

# Integrated Regional Water Management Plan for the Greater Monterey County Region



## Regional Water Management Group

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Moss Landing Marine Laboratories
Resource Conservation District of Monterey County
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The Integrated Regional Water Management Plan (IRWM Plan) for the Greater Monterey County region represents an expansion and modification of a former plan, the Salinas Valley Integrated Regional Water Management Functionally Equivalent Plan (IRWM FEP). The Salinas Valley IRWM FEP was prepared by the private consulting firm RMC Water and Environment for the Monterey County Water Resources Agency (MCWRA) and the Salinas Valley Water Management Group (MCWRA, Marina Coast Water District, and Castroville Community Services District) in May 2006 under the State's Proposition 50 IRWM Grant Program. The Greater Monterey County IRWM Plan, developed according to the current Proposition 84 IRWM Grant Program Guidelines, incorporates the former Salinas Valley IRWM FEP as its foundation, building upon that plan and expanding its scope in terms of geography, Regional Water Management Group (RWMG) representation, and stakeholder representation. The Greater Monterey County RWMG would therefore like to recognize and thank RMC and the Salinas Valley Water Management Group for its work in developing the Salinas Valley IRWM FEP.

The Greater Monterey County IRWM Plan was prepared by Susan Robinson, the IRWM Plan Coordinator (a consultant for the Greater Monterey County RWMG), with substantial input from RWMG members and other resource managers and scientists throughout the region. Several chapters of the IRWM Plan were drafted by RWMG members, specifically: Plan Performance and Monitoring was drafted by Sierra Ryan (Central Coast Wetlands Group) and Bridget Hoover (Monterey Bay National Marine Sanctuary); Data Management was drafted by Bridget Hoover; and Climate Change was drafted by Ross Clark (Central Coast Wetlands Group).

Note that the Greater Monterey County RWMG has been developed as a "working group." Members are expected to actively participate in all aspects of the IRWM planning process. During the development of this Plan, RWMG members attended monthly RWMG meetings, participated on subcommittees to develop various elements of the Plan (such as identifying the region's issues and conflicts, determining goals and objectives, and developing a process for ranking projects), attended public workshops, and reviewed drafts of the IRWM Plan. We would like to acknowledge and thank all of the RWMG members who have contributed so much of their time toward the development of this IRWM Plan.

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### **FOR MORE INFORMATION**

If you have questions about this document or about the Greater Monterey County IRWM planning process in general, please visit the Greater Monterey County IRWM website for additional information, resources, and contact information: <http://www.greatermontereyirwmp.org/>.

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## Acronyms

AB – Assembly Bill  
AF – Acre-feet  
AFY – Acre-feet per Year  
ACS – US Census American Community Survey  
AMBAG – Association of Monterey Bay Area Governments  
ASBS – Area of Special Biological Significance  
AWEP – Agricultural Water Enhancement Program  
AWQA – Agriculture Water Quality Alliance  
BLM – U.S. Bureau of Land Management  
BMP – Best Management Practice  
Cal-Am – California American Water Company  
CalDUCS – California Data Upload and Checking System  
Cal Water – California Water Service Company  
CCA – Critical Coastal Area  
CCAMP – Central Coast Ambient Monitoring Program  
CCC – California Coastal Commission  
CCD – Census County Division  
CCSD – Castroville Community Services District  
CCWG – Central Coast Wetlands Group  
CDFG – California Department of Fish and Game  
CDP – Census Designated Place  
CDPH – California Department of Public Health  
CEDEN – California Environmental Data Exchange Network  
CEQA – California Environmental Quality Act  
CFR – Code of Federal Regulations  
COS – Center for Ocean Solutions  
CPUC – California Public Utilities Commission  
CRAM – California Rapid Assessment Methods  
CRS – Community Rating System  
CSA – Monterey County Service Area  
CSIP – Castroville Seawater Intrusion Project  
CSUMB – California State University Monterey Bay  
CWC – California Water Code  
DAC – Disadvantaged Community  
DAU – Data Analysis Unit  
DEH – Monterey County Division of Environmental Health  
DMS – Data Management System  
DPS – Distinct Population Segment  
DWR – California Department of Water Resources  
DWS – Drinking Water Standard  
EIR – Environmental Impact Report

EJCW – Environmental Justice Coalition for Water  
EQIP – Environmental Quality Incentives Program  
ESF – Elkhorn Slough Foundation  
ESNERR – Elkhorn Slough National Estuarine Research Reserve  
FEMA – Federal Emergency Management Agency  
FEP – Functionally Equivalent Plan  
FORA – Fort Ord Reuse Authority  
GAMA – Groundwater Ambient Monitoring and Assessment  
GIS – Geographic Information System  
GPM – Gallons per Minute  
GWESR – Ground Water Extraction Summary Report  
ICLEI – International Council for Local Environmental Initiatives  
IPCC – Intergovernmental Panel on Climate Change  
IRWM – Integrated Regional Water Management  
IWRP – Integrated Watershed Restoration Program  
LAFCO – Local Agency Formation Commission  
LCP – Local Coastal Program or Local Coastal Plan  
LID – Low Impact Development  
MBNMS – Monterey Bay National Marine Sanctuary  
MCL – Maximum Contaminant Level  
MCRMA – Monterey County Resource Management Agency  
MCWD – Marina Coast Water District  
MCWRA – Monterey County Water Resources Agency  
MGD – Million Gallons per Day  
MHI – Median Household Income  
MM – Management Measure  
MOA – Memorandum of Agreement  
MOU – Memorandum of Understanding  
MPA – Marine Protected Area  
MRSWMP – Monterey Regional Storm Water Management Program  
MPWMD – Monterey Peninsula Water Management District  
MRWMD – Monterey Regional Waste Management District  
MRWPCA – Monterey Regional Water Pollution Control Agency  
MS4 – Municipal Separate Storm Sewer System  
MSR – Municipal Service Review  
NFIP – National Flood Insurance Program  
NFWF – National Fish and Wildlife Foundation  
NMFS - National Marine Fisheries Service  
NOAA – National Oceanic and Atmospheric  
NPDES – National Pollutant Discharge Elimination System  
NPS – Nonpoint Source  
NRCS – Natural Resources Conservation Service  
O&M – Operations and Maintenance  
OPR – Governor’s Office of Planning and Research

PRC – California Public Resources Code  
PVWMA – Pajaro Valley Water Management Agency  
RCAC – Rural Community Assistance Corporation  
RCD – Resource Conservation District  
RCM – Regional Climate Model  
RDC – Regional Data Center  
RDIPAC – Reclamation Ditch Improvement Plan Advisory Committee  
RLP – Repetitive Loss Property  
RON – Return of the Natives Restoration Education Project  
RTP – Regional Treatment Plant  
RUWAP – Regional Urban Water Augmentation Project  
RWMG – Regional Water Management Group  
RWQCB – Regional Water Quality Control Board  
SB – Senate Bill  
SBCWD – San Benito County Water District  
SMCA – State Marine Conservation Area  
SMR – State Marine Reserve  
SVIGSM – Salinas Valley Integrated Ground and Surface Water Model  
SVRP – Salinas Valley Reclamation Plant  
SVWP – Salinas Valley Water Project  
SWAMP – California Surface Water Ambient Monitoring Program  
SWRCB – State Water Resources Control Board  
SWMP – Stormwater Management Plan  
TAC – Technical Advisory Committee  
TDS – Total Dissolved Solids  
TMDL – Total Maximum Daily Load  
USDA – United States Department of Agriculture  
US EPA – United States Environmental Protection Agency  
USFWS – United States Fish and Wildlife Service  
USGS – United States Geological Survey  
UWMP – Urban Water Management Plan  
WDR – Waste Discharge Requirement  
WMI – Watershed Management Initiative  
WQPP – Water Quality Protection Program  
WRPC – Water Resource Project Coordination  
WSA – Water Supply Assessment

## Executive Summary

### Introduction

Integrated regional water management (IRWM) is a relatively new approach to water resource management in California. It is an approach that is being strongly promoted by State water managers and legislators as a way to increase regional self-sufficiency, encouraging local water resource managers to take a proactive, leadership role in solving water management problems on a local level through collaborative regional planning.

According to the California Department of Water Resources (DWR), planning for and adapting to the effects of climate change, in particular, “will be among the most significant challenges facing water and flood managers this century” (DWR 2009b, vol. 1, p. 2-9). They write: “For more than 200 years, California water and flood management systems have provided the foundation for the state’s economic vitality, providing water supply, sanitation, electricity, recreation, and flood protection. However, the climate patterns that these systems were designed for are different now and may continue to change at an accelerated pace. These changes collectively result in significant uncertainty and peril to water supplies and quality, ecosystems, and flood protection; and our water systems cannot be operated as they were originally designed” (ibid., vol. 1, p. 2-9).

Integrated regional water management offers an approach for managing the uncertainties that lie ahead. While the traditional approach to water resource management has typically involved separate and distinct agencies managing different aspects of the water system, i.e., water supply, water quality, flood management, and natural resources, integrated regional water management considers the hydrologic system as a whole. The IRWM planning process brings together water and natural resource managers, along with other community stakeholders, to collaboratively plan for and ensure the region’s continued water supply reliability, improved water quality, flood management, and healthy functioning ecosystems—allowing for creative new solutions, greater efficiencies, and an increased promise of long-term success.

### *Legislative Background*

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. Proposition 50 authorized \$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.” 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 State 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 California’s drinking water supply system by rebuilding delta levees that are vulnerable to earthquakes and storms.

In order to be eligible for IRWM grant funds through Proposition 84 or Proposition 1E, a project must be contained within an adopted IRWM Plan. According to the California Water Code §10540(c), an IRWM Plan must address at a minimum all of the following:

1. Protection and improvement of water supply reliability, including identification of feasible

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

This IRWM Plan has been developed for the Greater Monterey County IRWM region to fulfill the goals of IRWM planning in our region, and as a prerequisite for obtaining IRWM grant funding through Propositions 84 and 1E for regional planning and project implementation.

