse mix of RMS by offering additional points to projects that demonstrate diversity as part of the project ranking process. In future IRWM Plan project solicitations, projects will continue to be proactively sought to ensure a diverse mix of RMS for the region's water management portfolio. A strong diversification will not only ensure robust solutions to current water management issues but will provide resiliency to help the region deal with uncertain future circumstances.

While all RMS described in Section 4.2 were encouraged for inclusion in each project, some of these strategies were, ultimately, not included in any of the projects or proposals:

- Agriculture Water Use Efficiency
- System Reoperation
- Precipitation Enhancement
- Surface Storage
- Drinking Water Treatment and Distribution
- Agriculture Lands Stewardship
- Economic Incentives
- Forest Management
- Recharge Area Protection
- Wetlands Enhancement and Creation

- Recreation and Public Access
- Dewvaporation or Atmospheric Pressure Desalination
- Fog Collection
- Rainfed Agriculture
- Monitoring and Research

4.5 Resource Management Strategies and Climate Change

As noted above, the RWMG selected strategies based primarily on the IRWM Plan goals and objectives. Climate Change adaptation and mitigation is one of the six goals of the Plan, and as such, was explicitly factored in to the RWMG's selection of RMS.

The RWMG supports and encourages the implementation of "no regret" adaptations to the effects of climate change. Such adaptations are those that make sense in light of the current water management context for the region and also help in terms of effects of climate change. Examples of "no regret" strategies include increasing water use efficiency, water supply sustainability, water recycling, matching quality to use, practicing increased integrated flood management, and enhancing ecosystems and their ability to provide multiple benefits to the region. The RWMG generally encourages the implementation of "no regret" strategies through the IRWM Plan and gives higher priority to these strategies in the project ranking process by providing additional points under the "Climate Change" categories.

Chapter 15, Climate Change, presents an in-depth overview of climate change and its expected consequences for the Region. The section includes a preliminary adaptation strategy based on the climate change risk assessments conducted by the RWMG and stakeholder input (see **Table 15-7**, **Adaption Response Strategies to the Effects of Climate Change**). The recommended adaptation and response strategies address, among other things, impacts of sea level rise on coastal resources and coastal groundwater basins, impacts to water supply due to changes in rainfall, and the potential for increased flooding due to higher storm flow events. Adaptation and response strategies include, for example:

- Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies
- Implement adaptation strategies to conserve California's biodiversity
- Integrate land use and climate adaptation planning
- Promote community resilience to reduce vulnerabilities
- Implement water conservation and supply management efforts
- Manage watersheds, habitat, and vulnerable species
- Prepare a regional sea level rise adaptation strategy
- Educate, empower, and engage citizens regarding risks and adaptation
- Establish regional policies to protect critical habitats
- Support essential data collection and information sharing

The RMS selected for this Plan, in particular the "no regret" strategies, are consistent with and will help carry out these adaptation and response recommendations for addressing climate change impacts. In addition to addressing climate change impacts, the IRWM Plan supports greenhouse gas emissions

reduction and climate change mitigation activities, as discussed in **Chapter 15 Section 15.6, Mitigation of Greenhouse Gas Emissions Strategy**.

The **Chapter 15** of this IRWM Plan provides an in-depth discussion regarding climate change mitigation and GHG emissions reduction. A full GHG emissions reduction strategy for the region is currently under development by Monterey County to meet State mandates (AB 32, CEQA). The Monterey County Climate Action Plan is expected to take aim at reducing emissions to state-mandated levels, including a 15 percent reduction from 2005 levels by 2020 and an 80 percent reduction by 2050. The community-wide plan, which is required by the 2010 Monterey County General Plan, will also target emissions from major commercial and industrial uses, agricultural production, transportation, residential and more. Several key strategies and actions are recommended in **Chapter 15**, for project proponents, water resource managers, land use managers, and other stakeholders in the region based on strategies listed in the Climate Change Handbook for Regional Water Planning (US EPA Region 9 and DWR 2011). The recommended GHG reduction and climate mitigation actions will be further evaluated by the RWMG to define possible next steps, responsible entities, and funding resources.

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Chapter 5 Integration and Coordination

IRWM Plan Standard 5 (Integration)

An IRWM Plan must contain structures and processes that provide opportunities to develop and foster integration.

IRWM Plan Standard 15 (Coordination)

The IRWM Plan must include:

- Identification of a process to coordinate water management projects and activities of participating local agencies and local stakeholders to avoid conflicts and take advantage of efficiencies (CWC §10541.(e)(13)).
- Identification of other neighboring IRWM efforts and the way cooperation or coordination with these other efforts will be accomplished and a discussion of any ongoing water management conflicts with adjacent IRWM efforts.
- Identification of areas where a State agency or other agencies may be able to assist in communication, cooperation, or implementation of IRWM Plan components, processes, and projects, or where State or federal regulatory decisions are required before implementing the projects.

The Integration standard in the Proposition 1, IRWM Program Guidelines ensures that an RWMG create a system that fosters integration. The IRWM Plan must demonstrate that the RWMG is forming, coordinating, and integrating separate efforts in order to function as a unified effort. Integration may occur on many levels, which are discussed in this section: 1) stakeholder/institutional integration; 2) resource integration; and 3) project integration. The processes, structures, and procedures that foster integration are also described, sometimes implicitly, in other chapters of this IRWM Plan (including Governance, Stakeholder Outreach, Data Management, and Project Review).

5.1 Stakeholder and Institutional Integration

IRWM Plans are required to contain a governance structure that enables participation from a diverse stakeholder group to participate. The California Water Code (CWC) §10541(h)(2) ensures that IRWM plans are developed collaboratively to balance interests and engage a variety of stakeholders, regardless of their ability to contribute financially. This type of integration has been provided in the Region by the governance structure, including composition of the RWMG and the process for stakeholder participation.

5.1.1 Governance

Organizations have come together to form the Monterey Peninsula RWMG for the purposes of IRWM planning and project implementation. These entities include government agencies, nonprofit organizations, water service districts, private water companies, and groups representing agricultural, environmental, and community interests:

- Big Sur Land Trust
- California State University Monterey Bay
- Carmel Area Wastewater District
- Carmel River Watershed Conservancy

- Carmel Valley Association
- City of Carmel-by-the-Sea
- City of Del Rey Oaks
- City of Monterey
- City of Pacific Grove
- City of Sand City
- City of Seaside
- Marina Coast Water District
- County of Monterey
- Monterey County Water Resources Agency
- Monterey One Water
- Monterey Peninsula Water Management District
- Resource Conservation District of Monterey County

The RWMG is made up of diverse organizations with varying expertise, perspectives, and authorities regarding water management. Since 2005, MPWMD has taken much of the responsibility in funding and administering the IRWM program in the region; however, other members of the RWMG have committed funding and staff resources to periodically review proposed projects, update the IRWM Plan, and prepare grant applications. There is no one leadership position on the RWMG and major IRWM planning decisions are decided by consensus at the stakeholder meetings. Each RWMG organization is allowed to offer support, assistance, and comments or input regardless of their financial contribution to the Plan or to other RWMG activities. As such, in both its composition and rules of governance, the RWMG lays the foundation for an integrated approach to IRWM planning.

5.1.2 Stakeholder Involvement

Outreach efforts to include stakeholders in the development of the IRWM Plan have targeted specific entities as well as the general public. An initial stakeholder email list, with about 175 names, was developed by brainstorming every known organization that could be interested in the process or product. The current list includes over 300 individuals representing over 200 agencies, organizations, and interest groups. The list continues to expand as new stakeholders become involved.

Stakeholders have played an important role in the decision-making process throughout the development of this IRWM Plan. Together, stakeholders and the RWMG represent all of the major water resource management authorities in the region—as well as neighboring IRWM regions—and provide broad and fair representation of water supply, water quality, wastewater, stormwater, flood control, watershed, municipal, environmental, agricultural, and regulatory interests throughout all geographic areas of the planning region. Stakeholder organizations include such entities as the following:

- Water suppliers and water service districts
- Wastewater agencies
- Water quality regulatory entities

- Watershed groups
- Flood control agencies
- Federal, state, county and municipal agencies
- Environmental non-profit organizations
- Business organizations
- Disadvantaged communities
- Other community organizations
- Universities and research institutions
- Native American/Tribal representatives
- Elected officials
- Other interested individuals

All of the stakeholder groups necessary to meet the objectives of the IRWM Plan are included on the stakeholder list and can be seen in **Appendix 1-d.**

The RWMG ensures public involvement in its decision-making processes through various means, including regular email updates to stakeholders regarding the IRWM planning process, a website, public comment periods on all major IRWM Plan "milestones," and occasional public workshops.

Through these efforts to develop a broad, diverse, and inclusive stakeholder base and to promote the active participation of all stakeholders in the planning effort, the Monterey Peninsula RWMG ensures stakeholder/institutional integration in the IRWM planning process.

5.2 Resource Integration

The term "resource integration" is a broad term that can be applied in several ways. It can refer to the combining of multiple participant/agency resources that aid the regional planning effort, including the sharing of data, differing expertise, or technical capacity. Resource integration can also mean the consideration of different resources or resource management strategies—including both man-made infrastructure and natural water resource features—as components of the system being managed in the IRWM planning effort. This section describes how the RWMG promotes integration of resources.

5.2.1 Sharing Information and Expertise

Between the RWMG members and stakeholders, the combined knowledge, expertise, and technical capacity within the Region is extensive. The RWMG members lend their expertise and unique perspectives throughout the planning process, and call in outside expertise from stakeholders, as needed. For example, in the early stages of IRWM Plan development, water management and natural resource specialists from throughout the Region were asked to provide their knowledge and opinions about the water resource "issues and conflicts." Outside experts were asked to provide input on technical aspects of project applications during the project review process, as needed.

Another way in which the RWMG promotes integration is through data sharing. **Chapter 9**, **Data Management** describes the data management system for the Region. Due to the Monterey Peninsula IRWM Plan's lack of an ongoing and secure funding source for data management, the RWMG has opted to use an existing State of California database framework developed by the California Surface Water

Ambient Monitoring Program and the California Environmental Data Exchange Network. Wetland and riparian habitat conditions will be measured and documented using the California Rapid Assessment Methods and groundwater data will reside in GeoTracker using the Groundwater Ambient Monitoring and Assessment (GAMA) database. Thus, the intent and design of the Monterey Peninsula IRWM Plan data management system focuses on a localized approach to data collection and management with the uploading of data into statewide databases. These databases include web tools for dissemination, which will easily allow for the sharing of data between stakeholders and Project Proponents in the planning region.

In the future, the RWMG hopes to make use of an online data tool to track IRWM Plan implementation projects. The Conservation Action Tracker database, described in **Chapter 8, Plan Performance and Monitoring**, is a data system for tracking land-use management improvements in the Region. It is an online tool that will allow Project Proponents to register and update information on conservation projects across the Region in order to track efforts and improve stakeholder ability to evaluate collective impacts and effectiveness. The Conservation Action Tracker is being implemented by the Central Coast Resource Conservation Districts and project partners of the IRWM Plan.

5.2.2 Integration of Resource Strategies

Implementing projects that promote both natural and man-made water resource infrastructure, is yet another way in which the RWMG promotes integration. **Table 4-1 (Resource Management Strategies Incorporated in the IRWM Plan)** identifies the strategies incorporated in this plan and demonstrates how the proper and "healthy" functioning of both systems are equally important. To this end, the RWMG encourages stakeholders to develop projects by offering additional points to projects that demonstrate such diversity as part of the project ranking process. The integration of resource management strategies not only ensures robust solutions to current water management issues but will enable the region to become more resilient to, and mitigate, uncertain future circumstances, including the impacts of climate change.

5.3 Project Integration

One advantage of regional planning lies in the ability to address the similar objectives of local organizations with regional programs. IRWM planning decisions can lead to existing projects being combined or augmented with new projects. The resources to implement multiple smaller efforts may benefit from economies of scale when similar local interests can be satisfied by a regional project.

The RWMG encourages stakeholders in the Region to form partnerships and to collaborate on projects that meet regional needs and produce regional benefits. The RWMG also promotes project integration during the project review process for each IRWM Plan project solicitation. During every project solicitation, a Project Review Committee comprised of RWMG members reviews each project (both implementation projects and concept proposals). Potential integration opportunities are identified, with an aim of combining discrete project elements or entire projects to create regional benefits. Through this integration process, the RWMG helps coordinate activities within the IRWM planning region in order to avoid redundancies, increase efficiencies, and to create projects with multiple benefits.

For future IRWM Plan project solicitations, the RWMG may consider hosting informal stakeholder meetings for Project Proponents and other stakeholders to discuss current projects and brainstorm new project ideas. These gatherings would be conducive to "mingling" and would promote an organic and fluid exchange of ideas. The ultimate intent is to increase project integration and to enhance opportunities for coordination of activities, collaboration, and partnerships throughout the region.

5.4 Inter-Regional Integration and Coordination

The following integrated projects and programs are being implemented in both the Monterey Peninsula region and other IRWM Regions.

5.4.1 Central Coast Areas of Special Biological Significance Regional Dischargers Monitoring Program

Pacific Grove and Monterey have been implementing an integrated regional monitoring program known as Central Coast Areas of Special Biological Significance Regional Dischargers Monitoring Program. The program involves the following regional agencies representing several other IRWM regions: Caltrans, California State Parks and Recreation Department, and the County of San Mateo.

There are 34 state-designated ASBS along the California Coast; this includes two located in the Monterey Peninsula IRWM region. On March 20, 2012, the SWRCB adopted a General Exception to the California Ocean Plan for Areas of Special Biological Significance Waste Discharge Prohibition for Storm Water and Nonpoint Source Discharges, with Special Protections (ASBS Special Protections). The ASBS Special Protections can be summarized generally to eliminate dry weather runoff, ensure that wet weather runoff does not alter natural water quality in the ASBS, and that adequate monitoring be conducted to determine if natural water quality and the marine life beneficial use is protected. The ASBS General Exception and Special Protections documents are available online.[1]

The ASBS Special Protections require water quality monitoring and provide for the option of creating regional monitoring programs. In early 2013, the Central Coast ASBS Regional Monitoring Program was established through a Memorandum of Agreement for all dischargers on the Central Coast, covering an area from Big Sur, in Monterey County, to Pt. Reyes, in Marin County. The responsible parties include the following: the Cities of Carmel, Monterey and Pacific Grove, the Counties of Marin, Monterey and San Mateo, Caltrans, the Pebble Beach Company, Stanford University Hopkins Marine Station and the Monterey Bay Aquarium.

The results of the Central Coast Regional Monitoring Program Final Report dated August 1st, 2016, established the "natural water quality" objectives to be met by the ASBS Special Protections. The monitoring included water quality sampling of all separate storm sewer system (MS4) outfalls over 18" in diameter that discharge stormwater to an ASBS, as well as receiving water quality monitoring at outfalls over 36" in diameter, reference site monitoring, and other regional elements such as rocky intertidal and bioaccumulation monitoring.

M1W agreed to act as Program Administrator on behalf of the group in the Memorandum of Agreement (MOA). The MOA is based on the existing MRSWMP. The ASBS Special Protections are being incorporated into the NPDES MS4 Stormwater Permits; therefore, the M1W's role as the Program Administrator is an extension of its role in the MRSWMP.

[1] http://www.waterboards.ca.gov/water_issues/programs/ocean/asbs.shtml

5.4.2 Inter-Regional Coordination between Monterey Peninsula and Greater Monterey County Regions

The primary area where water resource management is shared between the Monterey Peninsula and the Greater Monterey County regions is in the vicinity of the Seaside/Salinas River groundwater basin divide in the former Fort Ord military base area (now known as the "Ord Community"). The Seaside Groundwater Basin is a place of water supply storage and extraction for the Monterey Peninsula, and the Salinas Valley Groundwater Basin is a source of water supply for the Ord Community and much of the Salinas Valley. The former Fort Ord area is almost equally divided geographically between the Greater Monterey County and Monterey Peninsula IRWM regions; however, most of the current population is in the Greater Monterey region. The Ord Community is under the jurisdiction of several agencies including the Army, the Bureau of Land Management, Fort Ord Reuse Agency, City of Seaside, City of Marina, City of Del Rey Oaks, Marina Coast Water District, Monterey County and the Monterey Peninsula Water Management District. Water supply in the Ord Community is managed by the Marina Coast Water District and the City of Seaside. Water is extracted from both the Seaside Groundwater Basin and the Salinas Valley Groundwater Basin and is delivered by MCWD.

Along this border, the 45-square-mile Ord Community is a geographical transition zone containing areas and resources that are managed by many agencies, including some that are in both IRWM Regional Water Management Groups. Fundamental challenges are: 1) determining which regional IRWM Plan proposed projects should be described in each IRWM Plan; 2) prioritizing projects in each region; 3) how to cooperate between regions in order to ensure that Ord Community projects do not fall into a "no man's land" between the regions; and 4) moving projects forward that benefit both regions.

The Seaside Groundwater Basin and other portions of the former Fort Ord area can provide a significant opportunity for stakeholders in both IRWM planning regions to collaborate and coordinate on projects of interest to both regions. A combination of factors—including a lack of sufficient permanent diversion rights from the Carmel River, pumping reduction requirements resulting from the Seaside Groundwater Basin adjudication, increased water demands from planned redevelopment of the former Fort Ord military base, and increasing population—has resulted in a future need estimated at over 25,000 AFY in new water supplies for northern Monterey County (RMC 2010).

In September 2010, IRWM Planning Grant funds were requested collaboratively from the Greater Monterey County and the Monterey Peninsula IRWM regions to explore and describe the overlapping interests and jurisdictional boundaries between the two regions, focusing specifically on the former Fort Ord area and including "joint" projects. At the time that the Planning Grant work was initiated, a portfolio of possible water supply projects called the Monterey Bay Regional Water Program – the goal of which was to address water supply issues within both the Greater Monterey County and Monterey Peninsula regions – was moving through the approval process. That project is no longer being pursued by regional stakeholders. However, there are other projects being pursued by stakeholders in the region that have similar objectives and would achieve similar results if implemented, and involve regional integration, cooperation, and collaboration. The Summary Report that resulted from the Planning Grant work is attached as **Appendix 5-a**, "Interregional Coordination between the Greater Monterey County and Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Regions."

The Greater Monterey County and Monterey Peninsula IRWM regions share common interests beyond those that exist in the border Ord Community area. For example, stormwater passes across the boundaries of both regions. The Monterey Regional Stormwater Management Program covers both the Monterey Peninsula cities and unincorporated areas of Monterey County for the purposes of the NPDES Phase II stormwater permit, and as such covers geographic areas that are included in both IRWM Plans.

Additional work is needed on the regional stormwater program. The Canyon Del Rey watershed is a good example of a drainage that lies within both regions. An upgraded drainage study has been completed; however, no funds have been identified to implement any project recommended in this study. The Monterey Peninsula RWMG will continue to coordinate with the Greater Monterey County RWMG on common issues such as this.

5.5 Overview of Coordination Efforts

The coordination of IRWM-related activities and efforts between the RWMG and project proponents and stakeholders in the IRWM planning region occurs in several ways. The Monterey Peninsula IRWM website[2] provides basic information to project proponents and stakeholders. In addition, the IRWM Plan Coordinator sends email notices to all stakeholders and project proponents whenever anything "newsworthy" occurs, such as milestone decisions for the IRWM Plan or planning process, solicitation of new projects for the IRWM Plan, the ranking of implementation projects for inclusion in the Plan, or the release of new IRWM Program Guidelines or Proposal Solicitation Packages (PSPs).

Finally, project coordination occurs during each new IRWM Plan project solicitation. The Project Review Committee reviews projects submitted for the plan and grant applications (both implementation projects and concept proposals) for potential integration opportunities, with an aim of combining discrete project elements or combining entire projects to create regional programs. Through the integration process, the RWMG helps coordinate activities within the IRWM planning region in order to avoid redundancies, increase efficiencies, avoid conflicts, and to create projects with multiple benefits.

5.5.1 Coordination Between the Six Central Coast IRWM Regions

Some of the Central Coast IRWM regions have common/overlapping water-related interests, but most water issues are more effectively managed within each of the individual regions. Representatives from each of the six IRWM regions within the Central Coast Funding Area meet periodically to discuss issues related to IRWM planning and funding considerations. Discussions regarding regional cooperation began in February 2007, with the lead agencies for each of these planning regions agreeing to a set of principles to guide the funding region in seeking Proposition 50 funds.

For the purposes of coordinated planning, the Monterey Bay National Marine Sanctuary compared and summarized the six IRWM Plans in the Central Coast Funding Area (MBNMS 2008). The report found many commonalities in water management objectives and issues, though distinct differences exist. Three out of the six regions receive at least some imported water (the Pajaro River Watershed region receives about 23 percent of its water supply from the Central Valley Project and both the San Luis Obispo County and Santa Barbara County regions each receive a small portion of their water supply from the State Water Project).

The Greater Monterey County, Monterey Peninsula, and Northern Santa Cruz County IRWM regions are all dependent on local rainfall and runoff for their water supply, with no connections to water sources outside of their respective regions. Groundwater is an important water supply source for all six regions, and all but the Monterey Peninsula region experience a significant problem with seawater intrusion. Agriculture is a major interest in the other five Central Coast IRWM regions, but except for some grazing and viticulture in Carmel Valley, is not a major land use in the Monterey Peninsula region. Water quality issues are similar across all of the regions, though to varying degrees. The most significant and serious

[2] https://www.mpwmd.net/resources/irwm-program/

water quality problems tend to be seawater intrusion, nitrates, sediment, nutrients, pesticides, and other contaminants (except for the Monterey Peninsula region, which experiences fewer water quality problems than the other regions).

The regions have similar goals and objectives regarding water supply, water quality, flood management, and environmental protection and enhancement, the exception being minor differences in specific priorities. All regions aim to improve water supply reliability and protect against drought; furthermore, almost all of the regions contain objectives regarding maximizing water conservation and recycled water use. Similarly, all regions aim to protect and improve water quality (including surface water, groundwater, stormwater, wastewater, recycled water, and/or coastal waters), and to meet or exceed all applicable regulatory standards. Moreover, all regions aim to identify opportunities for enhancement and/or restoration of natural resources and to minimize adverse effects from water management activities.

Commonalities are also evident in the types of high priority projects chosen for IRWM grant funding. The differences reflect the following region-specific needs and issues: the Northern Santa Cruz County region seems to place greatest emphasis on water supply strategies; Pajaro River Watershed on groundwater management strategies; Monterey Peninsula on water quality and replacement water strategies; San Luis Obispo County on water quality and water supply strategies; Santa Barbara County equally across several strategies (mainly, water quality, water supply, wastewater treatment, and environmental protection); and the Greater Monterey County region on water supply/groundwater management, water quality, and environmental protection strategies (as reflected by the number of objectives under each goal category).

Table 5-1 provides a summary of shared interests between the six Central Coast IRWM regions. The table also shows potential opportunities for interregional projects and programs. Representatives from the six IRWM regions continue to communicate on an ongoing basis regarding IRWM planning efforts and water-related issues on the Central Coast, as well as potential opportunities for interregional projects such as those listed below.

An additional issue that is particularly suited to an interregional approach is climate change and the potential impacts on water management systems on the Central Coast. Some preliminary attempts have been made to initiate a Central Coast region-wide climate change impact analysis. Sharing information and resources, coordinating efforts, and potentially creating a region-wide database would increase efficiencies, save money and staff time, and most likely result in increased coordination, collaboration, and communication between the regions regarding climate change projects, actions, and overall planning. The Central Coast IRWM regions will continue to discuss the possibilities for collaborating on climate change planning for the Central Coast, as well as coordinating on other potential projects and programs mentioned above.

Table 5-1: Central Coast IRWM Regions: Shared Interests and Opportunities for Interregional Coordination

Objective	Key Issues	Strategies	Potential Project Examples
Water Quality	**Agriculture Water Quality:** High concentrations of nutrients, pesticides and sediment are known pollutants in certain watersheds with agricultural development.	• Nutrient management • Irrigation management • Education • Integrated pest management • Food safety efforts	• Permit Coordination • Watershed Working Groups • Ranchette Series Model • Expand Regional Mobile Lab
	Urban Water Quality: High concentrations of nutrients, indicator bacteria and metals are known pollutants in watersheds with urban development.	• Reduce runoff • Education • Integrated pest management • Best management practices	• Permit Coordination • Low Impact Development (LID) • First Flush monitoring • Green Business Program
	Special Protected Areas: All planning regions along the coast have areas either designated as Marine Protected Areas, Critical Coastal Areas or Areas of Special Biological Significance.	• Education • Watershed assessments • Monitoring	• Coast and Oceans Regional Round Table • California Coastal Commission (CCC) • Critical Coastal Areas Program • Historical Ecology
	Sediment and Erosion: Erosion from roads, agriculture and unstable stream banks carry pollutants and are detrimental to aquatic habitats and organisms.	• Irrigation management • Stream bank stabilization • Redesign of rural roads • Education	• RCD Rural Roads program • Roads Maintenance Guide • Implementation of Stormwater Management Plans (SWMPs)
	Data Coordination and Management: A coordinated effort of data synthesis, assessment, management and accessibility is important to determine effectiveness of efforts.	• Make data comparable, accessible, and useful • Develop consistent evaluation tools	• Synthesis, Analysis and Management (SAM) Program • Upload of data to the Surface Water Ambient Monitoring Program (SWAMP) • Regional Web Information Station • Central Coast Wetland Group

Objective	Key Issues	Strategies	Potential Project Examples
Water Quality/ Water Supply	**Groundwater Management:** Groundwater is an important source of water for much of the Central Coast, but is threatened or already affected by saltwater intrusion, salinity, and overdraft in many areas.	• Conjunctive management • Recharge area protection	• Pajaro Watershed • Desalination Feasibility Study • Regional Water Quality Control Board (RWQCB) Low Impact Development (LID) Strategy
Water Supply	**Water Availability:** Water needs exceed available supply throughout the Central Coast for municipal, domestic and agricultural use as well as environmental protection. Expected water demand will increase in the future.	• Desalination • Water Recycling	• Regional Planning Approach • Research • Explore new technologies • Reclaimed water • Information exchange • Import advanced technology
		• Expand conservation programs • Expand rebate programs	• Regional conservation programs
		• Recharge, restoration, and enhancement	• Wastewater management to restore naturally functioning systems • Seaside Aquifer Storage and Recovery (ASR)
Ecosystem Protection	**Fisheries Enhancement:** Many Central Coast streams provide habitat for federally threatened or endangered species such as coho salmon, steelhead, and the red-legged frog.	• Promote, improve or re-establish habitat	• Removing fish passage barriers • Watershed assessments • Habitat restoration
Flood Management	**Flood Management:** All regions have areas prone to flooding and development within flood plains.	• Flood management	• Wetland restoration • Improve existing levees • Hydromodification • Central Coast Wetland Group • Stream gauges

5.6 Coordinating with Agencies

RWMG is composed of a diverse mix of agencies, organizations, and educational institutions. Their participation enables the RWMG to conduct the IRWM planning effort in close coordination with the

agency's mission and helps avoid potential regulatory conflicts during planning and implementation. The Monterey Peninsula RWMG members include:

- Big Sur Land Trust
- California State University Monterey Bay
- Carmel Area Wastewater District
- Carmel River Watershed Conservancy
- Carmel Valley Association
- City of Carmel-by-the-Sea
- City of Del Rey Oaks
- City of Monterey
- City of Pacific Grove
- City of Sand City
- City of Seaside
- Marina Coast Water District
- County of Monterey
- Monterey County Water Resources Agency
- Monterey One Water
- Monterey Peninsula Water Management District
- Resource Conservation District of Monterey County

In addition, the RWMG has engaged in extensive coordination with federal, state, and local agencies for the planning process and for implementation of projects included in the IRWM Plan. The major federal, state, and local agencies that have been involved are described below.

5.6.1 Federal Agencies

The following coordination activities with federal agencies would occur during plan implementation.

National Oceanographic and Atmospheric Administration Monterey Bay National Marine Sanctuary

The MBNMS is an active participating member of the RWMG as well as a project proponent for several former implementation projects in the IRWM Plan. The MBNMS's representative on the RWMG helps coordinate the IRWM planning process with the MBNMS Water Quality Protection Program and works to ensure that projects included in the IRWM Plan are consistent with MBNMS regulations and programs. The MBNMS works with project proponents and other stakeholders in the Region to assist with water quality information and monitoring and to promote implementation of the MBNMS's Action Plans.

US Army Corps of Engineers

The Army Corps (Corps) is involved in the IRWM planning process primarily in its capacity as a permitting agency. A §404 Permit from the Corps, pursuant to Section 404 of the Clean Water Act, may be required for construction associated with some projects in the IRWM Plan.

US Department of Agriculture Natural Resources Conservation Service

The RWMG coordinates with the Natural Resources Conservation Service (NRCS) through the implementation of agricultural water quality and water conservation projects through the IRWM Plan. For example, the Resource Conservation District of Monterey County will collaborate with the NRCS on the Carmel River Integrated Watershed Restoration Program, Carmel Valley Livestock & Land Program, and the Carmel Watershed Rural Roads Erosion Assistance Program. NRCS conservation and engineering staff will participate in field trials and will provide equipment, lab resources, time and critical technical guidance to the RCD project team.

US Fish and Wildlife Service

The USFWS serves as an advisor to the RWMG and is largely involved in the IRWM planning process in its capacity as a permitting agency. The USFWS also provides technical assistance to project proponents.

US Environmental Protection Agency

MCWRA received grant funding from the US Environmental Protection Agency (EPA) to complete a regional water management plan for the Salinas Valley. That plan has evolved and has been expanded into this IRWM Plan for the Region. The US EPA is signatory to the MBNMS Water Quality Protection Program MOA.

US Forest Service

Wildfire management is an issue of critical importance to water and natural resource managers in the Region, particularly given the location of the region's only reservoir in a fire-prone watershed, the predominance of high quality ecological habitats in the region, and the prediction of increased fires as a result of climate change. The RWMG coordinates with the US Forest Service as part of the FireScape Monterey planning effort. FireScape Monterey is a planning effort that promotes protection of both life and property affected by wildfire and healthy resilient ecosystems through collaborative stewardship. FireScape Monterey was initiated and is co-led by the US Forest Service, in collaboration with 27 organizations and local residents, and focuses in the Big Sur Coastal Range with the potential to expand throughout Monterey County.

5.6.2 State Agencies

The following coordination activities with state agencies would occur during plan implementation.

California Coastal Commission

The California Coastal Commission provides "in-house expertise" on all matters related to the County's Local Coastal Program (LCP) and other statewide coastal issues. LCPs are basic planning tools used by local governments to guide development in the coastal zone, in partnership with the Coastal Commission. Monterey County's LCP was completed in 1987, adopted by the Monterey County Planning Department and approved by the Coastal Commission, and consists of four plans for the County's

designated coastal areas: the North County Land Use Plan, the Del Monte Forest Land Use Plan, the Carmel Land Use Plan, and the Big Sur Coast Land Use Plan. The Coastal Commission also periodically reviews LCPs for Monterey and Sand City.

California Department of Fish and Wildlife

The CDFW is involved in the IRWM planning process on an individual project basis through CEQA compliance review and through the Lake and Streambed Alteration Program. For example, MPWMD and the County of Monterey work closely with the CDFW on issues associated with the Carmel River, including coordination for Stream Alteration Agreements and issues associated with endangered species that may be impacted by projects along the river.

California Department of Transportation

California Department of Transportation (Caltrans) is involved in the IRWM planning process mainly through project implementation. For example, the Big Sur Land Trust, MPWMD, and the County of Monterey have been working with Caltrans to implement the State Route 1 Causeway project, one of three components of the proposed Carmel River Floodplain Restoration and Environmental Enhancement Project. See **Appendix 6-a**.

California Department of Water Resources

The Monterey Peninsula RWMG cooperates with DWR on all aspects of the IRWM planning process in accordance with the IRWM Program Guidelines. The IRWM Plan Coordinator communicates with the DWR regional representative on a regular basis regarding requirements of the program through periodic teleconferences with the Central Coast IRWM region representatives.

California Regional Water Quality Control Board, Region 3

The RWQCB has made a concerted effort to incorporate the RWQCB's Water Quality Priorities as well as other Regional Board directives and initiatives into the IRWM Plan and planning process. RWQCB staff attended several of the 2018 RWMG meetings focused on revising strategies and objectives. Many of the IRWM Plan projects address priorities of the Central Coast Basin Plan and the RWQCB's Water Management Initiative chapter, as well as other regional plans such as the Central Coast Regional Toxic Hot Spot Cleanup Plan. RWMG members and project proponents work closely with the RWQCB on an individual basis to develop various plans and to implement projects. For example, MPWMD worked closely with the RWQCB to develop the Salt and Nutrient Management Plan for the Seaside Groundwater Basin.

California State Parks

California State Parks serves as an advisor to the RWMG and coordinates with the RWMG through the FireScape Monterey planning process.

California State Water Resources Control Board

The SWRCB has jurisdiction over public drinking water systems and the surface waters in the region. The RWMG is proposing to implement several projects through the IRWM Plan that address SWRCB priorities including the non-point Source Pollution Control Program that are addressed by the Ramona Avenue Stormwater Runoff Infiltration Project, the Del Monte Manor Park LID Improvements Project, and the West End Stormwater Management Improvements Project.

5.6.3 Coordination with Local Agencies, Governments, and Districts

The following coordination activities with local agencies, governments and districts would occur during plan implementation.

County of Monterey

The County of Monterey has participated in IRWM Plan updates and project reviews. Individual project proponents within the County's jurisdiction also coordinate with the Public Works and Planning Department on regulatory requirements and information gaps for their projects. Project proponents are required to ensure that their projects are consistent with the Monterey County General Plan and with local ordinances.

Fort Ord Reuse Authority

FORA is responsible for the redevelopment of the former Fort Ord military base, a 28,000-acre facility now known as the Ord Community. Following a competitive selection process in 1997, the FORA Board approved MCWD, a RWMG member, as the purveyor to own and operate the water and wastewater collection systems on the former Fort Ord. Through MCWD's connection with FORA, the RWMG remains informed of the latest developments in the Ord Community, an important "border region" between the Greater Monterey County and Monterey Peninsula IRWM regions.

Monterey County Health Department

The Monterey County Health Department is responsible for implementing and enforcing the California Safe Drinking Water Act to ensure small public water supply systems deliver a reliable and adequate supply of water that is pure, wholesome, and potable to the users at all times. As a permitting agency for public water systems in Monterey County, the Health Department is integrally involved with water resource management decisions in the Region. Besides its role as a permitting agency, the Monterey County Health Department is a good source for water quality data and information and provides assistance to water users to help them comply with regulations and resolve water quality and quantity problems.

Monterey County Parks Department and Monterey Peninsula Regional Park District

The Monterey County Parks Department and Monterey Peninsula Regional Park District are involved in the IRWM planning process. These entities are consulted any time there is a project that will occur on their property and are included on the distribution list for IRWM events.

Monterey County Water Resources Agency

The MCWRA is a participating member of the RWMG. MCWRA is responsible for managing, protecting, and enhancing water supply and water quality, as well as providing flood protection, in the County of Monterey. As such, the MCWRA has produced many of the water resource and flood management plans that have been used as a basis for this IRWM Plan. The MCWRA also provides expertise for the RWMG on matters related to flood management in the Carmel Valley and along a portion of the Canyon del Rey watershed along Highway 68. MCWRA is a reviewing agency for projects proposed within the designated 100-year floodplains within the County.

Municipalities

Several local municipalities are actively involved in IRWM planning including the cities of Monterey, Seaside, Sand City, Del Rey Oaks, Pacific Grove and Carmel. Project proponents with implementation projects in the IRWM Plan are required to ensure that their projects are consistent with General Plans and local ordinances (as applicable). Staff from the City planning or public works departments are consulted by project proponents for technical advice and guidance regarding development projects within City boundaries.

Resource Conservation Districts

The RCD of Monterey County is a participating member in the RWMG. The RCD also assists other project proponents in the region with data compilation and outreach to landowners and provides "in-house expertise" on matters related to agriculture and water quality management measures.

Transportation Agency for Monterey County

The Transportation Agency for Monterey County (TAMC) is involved in the IRWM planning process mainly through project implementation. Project proponents will coordinate with TAMC as needed on various aspects of implementation.

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Chapter 6 Project Review Process

IRWM Standard 6

The IRWM Plan must contain a process or processes to select projects for inclusion in the IRWM Plan. The selection process(es) must include the following components:

- Procedures for submitting a project to the RWMG
- Procedures for review of projects considered for inclusion into the IRWM Plan. These procedures must, at a minimum, consider the following factors:
    - How the project contributes to the IRWM Plan objectives
    - How the project is related to resource management strategies selected for use in the IRWM Plan
    - Technical feasibility of the project
    - Specific benefits to DAC water issues, including whether a project helps address critical water supply or water quality needs of a DAC
    - Environmental Justice (EJ) considerations
    - Project costs and financing
    - Economic feasibility, including water quality and water supply benefits and other expected benefits and costs
    - Project status
    - Strategic considerations for IRWM Plan implementation
    - Contribution of the project in adapting to the effects of climate change in the region
    - Contribution of the project in reducing Greenhouse Gas (GHG) emissions as compared to project alternatives
    - Whether the project proponent has adopted or will adopt the IRWM Plan
    - For IRWM regions that receive water supplied from the Sacramento-San Joaquin Delta, how the project or program will help reduce dependence on the Sacramento-San Joaquin Delta for water supply (not applicable to Monterey Peninsula Region)
- Procedures for displaying the list(s) of selected projects

Review factors must be evaluated for each project and compared for all projects in a systematic manner. The results should be used to promote and prioritize projects in the selection process, while keeping in consideration the unique goals and objectives of the IRWM Region. Review factors must also include the following climate change considerations:

- Include potential effects of climate change on the region and consider if adaptations to the water management system are necessary.
- Consider the contribution of the project to adapting to identified system vulnerabilities to climate change effects on the region.
- Consider changes in the amount, intensity, timing, quality and variability of runoff and recharge.
- Consider the effects of SLR on water supply conditions and identify suitable adaptation measures.
- Consider the contribution of the project in reducing GHG emissions as compared to project alternatives
- Consider a project's ability to help the IRWM region reduce GHG emissions as new projects are implemented over the 20-year planning horizon.
- Reduce energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions.

6.1 Procedures for Submitting a Project for Inclusion in the IRWM Plan

Prioritization of projects is a required element of an IRWM Plan and aids regional decision-making on issues such as project sequencing and quantitative allocations of limited financial, economic, social, and natural resources. Consistent with IRWM Plan standards, projects that utilize multiple water

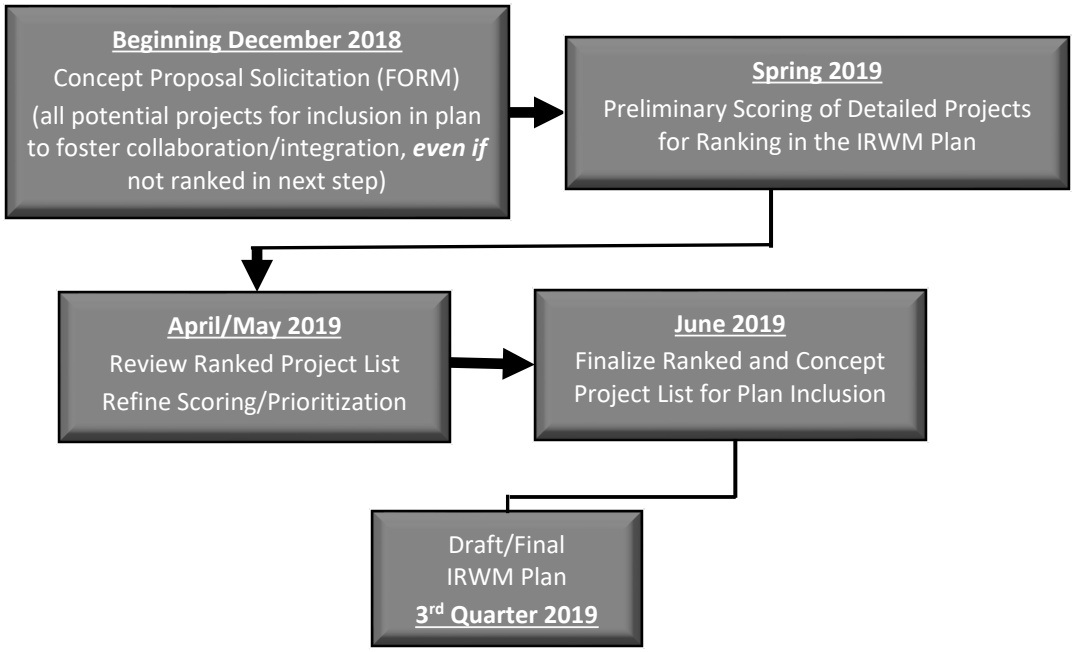
management strategies, meet Regional priorities, accomplish multiple objectives, and are feasible score higher and are more likely to move forward during implementation of the Plan.