## **Section A: Governance**

### ***The Regional Water Management Group***

The Greater Monterey County Regional Water Management Group (RWMG) is the group responsible for development of this IRWM Plan. The Greater Monterey County RWMG consists of 18 organizations. The member entities include government agencies, nonprofit organizations, educational organizations, water service districts, private water companies, and organizations representing agricultural, environmental, and community interests, as follows:

- Big Sur Land Trust
- California State University Monterey Bay
- California Water Service Company
- Castroville Community Services District
- City of Salinas
- City of Soledad
- Elkhorn Slough National Estuarine Research Reserve
- Environmental Justice Coalition for Water
- Garrapata Creek Watershed Council
- Marina Coast Water District
- Monterey Bay National Marine Sanctuary
- Monterey County Agricultural Commissioner's Office
- Monterey County Water Resources Agency
- Monterey Regional Water Pollution Control Agency
- Moss Landing Marine Laboratories
- Resource Conservation District of Monterey County
- Rural Community Assistance Corporation
- San Jerardo Cooperative, Inc.

### ***Description of Governance Structure***

Members of the RWMG have entered into a Memorandum of Understanding (MOU) to acknowledge

cooperative efforts in the planning region and to form an institutional structure to develop and implement an IRWM Plan. The Greater Monterey County RWMG is a truly “democratic” group made up of diverse organizations with differing expertise, perspectives, and authorities of various aspects of water management. 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. The RWMG meets on a monthly basis.

The RWMG has been created to be a “working” group, with RWMG members expected to actively participate in the monthly RWMG meetings and on committees. The RWMG also 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 (<http://www.greatermontereyirwmp.org/documents/minutes/>); and public comment periods on all major IRWM Plan “milestones.”

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. An informal review of the IRWM Plan will occur with each IRWM Plan project solicitation, which is expected to occur on an annual basis or at minimum with each successive IRWM Implementation Grant solicitation. 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 or as deemed necessary by the RWMG. Finally, a Plan Performance Review will occur on an approximately bi-annual basis. The intent of the Plan Performance Review is to determine how well the Plan objectives are being achieved.

## **Section B: Greater Monterey County Region Description**

The Greater Monterey County IRWM region lies entirely within the Central Coast Regional Water Quality Control Board (RWQCB) district and is part of the IRWM Central Coast Funding Area. Adjacent IRWM regions include:

- Pajaro River Watershed IRWM region
- Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region
- San Luis Obispo County IRWM region

Together these four regions, plus the Northern Santa Cruz County and the Santa Barbara County IRWM regions, form the Central Coast IRWM Funding Area.

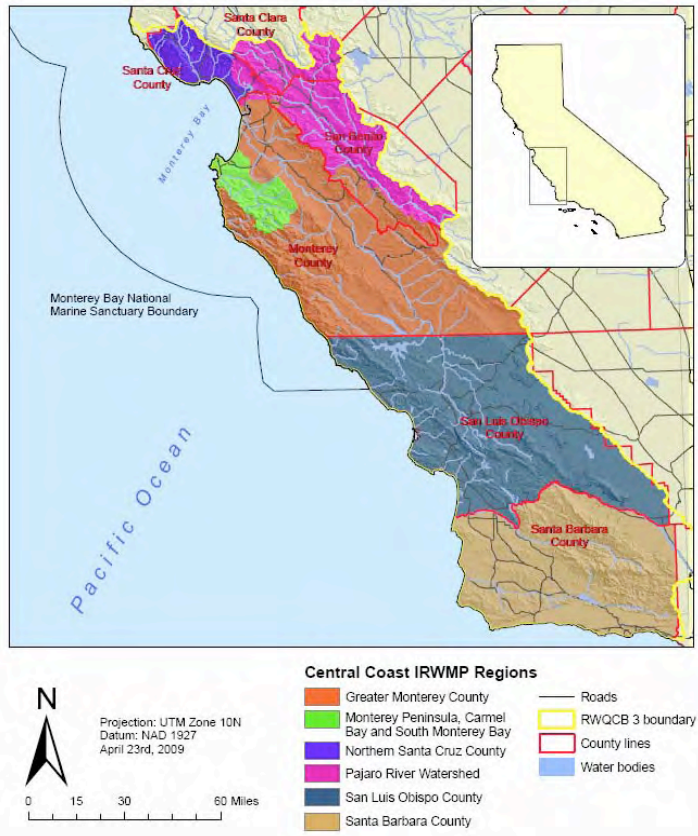
The Greater Monterey County IRWM region includes the entirety of Monterey County exclusive of the Pajaro River Watershed IRWM region and the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region established under Proposition 50. The Greater Monterey County IRWM region also includes a small portion of San Benito County where the Salinas River watershed extends outside of Monterey County. Generally, the region includes the entire Salinas River watershed north of the San Luis Obispo County line, all of the Gabilan and Bolsa Nueva watersheds in the northern part of the county, and all of the coastal watersheds of the Big Sur coastal region within Monterey County.

Areas within Monterey County that are not represented in this IRWM Plan (but that are represented in other IRWM Plans) include: the Pajaro River watershed, represented in the Pajaro River Watershed IRWM Plan; and the Carmel River watershed, the San Jose Creek watershed, areas overlying the Seaside Groundwater Basin, and all areas within the Monterey Peninsula Water Management District jurisdictional boundary (including the Monterey Peninsula cities of Carmel-by-the-Sea, Del Rey Oaks,

Pacific Grove, Monterey, Sand City, and Seaside), which are represented in the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Plan.

This IRWM Plan for the Greater Monterey County region represents an expansion and modification of a former plan—the Salinas Valley Integrated Regional Water Management Functionally Equivalent Plan (FEP)—that was developed by the Monterey County Water Resources Agency (MCWRA) in May 2006. The new Greater Monterey County region will promote significant opportunity for integration of water management activities related to water supply, water quality, environmental stewardship, groundwater management, and flood management. Expanding the Salinas Valley IRWM FEP boundary has served to make the region more inclusive, inviting more partners and stakeholders to the table and opening up new opportunities for cooperation and integration of efforts.

Expanding the Salinas Valley IRWM FEP boundary has also served to eliminate previous IRWM Plan coverage voids. The new regional alignment includes key areas that have not been previously covered in any other IRWM Plan. These include, specifically: the Big Sur coastal watersheds and communities on the western side of the Santa Lucia Range, from Pt. Lobos south to the San Luis Obispo County line; the larger Salinas River watershed from the Salinas River National Wildlife Refuge at the Pacific Ocean south to the San Luis Obispo County line and including the east and west ranges of the valley; the Gabilan watershed; and portions of western San Benito County. The Greater Monterey County region was approved by DWR in May 2009 as an IRWM planning region through the Regional Acceptance Process.



The figure to the right shows the Greater Monterey County IRWM region in context with the other five Central Coast IRWM regions.

**Description of Watersheds and Water System**

This section provides an overview of the watersheds, significant environmental resources, and water systems in the region, including surface waters, groundwater, reclaimed water, desalination, floodwater, and water supply infrastructure. These systems are integrally interconnected. The Greater Monterey County IRWM region receives no “imported” water, that is, no water from the State Water Project or from any other water source imported from outside of its boundaries (except for water from the Salinas River, which flows naturally from San Luis Obispo County). Therefore, maintaining the region’s water systems is absolutely critical for ensuring the health, prosperity, and long-term sustainability of local communities in the region.



### ***Environmental Resources***

Monterey County occurs within one of the richest biological regions in North America (Ricketts et al. 1999; Abell et al. 2000). Monterey County is especially rich in biological resources because of its highly varied terrain, large elevation range, extensive coastline, broad range of microclimates, and diverse substrate materials. This variability is reflected in the large array of plant communities and resident plant and animal species. For example, there are nearly 3,000 species of plants that occur in Monterey County according to Calflora, a database of California plants.

The Greater Monterey County region includes approximately 500,000 acres of land dedicated to wilderness, conservation areas, and open space. Some of the most significant of these areas include the Los Padres National Forest, Pinnacles National Monument, Fort Ord National Monument, the Salinas River National Wildlife Refuge, and numerous State and regional parks, beaches, and wildlife preserves. Protected estuarine, coastal, and ocean areas within or affected by the IRWM region include: the Monterey Bay National Marine Sanctuary, Elkhorn Slough National Estuarine Research Reserve, Big Creek State Marine Reserve and Big Creek State Marine Conservation Area, and Moro Cojo Estuary State Marine Reserve.

There are 100 CEQA-defined special-status plant species and 47 CEQA-defined special-status fish and wildlife species that are known to occur in Monterey County. The region's creeks and streams provide habitat for several federally protected species, including most notably South-Central California Coast steelhead (*Oncorhynchus mykiss*), federally listed as threatened in 1997 (and reconfirmed in 2006). Within the Greater Monterey County IRWM region, critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries.

### ***Watersheds***

The Greater Monterey County IRWM region includes six major watersheds (or portions thereof). The Salinas River watershed is by far the largest watershed in the region, encompassing an area of approximately 3,950 square miles within Monterey and San Luis Obispo Counties. Other major watersheds in the Greater Monterey County region include the Santa Lucia watershed, comprised of the numerous coastal watersheds along the Big Sur coast (including the Big Sur River watershed and Little Sur River watershed, among many others), the Estrella River watershed which is located in the southern part of the county (most of this watershed is actually located in San Luis Obispo County), and the Bolsa Nueva and the Gabilan Creek watersheds at the northern end of the county. The region also includes a small portion of the Estero Bay watershed at the southern end of the county along the Big Sur coast.

### ***Surface Waters***

The significant surface waters of the Greater Monterey County IRWM region include the Salinas River in the Salinas Valley and its tributaries, the largest of which are the Arroyo Seco, San Antonio, and Nacimiento Rivers; the San Antonio and Nacimiento Reservoirs, which control water flows to the Salinas River and, consequently, impact recharge of the Salinas Valley Groundwater Basin; the numerous rivers originating in the Santa Lucia Mountains along the Big Sur coast; the Elkhorn Slough and Moro Cojo Slough; the Monterey Bay, and the coastal waters of the Monterey Bay National Marine Sanctuary.

The Nacimiento and San Antonio Reservoirs are considered the most prominent elements of the region's water infrastructure. The watersheds of both the Nacimiento and San Antonio Reservoirs lie astride the boundaries of Monterey and San Luis Obispo Counties; and although the Nacimiento Reservoir is owned and operated by the MCWRA, it is actually located entirely within San Luis Obispo County, outside of the Greater Monterey County IRWM region. The Nacimiento Reservoir yields on average about 62 percent of the total water in the Salinas River system. The San Antonio Reservoir yields on average about



13 percent of the total water in the Salinas River system.

### ***Groundwater***

Groundwater is the main source of water for most water users in the planning region with the exception of residents along the Big Sur coast, who depend entirely on surface water and shallow wells for their water supply, and of residents in an area near Greenfield in the Salinas Valley, who have a diversion from the Arroyo Seco River. The largest groundwater basin in the planning region is the Salinas Valley Groundwater Basin. The basin is located entirely within Monterey County and consists of one large hydrologic unit comprised of five subareas: Upper Valley, Arroyo Seco, Forebay, Pressure, and East Side. These subareas have different hydrogeologic and recharge characteristics, though they are not separated by barriers to horizontal flow and water can move between them. The Upper Valley, Arroyo Seco and Forebay subareas are unconfined and in direct hydraulic connection with the Salinas River.

Other, considerably smaller groundwater basins in the planning region include Lockwood Valley, Cholame Valley, and Peach Tree Valley basins at the southern end of the county, Paso Robles Groundwater Basin, about a quarter of which lies in Monterey County and the remainder in San Luis Obispo County, and a portion of the Pajaro Valley Groundwater Basin at the northern end of the county.

According to the 2010 MCWRA Ground Water Extraction Data Summary Report, total groundwater pumping from the Agency's Zones 2, 2A and 2B of the Salinas Valley Groundwater Basin in the 2010 reporting year was 460,443 AF, based on 97 percent reporting of the 1,846 wells in the Salinas Valley. Agricultural pumping accounted for 90.4 percent of total groundwater pumping and urban uses accounted for the remaining 9.6 percent of the reported extractions. Groundwater recharge in the Salinas Valley is principally from infiltration from the Salinas River, Arroyo Seco, and to a much less extent, other tributaries to the Salinas River, and from deep percolation of rainfall. Both natural runoff and conservation releases from Nacimiento and San Antonio Reservoirs contribute to the flow in the Salinas River. It is estimated that stream recharge accounts for approximately half of the total basin recharge.

### ***Reclaimed Water***

The MCWRA, in partnership with the Monterey Regional Water Pollution Control Agency (MRWPCA), built two projects to retard the advancement of seawater intrusion: a water recycling facility at the Regional Treatment Plant and a reclaimed water distribution system that delivers recycled water to approximately 12,000 acres of agricultural users near Castroville. The MRWPCA owns and operates the regional wastewater treatment plant at the northern end of the City of Marina. The plant has the capacity to generate approximately 21,600 AFY of recycled water. Of that amount, 13,300 AFY of tertiary treated recycled water is delivered directly to the Castroville area for agricultural irrigation during the irrigation season (the Castroville Seawater Intrusion Project, or CSIP). The Marina Coast Water District (MCWD) has recycled water rights to a small fraction of the summer-time recycled water flows and is proposing to distribute that recycled water to regional golf courses, municipalities, and institutions for the irrigation of large landscapes and public common areas. This project is called the "Regional Urban Water Augmentation Project" (RUWAP), and is included as a proposed project in this IRWM Plan.

The City of Soledad owns and operates wastewater treatment plant facilities located one mile southwest of the City. The City completed construction of a new 5.5 million gallons/day (MGD) water reclamation facility at the wastewater treatment plant in February 2010, with a plan to provide tertiary treated water for agricultural and urban landscape irrigation. Through Round 1 of the Proposition 84 IRWM Implementation Grant program, the City has received funds to construct the recycled water pump station and design and construct the transmission mains needed to connect the recycled water transmission mains already constructed to the pump station. Completion of this project will enable delivery of recycled water to multiple landscaped areas currently being irrigated with potable water.

### ***Desalted Water***

One desalination plant currently exists in the Greater Monterey County region. The MCWD owns a small seawater desalination plant that has a capacity of 300 AFY, though the facility is currently idle. Desalination has been discussed and studied widely in Monterey County since the 1980s. There have been multiple site proposals for a new desalination facility, though the one with the most traction is a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about 10 MGD of product water.

### ***Floodwater and Flood Management***

Flooding is a major issue in the Greater Monterey County IRWM region. The agency with primary responsibility for flood control and floodplain management in Monterey County is the MCWRA. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal. The MCWRA employs both structural and non-structural approaches to flood control and floodplain management in the County. Structural approaches include the Nacimiento and San Antonio Dams, constructed in 1957 and 1967 respectively. Non-structural approaches to flood management include land use management tools such as regulation and flood insurance, and emergency response systems. Flood management in Monterey County is described in more detail in Section C, Flood Management.

### ***Wastewater***

Wastewater treatment services are provided in the northern part of the Greater Monterey County region by the MRWPCA. The MRWPCA provides regional wastewater conveyance, treatment, disposal, and recycling services to all of the sewered portions of northern Monterey County, including in the Greater Monterey County IRWM planning region the City of Salinas, Boronda, Marina, Castroville, Moss Landing, the Ord community, and some unincorporated areas in northern Monterey County. For other areas of the planning region, wastewater treatment is provided by the municipalities, water districts, or private water utilities that service those areas, or in more rural regions, via septic tanks.

### **Internal Boundaries**

This section describes internal boundaries within the Greater Monterey County region, including political boundaries; service areas of individual water, wastewater, and flood control districts; and service areas of land use agencies.

The Greater Monterey County IRWM region includes six incorporated cities, which comprise 69 percent of the region's population. The six cities include: Salinas, Soledad, Marina, Greenfield, King City, and Gonzales. Also included within the region are several unincorporated communities, including Prunedale (the largest community with a population of 17,560), Castroville (population 6,481), and the significantly smaller communities of Moss Landing, Las Lomas, Spreckels, Chualar, San Lucas, San Ardo, Lockwood, Bradley, and Parkfield. Along the Big Sur coast, unincorporated communities include: Big Sur, Lucia, and Gorda. Military areas in the region include Fort Hunter Liggett, a United States Army Reserve command post encompassing 165,000 acres on the eastern side of the Santa Lucia Mountains, and Camp Roberts, a National Guard training base located in southern Monterey County and northern San Luis Obispo County, encompassing approximately 17,000 acres within Monterey County.

Water supply in the region is managed by several agencies, both public and private. MCWRA, formed in 1947, is the primary water management agency for Monterey County and is responsible for managing, protecting, and enhancing water supply and water quality, as well as providing flood protection, in the County. A small portion of the Greater Monterey County region lies within the jurisdictional boundaries of the San Benito County Water District (SBCWD). This portion is in the northeastern portion of the

region where the Salinas River watershed falls within San Benito County. In addition, a small portion of the planning area—in the northernmost section where the Greater Monterey County IRWM planning region abuts the Pajaro River Watershed IRWM planning region—lies within the jurisdictional boundaries of the Pajaro Valley Water Management Agency (PVWMA).

Major water suppliers in the region include the MCWD, the Castroville Community Services District, the California Water Service Company, Alco Water Service Company, and the municipalities of Gonzales, Greenfield, Soledad, and King City. The U.S. Army and California State Parks supply water for use on their properties within the region. The majority of residents and businesses in the Big Sur coastal region obtain water from private wells and springs. California State Parks treats and provides its own water supply at each of the State Parks in Big Sur, including Andrew Molera State Park, Pfeiffer Big Sur State Park, Julia Pfeiffer Burns State Park, and Fremont Peak State Park, which lies within Monterey and San Benito Counties. Table B-6 in the IRWM Plan summarizes the water suppliers and service areas for connections greater than 200.

### **Water Supply and Water Demand**

This section describes historic land use, population, and water use trends in the region, and projected water demand over a 25-year planning horizon based on projected land use and population trends.

#### ***Population Trends***

Population in the Big Sur area of the Greater Monterey County region has remained relatively stable over the past hundred years. In the Salinas Valley and North County areas, however, population has expanded considerably. Most of the urban development in the region has occurred in the cities of Salinas, Soledad, Gonzales, Greenfield, and King City. The greater Salinas area has experienced particularly rapid growth and development in recent years, with Salinas absorbing approximately 70 percent of Monterey County's growth within the last 20 years. Over the next 20 years, population in the Big Sur coastal region is expected to remain relatively stable; however, continuous growth is expected in the cities of Gonzales, Greenfield, Salinas, King City, and Soledad. Growth for many of the smaller communities is expected to fluctuate over the years, with an average annual growth rate of about 0.2 percent over the next 20+ years.

#### ***Land Use Trends***

The primary land use in Monterey County is agriculture, representing about 56 percent of the total land area and occupying more than 1.4 million acres of land. The second largest land use consists of public and quasi-public uses (such as parks, recreational, community, and military facilities), comprising about 23 percent of the total land area. About 16 percent of the land area in the county is devoted to resource conservation and other uses. The remaining 5 percent of the county has been developed with residential, industrial, and commercial uses. In the Big Sur area, the predominant land uses are public recreation and private residential development. Cattle grazing occurs on several of the large private land holdings and on a few grazing allotments on public land. Approximately 65 percent of the Big Sur coastal region (a 234-square mile area, approximately 70 miles long and averaging 3.3 miles in width) is in public ownership.