This IRWM Plan incorporates a process to include a large number of stakeholder-sponsored projects with the potential for significant cost; however, given the scope and cost of some of the projects, it is unlikely that all projects can be fully funded by both local and State IRWM funds in the immediate future. Project sponsors may need to seek alternative funding sources in order to close funding gaps.

For the 2014 IRWM Plan, the Stakeholder Group and Technical Advisory Committee developed a system to compare and prioritize projects with vastly different characteristics. A 100-point system was used to evaluate the suite of selected projects, with each project evaluated against other projects and on whether a project would meet measurable regional objectives. Project characteristics that were deemed more important to the Region were allocated more points. Points were awarded in five different categories – water management strategies, objectives, regional priorities, technical and financial feasibility, and readiness to proceed. The result was an evaluation that describes both the strengths and weaknesses of each project and the project package as a whole.

In 2018, the RWMG solicited input from stakeholders on regional goals and objectives, which was incorporated into an updated scoring system. Projects were then solicited for inclusion in the 2019 Plan Update with a goal of creating a comprehensive project list that included concept proposals and projects that were prioritized and ready to implement. The projects included in this IRWM Plan are consistent with Plan objectives. All projects were required to undergo a thorough review process before they could be formally included in the IRWM Plan. **Figure 6-1** shows an overview of the process.

Figure 6-1: Project Solicitation Process for 2019 IRWM Plan Update



For inclusion in the plan, Project Proponents were required to first complete a short concept proposal form. Proposals that met eligibility criteria were included in the IRWM Plan Update and were moved to Step 2, allowing their project to be ranked (or prioritized). Concept proposals were required to meet the following minimum eligibility criteria to be included in the IRWM plan:

- assist the Monterey Peninsula region in achieving at least one of its IRWM Plan objectives,

- implement at least one of the region's Resource Management Strategies,
- provide water resource benefits to the region, and
- be consistent with current IRWM Guidelines and Department of Water Resources standards and requirements.

The concept proposal form was available for download starting in December 2018 and could be completed and emailed to the MPWMD. Projects and proposals included in the 2014 Monterey Peninsula IRWM Plan were not automatically included in the 2019 IRWM Plan unless a concept proposal form was completed. The Project Proponent was required to follow specific steps in order to submit a project:

- complete a concept proposal for each project,
- ensure the project information was up to date,
- respond to requests for information within the established deadline, and
- request that a project be removed if it was no longer being pursued

Projects submitted to the plan as concept proposals are contained in **Appendix 6-a**.

6.2 Project Review Procedure

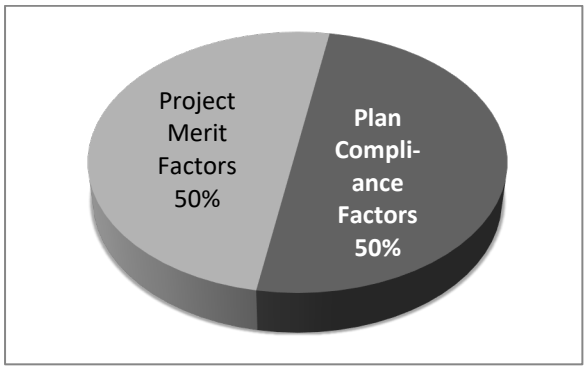
6.2.1 Detailed Project Solicitation and Scoring/Ranking (Step 2)

Project Proponents were not required to complete Step 2 in order to be included in the IRWM Plan. However, a detailed project submittal was required to be completed in order to be eligible for inclusion in an implementation grant application to the IRWM Grant Program and to be ranked in the plan.

Step 2 included submittal of detailed project information using a "Project Solicitation Form" as described below that allowed detailed objective scoring and resulted in an overall ranked or prioritized list of projects. Projects were added to the Project List by the Project Proponent(s) and in the first quarter of 2019 stakeholders were provided an opportunity to comment on the ranked list of projects through an email announcement of their availability. For projects to be ranked and prioritized, Project Proponents were required to complete and submit the detailed Project Solicitation Form.

Each project was ranked based on a score developed from answers on the Project Solicitation Form, which included a methodology for scoring that is summarized below. Two categories of factors were included in the scoring: (1) factors related to how well the project complied with the IRWM Plan, such as policy consistency and ability to assist the region in meeting its goals, and (2) factors related to the individual merits of the project, such as feasibility, readiness to proceed, and costs. Scores from each of these categories comprised one-half of the overall project score as shown in **Figure 6-2**. A detailed description of project scoring criteria, factors, relative weighting, and raw scoring is provided below.

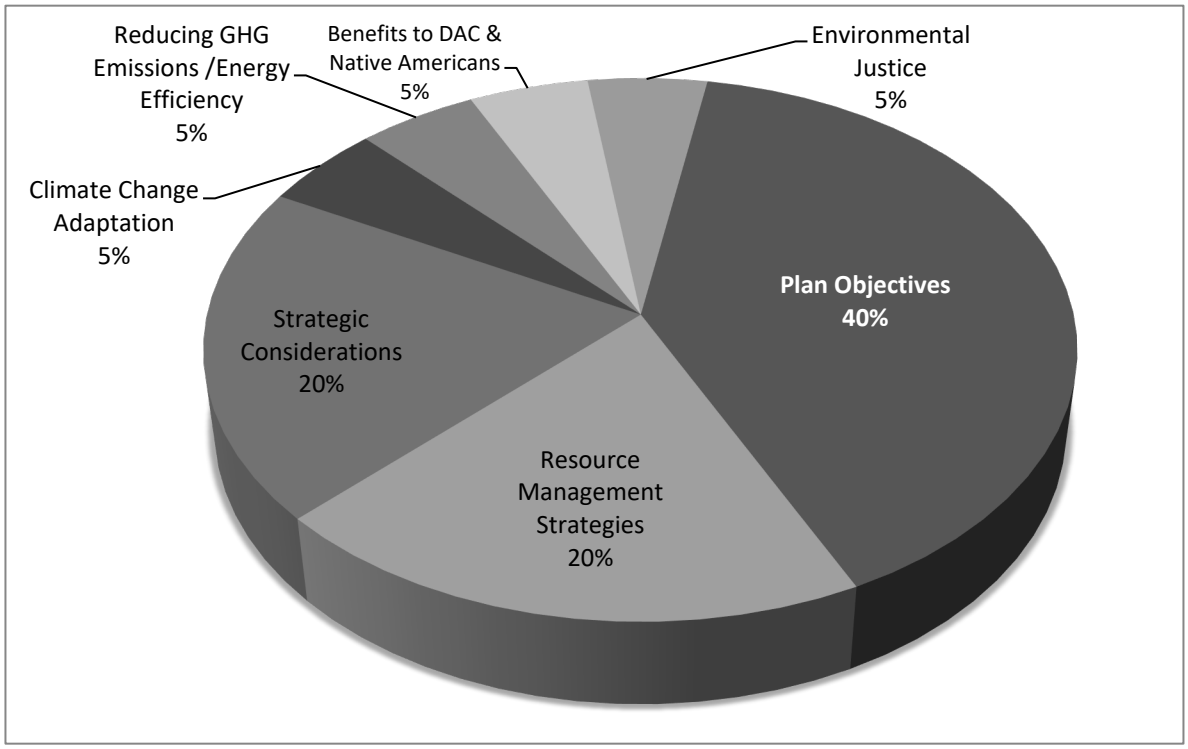
Figure 6-2: Relative Weighting: Plan Compliance vs. Project Merit Factors



6.2.2 IRWM Plan Compliance Factors (50% of total score)

Within the Plan Compliance category, projects were scored based upon the following specific factors and the relative weighting is shown in **Figure 6-3**. Following each factor, (in *italics)* is the methodology used to assign raw scores to projects based upon the project information submitted in the Project Solicitation Form. The appropriate weighting factor was applied to the raw score to give a weighted score to be used in the overall ranking.

Figure 6-3: Relative Weighting of Plan Compliance Factors



- **How the project contributed to the IRWM Plan Objectives** (40% of Plan Compliance Factors)
    - Number of objectives and high priority objectives that the project addressed

      Up to 53 points: Each project received one (1) point for meeting each of 26 objectives (26 max points). Plus, up to an additional 3 points could be received if specific metrics of each of the nine (9) high priority objectives were met.

- **How the project related to Resource Management Strategies (RMS)** (20% of Plan Compliance Factors)
    - Number of different California Water Plan (CWP) Management Outcome Categories and number of strategies that the project included.

      Total of up to 35 points, including 1 point per RMS, plus one point for every CWP management outcome category.

- **Strategic considerations for IRWM Plan implementation and project merit** (20% of Plan Compliance Factors)
    - Inter-Regionalism: Did the project involve active inter-regional collaboration or partnerships?

      5 points: project addresses inter-regional issues

    - Partnerships: How many entities were actively partnering to implement the project?

      5 points: project involved three or more partners that included both government agencies and NGOs; or

      2 points: project involved two or more partners; or

      0 points: project involved only one entity (no partnerships).

    - Monitoring and reporting of project performance: Would the project establish and document achievement of the performance criteria?

      5 points: project presents a plan for monitoring/reporting performance

    - Integration with land use planning: Was the project consistent with local plans, ordinances, and standards? Did the project integrate with local land use and water planning? Did the project increase coordination between water resources agencies and land use planners?

      5 points: if "yes" to all three questions; 3 points if "Yes" to 2 questions; 1 point for "yes" to one question

- **Specific benefits to critical disadvantaged community (DAC) and/or Native American tribal communities' water issues** (5% of Plan Factors)
    - Did the proposed project provide specific benefits to solve critical DAC water issue(s)?

      Yes: 5 points

- **Environmental Justice considerations** (5% of Plan Factors)
    - Did the project address inequitable distribution of environmental burdens and/or improve access to environmental goods?

      Yes: 5 points

- **Contribution to climate change adaptation** (5% of Plan Factors)
    - Would the project contribute to regional adaptation to projected climate change impacts? Does the project propose to implement one or more of the recommendations from the document: "*Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay*" (Monterey Bay Sanctuary Foundation and the Southern Monterey Bay Coastal Erosion Working Group, May 2012)?

      5 points: one point for every adaptation strategy implemented

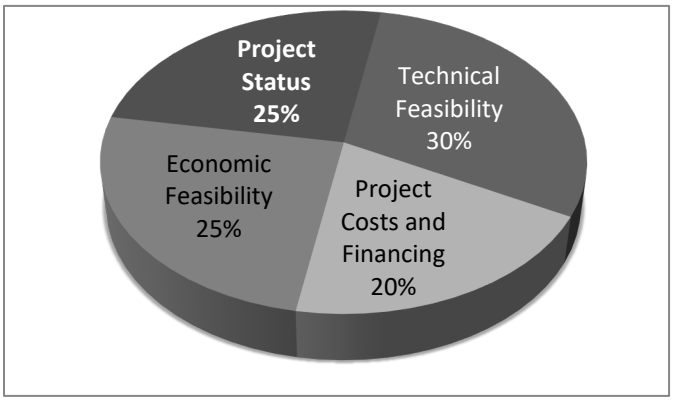
- **Contribution of the project in reducing Greenhouse Gas Emissions as compared to project alternatives** (5% of Plan Factors)
    - Compared to project alternatives, would the project reduce regional GHG emissions and/or improve energy efficiency?

5 points: one point for every GHG mitigation strategy implemented

6.2.3 Project Merit Factors (50% of total score)

Within the Project Merit category, projects were scored based upon the following specific factors with the relative weighting shown in **Figure 6-4**. Similar to the plan compliance factors, the ***italic*** text describes the proposed methodology used to assign raw scores. These factors are based upon the project information submitted in the Project Solicitation Form.

Figure 6-4: Relative Weighting of Project Merit Factors



- **Technical Feasibility** (30% of Project Merit Factors)
    - Was a common and widely accepted technology with well-documented results being used?
    - Were geologic conditions, hydrology, ecology, and other system aspects adequately described?
    - Were there significant data gaps?
    - Were there sufficient technical data to indicate the project is likely to result in success?
    - Was there enough information to support the project's estimated benefits?

      30 points: technical feasibility was documented in a project-specific pilot study or previous phase or has a documented track record of success

      -- OR score for each of the following –

10 points: technology proposed has been established as effective in similar situations;

10 points: project site conditions were documented (geology/soil, ecology, hydrology, land use, public utilities;

10 points: project partners have experience with similar projects (e.g., similar site, similar technology).

- **Project Costs and Financing** (20% of Project Merit Factors)
  - ***10 points:*** A project cost estimate was prepared and documented in the Project Form.
  - ***10 points:*** There was an identified revenue source of at least 25% match funding.
- **Economic Feasibility** (25% of Project Merit Factors)
  - ***15 points:*** Project benefits and costs were defined at a level of detail that would allow cost-effectiveness analysis or benefit-cost analysis **-- OR –** ***project is a DAC project.***
  - ***10 points:*** Project had a cost-effectiveness or benefit-cost ratio greater than 1.
- **Project Status** (25% of Project Merit Factors)
  - What steps in project planning were completed?
    - Feasibility Studies and Conceptual Plans
    - CEQA/NEPA Completed
    - Local Cost Share Confirmed
    - Right-of-way / Land Acquisition
    - Permits Acquired
    - Construction Drawings Complete & Bids Acquired

  (*4 points for each of the above criterion met for a possible total of 24 points)*

6.3 Procedures for Communicating Selected Projects

This plan update contains the projects that were submitted, including concept proposals aimed at increasing collaboration and integration and projects that were submitted using the detailed solicitation form to be ranked. The project ranking process was developed in collaboration with the stakeholders, vetted through the RWMG members, and is described in this chapter. An email announcement of the availability of the preliminary project rankings was sent to RWMG members and stakeholders on March 5, 2019. The full details of the projects submitted to the plan for ranking is in **Appendix 6-b.**

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Chapter 7 Impacts and Benefits

IRWM Standard 7

The IRWM Plan must contain a discussion of potential impacts and benefits of Plan implementation. This discussion must include both impacts and benefits within the IRWM Region, between regions, and those directly affecting DAC, EJ related concerns, and Native American Tribal communities.

7.1 Qualitative Impacts and Benefits

The anticipated impacts and benefits of individual projects in the Monterey Peninsula IRWM Plan differ greatly. Some will focus in just one resource area, for example, water supply, while other projects will integrate different resource areas, such as water supply, water quality, environmental restoration, and recreation. However, combined over time, the projects implemented through the IRWM Plan will provide multiple benefits across the entire Region—and on a variety of resource areas: water supply, water quality, flood management, environmental enhancement, regional coordination, recreational benefits, and special benefits for disadvantaged communities. At the same time, the projects will achieve the overarching goals and objectives of the Plan.

The tables below describe the impacts and benefits anticipated from each of the ranked projects (this does not include concept proposals) included in the IRWM Plan. **Table 7-1** includes the projects proposed for implementation in the IRWM Plan. Note that the impacts and benefits listed in the tables are descriptive rather than quantitative and are intended to give the reader a general understanding of the types of anticipated impacts and benefits. An in-depth impact analysis as required under CEQA will be required for every project that is included in an IRWM grant.

The impacts and benefits of implemented projects will be reviewed and this chapter of the IRWM Plan will be updated as part of the normal plan management activities. These updates will reflect changes to this chapter from any data gathered, and any additions or changes to the implementation projects listed in the IRWM Plan.

Table 7-1: Impacts and Benefits: Proposed Projects Included in the IRWM Plan

Project	Sponsor	Direct Qualitative Benefits	Direct Qualitative Impacts
Coe Avenue Recycled Water Distribution Pipeline	Marina Coast Water District	The project would offset demand for potable water supplied from Salinas Valley aquifers, with recycled water. There is an enduring long-term benefit to the Seaside Basin, as water used for outdoor irrigation contributes to groundwater recharge and irrigating with recycled water ensures that this benefit continues even during times of drought, when outdoor irrigation might otherwise be curtailed as a conservation measure. Benefits also accrue to the people of the community (parts of which are classified as Economically Distressed Areas), who will continue to enjoy the psychological and health benefits of outdoor recreation at green parks and schools, even during drought.	This project could result in temporary impacts related to noise, air quality, traffic, and drainage during construction. The project is primarily in an existing right-of-way with road improvements, therefore, little to no vegetation removal would occur.
Ramona Avenue Stormwater Runoff Infiltration Project	City of Monterey	This project would reduce flooding on Ramona Street and would provide an increase groundwater infiltration. In addition, it would capture pollutants found in runoff that would otherwise flow to the Monterey Bay.	This project could result in temporary impacts related to noise, air quality, traffic, and drainage during construction. The project is primarily in an existing right-of-way with road improvements, therefore, little to no vegetation removal would occur.
Del Monte Manor Park LID Improvements Project	City of Seaside	In addition to recreation benefits for the Seaside DAC, the proposed project offers a variety of benefits related to flood protection, water supply, water quality, and education. The project will reduce urban runoff pollutant loads, including trash and debris, currently discharged to the Monterey Bay National Marine Sanctuary. Runoff from the approximately 24-acre tributary catchment that currently enters the storm drain system would be re-routed to the pre-treatment bioswale and sub-surface infiltration infrastructure. In addition, the design includes specifications for native plants in the bioswale that both improve aesthetics and aide in the natural treatment of runoff. The project includes permanent educational signage to inform the public about the benefits of the bioswale and subsurface infrastructure.	This project could result in temporary impacts related to noise, air quality, traffic, and drainage during construction. During construction area would not be accessible to nearby residents, which could potentially result in impacts to this recreational resource.

Project	Sponsor	Direct Qualitative Benefits	Direct Qualitative Impacts
West End Stormwater Management Improvements	City of Sand City	The primary focus of this design is the capture and treatment of small, more frequent storm events. However, the combination of gray and green infrastructure will also be able to handle small and moderate storm events. The project will reduce flooding, treat urban runoff and infiltrate it into the underlying aquifer. Based on a 30% design of the project, quantitative performance outcomes include reduced pollutants entering the Monterey, increase in the average annual infiltration to the groundwater, and increased urban greening. Qualitative performance outcomes include increased city beautification through urban greening, improved resiliency to climate change, and improved community livability.	This project could result in temporary impacts related to noise, air quality, traffic, and drainage during construction. The project is primarily in an existing right-of-way with road improvements, therefore, little to no vegetation removal would occur.

7.2 How Projects Achieve IRWM Plan Goals and Objectives

Implementation of the projects included in this Plan will lead to numerous benefits including:

- **Increased water supply reliability.** Water supply and water quality projects, including conjunctive use projects, will protect or enhance current supplies while providing a sustainable source to meet future demand. Some projects will utilize improved management techniques to make better use of existing sources.
- **Water quality improvement.** Water quality in stormwater discharges to the ocean will be enhanced as a result of implementing the suite of projects in this IRWM Plan. Additionally, the threat of seawater intrusion will be reduced in the Seaside Groundwater Basin and non-point source (NPS) pollutants discharges will be reduced.
- **Public Protection.** Working with regional entities toward water supply solutions will minimize fiscal impacts to utility ratepayers. Implementation of flood control projects will reduce costly impacts to personal and commercial property and will protect human life. Improvement of water quality, especially at coastal beaches, will reduce threats to personal health and the marine environment.
- **Protection of Beneficial Uses.** The suite of projects in this Plan has the potential to provide and protect recreational, aquatic life, and habitat uses.

Implementation of the projects described in this Plan may also have quantitative and/or qualitative impacts if the projects are managed improperly. These impacts may include increased project costs to agencies and rate payers; delayed construction of planned facilities leading to delayed water supply and other benefits; and increased negative impacts on surface water or groundwater quality.

To ensure that project implementation is consistent with this Plan and that negative impacts are minimized or avoided, a framework for a program-wide project monitoring and assessment plan has been developed. This monitoring plan (**Chapter 8, Plan Performance and Monitoring**) will work within the institutional structure responsible for project implementation (**Chapter 5, Integration and Coordination**) and in conjunction with the adaptive management process outlined in **Chapter 8**.

The local agencies in the Monterey Peninsula Region stringently apply the California Environmental Quality Act (CEQA) and must comply with regulations pertaining to environmental resources prior to obtaining permits to implement proposed projects.

7.3 Project Benefits Identified by Stakeholders

The Project Proponent for each proposed project or program submitted an application that summarizes the benefit that could result in implementation.

Coe Avenue Recycled Water Distribution Pipeline:

The project addresses IRWM Plan goals and objectives related to Water Supply (WS), Quality (WQ), Climate Change (CC), and Regional Communication and Cooperation (RC).

Water Supply: This project has inter-regional benefits from maximizing the use of recycled water (WS-2) by providing advanced-treated wastewater to MCWD customers who currently irrigate outdoor landscape with potable supplies from the Salinas Valley aquifers. Parcels within the project area overlie the Seaside Groundwater Basin. Switching from potable to recycled water will continue to maintain a

supply to the Seaside Basin (WS-1) through infiltration of applied landscape water. Potable water from the Salinas Valley aquifers that is currently serving this project area could be put to beneficial use in other areas.

Water Quality: There is an indirect effect of improving ocean water quality (WQ-2), as sources of the advanced-treated wastewater include municipal and industrial wastewater, agricultural runoff, and urban stormwater runoff that would otherwise enter Monterey Bay via the Salinas River and Elkhorn Slough and direct discharge. Treating and beneficially reusing these polluted sources of water on land helps to minimize pollutants in discharges to the Monterey Bay.

Climate Change: Recycled water is a reliable water source that may be less impacted by more frequent/intense droughts that are expected to result from a changing climate (CC-1). Producing advanced-treated recycled water from freshwater sources (municipal and industrial wastewater and stormwater) is less energy-intensive than other water supply alternatives that depend on desalinating seawater or brackish groundwater, thus helping to conserve energy and decrease reliance on fossil fuels (CC-3). As part of its recycled water program, MCWD will educate future customers about the climate benefits of using recycled water (CC-2).

Regional Communication and Cooperation: The delivery of recycled water to irrigation customers is one component of the Regional Urban Water Augmentation Project (RUWAP), a regional infrastructure project involving multiple local governments, agencies, and private utilities (RC-1). By linking the region's water resources and coordinating use to maximize benefit, the project will help participants to move beyond a history of litigation and foster increased future collaboration among stakeholders (RC-2). The project will also help to build a relationship for sustainable groundwater management between the Seaside and Salinas Valley Basin agencies (RC-4).

Ramona Avenue Stormwater Runoff Infiltration Project:

The project addresses IRWM Plan goals and objectives related to Water Quality (WQ), Flood Protection (FP), Watershed Management (WM), Water Supply (WS), and Environmental Protection and Enhancement (EV).

Water Quality: Reduction of street runoff into infiltration seepage instead of flowing to Laguna Grande Lake and the Monterey Bay.

Flood Protection: Reduction of surface drainage on neighborhood streets and the abutting North Fremont street (a major arterial in Monterey) to the neighborhood DAC area.

Watershed Management: Reduction of sediment runoff by utilizing high-flow tree box filters and restoring natural hydrologic flow by infiltrating storm runoff using dry wells.

Environmental Protection: Protection of Laguna Grande Lake and Monterey Bay by reduction of street runoff.

Del Monte Manor Park LID Improvements Project:

The project satisfies several IRWM Plan goals and objectives including Water Supply (WS), Water Quality (WQ), Flood Protection (FP), Watershed Management (WM), Environmental Protection and Enhancement (EV), Climate Change (CC), and Regional Communication and Cooperation (RC). Specifically, the project will contribute to a long-term water supply for the adjudicated Seaside Groundwater Basin through the capture and infiltration of stormwater runoff (WS-3). This passive recharge will be far less energy intensive than desalinating seawater as a source of potable water, reduce greenhouse gas emissions associated with water supply operations (CC-3) and improve the

region's resiliency against prolonged drought (CC-1). Through the capture and infiltration of runoff, the project will reduce the pollutant load to the Monterey Bay National Marine Sanctuary (WQ-2), and recharge the groundwater basin, thereby reducing the risk of seawater intrusion (WQ-3). The project will alleviate periodic flooding of the existing basin, which affects a playground area utilized by the disadvantaged community (FP-4, EV-4). The project design will incorporate permanent educational signage describing the purposed and benefits of the project (RC-3).

West End Stormwater Management Improvements:

The project addresses multiple IRWM plan goals and objectives related to water supply (WS), water quality (WQ), flood protection (FP), watershed management (WM), environmental protection and enhancement (EV), climate change (CC), and regional communication and cooperation (RC). How the project meets specific objectives is explained below:

The project will capture, treat and infiltrate urban stormwater runoff into the Aromas Sand Aquifer (ASA) layer of the Seaside Groundwater Basin (SGB). The SGB is an adjudicated basin and the City has rights to draw from the ASA, which is the upper layer of the SGB. The City owns a reverse-osmosis desalination facility (RO Facility) that currently draws brackish water from the ASA via intake wells located near the beach on West Bay Street and Tioga Avenue. The RO Facility treats the brackish water and produces potable water for City uses. In recent years, the salinity of the brackish intake water has increased (possibly due to prolonged drought) and prevented the RO Facility from operating to its design capacity, resulting in the reduced production of potable water for city uses. The project is located upstream of the intake wells. Since the project will infiltrate treated urban stormwater runoff into the ASA, the gradient of fresh water flow towards the beach will increase and help to reduce the salinity of the brackish water at the intake wells, thus aiding in the operation of the RO facility and helping to increase the production of potable water for city uses. Therefore, the project will augment the drinking water supply for the City (WS-3), as well as improve quality and quantity of water supply (WS-5).

The Project will also improve water quality where runoff currently discharges to the Monterey Bay (WQ-2) and with groundwater augmentation through infiltration (WQ-3). The use of Low Impact Development (LID) designs to mimic natural hydrologic processes (WM-3) will prevent flooding in the West End neighborhood and provide urban greening (FP-4). This process will also reduce fine sediment loads originating from human activities as part of capture/treatment (WM-1). The Project will help protect natural resources from adverse impacts of climate change by providing decentralized LID Best Management Practices (BMPs) (EV-2, CC-1).

7.4 Impacts and Benefits to Disadvantaged Communities and Environmental Justice Concerns

All projects included in the IRWM Plan are reviewed for potential impacts and benefits to disadvantaged communities (DAC) and for potential environmental justice concerns as part of the regular project review process. If a potential impact to a DAC or an environmental justice concern is found, the project will not necessarily be eliminated from the Plan, but the issue will be discussed with the Project Proponent, mitigating factors will be considered, and a decision will then be made as to whether or not the project should remain in the Plan. Currently, no potential impacts to DAC or environmental justice concerns have been found in any of the projects submitted for inclusion in the IRWM Plan.

The following projects included in the IRWM Plan would directly benefit DAC in which they are located:

- West End Stormwater Management Improvements
- Ramona Avenue Stormwater Runoff Infiltration Project
- Del Monte Manor Drainage Improvements Project

7.5 Potential Adverse Environmental Impacts

Some adverse environmental impacts may be expected from implementation of the IRWM Plan, though most projects are purposefully developed to minimize environmental impacts. Construction-related impacts may include temporary and localized disturbances to air and water quality, habitat, and other physical factors including the following:

Water Resources. Construction of proposed projects may result in increased erosion and sedimentation of waterways in the vicinity of project sites, temporary changes in the watershed's hydrograph, or other impacts associated with construction activities that may degrade water resources.

Air Quality. Construction-related increases in PM_{10} (particulate matter on the order of ~10 micrometers or less) and ozone precursor emissions may result from operation of construction equipment, vehicles, and airborne dust during site grading or excavation.

Noise. Construction noise and vibration impacts may result from construction equipment, vehicles, and other activities.

Hazardous Materials. Project construction could result in spills of fuel, lubricants, pesticides, or other substances used in construction equipment.

Biological Resources. Construction associated with proposed projects may result in the direct loss or indirect disturbance of special-status plants and wildlife species that are known to or could occur in the region. Construction-related impacts may also include temporary unavailability and/or degradation of wildlife habitat, and short-term disturbance of wildlife as a result of construction noise. These impacts may result in a reduction in local population size, lowered reproductive success, and/or habitat fragmentation.

Transportation. Construction of proposed projects may result in temporary lane closures, detours, closure of transit stops, and the addition of construction trucks and equipment on the surrounding roadway system. Construction may potentially increase delays and congestion.

7.6 Fostering Benefits through Regional and Inter-Regional Coordination

The benefits of this IRWM planning effort go beyond the environmental benefits that are realized with project implementation. One of the benefits of the IRWM planning process is that it provides water resource managers with a framework for effectively integrating water management programs and projects within the Region and for achieving regional water resource goals. Through the IRWM planning process, the RWMG endeavors:

- To improve and maximize coordination of individual public, private, and non-profit agency plans, programs and projects for mutual benefit and optimal gain within the Region;

- To help identify, develop, and implement collaborative plans, programs, and projects that may be beyond the scope or capability of individual entities, but which would be of mutual benefit if implemented in a cooperative manner;
- To foster coordination, collaboration and communication between stakeholders and other interested parties, to achieve greater efficiencies, enhance public services, and build public support for vital projects; and
- To realize regional water management objectives at the least cost possible through mutual cooperation, elimination of redundancy, and enhanced regional competitiveness for state, federal, and private sources of grant funding.

Beyond the region, the IRWM program has helped to create a network through which nearby IRWM regions can collaborate on larger issues. Examples include the development of a cooperative agreement among the six Central Coast IRWM regions concerning equitable sharing of IRWM program grant funds. Locally, there is a "transition zone" between the Monterey Peninsula and Greater Monterey County regions where the Ord Community is situated. Most of the Ord Community is served water from the Salinas Valley Groundwater Basin, which is in the Greater Monterey County region, while approximately one third of the area and water demand for the Ord Community is within the Monterey Peninsula region.

Managing the resources and opportunities in the Ord Community and providing reliable water-related services for existing and future needs in the area is an ongoing challenge for both the Monterey Peninsula and Greater Monterey County regions.

The IRWM planning process fosters a spirit of positive collaboration among public, private, and non-profit agencies and organizations within the region, promotes communication, encourages new partnerships and programs, and ultimately results in increased efficiencies and cost savings. These more "intangible" benefits of the IRWM planning effort should be recognized equally alongside the numerous, significant, on-the-ground environmental and water resource benefits of project implementation.

Chapter 8 Plan Performance and Monitoring

IRWM Standard 8

The IRWM Plan shall contain performance measures and monitoring methods to ensure the objectives of the Plan are met. Therefore, the IRWM Plan must describe a method for evaluating and monitoring the RWMG's ability to meet the objectives and implement the projects in the IRWM Plan. The IRWM Plan must contain policies and procedures that promote adaptive management and, [ensure] projects are implemented [as] conditions change, as more effects of Climate Change manifest [themselves], new tools are developed, and new information becomes available, adjust IRWM plans accordingly.

The Plan Performance and Monitoring standard in the Proposition 1 IRWM Program Guidelines is to ensure the objectives of the plan are met and that projects can adapt to new challenges or incorporate new information.

Meeting this requirement will be accomplished by the following:

- Prior to implementation of any project, the RWMG will review each project using a comprehensive scoring analysis that includes IRWM program requirements and local objectives.
- After project implementation, the RWMG will review available project reports. IRWM-funded projects are required to provide reports to the grant coordinator in the region. For projects with other funding, the RWMG will request project completion reports for review.
- Concerning adapting to future changes, as stated in Section 6.6 in the RWMG MOU, the IRWM Plan and projects proposed in the plan must be consistent with State IRWM guidelines. If the guidelines change as a result of new information or tools, the RWMG will update the IRWM Plan (and proposed projects) to meet new standards.

Each implementation project submitted for inclusion in the IRWM Plan is carefully reviewed by the RWMG to ensure that it will make progress toward regional objectives and that it complies with all applicable rules, laws, and permit requirements before it can be approved for inclusion in the Plan (see **Chapter 6, Project Review Process**). Upon project completion, the RWMG will review the project report and results for conformance with IRWM Plan objectives.

Legal requirements and engineering standards and practices generally lag the rapid advancement in technology and understanding of human interaction with the environment. These latter factors are difficult to incorporate into long lead time water resources-related projects; however, this plan and the MOU reflecting the region's agreement provide the flexibility needed to meet significant future challenges and changes.

8.1 Plan Performance Measure and Monitoring Methods

Plan performance reviews will be prepared by the RWMG based on implementation of projects. The implementation of projects, along with associated monitoring data, can be tracked using project reports and database systems developed by statewide efforts. The RWMG will utilize existing database frameworks including those developed by the California Surface Water Ambient Monitoring Program (SWAMP) and by the California Environmental Data Exchange Network (CEDEN). Projects will be tracked on the Central Coast Conservation Action Tracker website. Wetland and riparian habitat conditions will be measured and documented using the California Rapid Assessment Methods (CRAM), and Groundwater

data will reside in GeoTracker using the GAMA database (see **Chapter 9, Data Management**, for a detailed description).

Two tables will be generated with each Plan Performance Review that addresses the first two requirements of the standard: 1) the RWMG is implementing projects listed in the IRWM Plan; 2) the RWMG is making progress towards meeting the objectives of the IRWM Plan. The first table will simply list all the projects in the IRWM Plan, their implementation status, and funding source. Projects that have been fully implemented will be highlighted. **Table 8-1** is an example of the table that will be completed as part of the implementation review.

Table 8-1: Status of Project Implementation

Project Proponent & Project Title	Funding Source		Date of Implementation/Status
	IRWM funds $	Other funds $ (source)	

The second table will be used to chart the progress of projects that have been implemented or are in the process of being implemented. The table will be populated by a Conservation Action Tracker database, a data system for tracking land-use management improvements in the Central Coast region. It is an online tool that will allow Project Proponents to register and update information on conservation projects across the region in order to track efforts and improve stakeholders' ability to evaluate its collective effectiveness. The Conservation Action Tracker is implemented by the Central Coast Resource Conservation Districts (RCD).

Table 8-2, below, is an example of the table that will be completed during each Plan Performance Review. The measurability criteria for objectives (see **Chapter 3, Goals and Objectives**) will be documented through the Conservation Action Tracker to help track the extent to which projects are achieving Plan objectives and implementing the IRWM Plan. Results will be brought to the RWMG for review and discussion.

Table 8-2: Progress toward Achieving IRWM Plan Objectives

Objectives	Qualitative Measurement	Quantitative Measurement
WATER SUPPLY OBJECTIVES		
WS-1. Meet existing water supply replacement needs of the Carmel River system and Seaside Groundwater Basin.		
WS-2. Maximize use of recycled water and other reuse and where feasible, expand sewer services to areas with onsite systems to increase sources of water for recycling. *		
WS-3. Develop opportunities for stormwater capture and reuse pursuant to the Stormwater Resource Plan.		
WS-4. Evaluate, advance, or create water conservation throughout the Region. *		
WS-5. Improve water supply needs to achieve multiple benefits, beneficial uses and environmental flows.		
WS-6. Seek long-term sustainable supplies for adopted future demand estimates.		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		
WATER QUALITY OBJECTIVES		
WQ-1. Improve inland surface water quality for environmental resources (e.g. steelhead), including headwaters and tributaries of streams, and to protect potable water supplies. *		
WQ-2. Improve ocean water quality, including, but not limited to, Areas of Special Biological Significance (ASBS), by minimizing pollutants in stormwater discharges.		
WQ-3. Protect and improve water quality in groundwater basins, especially where at risk from seawater intrusion.		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		
FLOOD PROTECTION OBJECTIVES		
FP-1. Develop regional projects and plans necessary to protect critical infrastructure and sensitive habitats from flood damage and sea level rise along the Carmel Bay and South Monterey Bay shoreline. *		
FP-2. Develop approaches for floodplain restoration or adaptive management that minimize maintenance and repair requirements (sustainable flood management systems).		
FP-3. Promote floodplain restoration that protect quality and availability of water while preserving or restoring ecologic and stream function.		
FP-4. Provide community benefits beyond flood protection, such as public access, open space, recreation, agricultural preservation, and economic development. *		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		

Objectives	Qualitative Measurement	Quantitative Measurement
COASTAL AND STREAMSIDE EROSION OBJECTIVES		
CSE-1. Manage areas along the shoreline susceptible to erosion, including long-term strategic retreat where appropriate. CSE-2. Identify opportunities to restore natural stream function, including meandering, in the lower 15 miles of the Carmel River and selected tributaries. CSE-3. Reduce or prevent adverse downcutting in the main stem Carmel River and its tributaries.		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		
WATERSHED MANAGEMENT OBJECTIVES		
WM-1. Reduce human-induced sources of non-point fine sediment runoff. WM-2. Restore natural fire frequency in headwater forests. WM-3. Restore the natural hydrologic flow regime in disturbed watersheds where appropriate, including low impact development strategies in urbanized areas. WM-4. Re-establish a natural level of sediment supply within the Carmel River and its tributaries.		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		
ENVIRONMENTAL PROTECTION AND EHANCEMENT OBJECTIVES		
EV-1. Protect and enhance sensitive species and their habitats in the regional watersheds*; including, but not limited to, promoting the steelhead recovery by meeting accepted or approved environmental flows within the regional watersheds. EV-2. Assess, protect, enhance, and/or restore natural resources, including consideration of climate change, when developing water management strategies and projects. * EV-3. Minimize adverse effects on biological and cultural resources when implementing strategies and projects. EV-4. Identify opportunities for open spaces, trails and parks along streams and other recreational areas in the watershed that can be incorporated into projects. * EV-5. Identify and integrate elements from appropriate Federal and State species protection and recovery plans. EV-6. Promote watershed activities for fire fuel management and adaptive management strategies to protect water quality and water supplies from catastrophic wildfires. *		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible

Objectives	Qualitative Measurement	Quantitative Measurement
ETC.		
CLIMATE CHANGE OBJECTIVES		
CC-1. Implement adaptation measures and mitigation solutions to climate change effects, including increased large storm intensity and/or frequency, sea level rise, drought and wildfire. CC-2. Support increased education, monitoring and research to increase understanding of long-term impacts of climate change in the region. CC-3. Increase energy conservation measures and alternatives to fossil fuel and non-renewable resources to reduce greenhouse gas emissions associated with water and wastewater facility operations and IRWM projects.		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		
REGIONAL COMMUNICATION OBJECTIVES		
RC-1. Identify cooperative, integrated strategies for protecting both infrastructure and environmental resources, including from climate change impacts. RC-2. Foster collaboration among regional entities as an alternative to litigation through ongoing meetings of the RWMG and regional data sharing. RC-3. Identify and pursue additional opportunities for public education, outreach, and communication on water resource management and climate change, including to disadvantaged communities and stakeholders with interests in water management issues. RC-4. Build relationships with State and Federal regulatory agencies and other water forums and agencies.		
Project title(s) here	List how project is meeting IRWMP objective qualitatively	List how project is meeting IRWMP objective quantitatively, if possible
ETC.		

During each Plan Performance Review, the information in the above table will be updated and new projects will be added. The table will be accompanied by a narrative, which will summarize the overall progress toward achieving IRWM Plan goals and objectives and describe areas that need further attention. The analysis will include data submitted to the statewide databases and information provided in the Conservation Action Tracker tool. Based on this analysis, the RWMG will evaluate how to fill the gaps and help achieve regional goals.

Table 8-3, below, describes how conformance with resource management strategies will be measured for projects submitted to the IRWM Plan.

Table 8-3: Resource Management Strategy Evaluation

Resource Management Strategy	Metric
Ecosystem restoration	Pre- and post-project diversity and development of native species, including population dynamics, age classes, and persistence.
Environmental and habitat protection and improvement	Acreage of habitat improved, increase in species count.
Water supply reliability	Ability to maintain adequate supply to meet residential and commercial needs during extended droughts.
Flood management	Protection of coastal areas against storm surge heights projected to occur by 2050; protection of inland properties against a 100-year return event.
Groundwater management	Comparison of aquifer levels to levels that protect against seawater intrusion; maintenance of potable water quality and quantity.
Recreation and public access	Acreage of open space and lineal measurement of trails created; measurable use of public lands (i.e., visitor usage).
Storm water capture and management	Number of Best Management Practices installed, reduced volume of storm water discharge to MBNMS and ASBS, pounds per year of pollutant reduction in surface water, beach closure reductions.
Water conservation	Decrease in annual per capita consumption.
Water quality protection and improvement	Improved water quality in the Monterey Bay National Marine Sanctuary (MBNMS), maintenance of water quality in the Seaside Groundwater Basin.
Water recycling	Annual acre-feet increase of recycled water.
Wetlands enhancement and creation	Acreage of wetlands created or enhanced.
Conjunctive use	Annual acre-feet of water used conjunctively.
Land use planning	Acreage of land managed, protected, or enhanced to protect beneficial uses.
Non-point Source pollution control	Total suspended solids pollutant reduction, pounds/year of sediment reduction, number of Best Management Practices installed.
Watershed planning	Acreage of watershed protected or enhanced acreage of land with improved management activities.
Water and wastewater treatment	There is only one major water treatment facility in the region (the Begonia Iron Treatment Plant in Carmel Valley). No upgrades are planned for this facility. Wastewater treatment facilities in the region are under-utilized at present.