While land use activities in Big Sur have remained relatively stable over the past 100 years, land use in the Salinas Valley has changed quite dramatically. There has been a steady increase in both urban and irrigated agricultural acreage over the years, occurring mainly in the Salinas Valley and North County. Urban acreage grew about 33,225 acres from 1968 to 2005 (nearly tripling), while irrigated agricultural acreage grew about 45,427 acres over that time period. As irrigated agriculture and urban populations have expanded, so have the water needs of the region. Agriculture is expected to remain the predominant land use in the Salinas Valley and North County area well into the future.

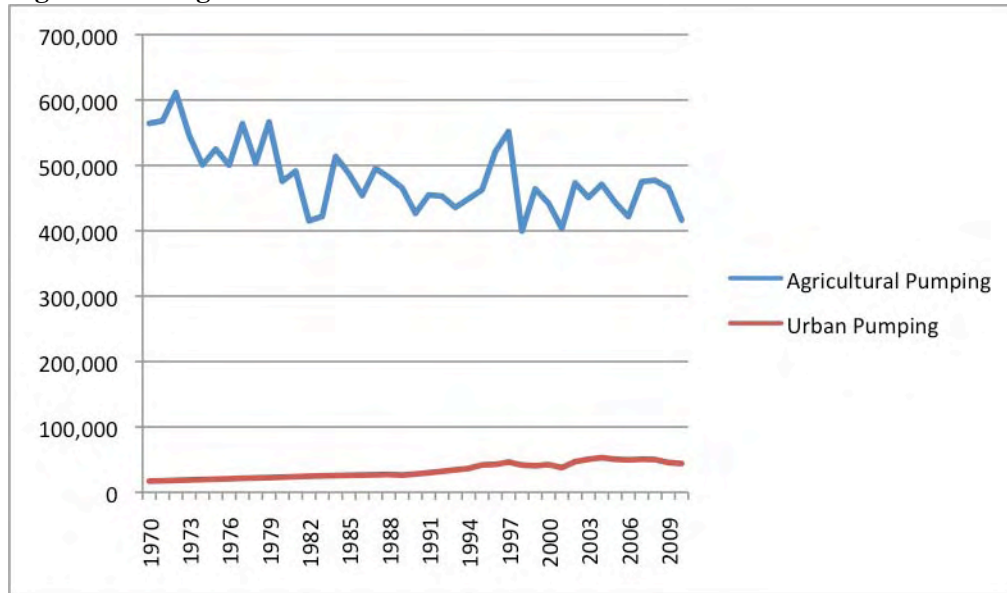
**Water Use Trends**

Water use information in the Big Sur coastal area has not been systematically tracked, and therefore historic water use trends cannot be assessed. Water suppliers in the Big Sur region report that water shortage is not typically a problem; any water management issues, when they occur, have more to do with infrastructure limitations such as inadequate filtration or insufficient storage capacity. This section therefore focuses on water use trends in the Salinas Valley and North County.

MCWRA began collecting groundwater extraction data from well operators for agricultural and urban water uses in 1992. The groundwater extraction data, provided by over 300 well operators, is compiled in the Ground Water Extraction Management System portion of MCWRA Information Management System, a relational database maintained by the MCWRA, and summarized in annual Ground Water Extraction Summary Reports (GWESR). MCWRA has estimated historic (1970-1994) agricultural and urban water use with the help of a modeling tool called the Salinas Valley Integrated Ground and Surface Water Model (SVIGSM).

Water use trends in the Salinas Valley from 1970 – 2010 are illustrated in Figure B-19, using a combination of SVIGSM and GWESR. While urban pumping accounts for a relatively small proportion of groundwater extraction, urban use has been slowly increasing relative to agricultural water use over the years. According to SVIGSM estimates, agricultural pumping accounted for approximately 97 percent of groundwater extraction in the mid-1970s and for approximately 93 percent in the mid-1990s, and according to GWESR data, has accounted for approximately 90 percent of groundwater extraction in recent years, with urban pumping accounting for the remaining 10 percent.

**Figure B-19: Agricultural and Urban Water Use Trends 1970-2010**



Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

**Determining Future Water Demand**

Three different methods for projecting urban water use in the Salinas Valley over the next 20 years are considered and compared for the purposes of IRWM planning. The first method utilizes the GWESR data, US Census population data, and AMBAG population projections for urban areas in the Salinas Valley. The second method is based on data reported by the water purveyors. The third method utilizes the SVIGSM. Table B-16 below compares the results of the three methods used to estimate future urban

water use. All three methods are valid, but for the purposes of IRWM planning, the most conservative water use estimate—resulting from the SVIGSM method—is used.

**Table B-16: Comparison of Urban Water Use Projection Methods**

Method	Urban Water Use in the Salinas Valley (AFY)					
	1995	2000	2010	2020	2030	2035
1. Ground Water Extraction Summary Reports and Population Projections	41,884 (with 98% reporting)	42,293 (with 89% reporting)	44,022 (with 97% reporting)	58,497	65,083	68,179
2. Reports from Purveyors			49,233	67,159	78,984	
3. SVIGSM Method	45,000				85,000	

Conclusions about future agricultural water use could not be drawn based on analysis of historical (1970-2010) agricultural water use data from GWESR, as the data suggests no significant trend. Therefore, the SVIGSM, taking into account projected land use changes, was used to estimate future agricultural water demand for the Salinas Valley. As noted earlier, agriculture is expected to remain the predominant land use in the Salinas Valley well into the future, though the pressure to convert agricultural land to urban will intensify as the population in the Salinas Valley continues to grow. The SVIGSM predicts that agricultural needs, which make up a far greater share of water use, will decrease by approximately 60,000 AFY from the year 1995 to the year 2030, a 13 percent reduction. This prediction was based on several assumptions, including increased irrigation efficiencies, changes from high to low water demand crops, and a slight reduction in agricultural land use resulting from conversion to urban uses.

The projected water demands for water supply from the Salinas Valley Groundwater Basin are summarized in Table B-18 below. Water demand estimates of the Salinas Valley are based on the SVIGSM model for both urban and agricultural uses, with environmental water needs currently unknown. The SVIGSM model predicts an overall decrease in water use on the order of 20,000 AFY from 1995 to the year 2030. While agricultural water use is expected to decrease by about 60,000 AFY over this time period, urban use is expected to increase by about 40,000 AFY.

**Table B-18: Future Water Demand**

Water Use	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
Urban	45,000	85,000
Agricultural	418,000	358,000
Environmental	unknown	unknown
<b>Total Demand</b>	<b>463,000+</b>	<b>443,000+</b>

Source: SVIGSM

***Future Water Supply***

Water use in the Salinas Valley Groundwater Basin has significantly outpaced water supply over the past several decades, resulting in overextraction and in extensive seawater intrusion. Despite the overall future reduction in total basin water use predicted by the SVIGSM, the current groundwater problems in the basin are projected to continue into the future. Table B-19 below shows SVIGSM estimates for Salinas Valley Groundwater Basin overdraft, seawater intrusion, and Salinas River outflow to the ocean for the year 2030. Though basin overdraft is predicted to decrease 3,000 AF by the year 2030, overdraft will nonetheless continue to be a problem for the Salinas Valley basin (estimated at 14,000 AFY in 2030). In addition, seawater intrusion will continue to worsen (from 8,900 AF in 1995 to 10,300 AF in 2030).



**Table B-19: Basin Overdraft, Seawater Intrusion, and Salinas River Outflow for the Salinas Valley**

	<b>Baseline or Existing (1995) Conditions (AFY)</b>	<b>Projected Future Baseline (2030) Conditions (AFY)</b>
Basin Overdraft (does not include seawater intrusion)	17,000	14,000
Seawater Intrusion	8,900	10,300
Salinas River Outflow to Ocean	238,000	249,000

Source: MCWRA 1998.

Several projects in the Greater Monterey County IRWM region and the broader Monterey Bay area that have been proposed to help achieve and maintain hydrologic balance in the Salinas Valley Groundwater Basin and augment regional water supplies are summarized.

***Potential Impacts of Climate Change on Water Supply and Demand***

Typically, water demand projections are based on past water use along with population projections. However, given climate change as a “new” factor, it may no longer be adequate to simply rely on historical water years when projecting future demand or supply. Local governments, agencies, and organizations in the Greater Monterey County IRWM region are only in the beginning stages of considering and planning for the effects of climate change on water supply, other critical services and infrastructure, and natural resources in the region. The water supply and demand projections provided in this IRWM Plan do not reflect anticipated effects of climate change, since the effects have not yet been well quantified in those terms. As water managers (along with regional scientists, local government agencies, and other key decision-makers) obtain better analytical tools for understanding the specific effects of climate change, the water supply and demand projections in this IRWM Plan will reflect that information.

In the meantime, the RWMG is aware of the following significant impacts that climate change is expected to have on water supply and demand, generally:

- Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion.
- 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.
- Droughts are expected to be more frequent and severe.
- Average rainfall is expected to change.
- Climate change will also likely have adverse effects on water quality, which in turn will affect the beneficial uses of surface water bodies and groundwater in the region. Changes in precipitation may 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

***Water Supply and Demand: Conclusions***

Water use in the Salinas Valley Groundwater Basin has significantly outpaced water supply over the past several decades, resulting in overextraction and seawater intrusion. Conditions are expected to improve somewhat by 2030, at least in terms of basin overdraft. However, while basin overdraft conditions are expected to improve by the year 2030, seawater intrusion is expected to worsen, though at a decreased

rate. Given the impacts of climate change, seawater intrusion may in fact increase at a greater rate than the model implies in future years.