8.2 Project-Specific Monitoring Plans

8.2.1 Current Monitoring and Data Collection

Project proponents are responsible for all monitoring activities (some projects do not require monitoring). Monitoring plans should include appropriate pre-project baseline information and post-project monitoring to assure that all requirements are met.

Project Proponents should be familiar with the relevant state and regional monitoring programs (SWAMP, CEDEN, CRAM, GAMA and CAT, see p. 8-1 and **Chapter 9, Data Management)**.

The project-specific monitoring plan requirements will vary based on the type of project being implemented. All projects should adhere to certain state guidelines for monitoring in order to be implemented through the IRWM Plan:

- Projects that involve surface water quality must meet the criteria for and be compatible with SWAMP.
- All projects that involve groundwater quality must meet the criteria for and be compatible with GAMA.
- All projects that involve wetland restoration should meet the criteria for and be compatible with the Wetland and Riparian Area Monitoring Plan (WRAMP) promulgated by CDFW.

Any projects that do not fall into one of the above categories must, at minimum, include the following:

1. Clearly and concisely describe what is being monitored for each project. Examples include (but aren't limited to) pre- and post-project photo monitoring, historical surveys, biological surveys, habitat surveys, topographic surveys, and hydrologic and hydraulic monitoring.
2. Measures to remedy or react to problems encountered during monitoring. An example would be to coordinate with the Department of Fish and Wildlife if a species or its habitat is adversely impacted during construction or after implementation of a project.
3. Location of monitoring (map).
4. Monitoring frequency.
5. Monitoring protocols/methodologies, including who will perform the monitoring.
6. Procedures to ensure the monitoring schedule is maintained and adequate resources (budget) are available to maintain monitoring of the project throughout the scheduled monitoring timeframe.

Through project-specific monitoring efforts, the Conservation Action Tracker, and measurable objectives, the RWMG intends to demonstrate over time that the IRWM Plan is meeting its goals and objectives. The Plan Performance Review includes an adaptive management process that will enable the RWMG to respond to lessons learned from the project monitoring efforts and to utilize new information, particularly as new technology and data regarding climate change impacts and vulnerabilities for the Monterey Peninsula region become available. The RWMG can choose to modify IRWM Plan objectives, the measurability of those objectives, the use of resource management strategies, or the project review and prioritization process.

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Chapter 9 Data Management

IRWM Plan Standard 9

The IRWM Plan must describe the process of data collection, storage, and dissemination to IRWM participants, stakeholders, the public, and the State. Data in this standard may include but is not limited to technical information such as designs, feasibility studies, reports, and information gathered for a specific project in any phase of development including the planning, design, construction, operation, and monitoring of a project.

9.1 Data Needs and Collection

During the IRWM Plan Update, stakeholder input, IRWM project information, reports and documents, plans and environmental studies were collected. Most of this information is contained in this update and appendices or is available from MPWMD. Additional information including project documents, feasibility studies, and reports are also available from MPWMD.

9.1.1 Existing Data

The current Monterey Peninsula Integrated Regional Water Management Plan, dated June 2014, is available from MPWMD A partial listing of the types of regional documents available from MPWMD includes the following:

ASBS Documents

Canyon Del Rey watershed update

Carmel Bay -Carmel River SB - Lagoon

Carmel River Watershed

Central Coast RWQCB Documents

Climate Change Guidance

Coastal Plans

Concept Proposals

DWR Guidance Documents

Fisheries - General

Flooding

Local Land Use Plans

Maps

Ocean-Marine Regulations

Ord Interregional

Pacific Grove Naturalist Program presentations

2010 Planning Grant Projects

Project Proposals

San Clemente Dam Removal and Reroute

Seaside Groundwater Basin

Sleepy Hollow Steelhead Rearing Facility

Stakeholder list

9.1.2 Data Needs

Carmel River Basin – interest in the anadromous Carmel River steelhead population over the past several decades has resulted in many studies of the inland populations; however, while the inland population declines and ocean conditions change, there are no reports about the behavior of Carmel River steelhead in the ocean.

A review of data needs was done prior to beginning work on the Monterey Peninsula IRWM Plan Update (2019). Three categories were identified that need data and supplemental information including water quality in the Seaside Groundwater Basin, future residential and commercial water demand, and environmental water demand.

Seaside Groundwater Basin – this basin will become the focal point of water supply for the region. Monitoring the aquifer levels and quality in this basin is essential for the health and safety of the region's population. At present, there are adequate monitoring programs to protect the supply from this basin. Data are reported regularly to the RWQCB and the Seaside Watermaster. In addition, the Seaside Watermaster has developed both water quantity and quality models that simulate the storage of water and chemical mixing in the aquifers. But the true dynamics of aquifer water levels and potential changes in quality will require these models to be updated with data in the coming years as new water supply projects come online.

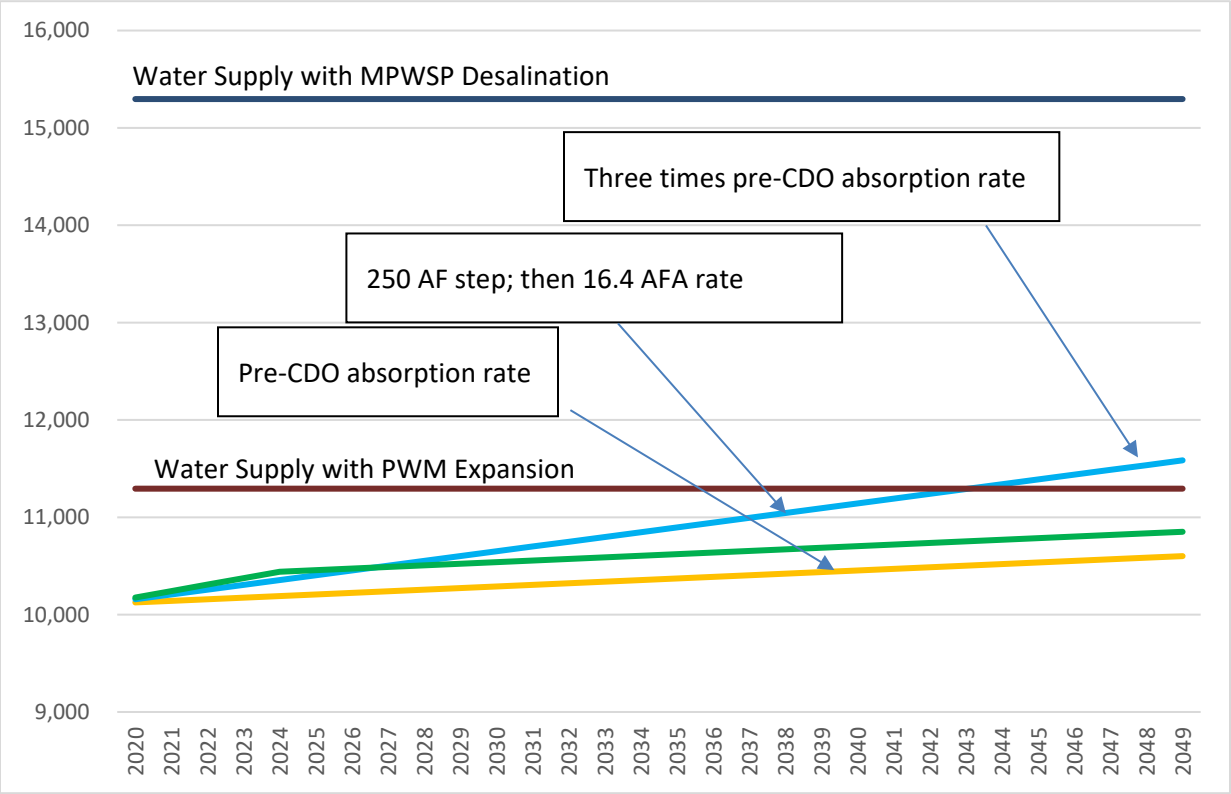
Future water demands – quantifying future residential and commercial water demand in the region was the subject of a significant amount of testimony given to the CPUC by several interested parties as part of the CalAm application for the Monterey Peninsula Water Supply Project. Parties to the CPUC proceeding are not all in agreement about the CPUC's decision that authorized CalAm to build additional facilities with a total plant capacity of 14,355 AFY[1] and some parties continue to contest the decision in courts and other venues to direct CalAm to build a 6.4 mgd desalination plant on the coast in Marina to help meet future demand.

Some parties argued that a 6.4 mgd desalination plant would not be needed and that an expansion of the Pure Water Monterey Project would be sufficient to meet replacement supply needs and allow for increased future demand. In September 2019, MPWMD reviewed available data on supplies and their ability to meet current and long-term demand. The analysis, presented in full in Appendix 15, also examined the changing nature of demand on the Monterey Peninsula, the underlying assumptions in the sizing of the water supply portfolio, and indicators of the market's ability to absorb new demand. Figure 9-1 shows MPWMD's projection of demand between 2020 and 2040 under three demand scenarios related to increased use for new development. In the 10 years prior to the first SWRCB Cease-and-Desist Order in 2009, water demand for new development averaged 16.4 AFY. It should be noted that production is somewhat higher than demand due to system losses and unmetered use, which generally run about 4% to 8% of production.

Environmental water demand estimates are ongoing and various modeling efforts are underway to better understand the interaction of surface flow, subsurface flow and water extraction. The Salinas and Carmel Rivers Basin study, conducted by the US Bureau of Reclamation, will include an analysis of supplies and needs projected to occur through 2100. As information from this study and other data become available, a better understanding of the environmental water demand and requirements can be expected.

[1] In this use, "plant" means CalAm's total production capacity including from the Carmel River, the Seaside Basin, Pure Water Monterey, and a desalination plant in Marina. CPUC Decision 18-09-017 September 13, 2018, Application 12-04-019, p.51 set the plant capacity.

Figure 9-1 Market Absorption of Water Demand Compared to Water Supply Current Demand at 5-Year Average (Acre-Feet)



Source: Monterey Peninsula Water Management District, Item 9, Supplies and Demands for Water on the Monterey Peninsula – Past and Future, September 16, 2019 meeting.

9.2 Stakeholder Contributions

9.2.1 Stakeholder Communication

Communication within the IRWM region is accomplished via public notices, site announcements on the MPWMD web site, and email. The IRWM Plan public stakeholder meetings serve as opportunities for networking, in addition to standard communications among groups regarding sections of the IRWM Plan. Grant and funding opportunities are made available through email updates, special events, forums, educational outreach workshops and project progress update meetings. All of these mechanisms serve to facilitate the ongoing data and information sharing between stakeholders.

9.3 Data Maintenance and Quality Assurance/Control

GIS data for individual project are provided by project proponents and are available from MPWMD and the individual project proponents. Data from State, regional or local Public agencies are assumed to have at least a moderate level of accuracy. Data is maintained by MPWMD staff and Project Stakeholders and is ongoing and updated on an irregular basis, as the need arises. As concept and project proposals progress, Stakeholders have multiple opportunities to review data and results of associated projects. Through this process and the project review process for DWR grant opportunities, most project data will be vetted for accuracy.

The review process is important for the scoring, ranking and prioritization of projects for possible grant funding and application submission. The top projects are ranked based on criteria established and approved by the Stakeholders. Comments and questions from that peer review are recorded and subsequent meetings provide an opportunity to review the project, have a question/answer session, and confirm, to the best of their ability, the project information. Any changes to the project information are done after approval from the Project Sponsor/Stakeholder. When the region submits a DWR grant application, high ranking projects undergo further review for quality control.

9.4 Data Sharing and Compatibility with State Systems

9.4.1 Data Compatibility

California Environmental Data Exchange Network – CEDEN is a system designed to facilitate integration and sharing of data collected by many different participants. The CEDEN data templates are available on the CEDEN website: http://www.ceden.org.

Stakeholders that collect water data including groundwater level wells, water quality stations, surface water stage and flow sites, rainfall/climate observers, or well logs are directed to the CA State Water Data Library (http://wdl.water.ca.gov/) to standardize their data in the appropriate format

Groundwater elevation monitoring data is provided to the state CASGEM Program. Many of the Stakeholders already follow this procedure and upload the data. Stakeholders are directed to the https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM site to register and provide information if they haven't already done so.

Any Stakeholder collecting or monitoring surface water quality data, is encouraged to provide the data to Surface Water Ambient Monitoring Program (SWAMP) (http://www.swrcb.ca.gov/water_issues/programs/swamp)

The GAMA program provides a comprehensive assessment of water quality in water wells throughout the State and the Monterey County Environmental Health Department collects and provides most of this information for both domestic and public wells. If Stakeholders propose a project that requires this type of water quality sampling they will be encouraged to coordinate with the Monterey County Environmental Health Department and the GAMA program (http://www.swrcb.ca.gov/gama).

Stakeholders are encouraged to submit their metadata to the California Environmental Information Clearinghouse (CEIC) at the California Natural Resources Agency (CNRA) portal.

California Environmental Resources Evaluation System (CERES)– CERES Map Layer Services and CERES Mapper is integrated in the GIS IMS for "mash up" services. The GIS IMS services are being made available for CERES users to integrate or explore the MPIRWM geospatial datasets.

9.5 How Data Management Supports RWMGs Efforts

9.5.1 State Databases Compatibility

Monitoring data can be found in the State databases that include SWAMP, Water Data Library, GAMA program, CEIC, and CERES. Due to the number of agencies, the different programs and project goals, much of the collected data is not readily available in the State formats. The Region plans to continue with outreach efforts to encourage adoption of the State data format when applicable. Stakeholders interested in pursuing DWR grants will be required to submit data in the appropriate format as part of their proposal.

Chapter 10 Finance

IRWM Standard 10

The IRWM Plan must include a plan for implementation and financing of identified projects and programs (Water Code §10541.(e)(8)). The IRWM Plan must also identify and explain potential financing for implementation of the IRWM Plan. The financing discussion must, at a minimum, include the following items:

- List known, as well as, possible funding sources, programs, and grant opportunities for the development and ongoing funding of the IRWM Plan.
- List the funding mechanisms, including water enterprise funds, rate structures, and private financing options, for projects that implement the IRWM Plan.
- An explanation of the certainty and longevity of known or potential funding for the IRWM Plan and projects that implement the Plan.
- An explanation of how operation and maintenance (O&M) costs for projects that implement the IRWM Plan would be covered and the certainty of operation and maintenance funding.

10.1 Introduction

The intent of the Finance standard in the Proposition 1 IRWM Program Guidelines is to ensure that the financing of the IRWM Plan has been considered at a programmatic level by the RWMG, and that the strategy for financing the IRWM Plan is transparent.

The Monterey Peninsula region recognizes that the need for project funds often exceeds the funding available from the State. However, pooling local funds, State funds, and Federal or private funds (if available) can result in making a project financially feasible.

The purpose of the Finance IRWM standard is to demonstrate that the RWMG has considered the financing available for proposed implementation projects.

10.2 Potential Funding Sources and Mechanisms

The RWMG has identified the following potential alternative, non-IRWM sources of grant funds and other means to help implement projects and programs in the IRWM Plan. Potential funding sources include (where appropriate):

Federal Grant Programs

US Fish and Wildlife Service grants (such as Coastal Wetlands Conservation grants, Cooperative Endangered Species Conservation grants, Partners for Fish and Wildlife grants), National Fish and Wildlife Federation grants, Economic Development Administration grants, USDA grant programs (such as the Agricultural Water Enhancement Program), Bureau of Reclamation Title XVI funds, USDA Natural Resources Conservation Service Environmental Quality Incentives Program (EQIP) grants.

State Grant Program

Department of Fish and Wildlife Fisheries Restoration Grant Program funds for watersheds with salmonids present, State Coastal Conservancy funds, State Water Resources Control Board Cleanup and Abatement Account grants, Supplemental Environmental Protection (SEP) grants (from Regional Water Quality Control Board fines).

Monterey Peninsula Water Management District

The Monterey Peninsula Water Management District has several sources of revenue associated with constructing and managing water supply and protecting the environment. These include property taxes, user fees, permit fees, capacity fees, and grant funds. The District has tapped these revenue sources to support the IRWM program, provide grant funds to local water projects, and to carry out monitoring programs, conservation programs, and environmental benefit programs.

Local Funds

The Transportation Agency for Monterey County is the local planning agency for the Monterey County region that programs and distributes state and federal money for local and regional transportation projects. The Transportation Agency is responsible for distributing money for public transit, rail, local street and road maintenance, highway, bicycle and pedestrian facilities. In total, the Transportation Agency distributes between $20 and $30 million per year for transportation (TAMC, 2004).

Private Grants

Grants from foundations associated with federal/state programs (such as California State Parks Foundation, Elkhorn Slough Foundation, and Monterey Bay Sanctuary Foundation), other private foundations (such as the Monterey County Agricultural and Historical Land Trust), and corporate gifts.

User Fees

User fees are non-land-based charges made by some water resource agencies where facilities and programs directly benefit the existing customers. For example, within the MPWMD boundary, a user fee is assessed on each connection to the Cal-Am system to pay for mitigation for water extraction and to fund projects that will reduce water use or replace existing unauthorized diversions. The user fee is a fixed percentage of the monthly water bill, which usually includes a base amount for a connection and a variable amount based on the metered usage. User fees for specific services are assessed by other agencies within the Region including MRWPCA and CAWD. Cal-Am rates are set by the California Public Utilities Commission. Under Prop 218, public agencies must go through a voting process in order to assess or raise user fees.

Development Impact and Mitigation Fees

Development fees are used by water resource agencies almost universally as a measure to achieve and maintain equity among its past, present and future customers. Development fees are typically charged per connection, measured in equivalent dwelling units (EDU). A single connection may encompass more than one EDU. In addition to the connection fee aspect of development fees, agencies may also assess other fees such as the Commercial Acreage Fee (per acre) and Other Service Fee (per acre).

Loans

The Federal Water Pollution Control Act (Clean Water Act or CWA), established the Clean Water State Revolving Fund (CWSRF) program. The CWSRF program offers low interest financing agreements for water quality projects. Annually, the program disburses between $200 and $300 million to eligible projects. Eligible projects can address a number of issues such as wastewater and stormwater treatment, water reclamation, nonpoint source projects, and the implementation of comprehensive conservation management plans (SWRCB, 2014).

General or Capital Improvement Funds: General or capital improvement funds are monies that an agency sets aside for funding general operations and/or facility improvements or upgrades. These funds are usually part of their overall revenue stream and may or may not be project-specific.

Bonded Debt Service

Revenue bonds are issued to pay for new capital in cases where a large facility is needed to support current services and future growth. In this way, a large facility 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 towards facilities that serve present and future customers. A user fee or rate must be pledged to the project as a bond document covenant in the event that development fees are not adequate to make the required annual payment for the debt service.

Grant Programs

Grant programs at the local, state, or federal level are available to the region from time to time. In the past, the RWMG members have applied for and obtained state and federal funding for studies and projects benefiting the region. These monies typically require that a local matching amount be available to obtain the grant that typically comes from one or more of the funding sources above or from another grant. The matching requirement shows a local commitment to promoting and completing the study or project. A grant is typically administered and contracted by a single agency within the region that works directly with the state or federal granting agency. There are typically higher administration costs for grants since a small portion of the grant also pays for administration of the grant by the state or federal agency.

Land Trusts and other Non-Profit Sources

Land trusts are often used as a way to conserve land and can attract donations from private parties for furthering the mission of a particular trust. Recently, both the Big Sur Land Trust and the Nature Conservancy, another non-profit group, have taken a more active role in water resource management. Local non-profit groups, such as the Carmel River Steelhead Association and the Carmel River Watershed Conservancy, also raise private funds and donate resources and funds to carry out water resource-related activities.

10.3 Certainty/Longevity of Funding the IRWM Plan and Projects

To date, the Monterey Peninsula IRWM planning effort has been funded through a combination of private foundation grant funds, State IRWM Planning Grant funds, contributions from RWMG entities, and in-kind staff time contributed by members of the RWMG. As noted in the **Chapter 1, Governance**, the RWMG has been developed to be a working group: its members are expected to actively participate in all aspects of the IRWM planning process. During the development of this IRWM Plan Update, RWMG members have attended public workshops, reviewed drafts of the IRWM Plan, and participated on various committees to develop elements of the plan.

This work has been accomplished by means of donated staff time, or in some cases volunteered time on the part of the RWMG members. It is also important to recognize the many hours contributed by stakeholders and community members who volunteered their time to review the draft plan, provide comments, and offer technical advice and expertise. Leading this effort—and responsible for drafting this IRWM Plan—is the IRWM Plan Coordinator, staff at MPWMD.

With the completion and final approval of the IRWM Plan, the time and resources required to support the IRWM planning efforts are expected to diminish. While the RWMG met quarterly during the initial development of this Plan, it is anticipated that the continuing IRWM planning process will require fewer (semi-annual) meetings.

The RWMG estimates that after the initial IRWM Plan development, ongoing IRWM planning and "maintenance" for the plan will most likely entail:

- Approximately 2-4 RWMG meetings a year, which will focus on alternative sources of funding for IRWM Plan projects and programs, ongoing water resource issues in the region, integration of projects, ongoing outreach and assistance to DAC, and opportunities for collaboration between RWMG members.
- Project solicitations for the IRWM Plan, which will occur about every 2 years in line with funding cycles.
- Committee work associated with the project solicitations (e.g., project ranking and project review).
- Project monitoring and Plan performance evaluation, which is expected to occur bi-annually.

The RWMG will continue to donate their staff time toward the ongoing planning effort, and stakeholders will continue to participate actively in the process. Additional funds will be needed to maintain the IRWM Plan and keep the process moving forward: organizing meetings, overseeing project solicitations, coordinating the continued planning process, keeping stakeholders (and RWMG members) engaged, and ensuring that IRWM Plan objectives are being met. The RWMG should explore various means for long-term funding including potential collaboration with other agencies and organizations outside the RWMG that share similar goals and could benefit from IRWM Plan implementation.

10.4 Operation and Maintenance Funding

Ongoing support and financing for operation and maintenance (O&M) of projects implemented from this IRWM Plan is expected to come from many of the same sources used to implement the projects. Support and financing will likely come from local sources, including user rates, fees and assessments.

Funding the O&M of implemented projects will be the responsibility of individual project sponsors. However, it is the intent of the stakeholder group to form a technical review committee to review project proposals and implementation for conformance with the proposed Final Plan for adoption and to offer support for and coordination of grant and funding opportunities.

Table 10-1 summarizes the anticipated and potential sources of funding that will support the projects and programs included in the IRWM Plan. This will include financing for O&M, which is not eligible for grant reimbursement by state grant programs. The table shows the approximate total project cost, the anticipated funding sources, the certainty of obtaining those funds, the O&M finance source, and the certainty of obtaining O&M financing.

Table 10-1: IRWM Plan Financing

[this table is intended to be revised after review by DWR of an Implementation Grant application is completed]

Activity Description	Approx. Total Cost	Funding Source & percent of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Certainty
West End Stormwater Management Improvements	$972,400	IRWM Grant: 100%	30 years	City of Sand City	
Del Monte Manor Park LID Improvements Project	$560,000	IRWM Grant: 100%	30 years	City of Seaside	
Ramona Avenue Stormwater Runoff Infiltration Project	$338,000	IRWM Grant: 17%	30 years	City of Monterey	
Coe Avenue Recycled Water Distribution Pipeline	$285,000	IRWM Grant: 46% Capital Improvement Funds: 54%	30 years	Marina Coast Water District	
Grant Administration	$142,540	IRWM Grant: 100%	End of grant	MPWMD	

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Chapter 11 Technical Analysis

IRWM Standard 11

The IRWM Plan must document the data and technical analyses that were used in the development of the Plan.

The purpose of the Technical Analysis standard as stated in the Proposition 1 IRWM Program Guidelines is to explain the technical information, methods, and analyses used by the RWMG to understand the water management needs over the planning horizon.

11.1 Technical Information Used in the IRWM Plan

A critical aspect of the regional planning process is the amalgamation of existing plans, reports, and studies to create a comprehensive overview of current water resource conditions in the Region and for updating the IRWM Plan. The background information and technical data—including land use information, population studies and demographic information, economic data, water supply and water use data, environmental resources, and projected water demand—have been derived from the following set of diverse documents:

- Research and technical studies by local academic institutions and consultants
- Local Agency Formation Commission (LAFCO) Municipal Services Review Reports
- DWR Land Use Surveys
- Watershed Assessment and Management Plans
- MCWRA and Seaside Watermaster Groundwater Summary Reports
- Seaside Basin Salt and Nutrient Management Plan (June 2014)
- MCWRA Monterey County Floodplain Management Plan
- Cities and Monterey County General Plans and Specific Area Plans
- RWQCB plans, including 303(d) List
- MBNMS Condition Report and Management Plan
- National Marine Fisheries Services –South-Central California Coast Steelhead Recovery Plan
- US Census decennial population data
- US Census/American Community Survey (ACS) five-year economic survey data
- Association of Monterey Bay Area Governments (AMBAG) and FORA economic reports
- USGS Carmel River flow records
- MPWMD groundwater monitoring and Carmel River watershed surface water monitoring
- Other annual MPWMD resource monitoring

The sources listed in **Table 11-1** have been used to describe historic and existing conditions in the IRWM Region, as well as to estimate future conditions—most importantly, future water demand. The table lists the sources of technical information used specifically to develop projected needs. Following the table is a brief description of these technical sources, and an explanation for why this technical information is representative and adequate for developing the IRWM Plan. All documents cited in this IRWM Plan are available to the public upon request. A complete list of documents used in the development of this plan is included in the References section.

Table 11-1: Technical Information Used in the IRWM Plan

Type of Study or Data	Source (Author/Title)	Information Used	Relevant IRWM Plan Sections
Hydrology data collection/reporting	United States Geological Survey; Monterey Peninsula Water Management District	Carmel River and tributary surface water data: historic instream flow, runoff amount, water production, peak flow data	Region Description
Service area planning	Monterey County Local Agency Formation Commission: Municipal Services Review	Status of the various service providers (including water and wastewater agencies/districts), jurisdictional boundaries and service area requirements	Region Description
Facilities planning report	Carmel Area Wastewater District Capital Improvement Program 20-Year Master Plan	Amount of wastewater from the Carmel Area Wastewater District	Region Description
Hydrology	MPWMD Los Padres Dam and Reservoir - Long-Term Strategic and Short-Term Tactical Plan (January 2014)	Planning-Level Report with summary of recent data Usable surface storage in Los Padres Reservoir and Tributaries	Region Description
Hydrology	Monterey Peninsula Water Management District	Total water production within the Region (1996- 2013)	Region Description
Hydrology	California American Water Company, 2015 Urban Water Management Plan (June 30, 2016)	Cal-Am allowable production from Carmel River and Seaside Basin for 2009- 2021 and statistical and data analysis	Region Description
Species recovery plan	National Marine Fisheries Service. 2013. South-Central California Coast Steelhead Recovery Plan. West Coast Region, California Coastal Area Office	Fisheries information relevant to San Jose Creek Watershed and Carmel River Watershed	Region Description and Resource Management Strategies
Monitoring	California Surface Water Ambient Monitoring Program (SWAMP)	Monitoring tool to be used for the continued plan performance and monitoring of IRWM projects and proposals.	Region Description
Monitoring	California Environmental Data Exchange Network (CEDEN)	Monitoring tool to be used for the continued plan performance and monitoring of IRWM projects and proposals.	Plan Performance and Monitoring and Data Management
Monitoring	Central Coast Conservation Action Tracker	Monitoring tool to be used for the continued plan performance and monitoring of IRWM projects and proposals.	Plan Performance and Monitoring and Data Management

Type of Study or Data	Source (Author/Title)	Information Used	Relevant IRWM Plan Sections
Monitoring	California Rapid Assessment Methods (CRAM)	Monitoring tool to be used for the continued plan performance and monitoring of IRWM projects and proposals.	Plan Performance and Monitoring and Data Management
Monitoring	Groundwater Ambient Monitoring and Assessment (GAMA) database	Monitoring tool to be used for the continued plan performance and monitoring of IRWM projects and proposals.	Plan Performance and Monitoring and Data Management
Economic data	US Census Bureau, American Community Survey, 2013-2017	Median household income data (2013-2017) for communities and census tracts in Region using five-year economic surveys	Region Description (disadvantaged communities)
Economic data	Fort Ord Reuse Authority, Base Reassessment Plan, including Market Report (EMC Planning and EPS, August 15, 2012)	Economic analysis, including population, jobs and housing data for the former Fort Ord	Region Description (economics)
Historic population trends	US Census Bureau, population data from 1960 to 2010 (US Census website)	Population for urban areas in Region from 1960 to 2010 for estimating population growth, and for calculating using decennial population surveys	Region Description
Population growth	AMBAG, 2018 Regional Forecast	Estimated population growth for urban areas in Region, from 2015 to 2040.	Region Description
Population growth and future water demands	Marina Coast Water District (MCWD) and CalAm's 2015 Urban Water Management Plans; CPUC Decision 18-09-017 (dated September 13, 2018); MPWMD estimates of future demand (September 16, 2019 MPWMD Board Packet)	Future population and demand estimates for the Ord Community and Monterey Peninsula service areas to use in water supply planning	Region Description; Data Management
Groundwater use	MPWMD annual production reports	Historic water use from the Carmel Valley Alluvial Aquifer, Camel Valley upland area, miscellaneous groundwater basins, and the Seaside Groundwater Basin: 1990-2015 to establish historic water use trends and to document current water use	Region Description, Objectives, and Resource Management Strategies

Type of Study or Data	Source (Author/Title)	Information Used	Relevant IRWM Plan Sections
Groundwater use/management reports	Seaside Basin Watermaster Reports (including Annual Report for Water Year 2017 – 2018, published November 2018) and Seawater Intrusion Response Report (November 2018)	Records of water injection and extraction monitoring and modeling effort summaries used to summarize historic water use from the Seaside Groundwater Basin through September 30, 2018.	Region Description
Urban water use	Urban Water Management Plans for: 2015 CalAm UWMP (2016), Marina Coast 2015 UWMP (2016)	Projected water use for urban areas in Region, according to water purveyors as reflected in their Urban Water Management Plans.	Region Description
Land use trends: Monterey County	DWR Land Use Surveys: 1997	Aerial surveys and field verification used to establish land use trends and as a basis for estimating future water demand in the Region-(specifically agricultural vs. urban vs. native land acreages; includes irrigated and non-irrigated lands).	Region Description
Groundwater and surface water modeling	Carmel River Basin Hydrologic Model (MPWMD); Monterey Peninsula groundwater and surface water model (Bureau of Reclamation, in progress)	MPWMD's linked surface-groundwater model uses past water production, precipitation, runoff, aquifer levels, temperature, evapotranspiration and land use; model can simulate future demand scenarios and climate change scenarios. Bureau of Reclamation model uses similar set of data to CRBHM, but incorporates future changes in climate, population, land use, and economics in forecasting future supply-demand imbalances.	Region Description
Local projections of changes in climate variables	Cal-adapt Web Tool - http://cal-adapt.org/	Local projections of changes in rainfall, average temperature, evapotranspiration, surface flows. Used to define how various climate variables are projected to change within the IRWM Region and their effect on water resources.	Plan Performance and Monitoring Climate Change
Physical Oceanography	MBNMS Site Characterization, Physical Oceanography, II. Water Masses and Hydrography	Information about the Monterey Submarine Canyon and the oceanographic effects caused by the canyon on the Monterey Bay	Region Description Climate Change

Type of Study or Data	Source (Author/Title)	Information Used	Relevant IRWM Plan Sections
Climate vulnerabilities	Climate Change Handbook, 2011, https://water.ca.gov/LegacyFiles/climatechange/docs/Front%20Matter-Final.pdf	Prioritization of potential environmental vulnerabilities and assessment of regional vulnerability to climate change used to define most critical environmental variables from which to focus Climate Risk Assessment and future studies	Climate Change, Goals and Objectives
Climate risk assessment	International Council for Local Environmental Initiatives (ICLEI) Climate Adaptation Planning Workbook	Identify high risk infrastructure and water resources using ICLEI Risk Assessment protocol	Climate Change, Goals and Objectives
Developing climate adaptation strategies	California Natural Resources Agency's 2018 Update of the California Climate Adaptation Strategy	Recommended adaptation actions/strategies and response scenarios for the Region, based on the risk assessment	Objectives, Resource Management Strategies and Climate Change

11.2 Description of Technical Information Source

The following provides a brief description of the technical sources used to develop projected water management needs in the Region, and an explanation for why this technical information is representative and adequate for developing the IRWM Plan.

11.2.1 Population, Housing, and Jobs Data

U.S. Census Bureau Data: The U.S. Census decennial population data have been derived from the U.S. Census Bureau website.[1] Economic data—in particular, median household income (MHI) and poverty status—have been derived from the American Community Survey (ACS) five-year survey, for 2013-2017. ACS is an ongoing statistical survey by the U.S. Census Bureau, sent to approximately 250,000 addresses monthly (or 3 million per year). It regularly gathers information previously contained only in the long form of the decennial census. MHI was measured in 2017 inflation-adjusted dollars. Disadvantaged Communities (DACs) are defined as communities that had an MHI in 2017 of less than 80 percent the statewide MHI. "Severely DACs" are defined as communities that had an MHI in 2017 of less than 60 percent the statewide MHI. DACs were identified both on the community level and tract level. The U.S. Census data are a trusted and broadly accepted source of population, demographic, and economic data, and the data used in the IRWM Plan are the latest U.S. Census data available. Therefore, these data are considered representative and adequate for developing the IRWM Plan.

Association of Monterey Bay Area Governments 2018 Regional Forecast: As required by state law, the regional planning agency AMBAG produces a regional forecast approximately every five years of population, housing, and employment for a region spanning the counties of Monterey, San Benito and Santa Cruz. Each forecast is produced with the best available data and is extensively reviewed by AMBAG's member agencies. The 2018 Regional Forecast provides detailed population, housing and employment projections for every jurisdiction in the Monterey Bay region through 2040. The forecast is developed using professionally accepted forecasting methodologies, and represents the most likely trend in population, housing units, and employment. As such, the forecast is broadly accepted as a basis for supporting official regional planning efforts.

Fort Ord Reuse Authority Economic Forecasts: The Fort Ord Reuse Authority conducted a Base Reuse Reassessment process and in December 2012 published a report (the "Final Reassessment Report"). The purpose of these were to evaluate progress toward implementing the 1997 Base Reuse Plan and explore options related to current and future needs. Appendix B of the Final Reassessment Report included a Market and Economic Analysis report (Economic Planning Systems, August 2012) that identifies the key issues related to Fort Ord's redevelopment over the next decades, with a primary focus on economic trends that are reshaping future land use demand. A baseline estimate of demand for new commercial and residential real estate products is provided, with a high-level comparison to projected Fort Ord supply.

11.2.2 Water Supply, Water Use, and Projected Water Demand

Urban Water Management Plans: All urban water suppliers as defined in Section 10617 (including wholesalers), either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) annually are required to prepare an Urban Water Management Plan (UWMP). The UWMP serves as a long-range

[1] U.S. Census Bureau website: http://factfinder2.census.gov/.

planning document for water supply, source data for development of a regional water plan, and a source document for cities and counties as they prepare their General Plans. UWMPs include a description of the service area (including population served), historical and current water demand and water demand projections, an overview of water system supplies (including purchased water, surface water, groundwater, recycled water, desalinated water, and water transfers), water supply reliability and water shortage contingency plans, and conservation master plans, among other topics. UWMPs for the following water districts have been used in the development of this IRWM Plan: Marina Coast (2016), California American Water Company-Monterey District Service Area (2015 published June 2016). Information from these UWMPs has been used to describe water systems and to establish future water demand for urban areas in the Region.

Seaside Basin Watermaster Reports: Adjudication of the Seaside Groundwater Basin occurred in 2006 with a Final Statement of Decision filed on March 27, 2006. The court ordered the formation of a Watermaster and mandated a "physical solution" to the overdraft problem. Since the Seaside Basin Adjudication was completed, the Seaside Basin Watermaster has conducted detail monitoring, data collection, and modeling of the Seaside Basin, and the following reports have been prepared to document the conditions of the basin and to recommend solutions for the overdraft problem (all are available for review at http://www.seasidebasinwatermaster.org/sbwmARC.html):

- Seawater Intrusion Response Plan Seaside Basin, Monterey County, California (HydroMetrics, LLC, 2009
- Seaside Groundwater Basin Modeling and Protective Groundwater Elevations, Prepared for: Seaside Watermaster. (HydroMetrics, LLC, 2009)
- Seaside Groundwater Basin 2018 Seawater Intrusion Analysis Report (Montgomery and Association, 2018)
- Seaside Groundwater Basin, Salt & Nutrient Management Plan, Prepared for: Monterey Peninsula Water Management District, (HydroMetrics WRI, 2014)
- Draft Seaside Groundwater Basin 218 Basin Management Action Plan (Montgomery and Associates, 2019)

Salinas Valley Groundwater Basin Seawater Intrusion Technical Memorandum: The "Memorandum from MCWRA to EPA Region IX, dated July 30, 2010, Subject: Technical Memorandum – SEAWATER INTRUSION" has been used along with the most recent seawater intrusion maps to provide an understanding of the extent of seawater intrusion in the Salinas Valley Groundwater Basin. The phenomenon of seawater intrusion was first noticed in the early 1930s and was documented in 1946 in Bulletin 52, an investigation of the Salinas Basin (DWR 1946). The MCWRA has implemented several programs aimed at slowing the rate of seawater intrusion and conducts annual sampling of groundwater wells in the coastal region to monitor the advancement of seawater intrusion. The Coastal Sampling Program includes agricultural wells in the Pressure 180-Foot, 400-Foot, and Deep Aquifers, as well as the East Side Shallow and Deep Aquifers. The MCWRA samples these wells annually during the peak agricultural production season (June through September) when pumping stresses are at their highest.

MPMWD monitors seawater intrusion levels in the Salinas Valley as the SVGB and SGB are not separated by a hydrogeologic barrier, but rather by a groundwater "divide." Essentially, water levels in both basins can influence where the groundwater divide is located.

Carmel River Basin Hydrologic Model (CRBHM): The CRBHM grew out of a need to replace a main-frame program written in FORTRAN that could not be run a main frame. A 2010 IRWM planning grant

assisted MWPMD with selecting a new platform to build a model on and MPWMD has since worked with the USGS and consultants to develop a comprehensive modeling tool for the basin. The USGS calibrated the model in 2018 and various future scenarios involving water supplies and operations are expected to be completed in 2019.

National Water Quality Assessment Data Warehouse: The United States Geological Survey began the National Water Quality Assessment program in 1991 when it collected chemical, biological, and physical water quality data from 51 basins across the nation. The source data is extracted daily and includes the following:

- Chemical concentrations in water, bed sediment, and aquatic organism tissues for about 3,000 chemical constituents
- Site, basin, well and network characteristics with many descriptive variables
- Daily stream flow information for fixed sampling sites
- Groundwater levels for sampled wells
- 4,700 surface water sites and 9,500 wells
- 68,000 nutrient samples and 45,000 pesticide samples as well as 13,000 VOC samples
- 2,700 samples of bed sediment and aquatic organism tissues
- Biological community data for fish, aquatic macroinvertebrate, and algae community samples

11.2.3 Watershed and Groundwater Basin Assessments and Management Plans

San Jose Creek Watershed Assessment

The Final San Jose Creek Watershed Assessment was completed in June 2014. This document is a steelhead-centric, physical watershed assessment that will lead to a prioritized list of watershed management actions for the San Jose Creek watershed. The assessment integrates information from sediment source analysis, hydrologic data, barrier evaluations, and lagoon monitoring. The San Jose Creek Watershed Assessment is included in **Appendix 2-d**.

Carmel River Watershed Planning

The 2016 Carmel River Watershed Assessment and Action Plan Update[2] identified its highest priority issues to be water quality, water quantity, flood management, Carmel River Estuary and Lagoon, conservation of threatened species, dam management and removal, wildfire management, erosion and sedimentation, channel incision and geomorphology, drought, public safety and health, and public awareness and access. Along with the watershed assessment, the plan identified specific strategies that, if implemented, could improve the Carmel River as a natural and cultural resource.

Federal Steelhead Recovery Plan

The Federal Endangered Species Act of 1973 requires that the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service (NMFS) develop and implement recovery plans for the conservation and survival of NMFS-listed species. The NMFS completed their Steelhead Recovery

[2] Carmel River Watershed Conservancy, Inc. *Carmel River Watershed Assessment and Action Plan 2016 Update*. (January 17, 2017).

Plan in 2013. The goal of the Recovery Plan is to prevent the extinction of South-Central California Coast steelhead (*Oncorhynchus mykiss*, or *O. mykiss*) in the wild and to ensure the long-term persistence of viable, self-sustaining populations of steelhead distributed across the South-Central California Coast Steelhead (SCCCS) Distinct Population Segment (DPS). It is also the goal of the Recovery Plan to establish a sustainable South-Central California Coast steelhead sport fishery. This report can be accessed online at the NOAA Fisheries West Coast website.[3]

Seaside Basin Salt and Nutrient Management Plan

SWRCB's Resolution No. 2009-0011 established a statewide Recycled Water Policy and required preparation of salt and nutrient management plans (SNMP) for each groundwater basin in California by 2014. SNMP are intended to facilitate management of salts and nutrients to optimize recycled water use while ensuring protection of groundwater supply and beneficial uses, agricultural beneficial uses, and human health. The SNMP prepared for the Region is included in **Appendix 2-c**; it identifies sources, transport and fate of salts and nutrients in surface water and groundwater within the Seaside Basin.

For seawater intrusion in the basin, the Watermaster has developed a Seawater Intrusion Response Plan (SIRP) as a contingency plan for responding to seawater intrusion in the Seaside Groundwater Basin, if and when it occurs. Based on the Seaside basin's native groundwater quality and the proposed use of recycled and desalinated water projects, managing salt and nutrient loadings on a sustainable basis is feasible with minimal implementation measures. Best Management Practices (BMPs) and public outreach are recommended implementation measures. If necessary, based on future monitoring results, the implementation measures identified in the following sub-sections will be reevaluated and updated measures recommended for future implementation. See **Appendix 2-c** for more information.

The Canyon Del Rey Master Drainage Plan Update

Canyon Del Rey Creek is an ephemeral stream that drains to the Pacific Ocean; the watershed includes portions of Seaside, Del Rey Oaks, Monterey, and unincorporated Monterey County. In 2014 MCWRA, MPWMD, and the City of Seaside partnered to prepare the Canyon Del Rey Master Drainage Plan for the watershed. The plan included a hydrologic analysis of existing data, predictions of future flows, a hydraulic analysis of existing facilities, and made recommendations for future improvements. The plan is provided in **Appendix 2-e**.

Areas of Special Biological Significance Watershed Planning

Chapter 12, Relation to Local Water Planning, includes details on studies, plans, and monitoring associated with watersheds that drain to Areas of Special Biological Significance.

11.2.4 Land Use Trends

Department of Water Resources Land Use Surveys: DWR land use surveys are typically performed every seven years throughout the state of California and consist of aerial surveys followed by field verification. The main emphasis of DWR's land use surveys is the mapping of agricultural land. Over 70 different crops or crop categories are included in the surveys. Urban and native vegetation (undeveloped) areas

[3] https://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/south_central_southern_california/2013_scccs_recoveryplan_final.pdf

are also mapped, though not to the level of detail of agricultural land. The land use surveys are performed using aerial photos and, more recently, satellite imagery to define field boundaries.

11.2.5 Climate Change

Many climate models have been generated to predict changes in ocean and land temperature, rain frequency and intensity, coastal wave exposure, and sea level rise. Modeling using regional climate models (RCMs) has matured over the past decade to enable meaningful climate vulnerability assessment applications. California has created several web-based interfaces to help local and regional planners "downscale" climate models for local planning purposes. The Cal-Adapt website provides a geographically based climate model interpretation tool that generates predictive changes to various climate variables using different Intergovernmental Panel on Climate Change (IPCC) greenhouse gas (GHG) emissions projections. Specifically, emissions RCP 4.5 and RCP 8.5 coincide, respectively, with emission rates consistent with current rates of increase and with emission rates associated with global success at curbing emissions as prescribed within international climate treaties.

The Pacific Institute study (California Vulnerabilities to Sea Level Rise, 2009) provides an analysis of coastal resources, human populations, infrastructure, and property that is at risk from projected sea level rise if no actions are taken. The study provides data regarding the cumulative impacts of increased watershed flooding, sea level rise, and storm surge, and shows how these cumulative effects can impact coastal areas for each United States Geological Survey (USGS) Quadrangle map of the California Coast.

The 2011 Climate Change Handbook for Regional Water Planning, developed cooperatively by DWR, the U.S. Environmental Protection Agency, Resources Legacy Fund, and U.S. Army Corps of Engineers, provides a framework for considering climate change in water management planning. It includes key decision considerations, resources, tools, and decision options to guide resource managers and planners as they develop means of adapting their programs to a changing climate. The handbook uses DWR's IRWM planning framework as a model into which analysis of climate change impacts and planning for adaptation and mitigation can be integrated.

The RWMG used the California Natural Resources Agency's 2009 California Climate Adaptation Strategy to develop an adaptation strategy for the Monterey Peninsula IRWM region. Adaptation actions and response scenarios from were selected from this document as applicable to the Greater Monterey County region. High priority responses along with climate mitigation actions are listed in Section R, Table 15-7, "Adaptation and Response Strategies Based on Risk Assessment."

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.

Nonetheless, some data gaps do exist and are described below.

- *Environmental water needs* ◦ Environmental water needs must be taken into consideration alongside agricultural and urban water needs when considering future water supplies for the Region. Unfortunately, as noted in **Chapter 2, Region Description**, with the exception of instream flow requirements recommended by NMFS for the Carmel River, environmental water needs are not well quantified for the Region. The lack of numerical data suggests that

environmental water needs may be getting overlooked in water resource planning. Addressing water needs will become more and more critical as ecosystems become increasingly vulnerable to the impacts of climate change. One of the objectives of this IRWM Plan is to "support applied research and monitoring to better understand environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources." It is the intention of the RWMG to provide quantified data for environmental water needs in future updates of this IRWM Plan.

- *Climate change impact assessment, adaptation and mitigation* ◦ MPWMD, MCWRA, M1W, and the County of San Luis Obispo are working with the Bureau of Land Management on the Salinas and Carmel Rivers Basin Study. The area includes the Carmel River Basin, the Monterey Peninsula, and Salinas Valley. The goal of the study is to assess the impact of climate change, identify imbalances between supplies and demands, and propose adaptation strategies. Multiple scenarios will be studied involving five climate change assumptions, projections of population growth, economic changes and land use changes. A final report is expected in late 2020.

  In addition, it is likely that significant data resources will be needed concerning potential effects to coastal areas before more accurate vulnerability evaluations can be made. Key data needs that have been identified to date include: 1) a comprehensive coastal elevation map using Light Detection And Ranging (LIDAR) data collected in 2011; 2) a complete inventory of water management infrastructure within the areas identified as vulnerable to the combined impacts of sea level rise and increased rain; 3) an evaluation of future capacity of culverts and tide gates that protect inland wetlands, agriculture, and urban land uses under various sea level rise scenarios; and 4) a cost benefit/effectiveness analysis of coastal protection, adaptation, and retreat options for various categories of coastal infrastructure and land uses.

- *Carmel River modeling* ◦ The MPWMD has completed a Carmel River Basin model as well as a steelhead habitat model for the main stem that is based on daily flows in four reaches of the river. Also, as part of study to determine whether Los Padres Dam should be removed or not, a sediment transport model for the lower 25 miles of the river has been developed. These modeling tools will help inform long-term decisions about the effects of various water supply scenarios on the river environment.

Data and information contained in this IRWM Plan will be reviewed and updated periodically, 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 Implementation Grant solicitation, using the ACS five-year survey estimates, in order to determine the status of DACs in the Region.

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Chapter 12 Relation to Local Water Planning

IRWM Plan Standard 12

The IRWM Plan must document the local water planning documents on which it is based including:

- A list of local water plans used in the IRWM Plan.
- A discussion of how the IRWM Plan relates to planning documents and programs established by local agencies.
- A description of the dynamics between the IRWM Plan and local planning documents.
- A description of the consideration and incorporation of water management issues and climate change adaption and mitigation strategies from local plans into the IRWM Plan.

12.1 Introduction

The intent of the Relation to Local Water Planning standard in the Proposition 1 IRWM Program Guidelines is to ensure that the Plan is congruent with local plans and that it includes current, relevant elements of local water planning and water management issues common to multiple local entities in the Region. IRWM planning does not replace or supersede local planning; rather, local planning elements are used as the foundation for the regional planning effort. This chapter describes how the Monterey Peninsula RWMG coordinates its water management planning activities to address or incorporate all or part of the following actions of its members.

Local Water Plans Used in the IRWM Plan

The following documents were used as references to guide the overall planning efforts of the RWMG and to serve as a resource to guide the stakeholders in water management planning.

Local water supply management planning:

- Groundwater management plans
- Urban water management plans
- LAFCO Municipal Services and Sphere of Influence Reviews
- Watershed management
- Stormwater management[1]
- CPUC Decision 18-09-017 dated September 13, 2018

Additional planning documents were reviewed for water resource considerations. A number of resource documents that were used are not necessarily considered “local water plans,” but are critical planning documents directly relevant to the Monterey Peninsula water planning efforts:

- Water Quality Control Plan for the Central Coast Basin Plan
- City and County general planning
- Monterey Bay National Marine Sanctuary Plan
- Flood Protection and Floodplain Management
- Federal Steelhead Recovery Planning Emergency response and disaster plans

[1] This includes LID ordinances and regulations

12.2 How Local Resource Plans Relate to the IRWM Plan

The goals and objectives for this Plan have been developed in response to the perceived water resource issues in the Region. The water resource goals for this Plan are provided in **Chapter 3, Goals and Objectives**.

In order to achieve these goals, the RWMG started with a foundational understanding of the Region's water systems, which include not only water supply (groundwater, surface water, recycled water, desalinated water, etc.) but a holistic view of the water systems (watersheds, floodplains, wetlands, and the nearshore and ocean waters). The information used to describe the Region's water system was derived from existing local and regional water resource management plans, which are described in more detail below.

12.2.1 Water Quality Control Plan for the Central Coast Basin

The Central Coast RWQCB relies on its adopted "Water Quality Control Plan for the Central Coast Basin Plan" (Basin Plan) to manage surface and groundwater in order to provide the highest water quality reasonably possible. The geographic scope of the Basin Plan covers a 300-mile long section of the central coast, from Santa Cruz to Santa Barbara, making the area relevant to the IRWMP Plan. The Basin Plan lists beneficial uses and describes water quality objectives to maintain water quality, describes programs, projects, and other actions to achieve the plan's standards, summarizes plans and policies to protect water quality, and describes statewide and regional monitoring programs (CCRWQCB, 2009).

The Central Coast RWQCB implements the Basin Plan by issuing and enforcing the following pollution standards: 1) waste discharge requirements (WDRs) (non-water body discharges); 2) NPDES (surface water body discharges) for point source discharges, water-quality based effluent limitations, prohibitions of discharge, and the review and establishment of Total Maximum Daily Loads.

Water bodies in the Basin Plan are designated by one or more beneficial uses:

- Domestic, municipal, agricultural, and industrial supply
- Power generation
- Recreation
- Aesthetic enjoyment
- Navigation
- Preservation and enhancement of fish, wildlife, and other aquatic resource

Monitoring for compliance is accomplished through various programs and agencies: discharger self-monitoring is required under WDRs and NPDES permits; the CCAMP[2], SWAMP, and the GAMA[3] Program are used by the RWQCB.

[2] CCAMP is a regionally-scaled water quality monitoring and assessment program to provide scientific information to Regional Board staff and the public, to protect, restore, and enhance the quality of the waters of central California.

[3] GAMA collects data by testing the untreated, raw water in different types of wells for naturally-occurring and man-made chemicals. GAMA compiles these test results with existing groundwater quality data from several agencies into a publicly-accessible internet database, GeoTracker GAMA.

12.2.2 Seaside Groundwater Basin Management

This section provides an overview of the Seaside Groundwater Basin (SGB or Basin) court ordered adjudication, Monitoring and Management & Implementation Plans, Basin Management Action Plan, and Seawater Intrusion Response Plan.

Historical and persistent low groundwater elevations caused by pumping led to concerns that seawater intrusion may threaten the Basin's groundwater resources. In 2006, an adjudication (*Cal-Am v. City of Seaside et al*.) led to the issuance of a Monterey County Superior Court decision that created the Seaside Groundwater Basin Watermaster (Watermaster). The court concluded that groundwater production within the SGB exceeded the "Natural Safe Yield"[4] and therefore a physical solution was established to prevent seawater intrusion and its deleterious effects on the Basin. The Watermaster consists of nine representatives, one representative from each of the following: Cal-Am, City of Seaside, Sand City, City of Monterey, City of Del Rey Oaks, Monterey Peninsula Water Management District and Monterey County Water Resources Agency, and two representatives from landowner groups. In 2012, the Watermaster evaluated water levels in the basin and determined that while seawater intrusion did not appear to be occurring, water levels were lower than those required to protect against seawater intrusion. Water levels were found to be below sea level in both the Paso Robles (the shallower aquifer) and the Santa Margarita aquifers of the Seaside Basin. The threat of seawater intrusion is being reduced through triennial pumping reductions which end in 2021 at the Natural Safe Yield of 3,000 AFY.

The Watermaster TAC has modeled several levels of groundwater recharge to the basin and concluded that supplemental water supply (injection well replenishment) is necessary to recover water levels to prevent seawater intrusion. There is a desire to achieve these levels within 20 to 25 years. Estimates of how much injection is required vary, but 750 to 1,000 AFY have been discussed. The Watermaster Board is considering how such a project would be financed and is encouraging local entities such as Cal-Am, MPWMD, and Monterey One Water to consider planning for such a water supply project.

In addition to the creation of a Watermaster, the court mandated a Monitoring and Management Plan (M&MP) be developed; the M&MP was completed in May 2006. The purpose of the Seaside Basin M&MP and its associated Implementation Plan (2007) was to establish a logical, efficient and cost-effective work plan to meet the requirements of the Seaside Basin Adjudication. The Implementation Plan contains a description of the phases identified for the Implementation Plan work effort, a detailed scope, budget and schedule of tasks planned, as well as a summary of other projects underway that, in addition to implementation of the M&MP, will develop solutions to the threat of seawater intrusion and establish a maximum perennial yield for the producers who rely on the Seaside Basin for their water supply.

In 2008 and 2009, the Watermaster through their consultant, Hydrometrics, prepared the Seawater Intrusion Response Plan and the Basin Management Action Plan. The Seawater Intrusion Response Plan is the Watermaster's contingency plan for responding to seawater intrusion in the SGB, if and when it occurs. The Seawater Intrusion Response Plan details both the indicators of seawater intrusion, and a list of recommended actions to be taken if seawater intrusion is observed. The Basin Management Action Plan describes the existing condition, identifies supplemental water supplies, groundwater management actions, and other recommendations, including a recommendation for development and use of a hydrogeologic model to evaluate proposed projects that may harm or benefit the project.

[4] "Natural Safe Yield" was defined as "the quantity of Groundwater existing in the Seaside Basin that occurs solely as a result of Natural Replenishment" (California American Water v. City of Seaside, et al., Case No. 66343 (Monterey County Superior Court, 2006).

12.2.3 Urban Water Management Plans

All urban water suppliers (as defined in California Water Code §10617), either publicly or privately owned, that provide water for municipal purposes (either directly or indirectly) to more than 3,000 customers, or that supply more than 3,000 AF annually are required to prepare a UWMP. The UWMP serves as a long-range planning document for water supply, source data for development of a regional water plan, and a source document for cities and counties as they prepare their General Plans. In addition, the UWMP includes a description of the service area (including population served), historical and current water demand and water demand projections, an overview of water system supplies (including purchased water, surface water, groundwater, recycled water, desalinated water, and water transfers), water supply reliability and water shortage contingency plans, and conservation master plans, among other topics.

For the IRWM planning process, the following UWMPs were used:

- Marina Coast Water District (2016)
- California American Water – Monterey District (2016)

Information from these UWMPs has been used to describe water systems and to establish future urban water demand in the in the IRWM planning region. The City of Seaside Municipal Water System serves fewer than 3,000 connections; therefore, it is not required to prepare a UWMP.

12.2.4 LAFCO Municipal Services Reviews

LAFCO produces Municipal Service and Sphere of Influence Reviews (MSR) for urban areas and other planning districts within the county. State law requires that the LAFCO conduct periodic reviews and updates of the Sphere of Influence of each city and district in Monterey County (Government Code §56425(e)). The law also requires that the Commission update information about municipal services before adopting sphere updates (Government Code §56430). The MSR contain the following information pertinent to understanding the water management and water management needs in the Region: growth and population projections; present and planned land uses in the area, including agricultural and open space lands; description of present and planned public facilities, including water supply, wastewater, stormwater, and flood management infrastructure; and adequacy of public services, including infrastructure deficiencies and needs.

The following MSRs have been used in the development of this IRWM Plan:

- City of Carmel-by-the-Sea (2011)
- City of Del Rey Oaks (2011)
- City of Marina (2011)
- City of Monterey (2011)
- City of Pacific Grove (2011)
- City of Sand City (2011)
- City of Seaside (2011)
- Pebble Beach Community Services District (2017)
- Carmel Area Wastewater District (2016)

- Seaside County Sanitation District (2007)
- Monterey Peninsula Water Management District (2007)
- Marina Coast Water District (2018)

The specific information derived from these MSRs includes population and population growth data, land use, and water resource infrastructure and needs for the cities and planning districts within the Region.

12.2.5 Flood Protection and Floodplain Management

Monterey County Floodplain Management Plan: The MCWRA first developed the *Monterey County Floodplain Management Plan* in 2002 with the goal of creating a plan to minimize the loss of life and property in areas where repetitive losses have occurred, and to ensure that the natural and beneficial functions of the county's floodplains are protected. Updated in 2008 and again in 2014, the plan describes the county's flood control system (infrastructure), identifies flood zones defined by the Federal Emergency Management Agency, including maps depicting Repetitive Loss Properties (RLP) and 100-year floodplains, provides a general hazard assessment, assesses the flood hazards of specific waterways in the county in terms of repetitive losses, and provides an implementation plan for flood mitigation and for mitigation of RLPs.

Information from the Floodplain Management Plan has been used in the IRWM Plan to provide the RWMG and stakeholders with an understanding of flooding, flood protection, and floodplain management in the Region. The Flood Protection and Floodplain Management objectives in this IRWM Plan incorporate and are fully consistent with the objectives of the *Monterey County Floodplain Management Plan*.

12.2.6 Watershed Management

Information from current and recent watershed assessments and management plans is included in this IRWM Plan to provide background for the RWMG and stakeholders about local watershed management planning efforts. The goals and objectives of this IRWM Plan are congruent with the various watershed management planning efforts in the Region. In fact, many of the objectives in this Plan were derived from previous watershed assessment and planning efforts.

San Jose Creek Watershed Assessment

The San Jose Creek Watershed Assessment is a steelhead-centric, physical watershed document that includes a prioritized list of watershed management actions for the San Jose Creek watershed. The assessment integrates information from sediment source analysis, hydrologic data, barrier evaluations, and lagoon monitoring.

San Jose Creek flows through a 14.2-square mile, steep, rugged, steelhead-bearing watershed that empties into the Pacific Ocean near the southern head of Carmel submarine canyon. Promoting the steelhead run is one of the regional priorities in the IRWM Plan. Salmonid[5] recovery can only occur if "major limiting factors" are prioritized and addressed, and a resource management or watershed plan contains the major salmonid-limiting factors for the South-Central California Coast Distinct Population Segment.

[5] "Salmonid" refers to the family of bony fishes that have the last three vertebrae upturned. This includes salmon, trout, and whitefish; in this instance, it is referring to the South-Central California Coast Steelhead population.

The work plan for the IRWM planning grant includes an assessment of the sediment, flows, and steelhead passage barriers in San Jose Creek and also the San Jose Creek lagoon's connectivity to the ocean. Recommended habitat improvements will be included in a formal Watershed Plan.

The findings and recommendations of the San Jose Creek Watershed Study are based on data from an unusually dry year. The anomalously dry year in which the study took place resulted in a more limited study on both sediment transport and the lagoon. Sediment transport in the Creek was observed as low; however, long-term sediment yields could be up to two times higher than observed since those periods may be more active than the period of study. This sediment movement, or erosion, is of greatest concern for both long-term restoration and fish habitat. Recommendations for future work were as follows:

- A study to understand the lagoon cycling and evolution
- A qualitative road and trail assessment
- Treatment of identified instream sites

Finally, it is recommended that 14 of the 57 inventoried sites receive treatment to reduce sediment, improve instream habitat, and possibly improve fish migration.

Carmel River Watershed Planning

The 2016 Carmel River Watershed Assessment and Action Plan Update[6] identified its highest priority issues to be water quality, water quantity, flood management, Carmel River Estuary and Lagoon, conservation of threatened species, dam management and removal, wildfire management, erosion and sedimentation, channel incision and geomorphology, drought, public safety and health, and public awareness and access. Along with the watershed assessment, the plan identified specific strategies that, if implemented, could improve the Carmel River as a natural and cultural resource.

The Watershed Assessment identified threatened species that inhabit the Carmel River Watershed. The current steelhead population is below historic numbers for the Carmel River and is well below populations found in Northern California coastal streams due, in part, to habitat fragmentation and degradation. In addition, the California red-legged frog was found in many areas of the watershed but little is known about its population structure.

Erosion, bank instability, and many other sediment contributors have been accelerated by land development for residential and agricultural purposes. The Watershed Assessment indicated that proper landscaping and restoration of the riparian-wetland habitat could help mitigate these impacts.

Since its adoption in 2004, the Plan has been consulted by stakeholders and water agencies when developing water management policies and projects. Similarly, information in the Assessment was also used throughout this IRWM planning process to form objectives and develop regional priorities. The following objectives align closely with the suggestions presented in the Carmel River Watershed Assessment:

- Meet or exceed water supply requirements set by the SWRCB WRO 95-10, CDO 2009-0060, and CDO 2016-0016
- Improve Carmel River water quality for environmental resources and recreational use

[6] Carmel River Watershed Conservancy, Inc. *Carmel River Watershed Assessment and Action Plan 2016 Update*. (January 17, 2017).

- Develop regional projects and plans necessary to protect existing infrastructure and sensitive habitats from flood damage and erosion resulting from the 100-year event
- Protect and enhance sensitive species and their habitats in the regional watersheds
- Minimize adverse effects on biological and cultural resources when implementing strategies and projects

The following regional priorities were developed with input from the Carmel River Watershed Assessment:

- Flooding in the Carmel Valley and the Carmel River Lagoon
- Mitigate stormwater runoff throughout the Carmel River watershed
- Promote the Steelhead run
- Eight action categories in order of sequence to the watershed: flows, groundwater, habitat, sedimentation, steelhead, education, public safety, and water quantity
- A total of 57 actions were recommended in the Action Plan

Salt and Nutrient Management Plans

The SWRCB adopted a Recycled Water Policy in February 2009, which requires local stakeholders, such as local water and wastewater entities, and members of the public to develop salt and nutrient management plans for groundwater basins. The Policy mandates completion of the salt and nutrient management plans by May 14, 2014, although it allows the Central Coast RWQCB to permit a two-year extension (until May 14, 2016) if the stakeholders demonstrate substantial progress toward completion of the plan.

The salt and nutrient management planning effort for the Seaside Groundwater Basin was completed in April 2014. A summary of the SNMP is included in **Chapter 11, Technical Analysis**.

12.2.7 Stormwater Management/Planning

The 1987 amendments to the Clean Water Act, Section 402(p), provide a framework for regulating certain stormwater discharges under the NPDES program. Separate permits are required for municipal, industrial, and construction activities.

Since March 10, 2003, municipal stormwater permits for urbanized areas in the Monterey Peninsula Planning Area have been covered under EPA's Stormwater Phase II Final Rule (December 1999), which established application requirements for stormwater permits for additional operators of MS4s in urbanized areas. In 2000, the Cities in the South Monterey Bay area (Monterey, Carmel-by-the-Sea, Del Rey Oaks, Sand City, Seaside, Marina, and Pacific Grove), Monterey County, and the Pebble Beach Company formed a Working Group to develop a stormwater management program and secure a Phase II NPDES permit from the Central Coast RWQCB. The Working Group developed the MRSWMP and permit coverage was issued by the Central Coast RWQCB in September 2006. The MRSWMP is currently being implemented by the participating entities. Under the permit, there are six types of pollution control activities: public education, pollution source identification and abatement, water quality monitoring, land use regulations, construction site regulation and control of municipal operations.

The MRSWMP contains a series of stormwater quality management practices, referred to as BMPs. These BMPs are designed to reduce the discharge of pollutants from the municipal separate storm

sewer systems to the "maximum extent practicable," to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

On February 5, 2013, the State Water Resources Control Board adopted new Phase II permit requirements, mandating that all small local governments submit a Notice of Intent for a new permit by July 1, 2013 and terminating the requirements of the previous permit cycle. The new program requires additional information be added to the existing permit in order for full compliance.

Stormwater associated with industrial activities that discharge either directly to surface waters or indirectly through separate municipal storm sewers must be regulated by an NPDES permit (Water Quality Order No. 97-03-DWQ, General Permit No. CAS000001).

The State Board has adopted a separate statewide general permit for construction activities disturbing an area greater than one acre (Order No. 2012-0006-DWQ, NPDES No. CAS000002). The intentions of this permit are to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters, and to implement and perform inspections of BMPs. State agencies such as Caltrans, municipal agencies and private construction activities are subject to this permit.

Stormwater management programs and plans are discussed in this IRWM Plan **Chapter 2, Region Description**. Information from these stormwater programs and plans has been incorporated into the IRWM Plan in order to inform the RWMG and stakeholders about local stormwater management as part of the region's water system. The goals and objectives of the IRWM Plan support the stormwater management efforts described in these plans (as indicated in the IRWM Plan objective to capture and manage stormwater runoff).

The Canyon Del Rey Master Drainage Plan Update

Canyon Del Rey Creek is an ephemeral stream that drains to the Pacific Ocean; the watershed includes portions of Seaside, Del Rey Oaks, Monterey, and unincorporated Monterey County. The MCWRA completed a Master Drainage Plan for the watershed in June 1977. The update to the 1977 plan was a cooperative effort between MCWRA, the City of Seaside, and the MPWMD. Other contributing agencies include the City of Monterey and the Monterey Peninsula Regional Park District. The Plan update was completed in 2014.

Balance Hydrologics, Inc. prepared the Canyon del Rey Master Drainage Plan Update project funded by the IRWM Planning Grant. The purpose of the project was to evaluate known drainage problems in the Canyon del Rey watershed and update a 1977 drainage study, especially concerning head-cutting in Canyon Del Rey Creek (the creek or CdR creek) and culvert sedimentation of road drainage facilities. Laguna Grande and Roberts Lakes, located at the terminus of the watershed, continue to experience sedimentation and have a reduced flood control capacity.

The study area is made up of 37 sub-watersheds. The size of these sub-watersheds varies from 8 acres to 1.88 square miles. Significant portions of the watershed to the south of Highway 68 are sparsely developed and contain steep slopes (>25%) rising up to 1,300 feet in elevation with a mix of coastal scrub, pine, and oak woodlands. Most of the runoff to the creek is from this area, which is rated as a fire hazard and thus can undergo episodes with high rates of erosion. The west end of the basin, in the Cities of Monterey, Seaside, and Del Rey Oaks there is a high degree of urbanization and development.

The most recent update of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (April 2, 2009) shows zones of shallow flooding in the 100-year event that would affect residences and businesses adjacent to the creek between Roberts Lake and the intersection of Highway 68/Highway 218 would be inundated during a 100-year flood. The first Technical Memorandum

prepared for this Drainage Plan Update analyzes precipitation and rainfall depth data, to be used for hydrologic modeling.

The second Technical Memorandum summarized the hydrologic modeling. The methodology used incorporates generally accepted best practices for flood analysis, management, and design which can be executed with available information regarding the local rainfall and watershed conditions. Runoff was calculated from precipitation in each sub-watershed using parameters including slope, sub-watershed geometry, percent impervious area, soil type, ground cover, and antecedent moisture.

The highly pervious nature of watershed soils, particularly on the north side of the valley enables the watershed to absorb and retain large amounts of rainfall before substantial runoff is initiated. The Hydrology Modeling System (HEC-HMS) model of the watershed was used to produce runoff rates and volumes for the sub-watersheds, flow results for stream channels, operational data for the storage basins, and performance data for the culverts.

City of Seaside Stormwater Master Plan

The City of Seaside owns, operates, and maintains a storm drain collection system within the city limits, as well as the 90-inch diameter Bay Avenue outfall in Sand City. This system conveys storm runoff out of the city through two ocean outfalls. The purpose of Phase 1 of the Master Plan is to: 1) investigate certain documented existing system deficiencies and develop preliminary improvement projects for inclusion into a potential capital improvement program (CIP); 2) develop a program to meet requirements for operating, maintaining and inspecting the City's storm drainage system; 3) develop a preliminary CIP to address the known system deficiencies and prioritize projects; and 4) prepare a stormwater utility fee study on the basis of the proposed CIP, operations and maintenance, inspection, NPDES commitments and future Stormwater Master Plan study phases. This report was originally developed in 2008 and was updated in 2014 to reflect new requirements prescribed by the 2013 update of the NPDES Phase II Stormwater Program permit.

This plan was used to complement efforts to update the Canyon Del Rey Drainage Study, which contains a portion of Seaside within the watershed.

12.2.8 Areas of Special Biological Significance

There are 34 State-designated ASBS along the California Coast, two of which are located in the Monterey Peninsula IRWM region: Carmel Bay and Pacific Grove. On March 20, 2012, the State Water Resources Control Board adopted a General Exception to the California Ocean Plan for Areas of Special Biological Significance Waste Discharge Prohibition for Storm Water and Non-point Source Discharges, with Special Protections (ASBS Special Protections). The ASBS Special Protections can be summarized generally to eliminate dry weather runoff, ensure that wet weather runoff does not alter natural water quality in the ASBS, and that adequate monitoring be conducted to determine if natural water quality and the marine life beneficial use is protected. The ASBS General Exception and Special Protections documents are available online[7].

The ASBS Special Protections require water quality monitoring, and provide for the option of creating regional monitoring programs. In early 2013, the Central Coast ASBS Regional Monitoring Program was established through a Memorandum of Agreement for all dischargers on the Central Coast, covering an area from Big Sur, in Monterey County, to Pt. Reyes, in Marin County. The responsible parties include:

[7] http://www.waterboards.ca.gov/water_issues/programs/ocean/asbs.shtml

the Cities of Carmel, Monterey and Pacific Grove, the Counties of Marin, Monterey and San Mateo, Caltrans, the Pebble Beach Company, Stanford University Hopkins Marine Station and the Monterey Bay Aquarium.

The results of the Central Coast ASBS Regional Monitoring establish the "natural water quality" objectives to be met by the ASBS Special Protections. The Scope of Work for the Central Coast ASBS Regional Monitoring Program was developed by responsible parties discharging storm water into ASBS in conjunction with the State and Regional Water Boards. The monitoring includes water quality sampling of all separate storm sewer system (MS4) outfalls over 18-inches in diameter that discharge stormwater to an ASBS, as well as receiving water quality monitoring at outfalls over 36-inches in diameter, reference site monitoring, and other regional elements such as rocky intertidal and bioaccumulation monitoring.

M1W agreed to act as Program Administrator on behalf of the group in MOA. The MOA is based on the existing MRSWMP. The ASBS Special Protections are incorporated into the NPDES MS4 Stormwater Permits; therefore, the MRWPCA's role as the Program Administrator is an extension of its role in the MRSWMP.

The cities of Pacific Grove and Monterey are currently constructing the ASBS Stormwater Management Project, which will include enhancing the Pacific Grove existing dry weather urban runoff diversion system that connects Pacific Grove's storm drain system to the M1W system, to be able to divert some wet weather flows. The City of Pacific Grove has an existing dry weather diversion system that diverts urban runoff from Pacific Grove's storm drain system into the M1W regional wastewater collection system.

The primary goal of the Pacific Grove ASBS Stormwater Management Project is to improve stormwater quality discharged into the ASBS located along the Pacific Grove coastline. Providing an additional source of water supply for recycling is a secondary goal of the project. A FEIR was certified for the project in 2014. In 2019, an Addendum to the FEIR was adopted by the City of Pacific Grove. The project is currently under design.

The ASBS Stormwater Management Project allows the City the flexibility to either direct runoff to a new Point Pinos stormwater facility or to capture runoff and convey it to the M1W Regional Wastewater Treatment Plant in Marina. The design storm for the project is 85th percentile event, defined as a 24-hour storm with a rainfall volume of 0.8 inches. The total volume of wet weather flows to be managed by this project is estimated to be 626 AFY, with approximately 580 AFY 85th percentile or smaller storms.

The ASBS Stormwater Management Project is comprised of five associated sub-projects located primarily in the City of Pacific Grove, with a portion of one project located in the City of Monterey. The five projects include:

- Upgrading and restoring the retired David Avenue Reservoir, adjacent to the intersection of David Avenue, Terry Street, and Carmel Avenue;
- Modifying the Pine Avenue drainage system between 7th Street and 18th Street;
- Modifying the Ocean View Boulevard drainage system from Forest Avenue west to the retired Pacific Grove Wastewater Treatment Plant near Point Pinos;
- Installing a new stormwater treatment system at the former Pacific Grove Wastewater Treatment Plant site, located on the Pacific Grove Golf Links; and

- Upgrading the dry weather diversion system along the Ocean View Boulevard right-of-way from Forest Avenue east to David Avenue to enable the diversion of wet weather flows to the Regional Wastewater Treatment Plant.

The existing dry weather diversion system is sized to convey 200 gpm to the M1W, and includes five pump stations, and over 6,800 feet of conveyance pipeline. The project component to upgrade and expand the existing dry weather diversion system is to increase the capacity of the existing dry weather diversion system to be able to divert up to the 85th percentile of wet weather storm to the M1W. The average annual wet weather runoff to the M1W collection system through is approximately 173 AFY, with an average of the 85th percentile or smaller events generating approximately 143 AFY that would be diverted to M1W.

The existing pump stations at Eardley, Berwick and Greenwood Park would need to be upsized to accommodate increased flows. Within the Lovers Point and Fountain section of the existing system, pipelines are adequate for delivery of the 85% event to the M1W. If the Pine Avenue component is not first constructed, peak flows to the diversion system would increase as its runoff from a larger area of the watershed would be captured.

The Point Pinos Stormwater Treatment Plant project component has been constructed. This component adds to the total amount of urban runoff diverted to the Regional Treatment Plant. Approximately 417 AFY to 434 AFY of additional wet weather flows can be routed to this project component, which can potentially be diverted to M1W at the Coral Street pump station if capacity is available in the M1W system to accept the flow rates from the treatment plant.

12.2.9 City and County General Planning

The policies of the General Plans for Monterey County and the cities in the Monterey Peninsula planning region (Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Seaside and Sand City) are generally consistent with the goals and objectives of the IRWM Plan (**Chapter 13, Table 13-1** identifies all General Plans of the Monterey Peninsula).

The introduction to the Monterey County General Plan (2010) Conservation and Open Space element summarizes its overarching goal: *The County's intent is not to alter existing regional, state or federal laws and regulations, but rather to enable greater cooperation among public agencies and the public to share management responsibilities in accomplishing the shared goal of conserving and protecting the resources of the region.*

The theme that links all the General Plans with the IRWM Plan is the preservation of valuable natural resources through environmentally responsible solutions. However, the land use plans have a limited reach where the management of those resources is concerning. Land uses and zoning in a municipal code can not necessarily accomplish what a collaborative resource management planning document that crosses jurisdictional and political boundaries can aspire to achieve. General Plans express a county's development goals and embody public policy on future land uses. The IRWM Plan fills in the gaps where water supply and water quality may not be covered.

Several area plans may also have specific water use components that are consistent with policies in the Monterey County 2010 General Plan: Cachagua Area Plan, Carmel Valley Master Plan, Carmel Area Land Use Plan, Del Monte Forest Land Use Plan, Greater Monterey Peninsula Area Plan, and Fort Ord Reuse Plan.

12.2.10 Emergency Response and Disaster Plans

Monterey County Multi-Jurisdictional Hazard Mitigation Plan (2015): The Disaster Mitigation Act of 2000 (DMA 2000) (Public Law 106-390) was passed by Congress to emphasize the need for mitigation planning to reduce vulnerability to natural and artificial hazards. For multi-jurisdictional plans, DMA stipulates that the plan be adopted by the participating local governing bodies. The Hazard Mitigation Plan for Monterey County was developed for the Monterey County Office of Emergency Services in 2007, and was updated in 2015. The Plan was adopted by County of Monterey and the cities of Carmel-by-the-Sea, Del Rey Oaks, Gonzales, Greenfield, King City, Marina, Monterey, Pacific Grove, Salinas, Sand City, and Soledad. The plan includes a hazard analysis (including coastal erosion, dam failure, earthquake, flood, hazardous materials event, landslide, tsunami, wildland fire, and windstorm), a vulnerability analysis, and a mitigation strategy.

Emergency response and disaster planning involves water resource planners both in the preparation and mitigation phases. Preparation includes, for example:

- Locating and constructing water supply, wastewater, and other infrastructure in such a way to reduce the effects of earthquakes, floods, tsunamis, and other disasters (Goal 1: Promote disaster-resistance and climate adaptation strategies in future development)
- Helping coastal residents minimize erosion and stabilize slopes (Goal 2: Retrofit, reinforce, or otherwise protect existing community assets, especially critical infrastructure, for hazard resilience
- Identifying and implementing minor flood and stormwater management projects to reduce damage to infrastructure due to local flooding/inadequate drainage, including the modification of existing culverts and bridges, upgrading capacity of storm drains, stabilization of streambanks, and creation of debris or flood/stormwater retention basins in small watersheds (Goal 6: Improve local government capacity for disaster resiliency; facilitate coordination between participating jurisdictions and state and federal agencies, local utility companies, local businesses, non-profit organizations, and other stakeholders to promote hazard risk reduction.)

Mitigation includes, for example, mitigating property damage following flood events, plans for ensuring the delivery of water following disaster events, and plans for managing the response effort.

Monterey County, in coordination with all of its incorporated municipalities, is preparing a comprehensive update to its Multi-Jurisdictional Hazard Mitigation Plan. The 2021 plan update process is being led by Monterey County's Office of Emergency Services, and through a collaborative partnership with NOAA, FEMA, and the National Association of Counties (NACo). The process includes an update to all elements in the existing plan to better reflect current conditions, along with the incorporation of new information to help address the potential long-term effects of climate change and sea level rise. The plan update is being guided by a multi-jurisdictional planning team that includes representation from participating communities and other key stakeholders, and will be informed through a sustained public outreach and engagement strategy. The plan update is scheduled to be completed by August 2021.

Upon completion, the plan will serve as a new road map to planning for a safer future in Monterey County. This includes (1) the identification, evaluation, and communication of hazard risks; (2) an assessment of local capabilities to reduce those risks; (3) a strategy for implementing specific, achievable, and measurable hazard mitigation actions; and (4) procedures to establish a sustained, long-term process for increasing the resilience of all communities to natural hazards.

Although emergency response and disaster planning is not discussed as a separate topic in this IRWM Plan, several RWMG entities do participate in the multi-jurisdictional hazard mitigation planning effort, and the IRWM Plan incorporates many of the objectives of that effort. Several IRWM Plan projects directly address the goals of hazard preparation and mitigation through such means as infrastructure improvements, erosion control, coastal restoration, and flood risk reduction projects. Also, the MCWRA has adopted a plan for flood mitigation in the *Monterey County Floodplain Management Plan* (see description above in Section 12.2.5)

12.2.11 Monterey Bay National Marine Sanctuary Management Plan

The entire Monterey Bay national sanctuary covers a much broader area than just the local Monterey Bay – extending from Marin County to San Luis Obispo County. In 2008 the MBNMS released their Management Plant, which includes twenty-three separate action plans. The MBNMS is currently in the process of updating their Management Plan; the final version of the update expected to be released in July 2020. The majority of the action plans are grouped into four main marine management themes: coastal development, ecosystem protection, water quality, and wildlife disturbance. Two additional sections, partnerships and opportunities as well as operations and administration, comprise action plans and strategies addressing how the Sanctuary will function and operate. Successful implementation of each of the action plans relies on partnerships with federal, state, and local agencies in addition to local stakeholders (montereybay.noaa.gov), creating an opportunity for the RWMG to coordinate as an Action Plan Partner. Several members of the RWMG along with other stakeholders in the region are working to implement strategies in the MBNMS Action Plans through the IRWM planning process.