A strategy is clearly needed to offset groundwater pumping in order to meet the objective of achieving hydrologic balance within the Salinas Valley Groundwater Basin. The IRWM Plan promotes projects that address specific infrastructure needs as well as overall water supply reliability for the region, in terms of water conservation projects, water recycling projects, desalination, and other “water supply enhancement” projects. It is the hope and intention of the RWMG that projects developed and funded through the IRWM planning process will, over time, help reverse the trend of basin overdraft in the Salinas Valley Groundwater Basin, halt the advance of seawater intrusion, and ultimately help achieve hydrologic balance and water supply reliability for the Greater Monterey County IRWM region.

## **Water Quality**

This section describes: current water quality conditions in the Greater Monterey County IRWM region for surface and groundwater; regional water quality goals and objectives (including Central Coast Basin Plan, Watershed Management Initiative, and specific watershed goals); and current efforts to protect and improve water quality in the IRWM planning region.

### ***Water Quality: Current Conditions***

The quality of surface waters in the region is greatly influenced by land use practices. Primary causes of pollutants to surface waters include urban runoff, agricultural runoff, erosion and sedimentation, and septic systems. Erosion is a widespread problem in Monterey County, due in part to the erosive nature of local soils as well as from land use practices (including farming on steep slopes, unmaintained or improperly designed dirt roads, altered water channels that increase water velocities and alter the natural sediment balance, and areas that have been denuded of vegetation by fire, overgrazing, or clearing).

The coastal rivers of the Big Sur region, where urban and agricultural land uses are minimal, are generally considered to be of excellent to good water quality. Big Sur rivers, creeks, and coastal waters are primarily affected by erosion and sedimentation, septic systems located close to the rivers, and trash from park visitors. The North County area has significant erosion problems. In the Salinas Valley, surface waters are impacted largely by intensive agricultural use (including grazing) and nonpoint source pollutants from urban uses. Salinas Valley surface waters are especially impaired by nitrates, pesticides, toxicity, and pathogens. Urban runoff from communities along the Salinas Valley impacts the Salinas River, Salinas Reclamation Ditch, and other tributaries ultimately flowing to the Monterey Bay.

Two major water quality problems affecting the Salinas Valley Groundwater Basin are nitrate contamination and seawater intrusion. Nitrate contamination in the Salinas Valley was first documented in 1978, and is due primarily to use of nitrogen-based synthetic fertilizers for irrigated agriculture, and commonly occurs in the unconfined and semi-confined aquifers that underlie areas of intense agricultural activity. However, nitrate contamination can also be caused from septic system failures, from wastewater treatment ponds located in floodplains, and from livestock waste. In 2007, 37 percent of the 152 wells sampled in the Salinas Valley Groundwater Basin showed nitrate levels greater than the maximum DWS of 45 mg/l NO<sub>3</sub>, with concentrations highest in the Upper Valley and East Side Subareas.

Seawater intrusion was first observed in a few wells in the Castroville area in 1932. By the 1940s, many agricultural wells in the Castroville area had become so salty that they had to be abandoned. The East Side and Pressure Subareas of the Salinas Valley Groundwater Basin are most impacted by overdraft (MCWRA 1997). Seawater has been intruding into these aquifers at a rate of approximately 28,800 AFY (Cal Water 2010b). In 2011, the total acres overlying the seawater intrusion front in the Pressure 180-Foot Aquifer equaled 28,142 acres, having advanced 351 acres since 2009. The total acres overlying the

seawater intrusion front in the Pressure 400-Foot Aquifer in 2011 equaled 12,573 acres, having advanced 476 acres since 2009. Seawater has intruded approximately seven miles inland in the 180-Foot Aquifer and three miles inland in the 400-Foot Aquifer. As a result of seawater intrusion, urban and agricultural supply wells have been abandoned, destroyed, and relocated.

### ***Regional Water Quality Goals and Objectives***

This section summarizes the following regional water quality goals:

- Central Coast Basin Plan goals
- Regional Water Quality Control Board Watershed Management Initiative goals
- Goals and objectives of various watershed management plans in the region

### ***Impaired Water Bodies***

Within the Greater Monterey County IRWM region, 29 water bodies have been determined by the RWQCB to be impaired under Section 303(d) of the Clean Water Act. These water bodies are shown in Table B-22 and illustrated in Figure B-24 of the Plan. Impairments are found to occur within the Salinas, Gabilan, and Bolsa Nueva watersheds (no impairments are listed for water bodies in the Big Sur coastal watersheds). The region has 332 miles of impaired rivers (20 rivers/creeks, including over 100 miles of the Salinas River), 2,339 acres of impaired estuaries (mostly Elkhorn Slough with 2,034 acres listed, but also including the Salinas River Lagoon, Moro Cojo Slough, Salinas River Refuge Lagoon, and Old Salinas River Estuary), 79 acres of impaired harbor (Moss Landing Harbor), and 5,580 acres of impaired lakes/reservoirs (most of which – 5,417 acres – includes San Antonio Reservoir, listed for mercury). Note that Nacimiento Reservoir, which is not located within the Greater Monterey County IRWM region but is an important water supply source for the region, is also listed for mercury and metals (5,736 acres). The entire Salinas Valley Groundwater Basin, which includes four sub-basins, is listed as impaired and as only partially supporting beneficial uses due to nitrate contamination and seawater intrusion (RWQCB 2002, p. 29). The water bodies in the lower Salinas Valley have some of the worst pollutant impairments on the Central Coast.

Other regulatory water quality programs are discussed in this section, including the Central Coast Irrigated Lands Agricultural Order and federal and state stormwater programs. Several voluntary water quality programs are also discussed, including the MBNMS's Water Quality Protection Program, Agriculture Water Quality Alliance (AWQA) efforts, the Central Coast Joint Effort for LID and Hydromodification Control, and various projects initiated by the MCWRA to improve groundwater quality in the Salinas Valley Groundwater Basin, including the Monterey County Water Recycling Projects and the Salinas Valley Water Project.

### ***Major Water-related Issues and Conflicts***

A committee comprised of RWMG members was formed in May 2009 to investigate and identify the region's issues and conflicts. The committee interviewed 43 local experts in the areas of water quality, water supply, flood control, natural resources, and public health and safety. Based on those interviews, the committee developed a summary list of water-related issues and conflicts in the Greater Monterey County IRWM region. That list is presented in this section.

## **Section C: Flood Management**

Flood management is considered to be an integral part of the collective water management system in the Greater Monterey County IRWM region. This chapter describes the current framework for flood management in the Greater Monterey County IRWM region and identifies the potential for integrated flood management.



Historic records from 1911-2007 show flooding and flood damage to have occurred on a fairly regular basis (every few years) within Monterey County. The damages caused by flooding in the Salinas Valley today—even with the construction of major flood control infrastructure—are far more substantial than they were a century ago. Along the Big Sur coast, streams and rivers draining the steep coastal mountains are subject to short, intense floods, capable of producing significant damage to property.

The agency with primary responsibility for floodplain management in Monterey County is the MCWRA. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal. In addition, several other organizations—most notably the Resource Conservation District (RCD) of Monterey County and the Natural Resources Conservation Service (NRCS)—contribute significantly to flood control and floodplain management efforts in the region through sediment and erosion control programs and grant incentives, though they have no jurisdictional flood control authority per se.

The MCWRA employs both structural and non-structural approaches to flood control and floodplain management in the county. The flood control infrastructure in the Greater Monterey County region is considered a critical component of the region’s overall water management system, providing not only flood control protection but water supply and recreational benefits as well. Existing flood control infrastructure within the Greater Monterey County IRWM region includes the Nacimiento and San Antonio Dams, constructed in 1957 and 1967 respectively. The dams were constructed to control floodwaters and to release water into the Salinas River for percolation to underground aquifers throughout the summer. At maximum pool, the Nacimiento Reservoir’s storage capacity is 377,900 AF with a surface elevation of 800 feet and a surface area of 5,400 acres. At full pool, the San Antonio Reservoir has a volume of 335,000 AF, surface elevation of 780 feet, and a maximum depth of 180 feet.

The Salinas Reclamation Ditch, originally named Reclamation Ditch District No. 1665, was constructed in 1917 to drain the marshlands in the northern Salinas Valley for agricultural use and urban development. While the original purpose of the Reclamation Ditch was to reclaim lands, the Ditch came to be used and depended upon by local residents as a flood control channel. Rapid agricultural and urban development throughout the 1900s, however, significantly changed the hydrology of the watershed, causing a dramatic increase in the rate and amount of runoff from storms. In 1967, the Monterey County Flood Control and Water Conservation District (now MCWRA) took over maintenance over portions of the Salinas Reclamation Ditch from the Northern Salinas Valley Mosquito Abatement District. After two major floods in the 1990s that resulted in substantial damage to agricultural lands west of Salinas, in 1999 the MCWRA initiated an evaluation of the Reclamation Ditch and a committee was convened to assist MCWRA in planning for an improved drainage system. That committee, the Reclamation Ditch Improvement Plan Advisory Committee (RDIPAC), has made several recommendations for improvements and provided guidance during the development of several studies such as the Potrero Tide Gates study (September 2000) as a result of changes in the watershed.

Non-structural approaches to flood management include land use management tools such as regulation and flood insurance, and emergency response systems. This section describes MCWRA’s participation in the National Flood Insurance Program (NFIP) and the County’s emergency response system for flood events. MCWRA developed the *Monterey County Floodplain Management Plan* in 2002 with the goal of creating an action 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. The Plan, updated in 2008, lists, describes, and assesses Repetitive Loss Properties (RLPs) in the County. Monterey County has 107 RLPs, 13 of which occur within the Greater Monterey County IRWM region.