12.3 Dynamics between Local Water Planning and IRWM Planning

12.3.1 Process for Updating Information in the IRWM Plan

Most of the planning documents described above are updated regularly, some on an annual basis, others on a decennial basis. All of the data and information contained in this IRWM Plan will be reviewed and updated periodically, depending on available funds, as part formal Plan updates. Accordingly, the IRWM Plan updates will reflect the latest planning efforts and most recent editions of the local planning documents.

12.4 How Regional Planning Efforts Feed Back to Local Planning Efforts

The flow of information between IRWM planning and local water planning is circular. The IRWM regional planning feeds back into local planning efforts in numerous ways. Most RWMG members are themselves local water planners, and the regional planning that occurs through the IRWM planning process is brought back to these local planning entities. Likewise, the results of the IRWM planning process impacts the decision-making of other water resource planners and stakeholders involved in the Monterey Peninsula IRWM planning process.

Currently, regional water planning is driven primarily by State orders and Federal Endangered Species Act requirements that are incorporated into the planning processes of both regional entities and local jurisdictions. Orders and regulations from the State Water Resources Control Board, Regional Water Quality Control Board, California Public Utilities Commission, California Coastal Commission, Federal Emergency Management Act, and requirements under the Endangered Species Act significantly affect how, when, and where water resources are used or developed. Local planners must wade through a

labyrinth of complex legal documents and requirements enacted at various levels of government in order to determine how to manage resources and plan for the future.

Ideally, the relationship between regional IRWM planning and local water resource management planning will remain dynamic, with a constant exchange of information.

12.5 Resolving Inconsistencies

The IRWM Plan is built upon local plans and planning efforts, and local entities were consulted on IRWM goals and objective, thus, few inconsistencies between the IRWM Plan and local plans exist. If discrepancies are found they will be resolved through direct communication and coordination with the related planning entities. As described in **Chapter 13**, **Relation to Local Land Use Planning**, the RWMG intends to evaluate potential barriers against IRWM Plan implementation and work closely with the regulating agencies, local agencies, and funding entities to resolve issues on a case-by-case basis.

12.6 Climate Change Adaptation and Mitigation Strategies in Local Plans

Local water planning agencies are incorporating climate change adaptation and mitigation strategies in their local plans. As these strategies develop through local water management planning efforts they will become incorporated into the Monterey Peninsula IRWM Plan with future Plan updates. Please see **Chapter 15**, **Climate Change**, for a full discussion of the RWMG's current climate change recommendations and strategies for the Monterey Peninsula region.

The RWMG has been in communication with water and land use managers in the broader Central Coast region regarding climate change mitigation/GHG reduction efforts throughout the Central Coast. The Climate Change chapter for this IRWM Plan was developed with significant contributions from the Greater Monterey County regions' Climate Task Force, comprised of local scientists, water resource managers, land use managers, and coastal policy experts before the chapter was submitted for inclusion within this Plan. Participating entities on the Climate Task Force included: Central Coast Wetlands Group at Moss Landing Marine Laboratories, Stanford University Center for Ocean Solutions, Monterey Bay National Marine Sanctuary, Santa Cruz County, Association of Monterey Bay Area Governments, Monterey County Planning, California Water Company, Monterey County Water Resources Agency, Stanford University Natural Capital Project, California Department of Water Resources, Santa Cruz County Resource Conservation District, and The Nature Conservancy.

The RWMG will continue to seek partnership with these entities, as well as with other RWMGs in the Central Coast region, and to participate in other regional climate change efforts in order to collectively and proactively address the issue of climate change on the Central Coast.

Chapter 13 Relation to Local Land Use Planning

IRWM Plan Standard 13

IRWM Plans must contain processes that foster communication between land use managers and RWMGs with the intent of effectively integrating water management and land use planning. IRWM Plans must document:

- Current relationship between local land use planning, regional water issues, and water management objectives.
- Future plans to further a collaborative, proactive relationship between land use planners and water managers.
- Demonstrate information sharing and collaboration with regional land use planning in order to manage multiple water demands throughout the state, adapt water management systems to climate change, and potentially offset climate change impacts to water supply in California.

13.1 Introduction

The intent of this standard in the Proposition 1 IRWM Program Guidelines is to a) exchange knowledge and expertise between land use planners and water resource managers through the IRWM planning process; b) examine how RWMG and land use planning agencies currently communicate; and c) identify how to improve planning efforts between the RWMGs and land use planning agencies. One of the goals of the *California Water Plan Update (2018)* is to ensure that water managers and land use planners make informed, collaborative water management decisions. Therefore, this standard helps meet this statewide goal.

Every city and county in California must adopt a comprehensive long-term General Plan in accordance with §65300 of the California Government Code (see **Table 13-1** for a list of General Plans within the Monterey Peninsula IRWM Region). There are seven required elements in all General Plans: land use, circulation, housing, conservation, open space, noise, and safety, which provide a broad overview of the issues within a jurisdiction. If deemed necessary, a jurisdiction may create additional elements in a plan that focus on specific issues. Water-related supply and treatment issues are commonly included in the conservation element. Policies that must be addressed in the conservation element include the following:

- Senate Bill (SB) 221 (Bus. and Prof. Code, §11010 as amended; Gov. Code, §65867.5 as amended; Gov. Code, §66455.3 and 66473.7) prohibits approval of subdivisions consisting of more than 500 dwelling units unless there is verification of sufficient water supplies for the project from the applicable water supplier(s). This requirement also applies to increases of 10 percent or more of service connections for public water systems with less than 500 service connections.
- SB 610 (California Water Code [CWC] §10631, 10656, 10910, 10911, 10912, and 10915 as amended; Public Resources Code [PRC] §21151.9 as amended) and Assembly Bill (AB) 901 (CWC §10610.2 and 10631 as amended; CWC §10634) make changes to the Urban Water Management Planning Act to require additional information in Urban Water Management Plans (UWMP) if groundwater is identified as a source available to the supplier. A key provision in SB 610 requires that any project subject to CEQA and supplied with water from a public water system be provided a water supply assessment, except as specified in the law.

- State of California General Plan Guidelines (Governor's Office of Planning and Research 2003) recommends facilitating SB 610 by having strong water elements in local general plans that incorporate coordination between that land use agency and the water supply agency.

The enactment of the Sustainable Groundwater Management Act (SGMA) in 2014 has created additional requirements for improved coordination and consultation between land use planners and local water supply and management agencies for regions that are subject to this legislation (i.e., groundwater basins that are designated as medium or high priority according to the Department of Water Resources Bulletin 118). SGMA provides a framework for long-term sustainable groundwater management across California, with a goal of achieving sustainable management by the year 2042.

According to §65352.5 of the SGMA legislation, upon receiving notification of a city's or a county's proposed action to adopt or substantially amend a general plan, a public water system with 3,000 or more service connections must provide the planning agency with: the current version of its urban water management plan; the current version of its capital improvement program or plan; a description of the source or sources of the total water supply currently available to the water supplier by water right or contract; a description of the quantity of surface water and of groundwater that was purveyed by the water supplier in each of the previous five years; a description of the total number of customers currently served by the water supplier; quantification of the expected reduction in total water demand associated with future implementation of water use reduction measures identified in the water supplier's urban water management plan; and any additional information that is relevant to determining the adequacy of existing and planned future water supplies to meet existing and planned future demands on these water supplies.

Even with advances in policy as described above and with new legislation such as SGMA, efforts to link land use decisions and water management decisions often remains an area of challenge. Land use decisions and water management decisions are frequently under the purview of different agencies, yet the resources each agency manages are inextricably linked. Often, the relationship among these agencies is characterized as reactive in that one agency must act to accommodate a decision the other agency has made. Early communication is vital in changing the relationship from reactive to proactive.

A primary aim of IRWM planning is to solve regional water management issues through diversified water management portfolios and to encourage early communication and coordination with agencies responsible for making land use decisions. This relationship can significantly influence how both water management decisions and land use decisions are made. The importance of open lines of communication between local land use planners and water resource managers is imperative to a successful IRWM effort.

This chapter describes the current relationship between local land use planning entities and water management entities in the Region and provides suggestions for how that relationship may be improved.

Table 13-1: General Plans of the Monterey Peninsula IRWM Region

General Plan Jurisdiction	Adopted
Carmel-by-the Sea	June 3, 2003
Del Rey Oaks	January 1997
Pacific Grove	October 1994
Monterey	January 2005
Sand City	2002
Seaside	August 5, 2004[1]
Monterey County	October 2010

13.2 Link Between Local Land Use and Water Management

This IRWM Plan seeks to solve regional water management issues by having a diversified water management portfolio and by coordinating with land use decision-makers. The IRWM Plan Stakeholder List (**Appendix 1-d**) contains the contact information for representatives of land use decision-making agencies and the RWMG. The relationship between the RWMG and land use decision-makers can significantly influence how both water management decisions and land use decisions are made. Opportunities may exist for the RWMG to provide input to land use planners in the following areas:

- Floodplain management
- Flood control planning
- Groundwater recharge and conjunctive water use
- Treatment and conveyance facilities
- Stormwater and runoff management
- Water conservation efforts
- Watershed management and restoration

In addition, the following are opportunities for land use planners to provide input to RWMG:

- Municipal landscaping programs
- Public access and recreational area management
- Changes in land use that affect water resources
- General plan updates and long-term planning

[1] A public draft of an updated General Plan was released for review in 2017. A final version has not yet been released.

- Planning review
- Development review
- Water supply for public safety and emergency planning purposes
- Habitat management

These are general examples described in the IRWM Proposition 1 Guidelines- instances where coordination among land use agencies and the RWMG could result in more efficient IRWM planning and implementation. Resource management crosses jurisdictional boundaries within the region, which increases the probability for collaboration on larger, more costly projects, which requires open lines of communication between land use planners and the RWMG.

13.3 Current Relationship between Local Land Use Planning and Water Management Objectives

This section describes how water resource managers currently communicate with land use planners in the Region. Since communication patterns are similar amongst entities with similar jurisdictions, this section has been organized, for the purpose of structuring this discussion, according to the following general categories:

- Municipalities that supply their own water services
- Municipalities and large communities that do not supply their own water services
- Agencies with regional jurisdiction

The term “water manager” is used in this section to refer both to regulatory water management entities (such as the Monterey Peninsula Water Management District, which is responsible for long-term management of the Seaside Groundwater Basin and the Carmel River aquifer) and those that regulate water quality (the Regional Water Quality Control Board and Monterey County Department of Environmental Health). In addition, “water manager” refers to those that manage water delivery: retail water purveyors, such as California American Water Company, Marina Coast Water District, and the Seaside Municipal Water system.

The Effects of State Orders to Reduce Carmel River Diversions and Seaside Groundwater Production

In 1995, the SWRCB issued Order No. WR 95-10, which found that Cal-Am was diverting more water from the Carmel River Basin than it was legally entitled to divert. The State Board ordered Cal-Am, instead, to maximize diversions (to the extent feasible) from the Seaside Groundwater Basin (SGB). In addition, a subsequent Cease and Desist Order (SWRCB 2009-0060) issued in 2009 requires Cal-Am to secure replacement water supplies for its Monterey District service area by December 2016 and reduce its Carmel River diversions to 3,376 AFY by the 2016-17 timeframe. In July 2016 the SWRCB adopted Order 2016-0016, which amends Orders 95-10 and 2009-0060. Order 2016-0016 extends the date by which CalAm must terminate all unlawful diversions from the Carmel River from December 31, 2016 to December 31, 2021. The revised CDO set an initial diversion limit of 8,310 AFY for Water Year 2015-2016 (October 1, 2015 - September 30, 2016) and establishes annual milestones that CalAm must meet in order to maintain the 8,310 AFY diversion limit through 2021.

In 2006, the Monterey County Superior Court adjudicated water rights in the SGB and ordered pumping to decrease from about 5,600 AFY to 3,000 AFY by 2024. In 2018, CalAm was given authority from the CPUC in Decision 18-09-017 dated September 13, 2018 to purchase 3,500 AFY from the Pure Water

Monterey project and to build a 6.4 mgd desalination plant to meet replacement water supplies needs to reduce its Carmel River diversions to the degree required by the Cease and Desist Order, to reduce its pumping in the Seaside Basin in accordance with the Watermaster's pumping mandates, and provide additional water for expanded uses and new development in the region.

13.3.1 Municipal Water Suppliers

The City of Seaside is unique from other jurisdictions within the Region in that it has its own municipal water system; however, the system supplies water to only a portion of the city from one well to 3,300 customers adjacent to the Ord Community boundary. Seaside Municipal Water District (SMWD) average demand was estimated at about 300 AFY in 2009. The area served by SMWD is considered "built-out" at this time; therefore, development opportunities and future land use changes are likely to be limited. As a result, land use planning and water resource management has been primarily focused on implementing water conservation measures. Because SMWD's allocation from the SGB will be reduced in the future, the City has been working with the SGB Watermaster and MPWMD to identify additional replacement water sources.

The remainder of the Seaside area is served either by CalAm or MCWD. Interaction between land use planners and water resources managers in those areas is described in the next section.

Where water resource management and land use planning occur "in house," coordination tends to occur naturally through ongoing interdepartmental communications. Discussions are initiated when a developer inquiries about a land use project or files an application. Additionally, when a city updates its General Plan, the planners will consider water sources and the expansion of the urban area. EIRs per CEQA and, more recently, Water Supply Assessments, typically provide the instrument for disclosure of information and potential impacts to concerned members of the public and other agencies.

13.3.2 Municipalities and Communities That Do Not Supply Their Own Water Services

In the Monterey Peninsula IRWM Region, Cal-Am, an investor-owned water utility, and MCWD, a special district, are the water suppliers for the majority of the region. Cal-Am serves the cities of Carmel-by the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, a portion of Seaside and some unincorporated Monterey County communities. MCWD serves the entire Ord Community, a portion of which is within the planning region, and Marina, which is part of the Greater Monterey County IRWM region.

Where inherent separation exists between the utility (water manager) and the City or unincorporated community (land use planner) that it serves, coordination between the two is somewhat more challenged than in the situation where land use planning and water resource planning occur "in house."

The Monterey Peninsula is unique in California as it is the only the region where a special district (MPWMD) allocates water to nearly all of the land use jurisdictions (allocation to the Ord Community is under a 1993 agreement with the federal government). MPWMD carries out water allocation under CEQA with an EIR that evaluates impacts from the use of water from sources within the MPWMD boundary. The process includes soliciting water demand projections from each jurisdiction, holding public hearings, and setting a limit on use within each jurisdiction. However, each jurisdiction determines how it will best use allocated water.

Cal-Am Service Area

Currently, Cal-Am is prohibited from setting new water meters and intensifying water use under a Cease-and-Desist Order (CDO) from the SWRCB and under an order from the CPUC. The SWRCB has

ordered cutbacks in production from Carmel Valley and the Superior Court has ordered cutbacks in water use from the SGB. Together, these cutbacks will result in a reduction of nearly 50 percent in available water supplies. Cal-Am reports quarterly to the SWRCB on compliance with the CDO. Within the SGB, the Seaside Watermaster serves to manage water from that basin. Several regional municipalities are represented on the Watermaster including Monterey, Sand City, Del Rey Oaks, and Seaside. Cal-Am, MPWMD, and MCWRA are also represented. The Watermaster meets most months. Basin pumpers are enjoined from overproducing and are subject to fines. The Superior Court has retained jurisdiction over the basin.

Land use planning agencies have been made aware of these limitations and MPWMD has warned that even if a development permit is issued by a land use agency, there may not be water available.

For future planning purposes, "formal" coordination between Cal-Am and land use jurisdictions is currently limited to efforts such as developing UWMPs or developing water service agreements (WSA). Some examples of Cal-Am's typical interactions with land use planners include:

- Cal-Am staff works with municipal staff to develop growth projections (population, service counts, water demand) for their UWMP, including the most recent update completed in July 2016.
- To develop Cal-Am's UWMP, Cal-Am staff and consultants used General Plan data and interviewed planning personnel to project future growth and water use.
- Cal-Am Monterey District Manager attends City Council, MPWMD, and Watermaster board meetings.

In addition, for large development projects that require a WSA, Cal-Am must conduct the WSA and submit it to the City or County prior to development approval. Coordination between Cal-Am and a City or the County is more limited for smaller projects. In those cases, Cal-Am deals directly with the developers after their plans have already been approved by the City or County. Cal-Am staff will review the project to make sure that adequate water supply exists in that part of the system and then will issue a will-serve letter.

Marina Coast Water District

MCWD provides water to the City of Marina and the Ord Community through a contract with FORA. The Ord Community includes lands under the jurisdiction of Marina, Seaside, Del Rey Oaks, Monterey, Monterey County (unincorporated). Each jurisdiction has been allocated water under a federal agreement signed in 1993. Although jurisdictions have identified future needs that are greater than the current allocation, no new water supply project has been built. For planning purposes, MCWD is similar to Cal-Am for the areas it serves. For large development projects, MCWD will prepare a WSA, to be included in a development project's EIR. MCWD requires written proof of a resolution of project approval by the respective jurisdiction in order to begin serving new developments. Potential problems may arise, however, when MCWD and the City (or another land use jurisdiction) disagree on the amount of water that will be required by a project. If the City approves a project based on its lower water use projections, and the higher projections prove to be more accurate, the City may be faced with a serious water shortage and MCWD will be in the position of needing to identify additional water supply. This situation could occur as the economy picks up and those "last units," which received prior approval but have not yet been built because of the economic downturn, finally get built. Upfront coordination between water managers and land use jurisdictions help prevent this situation.

Increased coordination and communication should occur with small development projects as well. For most land use jurisdictions, water supply is not directly allocated to particular parcels. If business development on the small parcels is being promoted without adequate (or accurate) consideration of the potential water use by those businesses (e.g., hotel, laundry facility), a potential "accounting" problem may occur. One suggestion is that water management staff and land use planners work together to develop a parcel map of the region, allocating water to each parcel in some sort of flexible—but quantifiable—manner. Specific allocations of water for small and large projects would remove some of the ambiguity and uncertainty regarding future water use and would help improve long-term water supply security.

13.3.3 Private Wells and Small Water Systems

Portions of the unincorporated areas can be divided into two groups. Areas subject to the State CDO on Carmel River diversions in Carmel Valley or to the Seaside Basin adjudication have special rules concerning onsite wells or small water systems. Areas outside of these orders are served by onsite wells or small water systems, which are regulated by DWR, MPWMD, Monterey County, and by the California Coastal Commission (CCC) for coastal development. Typically, a property owner will apply to the Monterey County Planning Department for a Use Permit for development, and in the coastal zone to the CCC. If the water supply is from an onsite well, DWR and the Health Department (and possibly the CCC) must review the application and issue a permit to drill a well. The application is also referred to MPWMD and MCWRA for action, including a review of potential impacts to the environment and/or other wells. In all cases, there is a CEQA review and although many single wells on single lots can be approved as an exemption, the aforementioned reviews ensure to a fairly high level that water supplies are available, and extraction will not cause significant harm.

If a new well yields enough water to support a planned development without significant impacts, the property owner can receive a Use Permit from Monterey County for development and convert a temporary well permit from the CCC to a permanent well for use with coastal development.

More complex situations, such as developing multiple parcels, usually require the lead agency to complete an EIR, which affords additional review by local, state, and in some cases, federal regulators.

13.3.4 Wastewater Service

The Monterey Peninsula IRWM Region has four wastewater service providers. Most of the region, including Pacific Grove, Monterey, Del Rey Oaks, portions of Seaside, Sand City, and some areas of Unincorporated Monterey County are serviced by M1W. Within the M1W service area, jurisdictions own and maintain most sewer collection facilities within their jurisdictions, while M1W owns and maintains the sewer main pipeline and regional pump stations that collect the cities' wastewater and convey it to the Regional Treatment Plant in north Marina. The Carmel Area Wastewater District (CAWD) services Carmel-by-the-Sea, Pebble Beach, and portions of unincorporated Monterey County in the Carmel area and south to and including Point Lobos and some properties in the Carmel Highlands area. The SCSD jurisdictional area includes parts of Seaside and Del Rey Oaks from which the SCSD collects wastewater and transmits it to the M1W sewer main that carries it in the M1W treatment plant. MCWD provides wastewater treatment collection in a portion of the Ord Community within the region.

These wastewater districts work with local land use decision agencies to ensure new developments receive wastewater service. As with all public agencies, the local wastewater districts schedule public hearings and community meetings. Many of the wastewater agencies contain technical advisory committees comprised of local professionals, public officials, or local government employees. Several of

these wastewater agencies are represented on technical advisory committees that can potentially impact land use. For example, both CAWD and M1W have representation on the Monterey Peninsula Regional Water Authority Technical Advisory Committee.

13.3.5 Regional Agencies with Integrated Responsibilities

Monterey Peninsula Water Management District

The MPWMD is responsible for integrating the management of water resources throughout the region. The agency has been granted broad powers over use of surface water supplies, recycled water, and groundwater supplies. However, several agencies and CalAm are responsible for the distribution of water supplies within the Region and other regulatory agencies, such as Monterey County, M1W, the CPUC, SWRCB, Superior Court, RWQCB, California Department of Fish and Wildlife, and NOAA fisheries also retain authority over water resources.

Except for the Ord Community, MPWMD requires the issuance of a water distribution system (WDS) permit for creation of a new water service connection or a permit amendment for intensified water usage. The WDS permit, or proof that a permit will be issued, must be obtained before a project can be approved by a land use agency within the IRWM Region. MPWMD staff and board members participate in numerous regularly scheduled meetings, including public hearings to provide clarification as necessary. Many of the committees are comprised of employees of public agencies or elected officials, including land use decision makers. Examples of these regularly scheduled public hearings and meetings include:

- Carmel River Advisory Committee
- Carmel River Task Force
- Community Advisory Committee
- Inter-Agency Review Meeting
- Legislative Advocacy Committee
- Monterey Peninsula IRWM RWMG and as needed, Technical Advisory Committee (TAC)
- Monterey Peninsula Regional Water Authority and associated TAC
- Monterey Peninsula Water Supply Project Governance Committee
- Ordinance No. 152 Citizens Oversight Panel
- Policy Advisory Committee (PAC)/TAC
- Public Outreach Committee
- Rules and Regulations Review Committee
- Water Demand Committee
- Water Supply Planning Committee
- Seaside Basin Watermaster Board/TAC

Monterey County Water Resources Agency

The Monterey County Water Resources Agency—responsible for managing, protecting, and enhancing water supply and water quality as well as providing flood protection in the County of Monterey—is involved in land use planning throughout the unincorporated portions of the county. In a 1993 agreement between MPWMD and MCWRA, MCWRA retained the authority to construct water supply and recycling projects within the region.

MCWRA works in close coordination with the County of Monterey Planning and Building Divisions, and several other departments/agencies throughout the land use permitting process. MCWRA is primarily responsible for administering Monterey County floodplain, drainage, water conservation, water supply, and well construction regulations. The MCWRA reviews discretionary permits, ministerial permits, and well construction permits. Written comments and recommendations are provided in accordance with established department protocols. The MCWRA also participates in the development of various CEQA documents including initial studies, negative declarations, mitigated negative declarations, and EIRs. As requested, the MCWRA reviews CEQA documents in other jurisdictions and written comments are provided to the lead agency.

The MCWRA also participates in several regularly scheduled meetings, including public hearings to provide clarification, as necessary. Examples of regularly scheduled meetings and public hearings include:

- Inter-Agency Review Meeting
- Inter-Departmental Review Meeting
- Inter-Departmental Coordination Meeting
- General Plan Implementation
- Zoning Administrator
- Planning Commission
- Subdivision and Minor Subdivision Committees
- Board of Supervisors

Other planning related meetings:

- Permit Streamlining Task Force
- Code Enforcement Task Force
- Carmel River Task Force
- Carmel River Advisory Committee
- Monterey Peninsula IRWM Plan TAC
- Monterey Peninsula Regional Water Authority and associated TAC
- Monterey Peninsula Water Supply Project Governance Committee
- Seaside Watermaster Board and TAC
- Floodplain Management Plan Working Group
- Multi-jurisdictional Hazard Mitigation Plan Working Group

- County Service Area 50 Citizens Advisory Committee – Technical Support

The MCWRA is not fully funded to participate in some land use activities (general plan implementation). In turn, this limits communication and coordination in those areas. Essentially, there is more demand for services than there is funding.

On the "land use planning" side, the County of Monterey participates in several water resource planning activities throughout the county:

- Technical Advisory Committee member in the Integrated Watershed Restoration Program, and the Carmel River Task Force and Advisory Committee with the Resource Conservation District (RCD) of Monterey County, MPWMD, and other partners
- Central Coast Wetlands Group Monterey Bay National Marine Sanctuary (specifically, on climate change adaptation planning efforts

The County of Monterey consults with MCWRA on water supply and flood/drainage matters in Monterey County; discretionary permit applications are routinely sent to the MCWRA for review. The County of Monterey consults with the Monterey County Environmental Health Department regarding water quality issues. In addition, the Monterey County General Plan (2010) is set up so that MCWRA provides advice on water supply, which the Monterey County Board of Supervisors has the discretion to accept or not.

Other Planning Related Forums

In addition, several forums exist throughout the region to bring together land use planners, water managers, natural resource managers, landowners, and other stakeholders for the purposes of planning or conflict resolution related to certain geographic areas or features. These include, the Carmel River Watershed Conservancy, which focuses on Carmel River watershed management; the Monterey Regional Stormwater Management Program, which includes all of the nearby coastal cities (including Marina) and unincorporated Monterey County, and focuses on stormwater issues. In addition, regional planning entities such as AMBAG conduct workshops occasionally where interdisciplinary professionals, including land use planners and water managers, collaborate. The County of Monterey also conducts sub-regional land use advisory committee meetings that continually include discussion of water supply issues of proposed projects during the project review process conducted by Monterey County.

One current forum that brings together land use planners, water managers, and natural resource managers along with other stakeholders is provided by FORA; the reuse authority is responsible for the planning, financing, and implementation of the conversion of the former Fort Ord to civilian activities. The approved Base Reuse Plan calls for significant commercial economic development, supportive housing, visitor facilities, and related institutional activities aimed at supporting the community after the loss of the 15,000 soldiers and thousands of civilian employees who were in the area when Fort Ord was an active base. Nearly two-thirds of the former base will be preserved and maintained as habitat for endangered species and recreational open space. Working groups have been formed to focus on particular issues related to the Base Reuse Plan, including a Habitat Conservation Plan and Coordinated Resources Management and Planning. A Water and Wastewater Oversight Committee comprised of key staff and representatives of the land use jurisdictions meet on a regular basis to implement water delivery, wastewater services, and stormwater infrastructure on the former Fort Ord. In addition, the committees regularly provide a forum for the discussion of water and land use jurisdiction interactions.

In 2012, a joint powers authority, MPWRA, was formed: it included a mayor of each city within the area impacted by SWRCB CDO 2009-0060. This authority meets twice per month in a public forum to

represent each local jurisdiction's interest in possible solutions to regional water shortage issues. The MPRWA considers input through public comment and through a technical advisory committee comprised of active community members with a technical background and members of water and wastewater agencies.

CalAm, working with local agencies, has proposed construction and operation of a CalAm owned and operated desalination project, known as the Monterey Peninsula Water Supply Project.[2] The project, in combination with the PWM Project and the ASR Project, could provide all of the replacement water needed to comply with the CDO and the Seaside Basin Adjudication. The CPUC, as the lead agency for the Monterey Peninsula Water Supply Project, approved the project in September 2018.

The Region generally has a high level of coordination between land use planners and water managers relative to other regions of the state based upon the number of interested members of the public and shared responsibilities among agencies.

13.4 Future Efforts: Land Use Planning and Water Management Collaboration

This section considers potential opportunities for improving communication and coordination between water managers and land use decision makers. As noted previously, a primary aim of IRWM planning is to solve regional water management issues through diversified water management portfolios and early water management and coordination with those responsible for making land use decisions. The importance of open lines of communication between local land use planners and water resource managers is imperative to a successful IRWM effort.

Some specific opportunities to improve coordination between land use decision-makers and water managers have already been mentioned. These suggestions were made by those being interviewed for this chapter, and include:

- involving the water supplier earlier in the development approval process and requiring a review from the water supplier prior to approval.
- ensuring that the water supplier and the land use decision-maker are in agreement about anticipated water use by any project prior to approval (during the WSA and/or CEQA processes).
- if appropriate to the situation, the water supplier and land use planners could work together to create parcel maps, allocating water to each parcel in a flexible—but quantifiable—manner, and thereby ensuring greater certainty in regard to future water use.

The RWMG can serve an important function in providing leadership and opportunities for encouraging and promoting increased communication between land use decision-makers and water managers. Potential opportunities include the following:

Regular Joint Planning Meetings: The RWMG can encourage local land use jurisdictions and CalAm managers to hold joint planning meetings at regular intervals to improve communication and

[2] In April 2012, California American Water submitted Application A.12-04-019 (*Application of CAW for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates*) to the California Public Utilities Commission that is intended to secure replacement water supplies for the Monterey District associated with the regulatory orders and legal decisions described in this section. The MPWSP includes many of the same elements previously analyzed in the Coastal Water Project EIR (CPUC/ESA, 2009); however, key components, including the seawater intake system and desalination plant, have been relocated and/or modified under the current proposal and the current proposal is for private (Cal-Am) ownership of the intake system, desalination facility and conveyance pipeline.

efficiencies. Joint planning meetings can be held at the staff level and/or by governing boards. Both options provide value in different ways, and both should be encouraged.

Annual Water Resource Planning Forum: At times, individuals in land use and water resource planning organizations may not fully understand the mission, priorities, and issues of the other organizations and agencies. To facilitate understanding, the RWMG could host an annual forum of land use and water resource planning agency/organization directors, where staff presents their agency or organization's mission and programmatic priorities. In a workshop-type forum, staff could discuss overlapping areas of interest, conflict with priorities or objectives, and potential areas for coordination. This type of forum could be conducted as a "retreat," and led by a professional facilitator.

"A User's Guide to the Water and Land Management Organizational Landscape": The RWMG could produce an almanac of the various agencies, organizations and companies that own or have jurisdiction over the land and water. The almanac would contain the entities' mission statements, authority, and jurisdictions, including a map that clearly shows watershed and jurisdictional boundaries. The map would enable individuals to understand how land areas and waterways are connected, how their actions may impact land or water resources, and which entities may have an interest in, or a responsibility for, those resources. For example, when a landowner discharges water to a drainage ditch, he or she will be able to see that it goes downstream into a habitat that a particular conservation agency manages. When a conservation organization wants to remove some culverts to improve water quality, they will be able to see which agency is responsible for maintaining that culvert to protect farmland and houses from flooding. Understanding these connections will help individuals and organizations understand the need for increased coordination, and will help facilitate that coordination, in order to achieve mutual benefits.

Greater Use of Websites for Information Dissemination and Education: Websites provide a great vehicle for keeping the public, other land use planners, and water managers up to date on plans, policies, regulations, studies, and related developments. Websites can provide access to meeting agendas and meeting minutes, monthly and quarterly status reports on a variety of water supply and water use issues, and other information that might be useful to both land use planners and water resource managers, as well as to the public in general. The RWMG could encourage both water managers and land use planners in the region to take greater advantage of their websites for the purpose of disseminating and sharing information.

Addressing Funding, Policy, and Regulatory Constraints to IRWM Plan Implementation: Funding decisions at the local, state, and federal level can have profound influence on the projects that are implemented in an IRWM Plan. If funding becomes available, the RWMG intends to investigate appropriate methods to communicate with local, state, and federal managers responsible for funding, policy, and regulations that could affect IRWM Plan implementation. The RWMG will work with local land use planners to resolve conflicts and implement changes as appropriate. Increased communication will lead to increased understanding by land use planners, water managers, and funding agencies of the other agencies' objectives and constraints and will ultimately lead to win-win solutions for both land use management and water resource management.

Finally, it should be emphasized that while this chapter has focused on the coordination between land use planners and water managers in the IRWM Region, the goal of the IRWM planning effort overall is to improve coordination and communication not only between land use planning and water management, but throughout all aspects of water management—connecting water supply, surface and ground water quality, flood management issues, stormwater runoff issues, water conservation, municipal and agricultural usage, recycled water use and ecological conservation to more comprehensively coordinate the efforts of all the agencies and stakeholders involved.

13.5 Climate Change Adaptation and Mitigation Strategies in Local Plans

As noted in **Chapter 12**, **Relation to Local Water Planning**, local planning agencies are adopting climate change adaptation and mitigation strategies in their local plans. For example, Policy OS-10.11 in the Monterey County General Plan 2010 states, "Within 24 months of the adoption of the General Plan, Monterey County shall develop and adopt a Greenhouse Gas (GHG) Reduction Plan with a target to reduce emissions by 2020 to the 1990 level to a level that is 15 percent less than 2005 emission levels."

Likewise, the RWMG is also addressing climate change as part of the IRWM planning effort. Monterey Peninsula IRWM planning effort has included an assessment of vulnerabilities and potential impacts of climate change in the Monterey Peninsula IRWM Region and formulating a mitigation response based primarily upon work conducted by the Greater Monterey County IRWM, RWMG, and other stakeholders. Please see **Chapter 15, Climate Change**, for a full discussion of current climate change efforts in the region.

It should be noted that the Climate Change chapter for this IRWM Plan was developed with significant input and coordination with the Greater Monterey County RWMG and their Climate Task Force, comprised of local scientists, land use managers, water resource managers, and coastal policy experts. Entities on the Greater Monterey County IRWM Climate Change chapter include: Central Coast Wetlands Group at Moss Landing Marine Laboratories, Stanford University Center for Ocean Solutions, Monterey Bay National Marine Sanctuary, Santa Cruz County, Association of Monterey Bay Area Governments, Monterey County Planning, California Water Company, Monterey County Water Resources Agency, Stanford University Natural Capital Project, California Department of Water Resources, Santa Cruz County Resource Conservation District, and The Nature Conservancy. The Monterey Peninsula is geographically surrounded by the Pacific Ocean and the Greater Monterey County IRWM Region and many of the climate change issues, especially impacts to coastal areas, apply to the Monterey Peninsula IRWM Region. The Monterey Peninsula RWMG will continue to coordinate and partner with other RWMGs and participate in regional climate change efforts in order to collectively and proactively address the issue of climate change on the Central Coast.

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Chapter 14 Stakeholder Involvement

IRWM Plan Standard 14

The IRWM Plan must contain the following items:

- A public process that provides outreach and an opportunity to participate in IRWM Plan development and implementation to the appropriate local agencies and stakeholders (Water Code §10541. (g)), as applicable to the region, including the following:
  - Native American Tribes – It should be noted that Tribes are sovereign nations, and as such coordination with Tribes is on a government-to-government basis.
  - Wholesale and retail water purveyors
  - Wastewater agencies
  - Flood control agencies
  - Municipal and county governments and special districts
  - Electrical corporations
  - Self-supplied water users
  - Environmental stewardship organizations
  - Community organizations
  - Industry organizations
  - State, federal, and regional agencies or universities
  - DAC members
  - Any other interested group appropriate to the region
- The process used to identify, inform, invite, and involve stakeholder groups in the IRWM process, including mechanisms and processes that have been or will be used to facilitate stakeholder involvement and communication during development and implementation of the IRWM Plan.
- A discussion on how the RWMG will endeavor to involve DACs in the IRWM planning effort.
- A description of the decision-making process including IRWM committees, roles, or positions that stakeholders can occupy and how a stakeholder goes about participating in those committees, roles, or positions regardless of their ability to contribute financially to the Plan.
- A discussion regarding how stakeholders are necessary to address the objectives and resource management strategies of the IRWM Plan and are involved or are being invited to be involved in Plan activities.
- A discussion of how collaborative processes will engage a balance of the groups listed above in the IRWM process regardless of their ability to contribute financially to the IRWM Plan's development or implementation.

14.1 Outreach for IRWM Plan

In addition to outreach conducted for the 2007 and 2014 IRWM plans, the Monterey Peninsula IRWM process has fully integrated known stakeholders throughout its development. Along with the RWMG, over 300 stakeholders were identified and invited to be involved in the planning process, including federal, state, dozens of regional and local agencies, municipalities and special districts, non-profits (environmental, disadvantaged communities, and community groups), academic educational institutions, private companies and landowners, and individuals (see **Appendix 1-d** for the current list of stakeholders).

14.2 Stakeholder Processes

The participating entities in the RWMG, and stakeholders involved in the development of the IRWM Plan continue to identify groups, individuals, entities and other stakeholders who can benefit from participating in the IRWM Plan. Throughout the life-cycle of the IRWM Plan, an outreach effort will continue to identify any additional stakeholders that have not participated in plan development. Outreach may consist of focused mailings, phone calls, advertisements, public notices, and public workshops. The Stakeholder Involvement and Outreach Plan that was prepared for the previous IRWM Plan update is

included as **Appendix 14-a**. The agendas, email notifications, presentations, handouts, and meeting notes for the public stakeholder meetings conducted in 2018 and 2019 and for the update of this plan are provided in **Appendices 14-b through 14-i**.

14.3 Project Specific Outreach

Projects included in the Final IRWM Plan and conducted as part of the 2018 planning grant also contain outreach efforts. See individual project descriptions in **Chapter 6, Project Review Process,** for additional details.

14.4 Environmental Justice and Disadvantaged Communities

According to the DWR DAC Mapping Tool, there are three census tracts in the Region that qualify as disadvantaged communities, all of which are located in the City of Seaside (06053013500, 06053013600, and 0653013700). The majority of communities in the Region have a median household income that is higher than the state average, and therefore no disadvantaged communities can be impacted.

Environmental justice is addressed by ensuring that all stakeholders have access to the decision-making process and that minority and/or low-income populations do not bear disproportionately high and adverse human health or environmental impacts. Although only three census tracts in the Region qualify as disadvantaged communities, increases in water or wastewater service rates that could accompany the implementation of several projects discussed herein may potentially affect these communities.

14.5 Native American Tribal Participation

Activities funded under the IRWM Grant Program must comply with CEQA (Public Resources Code §21000 et seq.). Public Resources Code §21080.3.1 requires the CEQA lead agency to consider project effects on Tribal cultural resources and to conduct consultation with California Native American Tribes. Before releasing a CEQA document, lead agencies must give notice to California Native American Tribes that have submitted a written request for notice and that are traditionally and culturally affiliated with the geographic area of the project.

MPWMD is lead agency for the IRWM Plan under CEQA. It is anticipated that the MPWMD Board of Directors will adopt the IRWM Plan under a CEQA Statutory Exemption for Feasibility and Planning Studies (Guideline § 15262). For this reason, Tribal Consultation is not required as part of this IRWM Plan Update. In an effort to foster coordination and communication with all relevant stakeholders, a representative from OCEN was invited to RWMG meetings and was given the opportunity to review this Plan.

14.6 Coordination

The RWMG and stakeholders have coordinated and conducted outreach with state and federal agencies during the creation of many supporting documents for this IRWM Plan, as shown in **Appendices 1, 2 and 14**. It is expected that this will continue with the development of individual projects that are consistent with this Plan. In addition, state and federal agencies will be notified of the completion of the Final IRWM Plan. See also **Chapter 5, Integration and Coordination**.

Chapter 15 Climate Change

IRWM Plan Standard 15

The IRWM Plan must address both adaptation to the effects of climate change and mitigation of GHG emissions (Water Code §10541.(e)(10)). Due to the overarching aspects of climate change, adaptation and mitigation must be addressed in various individual IRWM Plan components, along with a general discussion of climate change topic. Table 3 provides an overview of the steps RWMGs should take to address climate change within the relevant individual IRWM Plan standard which work in concert with the Climate Change standard.

The IRWM Program Guidelines state: "California is already seeing the effects of climate change on hydrology (snowpack, river flows, storm intensity, temperature, winds, and sea levels). Planning for and adapting to these changes, particularly their impacts on public safety, ecosystem, and long-term water supply reliability, will be among the most significant challenges facing water and flood managers this century" (p. 69). By design, IRWM planning efforts are collaborative and include many entities dealing with water management. These aspects make IRWM a good platform for addressing broad-based concerns like climate change, where multiple facets of water management are affected.

The intent of the Climate Change standard in the IRWM Program Guidelines is to ensure that IRWM Plans describe, consider, and address the effects of climate change on their regions and disclose, consider, and reduce when possible GHG emissions when developing and implementing projects. This chapter describes global climate change and its anticipated impacts for the Monterey Peninsula region. The chapter includes an initial vulnerability analysis and risk assessment and offers preliminary adaptation measures and climate change mitigation and GHG reduction strategies for the region. These strategies will be refined as more climate change data, and more refined analysis tools, become available.