The Greater Monterey County RWMG supports integrated flood management as a desirable goal. Significant potential exists to improve riparian coverage and floodplain function along the Salinas River

system and Arroyo Seco River, and along waterways in northern Monterey County, including Elkhorn Slough and its tributaries, and Moro Cojo Slough. The Salinas River system, in particular, is a challenge to approach from an integrated approach because of the adjacent agricultural lands and food safety concerns with flooding and agricultural production. The RWMG is still in the early stages of considering how to promote integrated flood management in the region.

## **Section D: Goals and Objectives**

The IRWM Plan goals and objectives are the response to what the RWMG perceives to be the major water resource issues in the region and as such, reflect the RWMG's water resource management values and overall priorities for the region. The objectives give focus to the IRWM Plan, provide the basis for determining which resource management strategies are appropriate for use in the region, 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.

This section includes: a description of the process for identifying the goals and objectives for the Greater Monterey County IRWM planning region; the list of approved goals and objectives; a matrix used to measure progress toward achieving each of the objectives; and an explanation of why the Greater Monterey County RWMG chose not to prioritize objectives. Below are the goals and objectives, along with a set of "guiding principles," chosen by the RWMG for this IRWM Plan:

### **GUIDING PRINCIPLES**

- Continue to provide localized solutions to regional water supply issues
- Do not burden anyone unfairly or unnecessarily
- Project results should be measured through monitoring
- Encourage projects with multiple benefits
- Support collaboration of agencies, organizations, stakeholders, and willing landowners on the development of projects that provide water resource benefits
- Minimize negative impacts to the environment and the local economy from water resource management projects
- Recognize, respect, and consider water rights and those who hold them
- Projects should be science based

### **GOALS AND OBJECTIVES**

#### **WATER SUPPLY Goal:**

- Improve water supply reliability and protect groundwater and surface water supplies.

#### **WATER SUPPLY Objectives:**

- Increase groundwater recharge and protect groundwater recharge areas.
- Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.
- Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.
- Diversify water supply sources, including but not limited to the use of recycled water.
- Maximize water conservation programs.
- Capture and manage stormwater runoff.
- Optimize conjunctive use where appropriate.
- Support research and monitoring to better understand identified water supply needs.
- Support the creation of water supply certainties for local production of agricultural products.

- Promote public education about water supply issues and needs.
- Promote planning efforts to provide emergency drinking water to communities in the region in the event of a disaster.

**WATER QUALITY Goal:**

- Protect and improve surface, groundwater, estuarine, and coastal water quality, and ensure the provision of high-quality, potable, affordable drinking water for all communities in the region.

**WATER QUALITY Objectives:**

- Promote practices necessary to meet, or where practicable, exceed all applicable water quality regulatory standards (for drinking water, surface and groundwater quality).
- Promote projects to prevent seawater intrusion.
- Incorporate or promote principles of low impact development where feasible, appropriate, and cost effective.
- Protect surface waters and groundwater basins from contamination and the threat of contamination.
- Support research and pilot projects for the co-management of food safety and water quality protection.
- Improve septic systems, sewer system infrastructure, wastewater treatment systems, and manure management programs to prevent water quality contamination.
- Support research and other efforts on salinity management.
- Support monitoring to better understand major sources of erosion, and implement a comprehensive erosion control program.
- Promote programs and projects to reduce the quantity and improve the quality of urban and agricultural runoff and/or mitigate their effects in surface waters, groundwater, and the marine environment.
- Promote regional monitoring and analysis to better understand water quality conditions.
- Support research and utilization of emerging technologies (enzymes, etc.) to develop effective water pollution prevention and mitigation measures, and source tracking.
- Promote public education about water quality issues and needs.

**FLOOD PROTECTION AND FLOODPLAIN MANAGEMENT Goal:**

- Develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes.

**FLOOD PROTECTION AND FLOODPLAIN MANAGEMENT Objectives:**

- Promote projects and practices to protect infrastructure and property from flood damage.
- Improve flood management infrastructure and operational techniques/strategies.
- Implement flood management projects that provide multiple benefits such as public safety, habitat protection, recreation, agriculture, and economic development.
- Develop and implement projects to protect, restore, and enhance the natural ecological and hydrological functions of rivers, creeks, streams, and their floodplains.
- Support research and monitoring efforts to understand the effects of flooding on transport and persistence of pathogens in food crop production areas.
- Support management of flood waters so that they do not contaminate fresh produce in the field.
- Promote public education about local flood management issues and needs.

**ENVIRONMENT Goal:**

- Protect, enhance, and restore the region's ecological resources while respecting the rights of private property owners.

**ENVIRONMENT Objectives:**

- Support science-based projects to protect, improve, enhance, and/or restore the region's ecological resources, while providing opportunities for public access and recreation where appropriate.
- Protect and enhance state and federally listed species and their habitats.
- Minimize adverse environmental impacts of water resource management projects.
- Support applied research and monitoring to better understand environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources.
- Implement fish-friendly stream and river corridor restoration projects.
- Reduce adverse impacts of sedimentation into streams, particularly from roads and non-point sources.
- Promote efforts to prevent, control, reduce, and/or eradicate high priority invasive species.
- Promote native drought-tolerant plantings in municipal and residential landscaping.
- Consider opportunities to purchase fee title or conservation easements on lands from willing sellers that provide integrated water resource management benefits. Ensure adequate funding and infrastructure to manage properties and/or monitor easements.
- Support research and monitoring efforts to understand the effects of wildfire events on water resources.

**REGIONAL COMMUNICATION AND COOPERATION Goal:**

- Promote regional communication, cooperation, and education regarding water resource management.

**REGIONAL COMMUNICATION AND COOPERATION Objectives:**

- Facilitate dialogue and reduce inconsistencies in water management strategies/regulations between local, regional, state, and federal entities.
- Promote dialogue between federal and state regulators and small water system managers to facilitate water quality regulation compliance.
- Foster collaboration between regional entities to minimize and resolve potential conflicts and to obtain support for responsible water supply solutions and improved water quality.
- Build relationships with federal, state, and local regulatory agencies and other water agencies to facilitate the permitting, planning, and implementation of water-related projects.
- Increase stakeholder input and public education about the need, complexity, and cost of strategies, programs, plans, and projects to improve water supply, water quality, flood management, coastal conservation, and environmental protection.

**DISADVANTAGED COMMUNITIES Goal:**

- Ensure the provision of high-quality, potable, affordable water and healthy conditions for disadvantaged communities (DACs).

**DISADVANTAGED COMMUNITIES Objectives:**

- Seek funding opportunities to ensure all communities have a water system with adequate, safe, high-quality drinking water.
- Seek funding opportunities to ensure all communities have adequate wastewater treatment.
- Ensure that DACs are adequately protected from flooding and the impacts of poor surface and groundwater quality.
- Provide support for the participation of DACs in the development, implementation, monitoring, and long-term maintenance of water resource management projects.
- Promote public education in DACs about water resource protection, pollution prevention, conservation, water quality, and watershed health.

**CLIMATE CHANGE 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.

**CLIMATE CHANGE Objectives:**

- Plan for potential impacts of future climate change.
- Support increased monitoring and research to obtain greater understanding of long-term impacts of climate change in the Greater Monterey County region.
- Support efforts to research alternative energy and to diversify energy sources appropriate for the region.
- Seek long-term solutions to reduce greenhouse gas (GHG) producing energy use.
- Seek long-term solutions to maintain and protect existing pristine natural resources from the impacts of climate change.
- Support research and/or implementation of land-based efforts such as carbon-sequestration on working lands and wildlands in the Greater Monterey County region.
- Promote public education about impacts of climate change, particularly as it relates to water resource management in the Greater Monterey County region.

## **Section E: Resource Management Strategies**

The IRWM Program requires RWMGs to consider certain resource management strategies for potential use in their regions and for possible inclusion in their IRWM Plans. The intention behind the “resource management strategy” standard is to encourage regions to diversify their water management portfolios in order to become more resilient to, and to mitigate for, uncertain future circumstances (such as climate change). The Greater Monterey County RWMG has chosen to include 37 resource management strategies in the Greater Monterey County IRWM Plan, including 28 resource management strategies from the *California Water Plan Update 2009* plus nine additional strategies. The process for selecting resource management strategies was based primarily on the region’s goals and objectives, i.e., the strategies needed to achieve the objectives of the Plan. The regional water management strategies chosen for the IRWM Plan include the following:

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency
- Conveyance – Regional/local
- System Reoperation
- Water Transfers
- Conjunctive Management & Groundwater Storage
- Desalination
- Precipitation Enhancement
- Recycled Municipal Water
- Surface Storage – Regional/local
- Drinking Water Treatment and Distribution
- Groundwater Remediation/Aquifer Remediation
- Matching Water Quality to Use
- Pollution Prevention
- Salt and Salinity Management
- Urban Runoff Management
- Agricultural Lands Stewardship
- Economic Incentives (Loans, Grants, and Water Pricing)

- Ecosystem Restoration
- Forest Management
- Land Use Planning and Management
- Recharge Area Protection
- Water-Dependent Recreation
- Watershed Management/Planning
- Flood Risk Management
- Dewvaporation or Atmospheric Pressure Desalination
- Fog Collection
- Rainfed Agriculture
- Environmental and Habitat Protection and Improvement
- Recreation and Public Access
- Stormwater Capture and Management
- Wetlands Enhancement and Creation
- Water and Wastewater Treatment
- Infrastructure Reliability
- Regional Cooperation
- Education and Outreach
- Monitoring and Research

## Section F: Project Review Process

All projects submitted for inclusion in the IRWM Plan must undergo a thorough review process before they can be formally adopted into the Plan. With each new project solicitation for the IRWM Plan, a Project Review Committee, comprised of RWMG members, is convened to review each of the projects. The committee: 1) ensures that projects meet “minimum standards” for inclusion in the Plan, 2) seeks opportunities for integration, and 3) prioritizes the projects according to how well they meet the IRWM Plan objectives, as well as how well they meet objectives and priorities of the IRWM Grant Program. The result of this process is a ranked project list, vetted and approved by the RWMG. All projects on the project list are potentially eligible for IRWM grant funds.