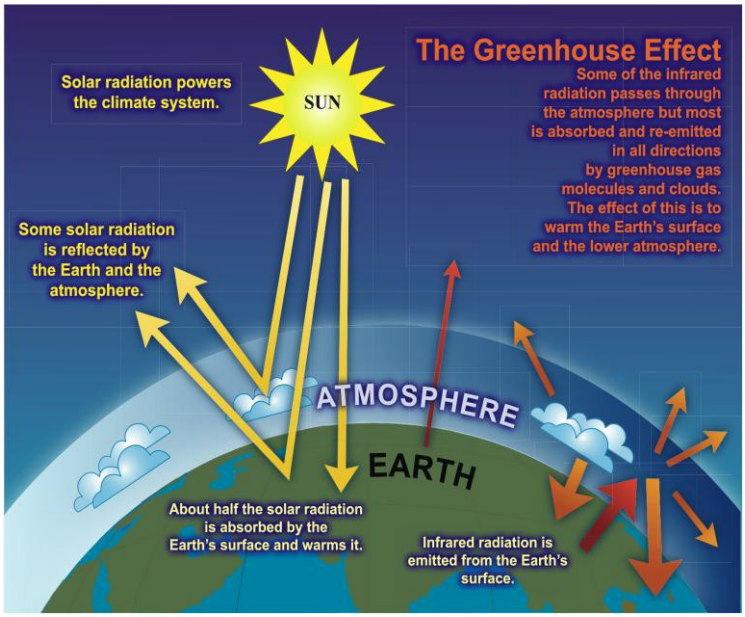
Most of the work for this chapter was conducted by the Central Coast Wetlands Group at Moss Landing Marine Laboratories (CCWG), in collaboration with a Climate Task Force comprised of local scientists, land use managers, water resource managers, and coastal policy experts. Participating entities on the Climate Task Force include: CCWG, Stanford University Center for Ocean Solutions, Monterey Bay National Marine Sanctuary, Santa Cruz County, Association of Monterey Bay Area Governments, Monterey County Planning, California Water Company, Monterey County Water Resources Agency, Stanford University Natural Capital Project, California Department of Water Resources, Santa Cruz County Resource Conservation District, and The Nature Conservancy. The RWMG will continue to seek to partner with these entities, as well as with other RWMGs in the Central Coast region, and to participate in other regional climate change efforts in order to collectively and proactively address the issue of climate change on the Central Coast.

15.1 Global Climate Change: An Overview

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors and/or from human activities that change the composition of the atmosphere and alter the surface features of the land. Such changes vary considerably by geographic location. Over time, the earth's climate has undergone periodic ice ages and warming periods, as observed in fossil isotopes, ice core samples, and through other measurement techniques. Recent climate change studies use the historical record to predict future climate variations and the level of fluctuation that might be considered statistically normal given historical trends.

Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface. This gradual warming is the result of heat absorption by certain gases in the atmosphere and re-radiation downward of some of that heat, which in turn heats the surface of the Earth. These gases are called "greenhouse gases" because they effectively "trap" heat in the lower atmosphere causing a greenhouse-like effect. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, others are created and emitted solely through human activities, while the production rate of some naturally occurring GHGs can be increased by human activities (California Natural Resources Agency 2018).

Figure 15-1: The Greenhouse Effect



Source: Le Treut et al., 2007, p. 115.

The greenhouse effect helps to regulate the temperature of the planet. It is essential to life; without it, our planet would have an average temperature of about 14°F, as opposed to a comfortable 60°F. However, an accumulation of GHGs in the atmosphere is intensifying the greenhouse effect, threatening to raise average temperatures well beyond our "comfort zone." Nearly all climate scientists agree that human activities are to blame for the changing climate. The addition of carbon dioxide, the most prevalent GHG, into the atmosphere as a result of burning oil, natural gas, and coal, in combination with the depletion of our dense forests and wetlands which act as natural carbon dioxide sinks, are leading to an unnaturally high concentration of GHGs that are in turn intensifying the natural greenhouse effect on earth.

The Intergovernmental Panel on Climate Change (IPCC) stated in its 2007 Synthesis Report:

> *Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. (IPCC 2007a, p. 30)*

Each of the last three decades has been increasingly warmer at the Earth's surface than any preceding decade since 1850. The time period 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere (to the extent that assessment was possible). The temperature increase is widespread over the globe and is greater at higher northern latitudes. Average Arctic

temperatures have increased at almost twice the global average rate in the past 100 years. Ocean warming makes up the majority of the increased energy stored in the climate system, and accounts for more than 90% of the excess energy stored between 1971 and 2010. The top 75 meters of the ocean have increased in temperature by approximately 0.1 degree Celsius each decade since 1970, while the average global surface temperature has increased by 0.85 degrees Celsius between 1880 and 2012 (IPCC 2014).

The IPCC has linked this increase in global temperature to a wide array of changes to our natural world, including a widespread decrease in the amount of snow cover and thickness and range of glaciers across the globe. Since 1978, the Arctic ice cap has decreased in size by about 4 percent per year with an average summer decrease of 7.4 percent. A 10 percent decrease in global snow cover and earlier spring thaws of rivers and lakes in the northern hemisphere have also been observed. Over the past 50 years, heat waves and serious rain events have been more common and in the past 30 years, there has been an increase in the number of northern Atlantic tropical storms (IPCC 2007a).

The combination of ice melt and the thermal expansion of seawater (due to warmer water temperatures) has led to global sea level rise (IPCC 2014). Research shows that since 1971, thermal expansion and glacial melt have caused 75% of observed sea level rise (IPCC 2014). From 1870 to 2004, a reconstruction based on tide gauge data finds that during the 20th century, sea-level rise occurred at a rate of 1.7 +- 0.3 mm/year. During this time, sea-level rise also accelerated at a rate of 0.013 +- 0.006 mm/year2 (Church and White 2006). More recent estimates show that from 1880 to the present, the average global sea level has risen by more than 20 centimeters (Church and White 2011). The IPCC's 2014 Fifth Assessment Report (IPCC 2014) projected sea level rise by the end of the century as a result of thermal expansion to range from 0.23 to 0.98 meters (9 - 48 inches). It predicts with "virtual certainty" that sea level rise will continue beyond 2100, and projects sea level rise beyond 2300 to be between 1 and 3 m (IPCC 2014).

IPCC scientists predict that the serious consequences of climate change will continue to grow and expand. The rate of increase in sea surface temperature is unprecedented, and is accelerating the planet's water cycle, which will result in extreme weather events throughout the globe. Droughts, storms, floods, and wildfires will become more common. These events will expose ecosystem and human system vulnerability and will likely disrupt and damage food and fresh water supplies (IPCC 2014). The extreme increases in temperature to could result in a summer ice-free arctic by 2050 (IPCC 2014) and cause the oceans to thermally expand, both of which will raise the average level of all oceans. This continuing increase in average global sea level will have various effects, including coastline destruction, the displacement of major population centers, and economic disruption.

15.1.1 Federal and State Responses to Climate Change: Legislation and Policy

Scientists consider climate change to be a very serious issue requiring major changes in resource, water supply, and public health management (California Climate Change Center, 2006). The following section describes some of the more significant pieces of legislation and policy that have been enacted by the United States and the State of California in response to climate change.

Federal Response to Climate Change

On April 17, 2009, the EPA Administrator signed Proposed Endangerment and Cause or Contribute Findings for GHGs under Section 202(a) of the Clean Air Act. EPA held a 60-day public comment period, which ended June 23, 2009, and received more than 380,000 public comments. These included written comments and testimony at two public hearings in Arlington, Virginia, and Seattle, Washington. EPA

carefully reviewed, considered, and incorporated public comments and has now issued the final findings.

EPA found that six GHGs taken in combination endanger both the public health and the public welfare of current and future generations. EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect and, under Section 202(a) of the Clean Air Act, result in air pollution that endangers public health and welfare. These findings were based on careful consideration of the full weight of scientific evidence and a thorough review of the numerous public comments received on the proposed findings published on April 24, 2009. The findings were effective as of January 14, 2010. The specific GHG regulations EPA has adopted to date are as follows:

- 40 CFR Part 98. Mandatory Reporting of Greenhouse Gases Rule. This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2e emissions per year (EPA 2009). Additionally, the reporting of emissions is required for owners of SF_6- and PFC-insulated equipment when the total nameplate capacity of these insulating gases is above 17,280 pounds.
- 40 CFR Part 52. Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. EPA recently mandated that Prevention of Significant Deterioration requirements be applied to facilities that have stationary-source CO_2e emissions exceeding 75,000 tons per year. It is not believed that the BMP Update would trigger the Prevention of Significant Deterioration permitting required by this regulation.

State Response to Climate Change

California State's top scientists consider climate change to be a very serious issue requiring major changes in resource, water supply, and public health management (California Climate Change Center 2012). Below describes some of the more significant pieces of legislation and policy that have been enacted by the State in response to climate change.

California's first statute on climate change was enacted in 1988 when the State Legislature ordered a report on the impacts of climate change and recommendations to avoid, reduce, and address them. In 2002, the State led the country in becoming the first jurisdiction to require standards for GHG emissions from cars. In 2004, Senate Bill 1107 directed the Secretary of Environmental Protection to coordinate all climate change activities in the state. The Secretary chairs the Climate Action Team, which is made up of agency secretaries and department directors from throughout State government. With the passage of California Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32, California became the first state to set a binding, economy-wide target for GHGs (California EPA 2010).

Executive Order S-3-05

California is a substantial contributor of global GHGs, emitting over 400 million metric tons of carbon dioxide a year (California Air Resources Board 2007). In June 2005, Governor Schwarzenegger established California's GHG emissions reduction targets in Executive Order S-3-05. The Executive Order established the following goals:

- Greenhouse gas emissions should be reduced to 2000 levels by 2010;
- Greenhouse gas emissions should be reduced to 1990 levels by 2020; and
- Greenhouse gas emissions should be reduced to 80 percent below 1990 levels by 2050.

Global Warming Solutions Act of 2006 (Assembly Bill 32)

The State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006, which Governor Schwarzenegger signed on September 27, 2006 to further the goals of Executive Order S-3-05. AB 32 states:

> *Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.*

AB 32 represents the first enforceable statewide program to limit GHG emissions from all major industries with penalties for noncompliance. The foremost objective of California Air Resources Board (CARB), tasked with implementing AB 32, is to adopt regulations that require the reporting and verification of statewide GHGs. The initial State goal is to limit GHG emissions to 1990 levels by 2020. In January 2008, a statewide cap for 2020 emissions based on 1990 levels was adopted. In June 2010, CARB prescribed GHG reduction goals to regional governments, including AMBAG. These prescriptions are the regional benchmarks from which to track local reductions.

Executive Order S-1-07 (2007)

On January 18, 2007, California further solidified its dedication to reducing GHGs by setting a new Low Carbon Fuel Standard for transportation fuels sold within the state. The target of the Low Carbon Fuel Standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10 percent by 2020.

Senate Bill 97 (2007)

SB 97, enacted in 2007, amended the California Environmental Quality Act (CEQA 2012) statute to clearly establish that GHG emissions and effects of GHG emissions are subject to CEQA. It also directed the Governor's Office of Planning and Research (OPR) to develop CEQA Guidelines to address GHG emissions for approval by the California Natural Resources Agency. The Natural Resources Agency adopted the amendments in January 2010, which went into effect in March 2010. The amendments do not identify a threshold of significance for GHG emissions, nor do they prescribe assessment methodologies or specific mitigation measures. The amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but preserve the discretion granted by CEQA to lead agencies in making their own determinations based on substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs when they perform individual project analyses.

Executive Order S-13-08 (2008)

Executive Order S-13-08 launched a major initiative for improving the state's adaptation to climate impacts from sea level rise, increased temperatures, shifting precipitation, and extreme weather events. It ordered a California Sea Level Rise Assessment Report to be conducted by the National Academy of Sciences, which was released in June 2012. It also ordered the development of a California Climate Change Adaptation Strategy. The Strategy, published in December 2009, assesses the state's vulnerability to climate change impacts, and outlines possible solutions that can be implemented within

and across State agencies to promote resiliency. The Strategy focuses on seven areas: public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forestry, and transportation and energy infrastructure.

California Ocean Protection Council Resolution

California Ocean Protection Council (OPC) Resolution, adopted on March 11, 2011, requires the vulnerabilities associated with sea level rise to be considered for all projects or programs receiving funding from the State. The Resolution states: "Given the currently predicted effects of Climate Change on California's water resources, IRWM Plans should address adapting to changes in the amount, intensity, timing, quality and variability of runoff and recharge. Areas of the State that receive water imported from the Sacramento-San Joaquin River Delta, the area within the Delta, and areas served by coastal aquifers will also need to consider the effects of sea level rise on water supply conditions and identify suitable adaptation measures." The OPC resolution and sea level rise guidance can be found at the following link: http://www.opc.ca.gov/council-documents/.

Senate Bill X1-2

This bill codifies California's ambitious goal to increase the quantity of energy generated from renewable sources. The ultimate goal is to have 33% of energy in California generated from renewable sources by 2020, with benchmarks of 20% by 2013, 25% by 2016. This bill enables the CPUC Renewable Energy Resources Program to enforce these goals upon all electricity retailers.

Various Legislative Actions to Promote Electric Vehicles and Zero Emission Vehicles

California passed four different legislative actions between the years of 2013 and 2014 to promote the use of electric and zero emission vehicles. SB 1275 (2014) established a state goal of 1 million zero emission and near zero emission vehicles to be in service by 2020. SB 1204 (2014) created the California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program to develop, pilot and deploy zero- and near zero- emission vehicle technologies. AB 8 (2013) extended extra fees on vehicle and boat registrations and tire sales to fund programs that support promotion of alternative fuels, vehicle technologies, and air emission reduction strategies. AB 1092 (2013) required the Building Standards Commission to adopt mandatory building standards for the installation of future electric vehicle charging infrastructure for parking spaces in multifamily dwellings and nonresidential development.

Senate Bill 350 (2015)

SB 350, enacted in 2015, requires that the amount of renewable electricity generated and sold to retail customers be increased to 50% by December 2030. This requirement is made through the Public Utilities Act and the Public Utilities Commission, which codifies the California Renewables Portfolio Standards (RPS) Program. This act revised the RPS program to incorporate expanded requirements on public and publicly owned electric utilities. This bill also requires the PUC to establish targets to double the energy efficiency savings in electricity and natural gas end uses by 2030.

California Commitment to Paris Climate Accord

California Governor Jerry Brown launched America's Pledge, an initiative to support the goals of the Paris Climate Accord that will report on State efforts to drive down GHG emissions. The initiative is meant to show support for the agreement in the United States. The Paris Climate Accord is a pact that

was made by nearly 200 countries in 2015, requiring countries to scale down their carbon emissions along with other measures to slow down the human causes of climate change.

Executive Order B-30-15 / Senate Bill 32 (2016)

In 2016, the Legislature passed SB 32, which codifies a 2030 GHG emissions reduction target of 40 percent below 1990 levels in accordance with executive Order B-30-15. With SB 32, the Legislature passed companion legislation AB 197, which provides additional direction for developing the CARB Climate Change Scoping Plan. CARB is moving forward with a second update to the Scoping Plan to reflect the 2030.

15.2 The Predicted Effects of Climate Change

Climate change models predict changes in temperature, precipitation patterns, water availability, and sea levels, and how these altered conditions can have impacts on natural and human systems in California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The state has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the spring (California Natural Resources Agency 2017). According to the California Department of Water Resources (DWR 2013), more changes related to climate change can be expected by the year 2050 and on to the end of the century:

- California's mean temperature may rise 1.5°F to 5.0°F by 2050 and 3.5°F to 11°F by the end of the century.
- Average annual precipitation may show little change, but more intense wet and dry periods can be expected with more floods and more droughts.
- Flood peaks will become higher and natural spring/summer runoff will become lower.
- Global sea level projections suggest possible sea level rise of approximately 14 inches (36 cm) by 2050 and a high value of approximately 55 inches (140 cm) by 2100.[1]

Globally, sea level rise is driven by two primary factors—global ice melt and thermal expansion of seawater—but locally, other factors can alter the rate, extent, and duration of changes in sea level. These processes include "steric variations, wind-driven differences in ocean heights, gravitational and deformational effects, and vertical land motions along the coast" (Committee on Sea Level 2012), and in California are additionally affected by movement along the San Andreas Fault and climate patterns in the Pacific Ocean, including the El Niño Southern Oscillation and the Pacific Decadal Oscillation and Interdecadal Pacific Oscillation. Large El Niño events can temporarily raise the sea level as much as 3 to 12 inches (10-30 cm) for several winter months (Committee on Sea Level 2012).

Mean sea level on the California coast rose approximately 8 inches (17-20 cm) over the past century (1900 – 2005) (Cayan et al. 2008). Since 1993, altimetry data suggests that the global mean sea level rise rate has increased from 2 to 3 mm/year, but during this time, data from altimetry and tide gauges show that the mean sea level along the Pacific coast has been stable due to wind stress (Bromirski et al. 2011).

[1] The State of California uses estimates of global sea level rise produced by Ramstorf 2007 and Cayan et al. 2008 for coastal adaptation planning purposes under Executive Order S-13-08.

The changes in sea levels, temperature, and precipitation that are anticipated to occur with climate change, as described above, will affect California's public health, habitats, ocean and coastal resources, water supplies, agriculture, forestry, and energy use (California EPA 2010), and will result in increased droughts and flooding. Climate change may also have adverse effects on water quality, which would in turn affect the beneficial uses (habitat, water supply, etc.) of surface water bodies and groundwater. Changes in precipitation could result in increased sedimentation, higher concentrations of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface water bodies.

In addition, climate change is expected to have effects on diverse types of ecosystems, from alpine to deep sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation will occur; this could affect the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states that "20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts within this century if global mean temperatures exceed 2°C to 3°C (3.6°F to 5.4°F) relative to pre-industrial levels" (IPCC 2007a). Shifts in existing biomes could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate. In general terms, climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity.

15.2.1 Regional Studies on the Effects of Climate Change

A number of studies have been completed that evaluate hazard vulnerabilities of various portions of the Monterey Bay and Monterey County. The following provides a brief summary of regional studies and efforts.

Philip Williams and Associates (PWA) Coastal Regional Sediment Management Plan for Southern Monterey Bay (2008):

This plan, prepared by PWA in 2008, aims to create a comprehensive regional strategy to approach issues of coastal erosion and protection in the Southern Monterey Bay, from Wharf 2 to the Monterey Submarine Canyon. The plan looks at local geomorphology, physical processes of erosion, sediment transport, sediment budget, critical habitat and species, existing vulnerable infrastructure, and various regulatory processes, and then proposes management strategies and analyzes their feasibility and projected effectiveness. These strategies include beach nourishment and restoration, sand reduction and removal, and continued natural erosion, while emphasizing the expansion of policies and governance structures to better manage coastal sediments.

Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and the Santa Cruz Mountains (2012):

A regional study was completed by the US Geological Survey (Flint and Flint, 2012), on how changing climate variables lead to a change in potential evapotranspiration, recharge, runoff, and climatic water deficit within the Santa Cruz Mountains. The coastal mountains in the Monterey Peninsula planning region have a similar geography and climate as the Santa Cruz Mountains and may experience similar climate change impacts; therefore, many of the conclusions from this study apply to Monterey Peninsula IRWM planning region. Hydrologic models predict a reduced early and late wet season runoff; summers are projected to be longer and drier in the future than in the past, regardless of

precipitation trends. While water supply could be subject to increased variability (that is, reduced reliability) due to greater variability in precipitation, water demand is likely to steadily increase because of increased evapotranspiration rates and climatic water deficit during the extended summers. This analysis identifies the areas in the landscape that are the most resilient or vulnerable to projected changes and implies greater water demand will occur to maintain current agricultural resources or land cover. Fine-scale modeling identifies areas possibly more resilient to climatic changes in contrast to locations where vegetation is currently living on the edge of its present-day bioclimatic distribution and, therefore, is more likely to perish or shift to other dominant species under future warming.

ESA PWA Technical Evaluation of Erosion Mitigation Alternatives (2012):

This study, conducted by ESA PWA for the Southern Monterey Bay Coastal Erosion Working Group and the Monterey Bay National Marine Sanctuary, assesses various coastal erosion mitigation strategies through cost-benefit analyses. The analyses compare the coastal erosion mitigation strategies to more traditional coastal armoring in order to develop strategies to minimize erosion hazards in the Southern Monterey Bay Littoral Cell. The set of 22 proposed tools highlights rolling easements, cessation of sand mining, and managed retreat, with specific recommendations over four timeframes for each sub-region.

ESA PWA Monterey Bay Sea Level Rise Vulnerability Study: Technical Methods (2014):

This vulnerability study and technical methods report, prepared by ESA PWA for the Monterey Bay Sanctuary Foundation, presents the methods and data used to develop maps of erosion and coastal flooding hazard zones for the Monterey Bay study area, from Año Nuevo to Monterey's Wharf 2. The hazard zones, including dune and cliff erosion, rising tides, and coastal storm flooding, take into account geology, tides, waves, historic erosion, existing armoring, and various sea level rise projections in order to most accurately represent the projected extents of erosion and flooding for 2030, 2060, and 2100. This report describes in depth the GIS layers and metadata for each hazard zone, and the processes used to create those layers.

The Nature Conservancy's Coastal Resiliency Mapping Tool (2015):

The Nature Conservancy (TNC) has developed a publicly accessible interactive mapping tool to view projected sea level rise hazards for various geographies across the world, on both local and global scales. Users can explore the extent of flooding and erosion along selected coastlines—specifically in the Americas or on a global scale—for multiple time horizons or amounts of sea level rise, and can overlay ecological, social, or economic layers to view vulnerabilities.

City of Monterey Final Sea Level Rise and Vulnerability Analyses, Existing Conditions and Issues Report (2016):

This report, by Revell Coastal, provides analyses of the existing conditions and future vulnerabilities from sea level rise of various sectors, including land use and structures, transportation, wastewater, hazardous materials, emergency services, ecological resources and more in the City of Monterey. The data is reported in detailed maps, charts, and recommendations for each sector. The report also details the physical setting of the City of Monterey, including the geology and geomorphology of the coastline and the coastline ecological habitats and human development, and looks at the current climate science and projections, including temperature, precipitation, wildfires, and sea level rise projections.

TNC Economic Impacts of Climate Adaptation Strategies for Southern Monterey Bay (2016):

This report, prepared by TNC, provides detailed economic analyses of various potential adaptation strategies for combating sea level rise and erosion in southern Monterey Bay, from Moss Landing to Del Monte. The report takes into account a range of sea level rise projections, and analyzes the social, environmental, and economic costs and benefits of many adaptation strategies in order to provide coastal planners with an understanding of the value of different strategies within each of the four focus areas. The report found that, contrary to conventional wisdom, in these four areas, hard shoreline armoring had significantly lower net present values than alternative adaptation strategies.

Moss Landing, Capitola, and Santa Cruz County Sea Level Vulnerability reports (2017):

The recent Moss Landing Coastal Climate Change Vulnerability Report (CCWG 2017) documented that Moss Landing, Castroville, and nearby farmlands are vulnerable to both river and ocean flooding. Historical examples of this risk include the March 1995 storms which resulted in county-wide flooding to private property resulting in damage to 1,500 homes and 110 businesses. In Castroville 312 residences and 38 businesses were damaged and 1,320 residents were evacuated. The County documented that the flood event in February 1998 resulted in losses of over $38 million, with agriculture-related losses totaling over $7 million and damaging 29,000 acres of crops.

The Capitola and Santa Cruz County reports document similar hazards in Santa Cruz County along the coast with similar or more extensive impacts to residential and agricultural properties. By 2100 sea level rise and fluvial models used in this analysis project that much of the coastal and low-lying areas along rivers may be periodically flooded during winter storms and high river discharges. By 2100 tidal inundation within low lying coastal areas may pose a serious challenge. Each of these reports makes valuable adaptation recommendations.

Federal Emergency Management Agency (FEMA) – Pacific Coastal Flood Mapping (Expected Completion 2018):

FEMA is working to update the Pacific Coastal flood maps through the California Coastal Analysis and Mapping Project for Region IX. This project is incorporating the latest engineering and mapping data for areas impacted by coastal flooding for the California coast in order to provide the most up-to-date coastal flood maps.

Safeguarding California Plan: 2018 Update (2018):

This Natural Resources Agency report, which is an update to the 2009 California Climate Adaptation Strategy, provides policy guidance for State decision makers and highlights climate risks in nine sectors impacted by climate change, discusses progress to date, and proposes real-world, realistic recommendations for actions to reduce climate change impacts.

State of California Sea-Level Rise Guidance (2018):

This Ocean Protection Council report specifically recommends that “risk assessments and adaptation planning efforts should be conducted at community and regional levels” including “cross-jurisdictional coordination.”

Residential Adaptation Policy Guidance (Revised Draft 2018):

The California Coastal Commission's Residential Adaptation Policy Guidance provides an in-depth discussion of sea level rise adaptation policies related to residential development.

15.2.2 Projected Changes in Climate Variables

Many climate models have been generated to predict changes in ocean and land temperature, rain frequency and intensity, coastal wave exposure, and sea level rise. Modeling with regional climate models has matured over the past decade to enable meaningful climate vulnerability assessment applications (Wang et al., 2004). California has created several web-based interfaces to help local and regional planners "downscale" climate models for local planning purposes. The Cal-Adapt website[2] is one that provides a geographically based climate model interpretation tool that generates predictive changes to climate variables using different IPCC GHG emissions projections. Specifically, emissions scenario RCP 4.5(or Representative Concentration Pathway 4.5) represents a low emissions scenario. In this scenario, it is assumed that emission peak in 2040 and then decline. Emissions scenario RCP 8.5 represents a high emissions scenario. This second scenario assumes that emissions continue to rise strongly through 2050 and plateau around 2100.

The Cal-Adapt tool was used to model changes in climate variables that may affect water resources within the Monterey Peninsula IRWM planning area. Two areas of the region, Monterey and Carmel, were used to reflect the climate regime. Changes in climate variables are presented for the RCP 8.5 emissions scenario as a worst-case prediction of potential vulnerabilities. Future analysis will be able to increase climate prediction evaluation for a select set of potential impacts based on this initial investigation.

Temperature Changes: **Table 15-1** shows the projected difference in temperature between a baseline time period (1961-1990) and an end of century period (2070-2090) for the two climate regime areas selected for the Monterey Peninsula IRWM planning region.

Table 15-1: Projected Increases in Average Temperature

Area	Historical Annual Mean for 1961-1990	Low-Emissions Scenario (B1)	Change in Temperature	High-Emissions Scenario (A2)	Change in Temperature
Carmel Area Grid Cell					
Maximum Temperature	65.6	69.6	+4.0	72.2	+6.6
Minimum Temperature	47.5	51.4	+3.9	54.3	+6.8
Monterey Area Grid Cell					
Maximum Temperature	65.4	69.4	+4.0	72.0	+6.6
Minimum Temperature	48.2	52.0	+3.8	54.9	+6.8

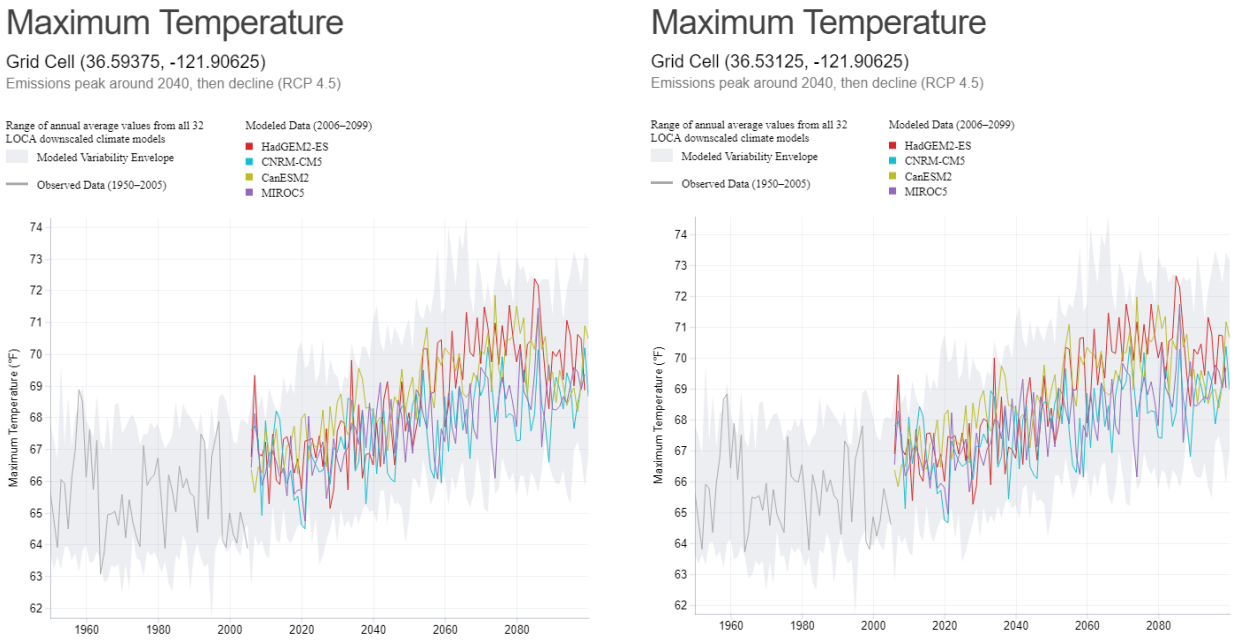
Source: Cal-Adapt web tool (http://cal-adapt.org/)

[2] http://cal-adapt.org

Projected increases in average temperature are graphed for the Monterey and Carmel area in **Figure 15-2**, below. Projected increases in temperature are similar through 2050 for both the RCP 8.5 (High Emissions) and RCP 4.5 (Low Emissions) scenarios. After 2050, temperature increases more rapidly using the high emissions rate scenario. **Figure 15-2**, below, shows the RCP 4.5 scenario. The charts below include the following model projections for the Monterey and Carmel areas:

- A warm/dry simulation (HadGEM2-ES)
- A cooler/wetter simulation (CNRM-CM5)
- An average simulation (CanESM2)
- The model simulation that is most unlike the first three for the best coverage of different possibilities (MIROC5)

Figure 15-2: Projected Increase in Temperatures in the Monterey Area (South) [Left] and Carmel Area [Right]



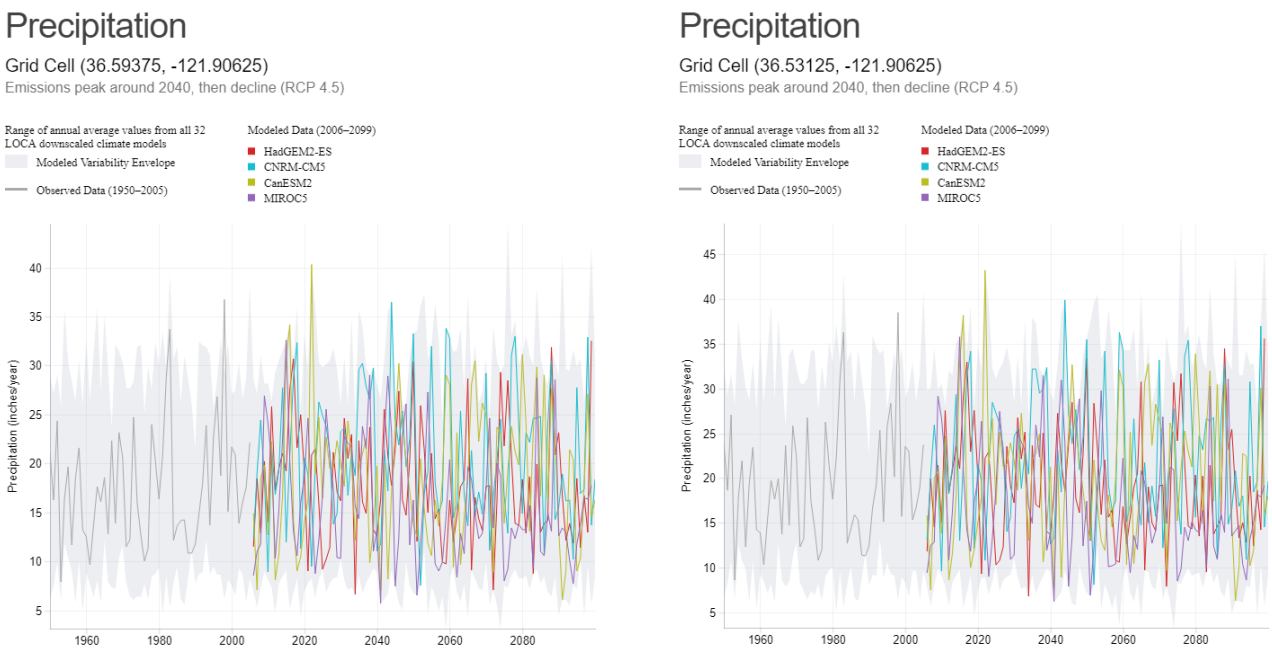
Source: Cal-Adapt web tool (http://cal-adapt.org/)

Rainfall Changes: The Cal-Adapt tool predicts that average rainfall will begin to increase throughout the Monterey Peninsula IRWM planning region with projected increases of approximately 3.5 inches (16.6 inches historical annual mean rainfall to 20.1 inches projected annual rainfall) in the Monterey Area and approximately 3.9 inches in the Carmel Area (17.9 inches historical annual mean rainfall to 21.8 inches projected annual rainfall) by 2100 (High Emissions Scenario RCP 8.5). **Figure 15-3** represents the inter-decadal fluctuations in precipitation (integrating historic decadal fluctuations) and the long-term increase in total precipitation for the areas in question. Note, however, that while most climate change scientists agree that precipitation patterns will change, there isn't complete consensus on the direction of the precipitation change, with some climate models suggesting decreases while others suggest increases.

The US Department of the Interior Bureau of Reclamation report (2011) gives an example of the variable predictions of precipitation in California: mean-annual precipitation in the Sacramento and San Joaquin basins will stay generally steady during the 21st century and will be quite variable over the next century, with the authors noting that there is significant disagreement among the climate projections regarding change in annual precipitation over the region. The 2009 California Climate Change Adaptation Strategy (California Natural Resources Agency, 2009) notes that climate models for the state differ in determining where and how much rain and snowfall patterns will change under different emissions scenarios. However, while the precipitation modeling results vary more than the temperature projections, the authors point out that 11 out of 12 precipitation models run by the Scripps Institution of Oceanography for northern California suggest a small to significant (12-35 percent) overall decrease in precipitation levels by mid-century. Finally, a US Geological Survey report (USGS, 2012), using five General Circulation Models (GCM) for two watershed basins in northern California, concludes that precipitation will follow cycles of wetter and drier decadal oscillations during the 21st century.

According to DWR, average annual precipitation throughout the state may show little change, but more intense wet and dry periods can be expected with more floods and more droughts (DWR, 2009). The actual change in precipitation is more difficult to predict on the local level.

Figure 15-3: Projected Average Rainfall in Monterey (Left) and Carmel Area (Right)



Source: Cal-Adapt web tool (http://cal-adapt.org/).

Note: Other climate variables, including evapotranspiration (water loss in plants) and runoff rates from storms, will also increase over time. Average base flow levels in creeks are projected to decline.

Sea Level Rise: Sea level rise[3] is a complex and dynamic process ultimately controlled by levels of heat-trapping greenhouse gases in the atmosphere. Globally, sea level rise is driven by two primary factors—

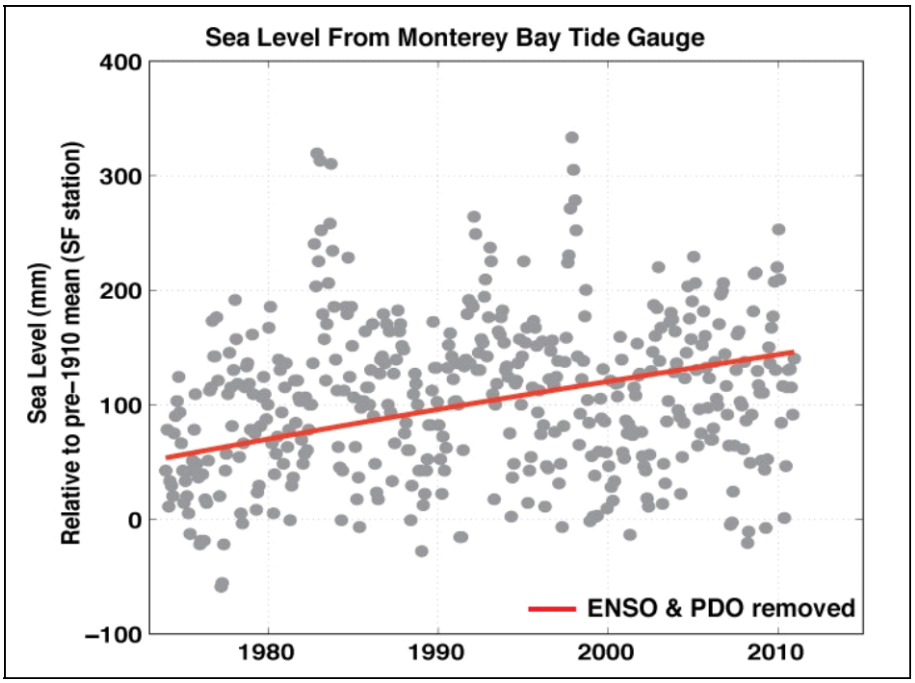
[3] This section regarding sea level rise has been excerpted from the "Climate Change and Monterey Bay" website (http://www.climatechangemontereybay.org/impacts_main.shtml). Text prepared by Michael Fox, Center for Ocean Solutions. The references in this section are as cited on the "Climate Change and Monterey Bay" website.

global ice melt and thermal expansion of seawater—but locally there are numerous processes that can alter the rate, extent, and duration of changes in sea level. As such, accurately predicting sea level over the coming centuries for specific locations is very challenging.

Sea level rose approximately seven inches (18 cm) over the past century (1900–2005) along most of the California coast (Cayan et al., 2008). The local tide gauge at Monterey dates back to 1973 (compared to the San Francisco gauge dating from 1855), but even during this short time period, a trend of sea level rise is evident at the rate of approximately 0.05 inches per year (**Figure 15-4**). Due to local oceanographic conditions, sea level in central California has been relatively stable or even declining over the past several decades. However, when the regional climate patterns that drive local sea level trends shift, the Central Coast will very likely experience a rise in sea level that will correspond to, or may even exceed, the mean global rate of sea level rise (Largier et al., 2010; Ramp et al., 2009; and Bromirski et al., 2011).

Currently, the State of California is using estimates of global sea level rise produced by Rahmstorf (2007) and Cayan et al., (2008) for coastal adaptation planning purposes under Executive Order S-16-08. These projections suggest possible sea level rise of approximately 14 inches (36 cm) by 2050 and up to approximately 55 inches (140 cm) by 2100. However, Cal-Adapt notes recent evidence suggests these values may prove to be underestimates of the possible rise in global sea level.

Figure 15-4: Sea Level in Monterey Bay from 1976-2010



The Pacific Decadal Oscillation (PDO) is a pattern of change in the Pacific Ocean's climate; El Nino Southern Oscillation (ENSO) is comprised of El Nino (warm ENSO phase) and La Nina (cool ENSO phase) activity.

Monthly records of sea level from the Monterey Bay tide gauge are shown from 1976 to 2010. Monterey has experienced a consistent rise in sea level on the order of 2 - 3 mm/yr (0.07 - 0.1 in/yr) for

the past 35 years[4]. The anticipated consequences of sea level rise for the Monterey Bay region are serious and far-reaching, and are discussed below in Section 15.3.2, Predicted Impacts of Climate Change.

Changes in Fog: There is evidence to suggest that yearly coastal fog may be declining. A recent study by Todd Dawson from UC Berkeley and James Johnstone from the University of Washington shows that coastal fog in California has declined more than 30 percent over the past 60 years (Sanders, 2010; Dayton, 2011). With only 60 years of data, it is unclear whether the phenomenon is part of a natural cycle or the result of global climate change[5]. However, a change in coastal fog could have critical implications for the fate of certain ecosystems, in particular coastal redwoods and maritime chaparral, both of which are dependent on fog for their survival. A decline in coastal fog could also lead to increased water use and an increased demand for water supplies in the Region.