The process begins by ensuring that projects meet “minimum standards,” which include: the project must be located within the boundaries of the Greater Monterey County IRWM region, or otherwise directly benefit the region; the project must include one or more of the elements outlined in PRC §75026(a); the project must have the support and approval of the landowner(s) for the property(ies) on which the project is located (i.e., the project proponent must be able to provide assurance of landowner support before a project can be submitted for IRWM grant funds); and the project must address IRWM Plan objectives.

All projects that meet minimum standards are then 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 point of this ranking is to ensure that the IRWM Plan project list is competitive for the purposes of the IRWM Grant Program. The following table shows the categories and relative weighting, and the maximum number of points that a project can achieve for the various criteria within each category:



**Table F-1: Project Ranking: Summary of Points**

Category	Criteria	Maximum Potential Points
Objectives = 40%	Regional objectives (in the IRWM Plan)	40
IRWM Grant Program Criteria = 20%	Statewide priorities	12
	Land use planning	2
	Water-related conflicts	2
	Disadvantaged Communities (DACs)	2
	Climate change	2
Integration = 20%	Water supply, water quality, flood reduction, and other benefits	10
	Resource management strategies	2
	Partnerships	4
	Regionalism	4
Project Need = 10%	Special/urgent need	10
Overall Strength of Project = 10%	Technical feasibility	4
	Budget	3
	Work Plan	3
<b>TOTAL</b>		<b>100</b>

A ranked project list is produced based on this scoring system. The ranked project list for 2012 IRWM Plan projects is provided in Section G of this Plan, and is posted on the website. The final step in the project ranking process is “adaptive management”: If the RWMG finds that the project ranking system falls short in achieving its ultimate purpose (i.e., if the projects/programs that should clearly float to the top, don’t), then the RWMG will re-evaluate the project ranking system to address the discrepancy. Any revisions made to the project ranking system would have to be formally approved by vote of the RWMG.

Whenever an IRWM grant solicitation occurs, the selection of projects to be submitted for IRWM grant funds will begin with the ranked project list, but will also take into account other key factors, such as: project costs and financing, economic feasibility, geographic impact (subarea and scope), whether the project addresses a critical water resource need of a DAC, and how well the projects complement each other in terms of providing the most benefits to the region. Only those projects that are ready to proceed, only those projects whose project proponents have adopted (or have expressed a commitment to adopt) the IRWM Plan, and only those projects which have proof of landowner support will be eligible for submission for IRWM grant funds. The desired outcome is a proposal package comprised of several projects that, together, will help implement the objectives of the Plan, will provide multiple and regional benefits for the Greater Monterey County IRWM region, and that will be most competitive on a State level for IRWM (and other) grant funds.

## Section G: Projects

This section lists the projects included in the IRWM Plan through 2012. Three separate lists of projects are shown:

- *Proposed Implementation Projects:* Projects proposed by stakeholders in the region for grant funding. This is what we typically refer to as the “Project List” for the IRWM Plan. The RWMG will choose from this list when applying for IRWM grant funds and other grant funds. This list is shown as Table G-1.

- *Funded IRWM Plan Projects:* Implementation projects that were previously included on the IRWM Plan Project List but have been funded either through the IRWM Grant Program or other source of funds (i.e., projects from previous IRWM Plan Project Lists that have “graduated” and are now implementing the Plan). This list is shown as Table G-2.
- *Concept Proposals:* Concept proposals are ideas submitted by stakeholders for projects that are not quite far enough along in their development to be submitted for grant funding. It is the intention that concept proposals will eventually grow into “full-fledged” implementation projects. This list is shown as Table G-3.

These three project lists will change over time as projects get implemented and new projects are submitted for inclusion in the IRWM Plan. Hence, the projects shown in Tables G-1, G-2, and G-3 should be considered more of an example of water resource management projects in the Greater Monterey County IRWM region rather than a fixed list of IRWM Plan projects. Note that the most current Project List will be posted on the website, at <http://www.greatermontereyirwmp.org/documents/>.

## Section H: Impacts and Benefits

This chapter describes the anticipated benefits and potential impacts that will result from the implementation of the Greater Monterey County IRWM Plan, both on a project-specific level and in terms of how the projects will help achieve regional goals. The section includes a table that illustrates how projects in the IRWM Plan, including those currently being implemented, will contribute toward addressing regional objectives. The table indicates that, of the resource-specific goals, the goal category “best addressed” by projects currently in the IRWM Plan is Water Quality, followed closely by Environment, then Water Supply, then Flood Protection/Management. Most of the projects in the Plan address the Regional Communication and Cooperation goal. More than half of the projects address DAC objectives, either directly or indirectly. Every IRWM Plan objective is addressed at least to some extent by projects in the IRWM Plan.

The chapter also includes detailed tables that summarize the impacts and benefits anticipated from each of the IRWM Plan projects, as described by the project proponents themselves.

Note that all projects included in the IRWM Plan are reviewed for potential impacts to DACs and for potential environmental justice concerns as part of the regular project review process. Thus far, no potential impacts to DACs or environmental justice concerns have been found in any of the projects submitted for inclusion in the IRWM Plan. On the other hand, numerous benefits to DACs are expected to result from implementation of the IRWM Plan. A list of projects included in the IRWM Plan that promise benefits, either directly or indirectly, to DACs is provided.

Finally, some of the more “intangible” benefits of the IRWM planning effort overall are described. The section concludes by pointing out that 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.



## Section I: Integration

The intent of the Integration standard in the Proposition 84/1E IRWM Program Guidelines is to ensure that RWMGs intentionally create a system where integration can occur. This section discusses three types of integration: 1) stakeholder/institutional integration, 2) resource integration, and 3) project integration.

### *Stakeholder/Institutional Integration*

IRWM Plans are required to contain governance structures and processes that enable diverse groups of stakeholders to participate in all levels of the IRWM planning effort. This type of integration has been ensured in the Greater Monterey County IRWM planning region through the governance structure, including composition of the RWMG and stakeholder participation. The Greater Monterey County RWMG is made up of diverse organizations with differing expertise, perspectives, and authorities of various aspects of water management, representing all major geographic areas within the region. Stakeholders also play an important role in the decision-making process. Together, stakeholders and the RWMG represent all of the major water resource management authorities in the region—as well as water resource management authorities and stakeholders from 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.

### *Resource Integration*

Resource integration can mean the sharing of data and expertise. The combined knowledge, expertise, and technical capacity between RWMG members and stakeholders within the Greater Monterey County IRWM region is truly immense. 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 the sharing of data. Section K of this IRWM Plan describes the data management system for the Greater Monterey County region. Finally, implementing projects that utilize a diverse mix of resource management strategies and that promote the full capacity of the water management system in the IRWM planning region is yet another way in which the RWMG promotes resource integration in the IRWM planning process. The projects included in this IRWM Plan utilize a broad and diverse mix of resource management strategies (see Table E-1 in Section E, which demonstrates how the various projects utilize resource management strategies).

### *Project Integration*

The RWMG promotes project integration both by encouraging stakeholders to form partnerships and 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.

## Section J: Plan Performance and Monitoring

### *Plan Performance*

An IRWM Plan Performance Review will be conducted every two years or as appropriate to evaluate progress made toward achieving Plan objectives. Progress toward meeting Plan objectives is directly tied to the implementation of projects, which will be tracked using the Data Management System described in the following chapter. Two tables will be generated with each Plan Performance Review to show: 1) that the RWMG is implementing projects listed in the IRWM Plan, and 2) that the RWMG is efficiently making progress towards meeting the objectives of the IRWM Plan. Templates for these tables are

provided. Project implementation will be tracked using the “Conservation Action Tracker” database, which is a data system for tracking land-use management improvements in the Central Coast region.

### ***Project Monitoring***

If a project requires monitoring, the project proponent is responsible for both development of the project-specific monitoring plans and for all monitoring activities. The project-specific monitoring plan requirements will vary based on the type of project being implemented. All projects must adhere to certain State guidelines for monitoring in order to be implemented through the IRWM Plan.

Through project-specific monitoring efforts, the Conservation Action Tracker, and measurable objectives, the RWMG intends to demonstrate over time that the Greater Monterey County IRWM Plan is meeting its goals and objectives.

## **Section K: Data Management**

The Data Management chapter describes how data from IRWM-funded projects is stored, validated, and shared in the Greater Monterey County IRWM planning region. Because the Greater Monterey County IRWM Plan does not have an ongoing secure funding source for data management, the RWMG has opted to utilize existing State database frameworks including, for surface water quality, those developed by the California Surface Water Ambient Monitoring Program (SWAMP) and by the California Environmental Data Exchange Network (CEDEN). 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 Groundwater Ambient Monitoring and Assessment (GAMA) database. The intent and design of the Greater Monterey County IRWM Plan data management system thus focuses on a localized approach to data collection and management with uploading of data into statewide databases.

This chapter describes existing regional monitoring programs (for surface water quality, habitat condition, and groundwater quality) and typical data collection techniques (including SWAMP, CRAM, and GAMA). The chapter also describes how project proponents in the Greater Monterey County IRWM region will contribute data to the IRWM Plan data management system, and how data collected for IRWM Plan implementation will be transferred and/or shared between members of the RWMG and other interested parties throughout the region, including local, state, and federal agencies.

Note that each organization or project proponent that collects data related to habitat condition, biological monitoring, or water quality will be responsible for maintaining their own data management system and quality control. Primary data management responsibilities for surface water quality data lies with the data collecting organization. After appropriate quality assurance checks, the data will be uploaded into the CEDEN database through the Regional Data Center (which for this region is located at Moss Landing Marine Labs).