California coastal fog is caused by the temperature differential between the cool ocean water and the warmer air. The Monterey Bay area is particularly foggy because of oceanic upwelling of the deep, cold waters of the Monterey submarine canyon. When the cold oceanic water meets the warmer air, the air chills and condenses to form fog. As noted above, one of the effects of global climate change is warmer ocean temperatures. The IPCC stated in a 2007 report, "observations since 1961 show that the average temperature of the global ocean has increased to depths of at least 3,000 meters" (IPCC, 2007). Warmer ocean temperatures could mean less fog for coastal California.

Fog occurs primarily in the summer months, when there is little or no rainfall. Fog provides an important source of water for many coastal plant communities by providing soil drip; and some plants, including redwoods and 80 percent of their understory plants, can absorb fog directly through their leaves. Fog also acts to keep moisture in the ecosystem, preventing evaporation and maintaining cooler temperatures. A significant decline in fog could mean an uncertain future for many of the plant communities in the region, including local endemic plants that depend on fog for their survival (Dayton, 2011).

The role that coastal fog plays in preventing evaporation and maintaining cooler temperatures also has important implications for water use and water supply in the Monterey Peninsula region. A decline in coastal fog would change the local coastal climate, resulting in warmer temperatures and increased evaporation during the summer months. This in turn may lead to increased agricultural and landscape water use, putting additional demand on water supplies in the region.

15.2.3 Potential Effects of Climate Change in the Region

Numerous tools are available to assist local water resource managers in evaluating the potential impacts of climate change on local infrastructure and populations. DWR provides a list of potential impacts to water resources associated with changes in climate variables. The State of California has also provided guidance on possible impacts to infrastructure and resources due to changing climate variables. These resources were used to identify local impacts that are most likely to occur in the Region, due to local changes in rainfall patterns, temperature increases, evapotranspiration, storm intensity and runoff rates, and urban and agricultural water use.

[4] Developed by Brock Woodson for the Preparing for the Future: Climate Change and the Monterey Bay Shoreline regional workshop; see http://centerforoceansolutions.org/preparingforthefuture. Data obtained from the Permanent Service for Mean Sea Level [PSMSL]. Used by permission.

[5] Note that the scientists are working to calibrate tree ring isotope data with actual coastal fog conditions in the past century and will then be able extrapolate back for 1,000 years or more to estimate climate conditions.

Table 15-2, below, represents a "broad brush" consideration of potential impacts to water resources associated with changes in climate variables, based on the State's guidance as applied to the Monterey Peninsula region (adapted from Appendix B of *Climate Change Handbook for Regional Water Planning*). Following this list is a more detailed discussion of key potential impacts of climate change in the Monterey Bay region, as presented at a December 2011 regional workshop report called "Preparing for the Future: Climate Change and the Monterey Bay Shoreline."

Table 15-2: Potential Impacts to Water Resources in the Region

Water Supply and Demand

- Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration.
- Rangelands are expected to be drier.
- Domestic landscaping water needs will be higher.
- Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion.
- Droughts will be more frequent and severe.

Water Quality

- Lower seasonal surface flows will lead to higher pollutant concentrations.
- Changes in storm intensity will increase sediment loading in many systems.
- Channel stability will be impacted from higher storm flows causing additional turbidity.
- Sea level rise will impact current estuary brackish water interface towards more marine systems.

Flooding

- Regional river levees will provide less protection during higher storm flow events.
- Natural creeks and managed conveyance will see higher flow rates leading to increased erosion and flooding.
- Coastal levees and control structures will be undersized to manage the combined influences of higher river flows and sea level rise.

Aquatic Ecosystem Vulnerabilities

- Migration patterns and species distribution will change.
- Invasive species populations will expand.
- Coastal wetland systems are likely to be inundated with increasing frequency, leading to the dieback of tidal marshes (Philip Williams & Associates, 2008b) and the salinization of fresh and brackish marshes.
- Changes in hydrograph (driven by rain pattern changes) will cause increased erosion and habitat loss in creeks and rivers.
- Some locally unique species and communities such as maritime chaparral, coastal prairie, Monterey Cypress, coastal redwoods and giant kelp are susceptible to changes in certain locally favorable climate variables; for example, redwood forest ecosystems and coastal chaparral species are dependent on fog, and productive kelp forests tend to be associated with areas of significant oceanographic upwelling. In addition, ocean acidification may impact marine species. As conditions change, these ecosystems and species may face an uncertain future (see Dayton, 2011).

Reservoir Storage

- Changes in rainfall patterns may be problematic for timing of release from reservoirs.
- More intense rainfall and increased risk of fires in watershed lands can lead to increased sediment loading to reservoirs.

Preparing for the Future: Climate Change and the Monterey Bay Shoreline: On December 6, 2011, the MBNMS and Center for Ocean Solutions (COS) convened regional decision-makers at a one-day workshop titled "Preparing for the Future: Climate Change and the Monterey Bay Shoreline." The event was the first Monterey Bay regional gathering on climate change adaptation, intended to facilitate a discussion on how to best prepare coastal communities in the Monterey Bay region to adapt to the impacts of climate change. More than 90 people attended from cities and municipalities in Santa Cruz and Monterey Counties, representing city and county staff, state and federal governments, research institutions, nonprofit organizations, private industry, and the public.

Presenters at the workshop focused on impacts of concern for the Monterey Bay region, which include increased coastal erosion, coastal inundation, storm and wave damage, and saltwater intrusion. Collectively, these impacts will threaten infrastructure, development, marine and coastal ecosystems, and the general welfare of the communities around Monterey Bay. Monterey Bay has variable coastal geology, and as a result, different regions will experience different types and magnitudes of impacts. For example, portions of the sandy beaches and dunes of South Monterey Bay are currently eroding at some of the highest rates in California, while the low-lying land and large flood plains in the central portion of the bay make those areas particularly susceptible to inundation (Abeles et al., 2012).

The following provides information presented at the workshop regarding the anticipated impacts of climate change specifically for the Monterey Bay shoreline area. Note that almost all of the text in this section has been excerpted from one of two sources: the "Climate Change and Monterey Bay" website[6]; and the workshop Summary Report (Abeles et al., 2012), which is also available online[7].

Coastal Erosion: Existing levels of coastal erosion in the Monterey Bay region of 28-244 cm/year causes significant threats to critical infrastructure, property, and natural habitats (Stamski, 2005)[8]. Coastal erosion will increase as global sea levels continue to rise. Higher sea level will allow waves and tides to travel farther inland, exposing beaches, cliffs, and coastal dunes to more persistent erosional forces (Storlazzi and Griggs, 2000). Erosion is not a new issue in California, but rising sea levels threaten to increase the severity and frequency of erosion damage to coastal infrastructure and property. Statewide, a 4.6-foot (1.4 m) rise in sea level has the potential to erode approximately 41 square miles (68 km2) of coastline by the end of the century (Heberger et al., 2009).

The southern portion of Monterey Bay is eroding more rapidly than any other region in the state, with coastal dunes between the Salinas River mouth and Wharf II in Monterey eroding at rates between 1.0 and 6.0 feet per year (0.3-1.8 m/yr) (Heberger et al., 2009; Brew et al., 2011; and Hapke et al., 2009). Even without consideration of accelerated sea level rates, eight oceanfront facilities in South Monterey Bay are at high risk in the next 50 years and will require mitigation measures to prevent their loss (Philip Williams & Associates, 2008a). One statewide study by the California Energy Commission, *Impacts of Sea Level Rise on the California Coast*, found that in Monterey County a total of approximately 4.4 square miles (7 km^2) of coastline is susceptible to erosion, and the maximum distances coastal dunes and sea cliffs are expected to retreat in this region are approximately 1,300 and 720 feet (400 m and 200 m), respectively (Heberger et al., 2009). Loss of this land threatens to place

[6] https://oceansolutions.stanford.edu/workshop-progress-towards-preparing-future-climate-change-and-monterey-bay-shoreline
[7] http://centerforoceansolutions.com/preparingforthefuture
[8] This section on coastal erosion has been excerpted from the "Climate Change and Monterey Bay" website: http://www.climatechangemontereybay.org/impacts_erosion.shtml. Text prepared by Michael Fox, COS. All references included in this section are cited on the website.

roughly 820 people in Monterey County at risk of losing their homes (Ibid.). In addition to the loss of the protective service, losing these coastal dunes also means the loss of habitat for coastal species. Coastal erosion will have long-lasting impacts on the Monterey Bay region's transportation infrastructure, threatening over 50 miles (~83 km) of highway, roads, and rail throughout the region, including Highway 1 (Ibid.). Important public infrastructure is also vulnerable to erosion. One example is the Monterey Interceptor pipeline that carries raw sewage from the Monterey Peninsula to the treatment plant located north of the city of Marina. Portions of this critical piece of infrastructure run directly beneath the beach, and if undermined, could result in a significant threat to marine resources and public welfare and safety. Other threatened structures include beachfront hotels, condominiums, private residences, and other wastewater pumping stations associated with the Monterey Interceptor pipeline. Given the current rates of erosion, this sewage pipeline faces possible risk of exposure in the next 30 to 50 years (Brew et al., 2011), highlighting the importance of strategic long-term planning efforts.

Coastal Inundation: Coastal inundation occurs when normally dry land becomes covered by water and it is one of the most costly and damaging impacts associated with sea level rise[9]. Low-lying coastal areas of the Monterey Bay region will be exposed to a greater risk of major flooding events, and storm surge, high tides, and waves will travel farther inland (Heberger et al., 2009). Elevated sea levels combined with increases in winter storm intensity and wave heights will make coastal inundation a more serious risk (Storlazzi and Wingfield, 2005; and Wingfield and Storlazzi, 2005).

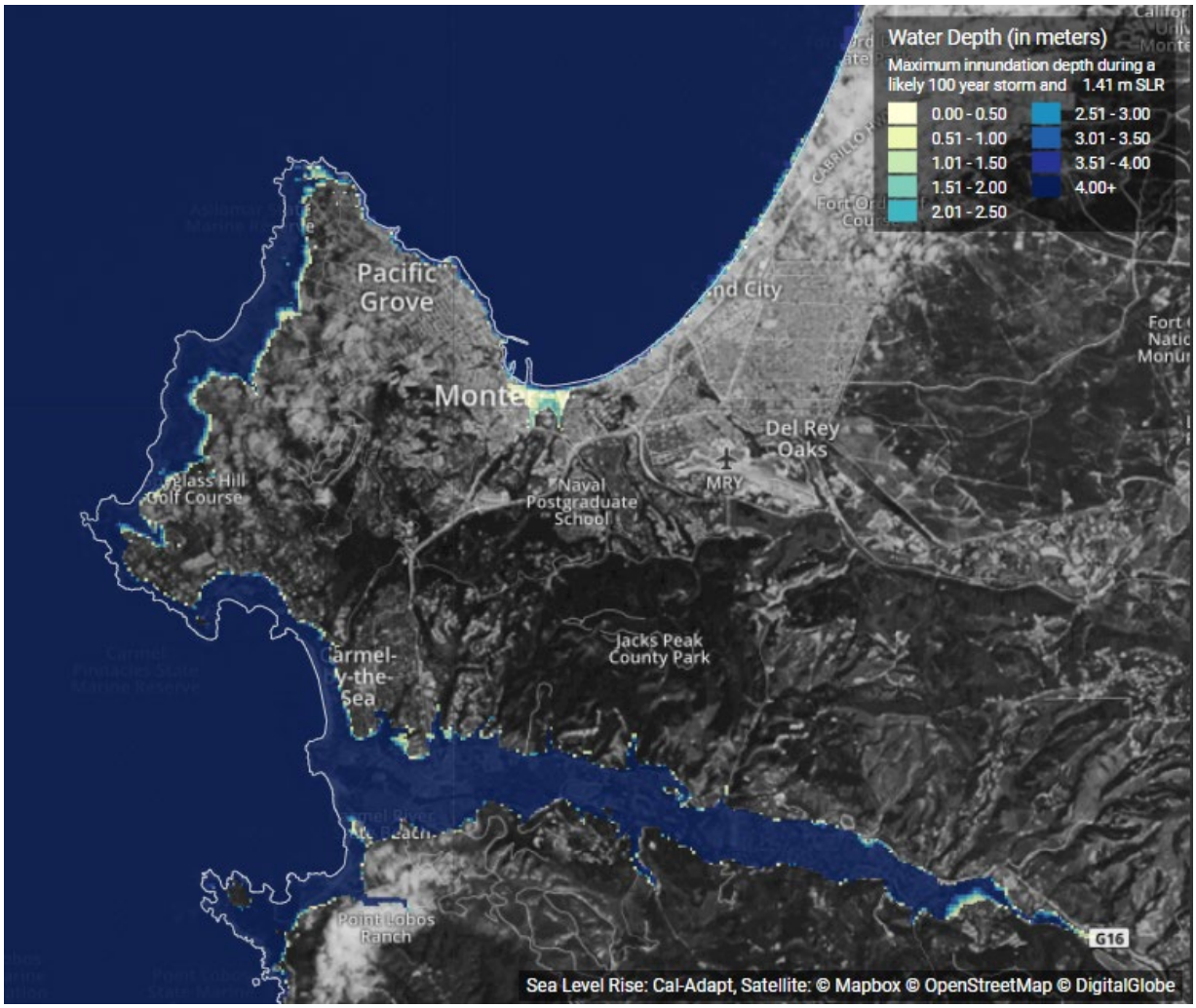
Given the large impact zone associated with coastal inundation, a significant portion of transportation infrastructure is at risk. Highways, roads, and railways in Monterey County are susceptible to coastal inundation, and flooding may impact several power generating facilities (Heberger et al., 2009). The low- lying coastal location of many agricultural properties in this region increases the likelihood of significant loss of agricultural land due to storm-induced flooding and salinization with increasing sea level and long-term inundation. Loss of agricultural production in the region will have lasting consequences for the largest sector of the regional economy.

In conjunction with coastal inundation, coastal water quality will likely decline as storm-induced flood waters recede, drawing debris, fertilizers, and other contaminants into the bay. This increased runoff has the potential to increase the frequency and severity of harmful algal blooms (HABs) in the area posing a serious threat to local fisheries and marine mammal populations (Largier et al., 2010).

Coastal inundation also poses a risk to local wetlands. The impact of sea level rise on wetlands is significant for the Monterey Peninsula area, since the region contains several important wetland systems. If the rate of sea level rise exceeds the rate of wetland accretion, or if wetlands cannot transgress (migrate up and inland) large tracts of critically important habitat, such as Carmel River and San Jose Creek, will become permanently submerged by ocean or brackish water. If these wetland systems become submerged with seawater or brackish water, their ability to provide crucial services such as nursery habitat, wave protection, and nutrient and sediment retention will be greatly diminished. There are several other wetland systems that are in contact with the Monterey Bay, including the Del Rey Creek, Roberts Lake/Laguna Grande, and El Estero Lake. All of these systems' tidal interactions are muted due to sand dunes and urban infrastructure. Sea level rise will pose significant threats to these systems as well, but those interactions are less well understood.

[9] This section on coastal inundation (except for last two paragraphs) has been excerpted from the "Climate Change and Monterey Bay" website: http://www.climatechangemontereybay.org/impacts_inundation.shtml. Text prepared by Michael Fox, COS. All references included in this section are cited on the website.

Figure 15-5: Predicted Flooding in the South Monterey Bay Area due to Sea Level Rise and Increased Winter River Flows



Source: Cal-Adapt web tool (http://cal-adapt.org/) Map depicting where increased inundation will occur within the Monterey Bay area without adaptation from a 1.4m sea level rise. Source Cal Adapt

The Monterey Peninsula IRWM planning region hosts numerous coastal river and creek mouth lagoon systems that provide a diverse set of environmental benefits and span the entire IRWM planning region. The cumulative impacts of increased rain intensity and flows within coastal watersheds along with increased sea levels and storm wave impacts pose unique threats to these valuable wetland resources. Regional partners have begun to evaluate the potential impacts to these systems, but studies are incomplete, and more research is needed.

Seawater Intrusion: Seawater intrusion is caused by two primary processes: overdrafts of coastal wells and sea level rise. As described in the Regional Description of this Plan, the Salinas Valley and Seaside groundwater basins used for water supply in the region have been experiencing overdraft for many years. The Salinas Valley Groundwater Basin is the primary source of water supply to the former Fort Ord area of the Monterey Peninsula planning region. It is estimated that the Salinas Valley Groundwater Basin has an average annual non-drought overdraft of approximately 50,000-AF (Cal Water, 2010a), though during the last drought the annual overdraft was estimated at 150,000–300,000 AFY (Cal Water, 2010b). As a result of this consistent overdraft, groundwater levels in the Salinas Valley

Groundwater Basin have dropped below sea level, allowing seawater to intrude from Monterey Bay into aquifers located 180 and 400 feet below ground surface. The East Side and Pressure Subareas of the Salinas Valley Groundwater Basin are most impacted by overdraft (MCWRA, 1997). The hydrologic continuity between the ocean and the aquifers of the Pressure Area caused seawater to intrude these aquifers at a rate of approximately 28,800 AFY (Cal Water, 2010b).

The Seaside Basin underlies an approximately 19-square-mile area at the northwest corner of the Salinas Valley, adjacent to Monterey Bay. The hydrogeology of the Seaside Basin has been the subject of numerous studies beginning with a California Department of Water Resources study in 1974. Monitoring data gathered since 1987 shows that water levels have been trending downward in many areas of the basin. A steep decline since 1995 in the northern coastal portion of the basin, where most of the groundwater production occurs, coincides with increased extraction in that area after the State Water Resources Control Board required Cal-Am to reduce its Carmel River diversions, and instead maximize its pumping in the Seaside Basin.

Continued pumping in excess of recharge and fresh water inflows, pumping depressions near the coast, and ongoing seawater intrusion in the nearby Salinas Valley all suggest that seawater intrusion could also occur in the Seaside Groundwater Basin; however, no seawater intrusion has been observed in existing monitoring wells and modeling and other water quality analyses have not demonstrated seawater intrusion will affect extraction wells in the near term. (Hydrometrics, *Seawater Intrusion Analysis Report*, 2011).

Groundwater is produced by 22 wells in the Seaside Groundwater Basin. California American Water (CalAm), an investor-owned public utility that serves approximately 38,480 customer accounts in the Monterey Peninsula area, owns 6 wells and currently pumps approximately 65 percent of the water produced in the basin. In addition, CalAm and Monterey Peninsula Water Management District operate a Seaside Basin Aquifer Storage and Recovery system that stores excess Carmel River water supplies during the wet season in the groundwater basin and recovers the banked water during the following dry season for consumptive use.

The estimated average yield of the existing Aquifer Storage and Recovery facilities is 1,920 AFY but varies yearly based on rainfall due to the requirement to maintain adequate Carmel River instream flows. Historical and persistent low groundwater elevations caused by pumping have led to concerns that seawater intrusion may threaten the basin's groundwater resources. In 2006, an adjudication process (Cal-Am v. City of Seaside et al., Case No. M66343) led to the issuance of a court decision that created the Seaside Basin Watermaster (Watermaster). The Watermaster consists of nine representatives, one representative from each: Cal-Am, City of Seaside, Sand City, City of Monterey, City of Del Rey Oaks, Monterey Peninsula Water Management District and Monterey County Water Resources Agency, and two representatives from landowner groups. The Watermaster has evaluated water levels in the basin and has determined that while seawater intrusion does not appear to be occurring at present, current water levels are lower than those required to protect against seawater intrusion.

Seawater intrusion has not been documented in the Carmel River alluvial aquifer. Looking forward, seawater intrusion is not anticipated due to the narrow alluvial aquifer near the lagoon and mouth of the Carmel River and the seasonal high river flows that cause the alluvial aquifer to fill annually.

Coastal Storms and Waves: Seasonal patterns of storms and wave intensity are the primary driving forces behind coastal erosion along the California coast.[10] While erosion is a natural process that shapes shorelines and beaches, erosional forces become a hazard when they interact with permanent structures that rely on a stable shoreline. The impacts of storm and wave damage are episodic and have the greatest severity when large storms coincide with high tide events. Despite the gradual day-to-day erosion experienced along the coast, it is the large, episodic erosional events that pose the greatest threat to the Monterey Bay shoreline. Given the recent evidence that suggests storm and wave intensity is likely to increase in this region, these large, episodic erosional events may occur more frequently. Protecting and restoring natural systems to take advantage of their protective services can increase resilience to these coastal impacts. Protecting and restoring these systems will likely provide additional benefits such as improved water quality and increased nursery habitat and recreation areas.

15.3 Vulnerability and Adaptability of Water Management Systems

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.

As described in **Chapter 2, Region Description**, the stakeholders work to address a number of critical and sometimes conflicting water issues. Great strides have been made to address many of these issues, but challenges remain. Essentially, whatever challenges currently exist for water managers in the Region will be greatly exacerbated—and augmented—by the impacts of climate change. The RWMG has conducted an initial climate vulnerability analysis and risk assessment to help water resource managers evaluate these risks and to consider potential adaptation measures.

15.3.1 Initial Vulnerability Assessment

The State of California and other climate partners have provided numerous tools and several comprehensive guidance documents to evaluate the vulnerabilities of human and natural systems in the face of climate change variables. The RWMG has used a combination of tools to identify priority resources that face the greatest threat from the impacts of climate change. Those impacts were prioritized based on their likelihood and the consequence that those impacts pose on life, property, public resources, and the natural environment of the Monterey Peninsula region; stakeholders from the region were invited to provide input for this prioritization exercise.

Key documents used for this vulnerability assessment include the State guidance *Climate Change Handbook for Regional Water Planning* (US EPA Region 9 and DWR, 2011) and the guidebook *Preparing for Climate Change* (Snover et al., 2007). Both documents outline 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. In addition, region-specific guidance has been provided by the Monterey Bay Sanctuary Foundation and the Southern Monterey Bay Coastal Erosion Working Group, (PWA-ESA, Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay, 2012) and by the Center for Ocean Solutions, Monterey Bay National Marine Sanctuary, and California Coastal Commission (Abeles et al. 2011).

[10] This section on coastal storms and waves has been excerpted from the "Climate Change and Monterey Bay" website: http://www.climatechangemontereybay.org/impacts_storms.shtml. Text prepared by Michael Fox, COS.

The RWMG used several tools to identify resources that are sensitive to changes in climate variables. The website for the International Council for Local Environmental Initiatives (ICLEI) – Local Governments for Sustainability provides an online tool to identify important resources (human and natural) that are susceptible to climate change, and the *Climate Change Handbook* provides a useful checklist for identifying potential water resource specific vulnerabilities. The following is a listing of the vulnerabilities defined in the *Climate Change Handbook* and their applicability to the Monterey Peninsula IRWM planning region.

The results of the vulnerability and risk assessments may lead to a resiliency analysis and adaptation strategy (Atchison, 2011). A vulnerability analysis for the Monterey Peninsula IRWM planning region will help the RWMG select priority planning areas based on the region's potential impacts due to climate change and the associated risks to human health, infrastructure, the economy, and environment. The Monterey Peninsula RWMG conducted this preliminary vulnerability analysis for the Region, following the guidance provided by ICLEI and the State and using an example that was conducted for the Greater Monterey County IRWM Plan and the City of Santa Cruz. A description of the process and the assumptions that went into this analysis are detailed, below. Note that the results of the vulnerability analysis are considered to be preliminary only; the analysis itself will be refined as more tools and more information become available.

Climate preparedness planning relies on the evaluation and prioritization of risks. Risk is determined based on the probability that an impact will occur (*likelihood*) and the significance of that impact (*consequence*) on life, land uses, water resources, the economy, and the environment: *Risk = Consequences x Likelihood.* Since no region has sufficient resources to address all potential impacts of climate change simultaneously, this prioritization process is necessary to address impacts that are most likely and that will result in the greatest detriment to life, the economy, and infrastructure (*consequence*).

Likelihood

The probability that a specific impact will occur, or "likelihood", as defined by ICLEI workbook, is estimated based on the increased chance, or periodicity, that a certain event will occur. **Table 15-3** illustrates how the combined factors of risk and likelihood relate to the determination of priority planning areas. **Table 15-4** illustrates the "Likelihood Rating" of impacts based on the chance of an infrequent impact occurring more often ("recurrent risk") and the chance that a previously unrealized impact could occur ("single event").

Table 15-3: Risk Variables

	Low Likelihood	Medium Likelihood	High Likelihood
High to Extreme Risk	May be priority planning areas	Should be priority planning areas	Should be priority planning areas
Low to Medium Risk	Are unlikely to be priority planning areas	May be priority planning areas	Likely to be priority planning areas

Table 15-4: Probability Variables

Likelihood Rating	Recurrent Risks	Single Event
Almost Certain	Could occur several times per year	More likely than not - probability greater than 50 percent
Likely	May arise about once per year	As likely as not - 50/50 chance
Possible	May arise once in 10 years	Less likely than not but still appreciable - probability less than 50 percent but still notable
Unlikely	May arise once in 10 years to 25 years	Unlikely but not negligible - probability low but noticeably greater than zero
Rare	Unlikely during the next 25 years	Negligible - probability very small, close to zero

Consequence

The consequence of a specific climate change impact occurring is evaluated individually for five different social, economic, and environmental factors:

- Public safety
- Local economy and growth
- Community and lifestyle
- Environment and sustainability
- Public administration

The cumulative consequence from the combined impacts to specific social, economic, and environmental factors is then derived. For example, the consequences of failing to address sea level rise will depend on the potential impacts of that future sea level rise on the five factors listed above, combined. The consequence for each factor is estimated from little or no consequence (0) to serious devastation to infrastructure or significant economic or environmental impacts or loss of life (5).

Risk

The amount of risk involved from a climate change impact depends on both the likelihood and severity of the consequences that may result from that impact. Using the example of sea level rise, risk can be mitigated by reducing the consequence of the flooding or the possibility that flooding will occur at a given ocean height. Risk was determined for the Monterey Peninsula region based on the consequences that are expected to arise from any particular impact occurring within the region. Consequences were evaluated for human well-being, economic stability, environmental health, and the ability of municipalities to respond. The Climate Impact Risk Analysis results, shown in the two columns on the right side of **Table 15-5**, **Climate Change Vulnerability Checklist for Monterey Peninsula** qualify the risk associated with each likely impact.

Table 15-5: Climate Change Vulnerability Checklist for Monterey Peninsula

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
Water Demand					
	Are there major industries that require cooling/process water in your planning region?	Not Applicable	–	–	–
	Does water use vary by more than 50 percent seasonally in parts of your region? - Seasonal water use, which is primarily outdoor water use, is expected to increase as average temperatures increase and droughts become more frequent. - Where water use records are available, look at total monthly water uses averaged over the last five years (if available). If maximum and minimum monthly water uses vary by more than 25 percent, then the answer to this question is "yes". - Where no water use records exist, is crop irrigation responsible for a significant (say >50%) percentage of water demand in parts of your region?	No; however, prior to implementation of a steeply tiered rate structure, winter demand could be 50% of peak summer demand. There is limited agricultural water demand. Not a key vulnerability. Over the most recent period, available water use records do not demonstrate variations of more than about 40% percent difference between minimum and maximum monthly water use rates.	Low	Medium	Low
	Are crops grown in your region climate-sensitive? Would shifts in daily heat patterns, such as how long heat lingers before night-time cooling, be prohibitive for some crops? - Fruit and nut crops are climate-sensitive and may require additional water as the climate warms.	Small relative agricultural demand, thus less overall vulnerability due to crop sensitivity.	Low	High	Low

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Do groundwater supplies in your region lack resiliency after drought events? - Droughts are expected to become more frequent and more severe in the future. Areas with a more hardened demand may be particularly vulnerable to droughts and may become more dependent on groundwater pumping.	During extended droughts, the Carmel Valley Alluvial Aquifer can become severely depleted; however, after a drought, the CVAA generally recharges fully in a single winter. In the Seaside Basin, adjudicated water rights have been established based on the long-term yield, including drought periods.	Medium	Medium	Medium
	Are water use curtailment measures effective in your region? - Droughts are expected to become more frequent and more severe in the future. Areas with a more hardened demand may be particularly vulnerable to droughts.	Conservation efforts (including rebates and permit requirements) have achieved dramatic water use reductions. Future curtailment will be mandatory without new water supplies; the demand is considered somewhat "hardened" due to existing conservation efforts and local water use permit programs and relatively high rates for water.	High	High	High

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Are some instream flow requirements in your region either currently insufficient to support aquatic life, or occasionally unmet? - Changes in snowmelt patterns in the future may make it difficult to balance water demands. Vulnerabilities for ecosystems and municipal/agricultural water needs may be exacerbated by instream flow requirements that are: 1. not quantified, 2. not accurate for ecosystem needs under multiple environmental conditions including droughts, and 3. not met by regional water managers.	NMFS has recommended instream flows in the main stem of the Carmel River to protect steelhead that cannot currently be met in most dry periods. Snowmelt patterns are not applicable to the region only rainfall.	High	High	Medium[11]
Water Supply					
	Does a portion of the water supply in your region come from snowmelt?	Not Applicable	–	–	–
	Does part of your region rely on water diverted from the Delta, imported from the Colorado River, or imported from other climate-sensitive systems outside your region?	Not Applicable	–	–	–

[11] Due to impending cease and desist order and Seaside Groundwater Basin Adjudication; see **Chapter 2, Region Description**, for details

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Does part of your region rely on coastal aquifers? Has salt intrusion been a problem in the past? - Coastal aquifers are susceptible to salt intrusion as sea levels rise, and many have already observed salt intrusion due to over-extraction, such as the West Coast Basin in southern California.	The Monterey Peninsula region relies on the Seaside Groundwater basin for a portion of its supply and has the potential to be affected by saltwater intrusion due to ongoing basin overdraft. The Carmel River alluvial aquifer topography and hydrogeology prevents significant seawater intrusion.	High	High	Medium[12]
	Would your region have difficulty in storing carryover supply surpluses from year to year? - Droughts are expected to become more severe in the future. Systems that can store more water may be more resilient to droughts.	The only substantial seasonal storage reservoirs are the Los Padres Reservoir and the Seaside Groundwater Basin, which are being utilized to the extent possible given current water rights to winter flows in the Carmel River and court ordered adjudication pumping restrictions that apply to the Seaside Basin.	Medium	Medium	Medium

[12] Due to Seaside Groundwater Basin Adjudication

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Has your region faced a drought in the past during which it failed to meet local water demands? - Droughts are expected to become more severe in the future. Systems that have already come close to their supply thresholds may be especially vulnerable to droughts in the future.	The drought years have resulted in overdraft conditions in the Seaside Groundwater Basin and excess (illegal) diversions from the Carmel River that result in the inability to provide water for environmental beneficial uses. Municipal water demands have consistently been met on an annual average basis, to the detriment of the habitat.	Medium	Medium	Medium
	Does your region have invasive species management issues at your facilities, along conveyance structures, or in habitat areas? - As invasive species are expected to become more prevalent with climate change, existing invasive species issues may indicate an ecological vulnerability to climate change.	The region has no significant invasive species issues that reduce water conveyance and water supply in local streams and rivers.	Low	Low	Low
Water Quality					
	Are increased wildfires a threat in your region? If so, does your region include reservoirs with fire-susceptible vegetation nearby which could pose a water quality concern from increased erosion? - Some areas are expected to become more vulnerable to wildfires over time. To identify whether this is the case for parts of your region, the California Public Interest Energy Research (PIER) Program has posted wildfire susceptibility projections as a Google Earth application at: http://cal-adapt.org/fire/.	Increased incidences and severity of wildfires are a risk in mountains surrounding Los Padres reservoir, the Carmel River, and their tributary creeks, resulting in erosion and sedimentation and also greater amount of water use for fire protection.	Medium	Medium	High

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Does part of your region rely on surface water bodies with current or recurrent water quality issues related to eutrophication, such as low dissolved oxygen or algal blooms? Are there other water quality constituents potentially exacerbated by climate change? - Warming temperatures will result in lower dissolved oxygen levels in water bodies, which are exacerbated by algal blooms and in turn enhance eutrophication. Changes in streamflows may alter pollutant concentrations in water bodies.	The Monterey Peninsula region relies on groundwater under the influence of surface water (Carmel Valley) that are impacted by water quality issues, and that could be exacerbated by climate change. Los Padres Reservoir is subject to algal blooms in the summer that impact water quality of releases from storage.	Medium	Medium	Medium
	Are seasonal low flows decreasing for some waterbodies in your region? If so, are the reduced low flows limiting the waterbodies' assimilative capacity? - In the future, low flow conditions are expected to be more extreme and last longer. This may result in higher pollutant concentrations where loadings increase or remain constant.	The lower portion of the Carmel River and its alluvial aquifer are seasonally dewatered, which could become more severe.	Medium	Medium	Medium
	Are there beneficial uses designated for some water bodies in your region that cannot always be met due to water quality issues? - In the future, flows are expected to decrease. This may result in higher pollutant concentrations where loadings increase or remain constant.	Water supply needs of some beneficial uses cannot always currently be met, particularly in the Carmel River and at its lagoon.	Medium	Medium	High

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Does part of your region currently observe water quality shifts during rain events that impact treatment facility operation? - While it is unclear how average precipitation will change with temperature, it is generally agreed that storm severity will probably increase. More intense, severe storms may lead to increased erosion, which will increase turbidity in surface waters. Areas that already observe water quality responses to rainstorm intensity may be especially vulnerable.	Increases in water temperatures and erosion may result in worsening estuarine water quality in local lakes and in the Carmel River and Lagoon (NOAA, 2008); however, because the water supply is from groundwater wells in the Carmel River alluvial aquifer and Seaside Groundwater Basin, these shifts are not severe.	Low	Low	Low
Sea Level Rise					
	Has coastal erosion already been observed in your region? - Coastal erosion is expected to occur over the next century as sea levels rise.	Coastal erosion is a significant issue in the Monterey Peninsula region specifically between the northern region boundary and Monterey Harbor and along Scenic Road near Carmel River State Beach	High	High	High
	Are there coastal structures, such as levees or breakwaters, in your region? - Coastal structures designed for a specific mean sea level may be impacted by sea level rise.	Numerous coastal structures and levees are at risk from sea level rise and the associated increased storm surges.	High	High	High

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Is there significant coastal infrastructure, such as residences, recreation, water and wastewater treatment, tourism, and transportation) at less than six feet above mean sea level in your region? - Coastal flooding will become more common, and will impact a greater extent of property, as sea levels rise. Critical infrastructure in the coastal floodplain may be at risk. - Digital elevation maps should be compared with locations of coastal infrastructure.	The region includes significant infrastructure and other assets, including water treatment facilities, waste water collection facilities, storm water control structures, a state highway, a major local road, a pedestrian bicycle trail, and a marina, and that are located within six feet of the current high tide line, and therefore are most vulnerable to sea level rise.	High	High	High
	Are there climate-sensitive low-lying coastal habitats in your region? - Low-lying coastal habitats that are particularly vulnerable to climate change include estuaries and coastal wetlands that rely on a delicate balance of freshwater and saltwater.	There are low-lying coastal habitats in the region including estuaries, dunes, coastal lagoons and brackish water marshes that play an important role in water quality and biological diversity and are sensitive to changes to the balance of fresh and saltwater.	High	High	High
	Are there areas in your region that currently flood during extreme high tides or storm surges? - Areas that are already experiencing flooding during storm surges and very high tides, are more likely to experience increased flooding as sea levels rise.	There are some areas that flood during storm surge events, including along the coast- between the Monterey Harbor and the City of Seaside- and the residential and commercial areas on the north side of the Carmel River Lagoon.	High	High	High
	Is there land subsidence in the coastal areas of your region? - Land subsidence may compound the impacts of sea level rise.	Land subsidence exists in coastal areas, making estuarine wetland management difficult and sensitive to sea level rise.	Low	Low	Low

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Do tidal gauges along the coastal parts of your region show an increase over the past several decades? - Local sea level rise may be higher or lower than state, national, or continental projections. - Planners can find information on local tidal gauges at http://tidesandcurrents.noaa.gov/sltrends/sltrends	Tidal records suggest ocean levels in the Monterey Bay have been increasing by 1.34 mm/yr over the past few decades[13]. [Note: Updated information will be provided from the State Coastal Conservancy/MP Sanctuary Foundation report to be published in 2014.]	High	High	High
Flooding					
	Does critical infrastructure in your region lie within the 200-year floodplain? DWR's best available floodplain maps are available at: http://www.water.ca.gov/floodmgmt/ - While it is unclear how average precipitation will change with temperature, it is generally agreed that storm severity will probably increase. More intense, severe storms may lead to higher peak flows and more severe floods. - Refer to FEMA floodplain maps and any recent FEMA, US Army Corps of Engineers, or DWR studies that might help identify specific local vulnerabilities for your region. Other follow-up questions that might help answer this question: 1. What public safety issues could be affected by increased flooding events or intensity? For example, evacuation routes, emergency personnel access,	Critical infrastructure lies within the 200-year flood plain, including wastewater treatment, collection/conveyance, roadways, and other urban development, including residential land uses. Of particular concern are the coastal areas of Monterey and Seaside, as well as Carmel Valley.	High	High	High

[13] *Updated information will be provided from the State Coastal Conservancy/MB Sanctuary Foundation report to be published in 2014*

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	hospitals, water treatment and wastewater treatment plants, power generation plants and fire stations should be considered. 2. Could key regional or economic functions be impacted from more frequent and/or intense flooding?				
	Does part of your region lie within the Sacramento-San Joaquin Drainage District?	Not Applicable.	–	–	N/A
	Does aging critical flood protection infrastructure exist in your region? - Levees and other flood protection facilities across the state of California are aging and in need of repair. Due to their overall lowered resiliency, these facilities may be particularly vulnerable to climate change impacts.	Critical flood control infrastructure is old and undersized in the lower Carmel Valley.	High	High	High
	Have flood control facilities (such as impoundment structures) been insufficient in the past? - Reservoirs and other facilities with impoundment capacity may be insufficient for severe storms in the future. Facilities that have been insufficient in the past may be particularly vulnerable.	Rising sea level will increase the extent of river flooding. There are no flood impoundment structures in Carmel Valley. Without active management, several coastal lakes may overtop, which will flood coastal land uses.	Medium	Medium	Medium

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Are wildfires a concern in parts of your region? - Wildfires alter the landscape and soil conditions, increasing the risk of flooding within the burn and downstream areas. Some areas are expected to become more vulnerable to wildfires over time. To identify whether this is the case for parts of your region, the California Public Interest Energy Research Program (PIER) has posted wildfire susceptibility projections as a Google Earth application at: http://cal-adapt.org/fire/. These projections are the results of only a single study and are not intended for analysis but can aid in qualitatively answering this question. Read the application's disclaimers carefully to be aware of its limitations.	Wildfires are a major concern for flooding in coastal and inland mountain ranges. Wildfires also contribute to destabilization of slopes and increased sedimentation in streams and at Los Padres Reservoir.	High	High	High
Ecosystem and Habitat Vulnerability					
	Does your region include inland or coastal aquatic habitats vulnerable to erosion and sedimentation issues? - Erosion is expected to increase with climate change, and sedimentation is expected to shift. Habitats sensitive to these events may be particularly vulnerable to climate change.	Our region has coastal aquatic systems that are vulnerable to acidification, erosion and sedimentation.	Medium	Medium	Medium
	Does your region include estuarine habitats which rely on seasonal freshwater flow patterns? - Seasonal high and low flows, especially those originating from snowmelt, are already shifting in many locations.	Yes, Carmel River Lagoon in particular. Roberts Lake in Seaside and Lake El Estero in Monterey also have freshwater habitat.	High	Low	High

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Do climate-sensitive fauna or flora populations live in your region? - Some specific species are more sensitive to climate variations than others.	The region hosts a number of fauna and flora populations that are particularly vulnerable to climate change, including species that live in estuaries, dunes, maritime chaparral, freshwater and brackish marshes, Monterey Pine and Cypress forests, and kelp forests.	Medium	Low	Medium
	Do endangered or threatened species exist in your region? Are changes in species distribution already being observed in parts of your region? - Species that are already threatened or endangered may have a lowered capacity to adapt to climate change.	Numerous threatened and endangered species exist in the region.	Medium	Medium	Medium
	Does the region rely on aquatic or water-dependent habitats for recreation or other economic activities? - Economic values associated with natural habitat can influence prioritization.	The region relies on significant aquatic recreational and economic (particularly, tourism and fishing) opportunities along the coast, beaches, and the Monterey harbor and Carmel River and lagoon.	High	High	High
	Are there rivers in your region with quantified environmental flow requirements or known water quality/quantity stressors to aquatic life? - Constrained water quality and quantity requirements may be difficult to meet in the future.	Water quality and quantity concerns affect a number of the region's creeks and rivers- with aquatic life stressors due to inability for surface water flows to meet environmental flow requirements.	High	Medium	High

✓	Climate Change Handbook for Regional Water Planning	Applicable Vulnerabilities for Monterey Peninsula	Severity of Consequences		Occurrence Likelihood
			Environment	Socio-economic	
	Do estuaries, coastal dunes, wetlands, marshes, or exposed beaches exist in your region? If so, are coastal storms possible/frequent in your region? - Storm surges are expected to result in greater damage in the future due to sea level rise. This makes fragile coastal ecosystems vulnerable.	The region coastal estuarian, lagoons, and river mouths as well as beaches and dune complexes that would be affected by changes in storm intensity.	High	Medium	High
	Does your region include one or more of the habitats described in the Endangered Species Coalition's Top 10 habitats vulnerable to climate change http://www.itsgettinghotoutthere.org/?	Not Applicable	–	–	–
	Are there areas of fragmented estuarine, aquatic, or wetland wildlife habitat within your region? Are there movement corridors for species to naturally migrate? Are there infrastructure projects planned that might preclude species movement? - These ecosystems are particularly vulnerable to climate change.	Habitat fragmentation in the region may restrict species migration, and fragmentation may continue if policies are not developed to minimize such actions.	Medium	Low	Medium
Hydropower					
	Is hydropower a source of electricity in your region?	Not Applicable	–	–	–
	Are energy needs in your region expected to increase in the future? If so, are there future plans for hydropower generation facilities or conditions for hydropower generation in your region?	Not Applicable	–	–	–

Note that the results of these analyses are considered by the RWMG to be preliminary only. The RWMG will further evaluate the assessment results and adjust and reprioritize impacts and resulting actions as additional data are made available. It is also important to note that the risk assessment evaluates the likelihood and consequence of a specific environmental condition occurring and that this analysis does not factor in potential inaccuracies in the projected rate of environmental change (e.g., sea level rise) within a given timeframe. Therefore, agencies must consider and balance the relative risks and costs associated with under- and/or overestimating sea level rise and other environmental changes in making decisions.

15.3.2 Initial Adaptation Strategy

The following section describes the RWMG's adaptation strategy for addressing impacts to water resources in the Monterey Peninsula IRWM planning area, based on the results of the initial risk assessment described above. This initial adaptation strategy will become more developed over time by the RWMG as more climate change data and analytical tools are generated.

Adaptation Goals and Objectives

The Monterey Peninsula IRWM region's initial adaptation goals and objectives, listed below, have been selected from a comprehensive list of potential actions within the DWR guidance document. The goals are intended to direct focus towards the three priority Prioritized Vulnerabilities, identified above, as well as the water resource goals and objectives defined within the Monterey Peninsula IRWM Plan (see Section D, Objectives). The adaptation goals and objectives form the foundation for the RWMG's initial adaptation strategy for the Monterey Peninsula region. The goals are specific responses to the priority Prioritized Vulnerabilities that can be accomplished by the various IRWM partner agencies and stakeholders and do not need to be managed or actively coordinated by the RWMG. Rather, the Monterey Peninsula IRWM planning effort can serve as a forum to hear about projects aimed to address these goals.

Adaptation Goals: The Monterey Peninsula IRWM Plan recognizes the importance of becoming a climate resilient region. Adaptation goals that could support that intention include:

- Encourage adaptation activities that increase the resiliency of local communities, businesses, and institutions to changes in the climate.
- Minimize the potential for injury of citizens and damage to public and private property from impacts of climate change.
- Increase the resilience of municipal departments to adapt and respond to climate related emergencies.
- Protect natural lands, agricultural areas, and coastal resources from the future threats of climate change to increase the resilience of communities.
- Do not permit the construction of new critical facilities within the 200-year flood plain (per State recommendations).
- Plan for effective adaptation and resiliency that supports proactive steps towards sustainability rather than response through unplanned emergency actions.

Adaptation Objectives:

- Implement on-going climate change variable monitoring to inform adaptation and response efforts.

- Develop regional sea level rise resiliency strategies to prepare for impacts to water resource infrastructure and lands, that support the multiple benefits described in the IRWM Plan, and that consider short and long-term economic implications.
- Consider potential climate change impacts to water resources in future land use and regional resource planning of the county and other municipalities.
- Support regional collaborations and planning efforts and provide information to the public regarding potential climate change impacts and status of response planning.
- Encourage the retrofit or relocation of water infrastructure that is vulnerable and evaluate changes to water management strategies that are likely to be less effective due to climate change.
- Prioritize the protection of drinking water resources and sensitive water supplies and aquatic ecosystems that support a sustainable region.

15.4 Top Priority Vulnerabilities for the Region

Priority impacts are defined as those that are more likely to occur and that will lead to significant impacts if they do occur. Priority impacts for the Monterey Peninsula region were determined according to methods described by ICLEI. The climate risk analyses and priority impact assessment indicate the following climate risks to be top priority for the RWMG and other water managers for considering how to adapt the Region's water management systems for climate change impacts:

- *Decreased water supply* due to changes in precipitation and more frequent and severe droughts.
- *Increased flooding and erosion of creeks and rivers* due to more intense storm events (higher river flow rates), and overburdening of conveyance systems, levees, and culverts.
- *Coastal inundation of urban development and other land uses and impacts to river and wetland ecosystems* due to changes in rainfall patterns, storm intensity, storm surges (due to increased storm frequency and intensity), and sea level rise.

15.5 Adaptation Planning

The Monterey Peninsula IRWM region's ability to respond to a given climatic impact will enable the region to reduce either the likelihood or consequence of an event. The ability to adapt to sea level rise, for example, can occur in many forms, including coastal armoring and protection, the raising of infrastructure, and inland retreat. Each adaptive measure provides a certain level of additional protection for a certain period of time for a certain cost. Significant resources are required to fully evaluate the adaptive capacity of any social-economic factor to a given climatic variable. Numerous engineering (hard) and adaptive planning (soft) measures would need to be evaluated and cost benefit analyses completed. Additionally, secondary unintended consequences of any adaptive measure to all of the social-economic factors defined within this chapter should also be evaluated and quantified. Because of the complexity of this process, adaptive capacity has not been systematically evaluated by the RWMG.

Nonetheless, understanding which infrastructure is vulnerable to what hazard at what future date can help local agencies and regional partners identify strategies to increase water management resiliency and to develop projects and programs to support those strategies. The sections below describe possible strategies to reduce vulnerabilities, including specific assets that lie within the various future climate

hazard zones according to climate scenarios for the years 2018-2030, 2030-2060, and 2060-2100. **Table 15-6** identifies the asset, the likely hazard, and possible actions to reduce the vulnerability of these assets to these risks.

Table 15-6: List of Possible Actions

Asset	Hazard	Recommended Actions	Feasibility	Estimated Cost
Water Utility and Infrastructure				
Storm Drains	Storm and fluvial flooding	Install gates on vulnerable storm drains	Easy	Low
	Rising tides	Estimate effective life using sea level rise predictions	Easy	Low
	Storm and fluvial flooding	Evaluate options to reduce reliance on vulnerable storm drain infrastructure (LID, retention)	Easy	Low
Culverts	Risings tides	Evaluate necessary upgrade to existing structures	Moderate	Moderate
	Fluvial flooding	Evaluate secondary overflow options	Moderate	Moderate
	Fluvial flooding	Evaluate feasibility of installing additional pumps and control structures	Moderate	Moderate
	Fluvial flooding	Evaluate drainage modifications (retention) in upper watershed that reduce downstream peak flows	Moderate	Moderate
Wastewater and Recycled Water	Coastal Storm Flooding and Erosion	Relocate infrastructure out of hazard areas or redesign to accommodate hazards.	Moderate	Moderate
Groundwater Wells	Coastal storm flooding, risings tides	Evaluate risk of contamination from surface flood waters	Moderate	Moderate
Natural Resources				
Dunes	Coastal storm flooding	Continue restoration and resiliency programs, upgrade trails	Easy	Moderate
	Coastal storm flooding, rising tides and coastal erosion	Accommodate retreat and investigate development rights exchange program	Moderate	Moderate
	Coastal storm flooding, rising tides	Beach Nourishment	Moderate	Moderate
Beach Habitat	Coastal storm flooding and erosion	Draft a Beach Management Plan that establishes objectives and strategies to retain beach habitat in parallel with other sea level rise adaptation strategies.	Easy	Low
Wetlands	Sea level rise and coastal storm flooding	Update to the Study Plan for Long Term Adaptive Management of the Carmel River State Beach and Lagoon	Moderate	Moderate
	Fluvial flooding, coastal storm flooding, rising tides	Establish easement programs that fairly compensates farmers for lands lost due to adaptive retreat along waterways	Moderate	Moderate

15.5.1 Adaptation Actions and Response

To develop an adaptation strategy for the Region, adaptation actions and response scenarios from the California Natural Resources Agency's 2009 California Climate Adaptation Strategy were selected, as applicable to the Monterey Peninsula region. High priority responses along with climate mitigation actions are listed in **Table 15-7**, **Adaptation Response Strategies to the Effects of Climate Change**, below. The "high priority responses" were prioritized by the RWMG and stakeholders according to the risk assessment described above and in accordance with the objectives of the Monterey Peninsula IRWM Plan. This prioritization exercise will better enable IRWM Plan participants to respond to funding opportunities that focus specifically on water infrastructure projects or environmental resource protection, as needed. This prioritized list of adaptation actions is considered a first step toward developing a comprehensive adaptation strategy for the Monterey Peninsula IRWM planning region to address the impacts of climate change. These adaptation and climate mitigation actions will be further evaluated by the RWMG in collaboration with the stakeholders to define next steps, responsible entities, and funding resources to complete adaptation actions. As more tools become available, the RWMG will be able to consider more specific risks to the region due to climate change, better understand the tradeoffs and benefits of different adaptations, and will be able to identify additional adaptations relevant to the region. The adaptation strategy will consider the extent to which existing water management systems in the region—including man-made and natural water systems—are adaptable to climate change impacts and the steps that would need to be taken, along with associated costs, to make those systems more robust. The process will include a cost-effectiveness analysis and a final prioritization of adaptation actions, focusing on specific water management systems throughout the region. In addition, specific consideration will be afforded to strategies that offer multiple benefits.

Table 15-7: Adaption Response Strategies to the Effects of Climate Change

ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE		
Climate Change Effects	**Adaptation and Response Strategies**	**Initial Actions**
Rangelands are expected to be drier	Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies. Implement adaptation strategies to conserve California's biodiversity.	N/A
Domestic landscaping water needs will be higher	Integrate land use and climate adaptation planning	Education Incentive programs Demonstration programs Grey water Xeriscaping Expand water supplies (purple pipe) and storage Aquifer management
Decrease in local rainfall	Promote community resilience to reduce vulnerabilities: Food sustainability Implement water conservation and supply management efforts Manage watersheds, habitat, and vulnerable species	Education Incentive programs Demonstration programs Grey water Xeriscaping
Sea level rise and higher groundwater extraction will lead to increased rates of seawater intrusion	Prepare a regional sea level rise adaptation strategy Promote working landscapes with ecosystem services Integrate land use and climate adaptation planning	Education Incentive programs Demonstration programs Grey water Xeriscaping Expand water supplies (purple pipe) and storage Aquifer management Expand agriculture water conservation programs

ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE		
Climate Change Effects	**Adaptation and Response Strategies**	**Initial Actions**
Droughts will be more frequent and severe	Implement adaptation strategies to conserve California's biodiversity. Educate, empower, and engage citizens regarding risks and adaptation Integrate land use and climate adaptation planning Promote community resilience to reduce vulnerabilities	Human safety response Education Incentive programs Demonstration programs Grey water Xeriscaping Expand water supplies (purple pipe) and storage Aquifer management Expand agriculture and urban water conservation programs
Lower seasonal surface flows can lead to higher pollutant concentrations	Manage watersheds, habitat, and vulnerable species	Minimize non-point source pollution Buffers
Changes in storm intensity will increase sediment loading in many systems	Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies	Erosion control on farms and creeks Buffers
Channel stability will be impacted from higher storm flows causing additional turbidity	Provide guidance on protecting critical creek/river ecosystems and development	Erosion control on creeks Wastewater and stormwater infrastructure vulnerability analysis
Sea level rise will impact current estuary brackish water interface towards more marine systems	Implement adaptation strategies to conserve California's biodiversity	Retain freshwater in watershed Habitat migration Buffers Erosion control
Regional levees will provide less protection during higher storm flow events	Support essential data collection and information sharing Manage watersheds, habitat, and vulnerable species Prepare a regional sea level rise adaptation strategy	Refurbish or expand levees or tide gates (upgrade priority infrastructure) Map/inventory infrastructure

ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE		
Climate Change Effects	**Adaptation and Response Strategies**	**Initial Actions**
Natural creeks throughout the region and managed conveyance within the Carmel Valley will see higher flow rates leading to increased erosion and flooding	Manage watersheds, habitat, and vulnerable species	Refurbish or expand levees or tide gates(upgrade priority infrastructure) Map/inventory infrastructure
Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise	Support essential data collection and information sharing Prepare a regional sea level rise adaptation strategy	Refurbish or expand levees or tide gates(upgrade priority infrastructure) Map/inventory infrastructure/levee locations and WCS, ownership Phase II task 5 activity 3 - ecosystem services - be aware of services available Elevations of levees and sea walls - maybe with PWA-management strategies USGS elevation data
State recommendations suggest no new critical facilities be built within the 200-year flood plain(DWR 2008, DWR 2009b, CNRA2009)	Integrate land use and climate adaptation Planning	Work with Monterey County and cities, Coastal Commission (local jurisdiction)
Migration patterns and species distribution will change	Establish a system of sustainable habitat Reserves	Reduce migration impediments (dams, etc.) Compile data on species distribution Primary focus species - amphibians, waterfowl, salmonids, redwoods, tide water gobies Maintain habitat corridors - contiguous areas Fish and Game - wildlife adaptation plan - vulnerability for key species for each region
Invasive species populations will expand	Habitat/ecosystem monitoring and adaptive management	What are the invasive species and their ranges? Will they expand, be introduced? How are the habitats shifting (awareness)? Ecological adaptation investigation and strategy

ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE		
Climate Change Effects	**Adaptation and Response Strategies**	**Initial Actions**
Coastal wetland systems are especially vulnerable to the combined influences of climate change	Establish regional policies to protect critical habitats Provide guidance on protecting critical coastal ecosystems and development	Identify critical habitats and ecosystems Integrate ecosystem management Regulatory mechanisms dedicated to protecting future locations of these areas Inventory of wetlands currently
Some locally unique species such as coastal redwoods and giant kelp are susceptible to changes in certain locally favorable climate variables (fog duration, coastal upwelling)	Manage watersheds, habitat, and vulnerable species	Identify how they will be impacted - What are the changes? USGS study outcome - get a better handle on modeling fog changes in climate change

15.5.2 Adaptation Response Planning 2019-2030

Support Dune Restoration Activities: Future wave run-up is projected to undercut dune faces and funnel waves inward along erosion scars, leading to inland flooding of coastal areas within the region. Wave overtopping in this area will leave the low-lying areas vulnerable to flooding. Several studies suggest that restoring the complexity of dune species (De Lillis et al. 2004) and the reestablishment of native foredunes will support natural dune building processes and enhance the long-term resiliency of dunes to wave-derived erosion and overtopping. An increase in structural complexity is anticipated to play a key role in maintaining resilience as ocean levels rise and dunes are required to adapt and migrate. Setting restoration goals that ensure the long-term adaptive capacity of these natural dunes through proper management and habitat enhancement should be a priority for the Monterey Peninsula IRWM Region.

Reduce Risks of Flooding: The periodic flooding predicted within the 2030 hazard maps can be planned for. Actions to provide protection and accommodation can be made that will reduce risks to properties.

Establish Managed Retreat Policies to Support Future Adaptation: Managed retreat is designed to facilitate and regulate the gradual move away from areas vulnerable to flooding or erosion. Managed retreat can take many forms, including zoning, setbacks, buffers, restrictions, rolling easements, and land acquisition. These strategies can be used in conjunction with other adaptation measures to facilitate the most fluid and equitable adaptation approach to the varying threats that sea level rise and other climate-related flooding poses. Managed retreat programs can work in tandem with other adaptation strategies to manage flooding, maintain local character, improve natural habitat areas, and secure coastal access.

Improve Flood Attenuation through Creek and Wetland Restoration: Wetlands can act as a critical buffer for waves, tides, and erosion. Additionally, wetlands are able to migrate inland as sea levels rise, if space is provided. Wetlands also provide natural pollution filtration and shoreline stability, sequester carbon, and can store extra water in the case of a flood, along with providing important habitat that can support local fishing and tourism. Numerous wetland restoration efforts are underway within the Carmel Lagoon area. The County and local community can support these and other activities within the IRWM Region to improve climate resiliency.

15.5.3 Adaptation Response Planning 2030-2060

Identify Priority Areas for Managed Retreat: Protection of all properties and infrastructure identified at risk during each time horizon is likely infeasible. Therefore, stakeholders in IRWM Region will need to establish adaptation strategies that best meet local long-term goals. Public cost considerations, longevity of adopted strategies, and resultant changes to the community should be considered when setting policy. Establishing equitable managed retreat policies early will likely best enable the long-term implementation of these policies to ensure long-term sustainability for the community. Selecting time horizons and climate conditions for which next phase adaptation strategies are triggered will allow the community to anticipate and prepare for future actions.

15.5.4 Adaptation Response Planning: 2060-2100

Between 2060 and 2100, increased coastal wave damage, greater flooding depths and periodicity, and higher tides will threaten significant portions of properties within the area. Protection of all properties from these risks will be costly and technically challenging. Decisions regarding what the urban and beach front areas will look like in 2100 will need to be made much earlier if adaptation is to be strategic and

cost effective. Adopting coastal adaptation and retreat policies once all efforts to protect infrastructure fail would be a costly strategy.

Implement Managed Retreat Strategies: There are a number of theoretical managed retreat strategies that have been described within the literature. Examples of coastal communities adopting re-zoning, building restrictions, and other land use policies to drive the removal of buildings and infrastructure from the California coast, however, are few.

Cost implications from routine impacts from the predicted hazards will lead many property owners to upgrade their properties to be more resilient or abandon the current uses of those properties. Equitable retreat policies that outline how and when various portions of a community should be relocated will help the community adapt and become more resilient. Cost sharing strategies between private property owners and State and local agencies will need to be defined. Local land trusts will likely play an important role in administering these programs in years to come. Adaptation strategies adopted decades before they are implemented will help property valuation, economic considerations, and land use objectives accommodate these future changes.

Realign Roads and Utility Infrastructure: Between 2060 and 2100, much of the portion of the IRWM Region is predicted to be flooded during high tides or by winter storms. Roads will need to be upgraded or realigned if they are to continue to function. Adaptive community planning can help Caltrans and other agencies make better decisions regarding how to upgrade roads and utilities to best serve the Monterey Peninsula through 2100.

Costs for future realignment of roadways (including Highway 1) and utility infrastructure can be minimized if managed adaptation and retreat policies are established decades before implementation. County agencies and utility districts should integrate future land use changes into current infrastructure repair and replacement decisions to minimize future costs of infrastructure loss and realignment.

15.5.5 No Regret Strategies

Since the tools to properly assess the risk of any one effect of climate change in the region are currently not well developed, the RWMG encourages the implementation of so-called “no regret” adaptations to general effects of climate change. Such adaptations are those that make sense in light of the current water management context for the region and also help in terms of effects of climate change. Examples of “no regret” strategies include increasing water use efficiency, water supply sustainability, practicing increased integrated flood management, and enhancing ecosystems and their ability to provide multiple benefits to the region. The RWMG generally encourages the implementation of “no regret” strategies through the IRWM Plan and gives higher priority to these strategies in the project ranking process by providing additional points under the “Climate Change” categories.

15.5.6 Next Steps towards Climate Preparedness

Preparing for the Future: Climate Change and the Monterey Bay Shoreline

As noted previously, on December 6, 2011, the MBNMS and Center for Ocean Solutions convened regional decision makers at a one-day workshop titled “Preparing for the Future: Climate Change and the Monterey Bay Shoreline.”[10] The event was the first Monterey Bay region-wide gathering on climate change adaptation, intended to facilitate a discussion on how to best prepare coastal communities in the Monterey Bay region to adapt to the impacts of climate change. More than 90 people attended from cities and municipalities in Santa Cruz and Monterey Counties, representing city and county

staff, state and federal governments, research institutions and nonprofit organizations. They heard from featured experts and participated in breakout group sessions. Examples of climate change adaptation plans from government jurisdictions around the country were also shared at the workshop. The workshop demonstrated to participants that past experience with storms and strong El Niño conditions provide the Monterey Bay region with concrete examples of what increased sea level and storm intensity may mean for the area's future.

Workshop goals for participants were to:

- Begin Monterey Bay region-wide discussion and collaboration on climate change adaptation
- Understand the latest research on climate change impacts to the Monterey Bay coastline
- Gain a basic understanding of the typical climate change adaptation planning process
- Witness how communities in the Monterey Bay area are already planning for climate change
- Learn about grant opportunities and other resources (tools, assistance) available to support climate change adaptation planning
- Have the opportunity to develop new collaborations and partnerships in climate change adaptation planning

During the workshop, the following themes emerged:

- If Monterey Bay communities start now, they will have time to prepare for the impacts of climate change on their coast. Past storms provide examples of the range of impacts to expect from changes in sea level and storminess as a result of climate change
- A range of tools and resources currently exists for climate change adaptation planning
- Uncertainty in local projections is unavoidable so communities should not wait for perfect information to begin adaptation planning
- There are very real and difficult barriers to making progress in climate change adaptation, including lack of resources, unprecedented regulatory challenges, low perceived public support, and limited local data; yet by working collaboratively it is possible to overcome these challenges

Participants recommended the following next steps for the region:

- Improve understanding of local impacts of climate change and develop actionable recommendations for moving forward
- Design and implement a governance structure for the Monterey Bay region that could aid and coordinate climate change adaptation and related activities
- Continue the discussion initiated at the workshop by building a regional network of people interested in or working on climate change adaptation
- Expand the scope of stakeholder involvement to include in-person discussions and engage coastal business owners, landowners and the general public
- Create a technical advisory group on climate change adaptation for the region
- Actively use the Internet as a way to connect and educate the regional community
- Jointly apply for funding to support coastal climate change adaptation work in the region

- Develop climate change projection data at a scale fine enough to use for local planning
- Consider a public engagement campaign to help increase awareness about the need for climate

Members of the Monterey Peninsula RWMG participated in the "Preparing for the Future" workshop. RWMG members will continue to stay involved in any "next steps" that result from the "Preparing for the Future" workshop and will work to coordinate the IRWM planning efforts regarding climate change with this promising Monterey Bay regional effort. The Summary Report for the workshop, along with all workshop presentations, can be downloaded[14].

15.6 Mitigation of Greenhouse Gas Emissions Strategy

The development of a GHG emissions mitigation strategy is a required component of an IRWM Plan. All aspects of water resources management have an impact on GHG emissions, including the development and use of water for habitat management and recreation; domestic, municipal, industrial, and agricultural supply; hydroelectric power production; and flood control. Water management results in the consumption of significant amounts of energy in California and the accompanying production of GHG emissions, especially where water must be pumped from long distances, from the ground, or over significant elevations. According to California Energy Commission November, 2005 *CEC-700-2005-011 California's Water–Energy Relationship Final Staff Report*, 19 percent of the electricity and 30 percent of the non-power plant natural gas of the state's energy consumption are spent on water-related activities, primarily related to end-uses of water- what the customer does with the water. The close connection between water resource management and energy is an important consideration for helping the state meet its GHG emission reduction goals. IRWM Plans can help mitigate climate change by reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions.[15]

This IRWM Plan focuses on several sectors of emissions that are most directly linked to water management and that are most likely to not be addressed within other climate/GHG reduction strategies. Emissions sources to be addressed include:

- Emissions in the region for the production and distribution of water, including emissions from privately-owned pumps,
- Emissions from local agency staff fleet and private vehicle emission associated with water project construction and maintenance, and
- Emissions from energy generation that could be mitigated through renewable energy sources.

15.6.1 GHG Reduction in Projects and Programs

A full GHG emissions reduction strategy for the region will be created by Monterey County and AMBAG in the near future to meet California State mandates (Assembly Bill 32). In the meantime, several effective GHG reduction strategies can be presented in the IRWM Plan and the relevant projects may be funded and managed by this working partnership. To address the emissions categories identified above, several key strategies and actions described in the *Climate Change Handbook for Regional Water Planning* can be encouraged by the RWMG through the IRWM planning process, including the following (US EPA Region 9 and DWR 2011):

[14] http://centerforoceansolutions.com/preparingforthefuture.
[15] This introductory paragraph has been excerpted from the Proposition 84/1E Program Guidelines, pp. 71-72.

Emissions from water supply and delivery

- Select energy sources with low carbon content (green electricity purchases)
- Prioritize pump and infrastructure upgrades based on energy efficiency
- Reduce water use by all sectors of the community through conservation and water efficient irrigation
- Install solar PV at remote pump and infrastructure sites and provide incentives for private investment in solar for similar infrastructure
- Schedule pumping to reduce peak hour (12:00-5:00pm) energy use that has the highest carbon content

Staff fleet and commute

- Encourage carpooling
- Invest in energy efficient/low carbon fleet vehicles and fuels
- Encourage efficient driving practices

Emissions from IRWM Plan project construction

- Encourage carpooling within construction contracts
- Encourage use of B20 fuels in construction equipment and other diesel machinery
- Invest in high efficiency pumps and control equipment
- Integrate solar generation in appropriate projects

Renewable energy generation

- Encourage investment in solar and other renewable energy generation options in regional facilities
- Work with regional waste district to increase electricity generation from farm-generated food and animal bio-waste
- Consider hydro-electric generation within current water infrastructure

Carbon Sequestration

- Identify new carbon sequestration opportunities including wetland restoration and bio-char soil amendment opportunities.
- Develop funding mechanisms to support sequestration within proposed IRWMP projects or as project mitigation options.

The RWMG can encourage the reduction of GHG emissions for IRWM Plan implementation projects through the project review and ranking process. The RWMG can also use the IRWM planning process to coordinate with water managers and land use planners throughout the Monterey Peninsula region in order to encourage broader implementation of these and other GHG reduction and climate mitigation actions. The recommended GHG reduction and climate mitigation actions will be further

evaluated by the RWMG, with input from stakeholders, to define possible next steps, responsible entities, and funding resources.

15.6.2 Other Climate Change Mitigation/GHG Reduction Activities in the Central Coast Region

The RWMG has been communicating with water managers and land use managers in the broader Central Coast region regarding other climate change mitigation/GHG reduction efforts along the Central Coast. The RWMG will seek to partner in these and similar efforts as opportunities arise. Regional climate change mitigation/GHG reduction programs include the following.

Climate Action Compact

In October 2007, the County of Santa Cruz, the City of Santa Cruz, and the University of California Santa Cruz partnered to create a Climate Action Compact (CAC). The goal of the CAC is to achieve meaningful and measurable progress towards lowering local GHG emissions through the implementation of cooperative programs. To that end, the CAC partners initiated a process to develop actions necessary to accomplish the goals outlined in the compact. In 2011 CAC members reached out to all municipalities within the Monterey Bay region, including the area covered by the Monterey Peninsula IRWM Plan, to join and participate in collaborative GHG reduction efforts. The members pledged to support public, private, and nonprofit partnerships and investments to reach quantifiable reductions in their institutions' GHG emissions (Clark, 2011). In taking this leadership role, the CAC partners pledged themselves to the following:[16]

- Set and present a GHG reduction goal for their respective organizations;
- Identify specific inter-institutional cooperative projects that reduce GHG emissions, stimulate investment in the community, and foster economic development;
- Present a comprehensive GHG reduction action plan for their respective organizations; and immediately invite others from the public, private, and non-profit sectors in the region to join in the effort.

Association of Monterey Bay Area Governments Programs

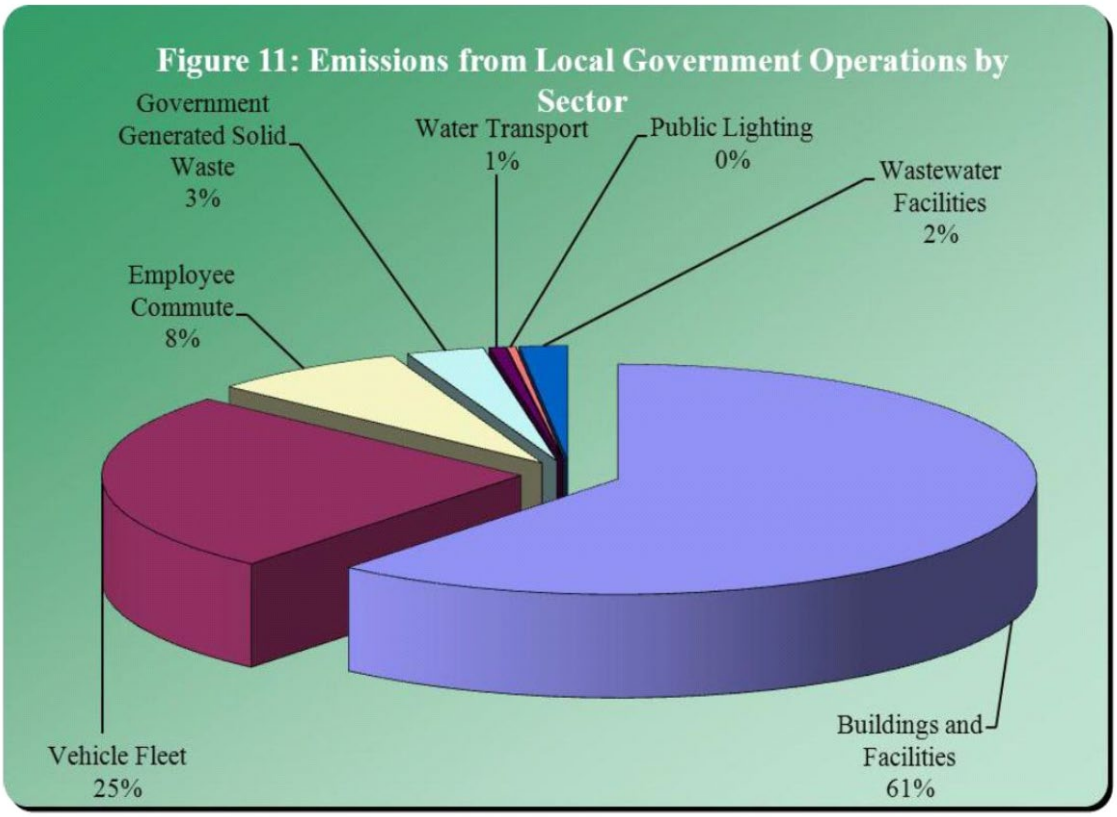
AMBAG has developed regional emission targets in accordance with requirements of Senate Bill 375. AMBAG has also initiated a program in collaboration with the Pacific Gas and Electric Company (PG&E) called "Energy Watch." The Energy Watch Program helps local governments in Monterey, San Benito, and Santa Cruz counties to promote energy efficiency and climate action planning. This collaboration has included preparation of GHG emissions inventories.

In early 2011, the AMBAG Energy Watch Program completed a GHG emissions inventory for Monterey County for the year 2005. The inventory for Monterey County was developed using the "Clean Air and Climate Protection" software developed by ICLEI. The inventory examines emissions by community sector and includes direct and indirect emissions. The study also predicts that under a "business-as-usual" scenario, Monterey County GHG emissions are estimated to grow by approximately 9 percent by the year 2020, which represents an average annual rate of increase of about 0.6 percent per year with the total increase between 2005 and 2020.

[16] Source: City of Santa Cruz CAC website: http://www.cityofsantacruz.com/index.aspx?page=1231 (March 2012).

In 2010, AMBAG completed a set of GHG inventories for all of its 21 municipal members. The cumulative emissions from the unincorporated areas of Monterey County were quantified for various sectors including municipal (county government) residential and commercial/industrial. For 2005, countywide emissions of CO_2e were calculated to be 1,648,410 metric tons. Of that total, municipal emissions comprised 1.3 percent (21,641 metric tons); and of the municipal emissions total, emissions from municipal supply and distribution of water resources were 0.6 percent (133 metric tons). **Figure 15-6**, below, illustrates emissions from local government operations for Monterey County, by sector. Additional emissions attributable to water management in Monterey County that are not included in this calculation include: emissions from small water purveyors, private well and flood management pump infrastructure, and the emissions associated with water agency fleet and staff vehicles used to manage the vast water resource infrastructure of the region.

Figure 15-6: 2005 GHG Emissions from Monterey County Government Operations



Source: AMBAG 2011, Monterey County Greenhouse Gas Emissions Inventory. Used by permission.

Association of Monterey Bay Area Governments Energy, Greenhouse Gas, and Climate Action Planning Programs

The AMBAG Energy Watch completed the following at no cost to the municipal governments:

1. Local Government Operations 2005 Baseline GHG Inventories;
2. Community-wide 2005 Baseline; and
3. Community-wide 2009 GHG Inventories.

AMBAG Energy Watch provides a variety of support services to member jurisdictions who are working to develop, adopt and implement Climate Action Plans:

- General technical support (GHG Inventories, GHG Forecasts, GHG Reduction Measure Identification and Modeling, etc.)
- Legislative and regulatory liaison services
- Educational forums and technical training workshops (GHG Inventory Methodologies, SEEC Climate Action Planning Assistant, PG&E Tableau Data, etc.)
- Energy-related GHG mitigation scenario development and modeling
- Peer review of climate action planning documents

AMBAG Energy Watch is working closely with member jurisdictions to develop comprehensive and cost-effective plans to quantify and reduce residential and non-residential energy consumption and related GHG emissions. AMBAG's Regional Energy Plan Program was a collaborative effort in 2008 to create a comprehensive Energy Efficiency Plan for the Monterey Bay Area, encompassing AMBAG's areas of service in the Monterey, San Benito, and Santa Cruz Counties.

City of Monterey Climate Action Plan

The City of Monterey Climate Action Plan, dated March 2016, represents the City's effort to address the City's contribution to a global environmental problem with community -level impacts. The Climate Action Plan includes the following: 2005 GHG emissions inventory; 2012 GHG emissions inventory; existing and planned GHG emissions reduction strategies for both the community (within the City geopolitical boundary) and government operations (associated with operations and management of City real properties and programs; also known as municipal), and recommendations to make further reductions to meet future goals. The CAP sets emission reduction goals for 2020, 2030, and 2050 according to California AB 32, the Urban Environmental Accords (UEA), and Executive Order S-3-05.

City of Pacific Grove Climate Change Vulnerability Assessment

The City of Pacific Grove Climate Change Vulnerability Assessment prepared in 2015 to support the Local Coastal Program, provides an evaluation of potential significant impacts of climate change for the city's coastal zone with an emphasis on how anticipated climate change may affect people, resources, and infrastructure along the coast.

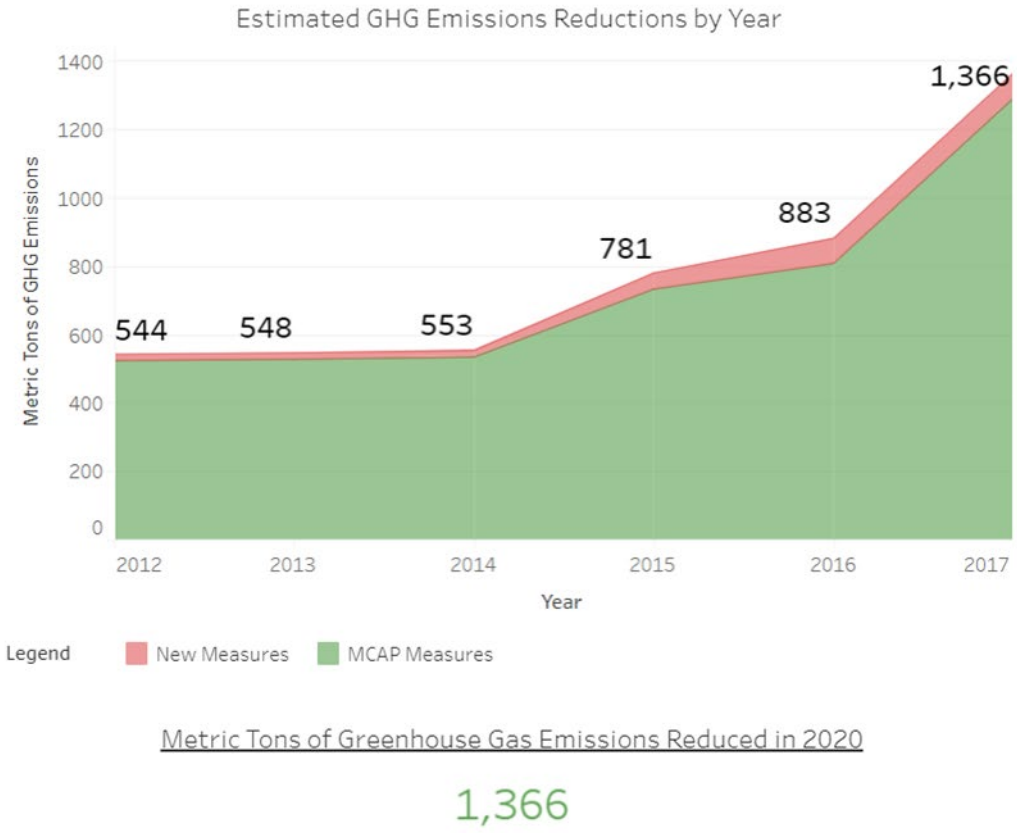
Monterey County Climate Action Program

Monterey County has prepared a Municipal Climate Action Plan (MCAP) in response to the AB 32 Scoping Plan recommendation. The plan:

- Provides a description of the steps being taken by the County to reduce GHG emissions associated with its municipal operations (i.e., the County's day-to-day activities in providing services to Monterey residents and businesses).
- Describes three potential paths towards the County's goal of reducing GHG emissions to a level that is 15% below the 2005 emissions level before 2020.
- Serves as one component of the County's larger, community-wide Climate Action Plan, which addresses GHG emissions from the community at large.

The Monterey County Energy Efficiency Measure Dashboard on the County's website (http://www.co.monterey.ca.us/government/departments-a-h/administrative-office/intergovernmental and-legislative-affairs/go-green-monterey-county/energy) provides information on estimated GHG reductions resulting from energy efficiency measures implemented at County facilities. **Figure 15-7** below illustrates the dashboard as of July 2019.

Figure 15-7: Monterey County Energy Efficiency Measure Dashboard



15.7 Future Studies and Data Needs

As recognized in the climate risk assessment, priority actions to address local climate change impacts should focus on the three prioritized vulnerabilities:

- *Decreased water supply*
- *Increased flooding and erosion of creeks and rivers*
- *Coastal inundation of urban development, other land uses, and impacts to coastal river and wetland ecosystems*

The risk assessment process identified many data needs and research studies. The process also identified that the above risks pose specific hardships and challenges to each of the five different social, economic, and environmental factors described previously. The GMC Climate Task Force developed an initial list of response strategies, initial actions, and data needs in response to the risk assessment. These strategies are based on the adaptation actions and response scenarios listed in the California Natural Resources Agency's *2009 California Climate Adaptation Strategy,* and prioritized as described in

Section 15.5.3, above. The Monterey Peninsula RWMG has agreed that future research and program funds should be directed towards the three priority climate risk areas above, consistent with the GMC Climate Task Force findings. In addition, future IRWM Plan projects should strive to help fill data gaps and promote the priority response strategies and initial actions. Specifically, the areas listed below should be integrated into future implementation projects.

Land Use

- Integrate land use and climate adaptation planning
- Promote community resilience to reduce vulnerabilities for food sustainability and DACs
- Educate, empower, and engage citizens regarding climate risks and adaptation
- Provide guidance on protecting critical coastal development

Ecosystems

- Implement adaptation strategies to conserve California's biodiversity Support habitat/ecosystem monitoring and adaptive management
- Manage watersheds, habitat, and vulnerable species
- Provide guidance on protecting critical coastal ecosystems

Water Conservation

- Implement water conservation and supply management efforts
  - Support adaptive agricultural protection policies
  - Promote working landscapes with ecosystem services

Coast and Ocean

- Manage watersheds, habitats, and vulnerable species
  - Establish regional policies to protect critical habitats
  - Provide guidance on protecting critical coastal ecosystems and development
  - Promote working landscapes and ecosystem services
- Prepare a regional sea level rise adaptation strategy
  - Complete a regional sea level rise risk assessment periodically
- Support essential data collection and information sharing

Carbon Mitigation

- Expand renewable energy infrastructure that supports water management efforts

The Monterey Peninsula RWMG strongly recommends that these ideas be integrated into project submittals for the following rounds of concept and implementation project proposals for the Monterey Peninsula IRWM Plan.