## **Section L: Finance**

A Funding Committee, comprised of RWMG members, has been convened to identify sources of funding for IRWM Plan projects and programs, and to develop a strategy for funding the ongoing IRWM planning process.

### ***Funding for IRWM Plan Projects and Programs***

This section provides a table that summarizes the anticipated and potential sources of funding to support the projects and programs currently included in the IRWM Plan. The table shows the approximate total

project cost, the anticipated funding sources, the certainty of obtaining those funds, the operations and maintenance (O&M) finance source, and the certainty of obtaining O&M financing.

### ***Ongoing Funding of the IRWM Plan***

To date, the Greater Monterey County IRWM planning effort has been funded through a combination of private foundation grant funds, State IRWM Planning Grant funds, monetary contributions from RWMG entities, and in-kind staff time contributed by members of the RWMG. With the completion and final approval of this IRWM Plan, the time and resources required to support the Greater Monterey County IRWM planning effort are expected to diminish. It is expected that RWMG members will continue to donate their staff time toward the ongoing planning effort, and that stakeholders will continue to participate actively in the process. Additional funds will be needed, however, to continue to support the IRWM Plan Coordinator position. While financial contributions are not required of RWMG members, the Funding Committee will be requesting each RWMG entity to contribute annually, on a sliding scale, toward the ongoing IRWM planning process. The Funding Committee is also investigating other potential means of long-term support, including collaboration with other agencies and organizations that share similar goals and that might benefit from IRWM Plan implementation; and potentially, grant funds from America's Great Outdoors (AGO) Initiative.

## **Section M: Technical Analysis**

The RWMG relies almost entirely on existing plans, reports, and studies as a basis for understanding current water resource conditions in the Greater Monterey County IRWM planning region and for developing the IRWM Plan. This chapter describes the technical information, methods, and analyses used by the RWMG for developing this 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 types of plans and reports (among others):

- Urban Water Management Plans
- Water Master Plans
- Stormwater Management Plans
- Wastewater Management Plans
- Local Agency Formation Commission (LAFCO) Municipal Services Review Reports
- Department of Water Resources (DWR) Land Use Surveys
- Watershed Assessment and Management Plans
- Monterey County Water Resources Agency (MCWRA) Groundwater Extraction Summary Reports
- MCWRA Monterey County Floodplain Management Plan
- Monterey County General Plan and Specific Area Plans
- Regional Water Quality Control Board (RWQCB) plans, including 303(d) List
- Monterey Bay National Marine Sanctuary (MBNMS) Management Plan
- MBNMS Condition Report
- US Census decennial population data
- US Census/American Community Survey (ACS) five-year economic survey data
- Association of Monterey Bay Area Governments (AMBAG) economic reports
- Monterey County Agricultural Commissioner Crop Reports
- Research and technical studies conducted by local academic institutions and environmental consultants

The chapter includes a brief description of each of the technical sources used to understand and project water management needs in the Greater Monterey County IRWM planning region, and an explanation for why this technical information is representative and adequate for developing the IRWM Plan.

## **Section N: Relation to Local Water Planning**

The intent of the Relation to Local Water Planning standard in the Proposition 84/1E IRWM Program Guidelines is to ensure that the IRWM Plan is congruent with local plans and that the IRWM Plan 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 Greater Monterey County RWMG has coordinated its water management planning activities to address or incorporate all or part of the following:

- Local water supply management planning including:
  - Groundwater management
  - Water supply assessments
  - Urban water management
  - Agricultural water management
- Other water resource management planning including:
  - Flood management
  - Watershed management
  - Stormwater management
  - Low impact development (LID)
  - Salt and salinity management
- Other planning efforts including:
  - City and County general planning
  - Emergency response and disaster plans
  - Monterey Bay National Marine Sanctuary Management Plan

All of the data and information contained in this IRWM Plan will be reviewed and updated approximately every five years, depending on available funds, as part of the formal Plan update. Accordingly, the IRWM Plan updates will reflect the latest planning efforts and most recent editions of the local planning documents.

## **Section O: Relation to Local Land Use Planning**

The effort to link land use decisions and water management decisions remains an area of challenge in the Greater Monterey County IRWM region as it does in many other regions of the state. This chapter provides examples of how water resource managers currently communicate with land use planners in the Greater Monterey County IRWM region. Since communication patterns seem to be similar amongst entities with similar jurisdictions, the chapter has been organized 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
- Smaller, more rural communities
- Agencies with regional jurisdiction

The level of communication and coordination between land use planners and water resource managers

varies quite significantly amongst entities. A higher level of communication and coordination seems to exist between entities that operate on a regional scale than between those that operate more locally. Opinions also vary as to the level of exchange desired, with some water resource managers (typically those in rural areas where development pressures are minimal) preferring to manage their water supplies without “input” (perceived constraints) from outside agencies, and other water managers expressing a strong desire and need for increased coordination with land use planning agencies.

While the level of coordination between land use planners and water managers varies considerably in the Greater Monterey County IRWM region from entity to entity, and from the local level to the regional level, 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, including: convening monthly or quarterly joint planning meetings; organizing an annual water resource planning forum, or a one-time collaboration workshop; developing a “User’s Guide to the Water and Land Management Organizational Landscape”; and encouraging water managers and land use planners in the region to take greater advantage of their websites for the purpose of disseminating and sharing information.

## **Section P: Stakeholder Involvement**

The Stakeholder Involvement chapter describes the protocols used for stakeholder involvement in the Greater Monterey County IRWM region, including the process used to identify stakeholders, the process used to communicate with stakeholders, special outreach to disadvantaged communities (DACs) and Native American tribes, and how stakeholders can participate in the IRWM planning process.

A website has been developed to facilitate communication with stakeholders about the Greater Monterey County IRWM Plan process (<http://www.greatermontereyirwmp.org/>). Stakeholders are informed of IRWM Plan developments through website postings, email notices, and where email capability is lacking, personal communication.

Stakeholders can participate directly in the IRWM planning process through attendance at regularly scheduled RWMG meetings, which are open to the public and announced on the website. In addition, stakeholders can participate by attending public workshops and by providing written during public comment periods. Minimum 30-day public comment periods are held for every IRWM Plan “milestone,” including: goals and objectives; project ranking system; ranked project lists; and the Draft IRWM Plan. Stakeholders are occasionally asked directly to assist the RWMG in its decision-making process; for example, regional “experts” were asked to provide input during information gathering for “issues and conflicts,” and several non-RWMG water resource managers and other experts were asked to help review project proposals during the first (2010) project solicitation.

Special effort has been made to encourage the participation of DACs in the Greater Monterey County IRWM planning process and to ensure that their water resource needs are considered and addressed. DACs are defined as communities with annual median household incomes (MHI) that are less than 80 percent of the statewide MHI (the California MHI was \$60,883 in 2010, according to the 2006-2010 American Community Survey [ACS] conducted by the US Census Bureau). According to US Census data, four DACs have been identified in the Greater Monterey County IRWM region: Boronda, Castroville, Chualar, and San Ardo. A tract-level search using 2006-2010 ACS data identified additional DAC areas outside of these communities. These include 20 census tract areas, primarily in or near the cities of Salinas, King City, Gonzales, and Marina, and in the McClosky Slough area north of Moss Landing.

The Greater Monterey County RWMG has made a concerted effort to ensure that the water resource management needs and interests of DACs are fully addressed in the IRWM Plan. Two organizations, the Environmental Justice Coalition for Water (EJCW) and the San Jerardo Cooperative, were asked to participate in the RWMG specifically to represent DAC interests. They were joined in this effort by the Rural Community Assistance Corporation (RCAC) in late 2011. Including three organizations on the RWMG that proactively represent the interests of DACs and environmental justice communities helps ensure that the IRWM planning process remains sensitive to the unique needs of these communities. The RWMG also makes a special effort to include local Native American Tribal members in the IRWM planning process.

## **Section Q: Coordination**

The intent of the Coordination standard in the Proposition 84/1E IRWM Program Guidelines is to ensure that RWMGs: coordinate their activities with local agencies and stakeholders to avoid conflict within the region and to best utilize resources; are aware of adjacent planning efforts and are coordinating with adjacent RWMGs; and are aware of state, federal, and local agency resources and roles in the implementation of their plans and projects. This chapter describes how the IRWM planning effort in the Greater Monterey County IRWM region addresses that standard.

### ***Coordination of Activities within the Region***

The coordination of IRWM-related activities and efforts between the RWMG and project proponents and stakeholders in the Greater Monterey County IRWM planning region occurs in several ways. First, the Greater Monterey County IRWM website (<http://www.greatermontereyirwmp.org/>) is a central coordinating tool for the IRWM planning effort. It is the “go to” place for project proponents and stakeholders to learn about IRWM planning, read the latest news, review projects that are included in the IRWM Plan, and find resources about related efforts in the region. Secondly, the RWMG has been working with the Central Coast RCDs to develop and utilize a new database (Conservation Action Tracker) as a way to track water resource projects within the Greater Monterey County region. This online tool will allow the RWMG and stakeholders to track efforts and improve their ability to evaluate collective impacts and effectiveness of IRWM Plan projects. Finally, a type of “project coordination” occurs during each new IRWM Plan project solicitation. The Project Review Committee reviews each and every project for potential integration opportunities, with an aim of combining discrete project elements or combining entire projects to create regional programs.

### ***Coordination with Neighboring IRWM Regions***

The Greater Monterey County IRWM region shares borders with three other IRWM planning regions: the Pajaro River Watershed region to the north, the Monterey Peninsula region, and the San Luis Obispo County region to the south. Collaborative efforts have been undertaken to ensure that projects for each of the regions are well understood and coordinated where overlapping interests may exist now and in the future. This section describes how the Greater Monterey County RWMG coordinates specific IRWM planning efforts with each of these adjacent regions. The section also describes ongoing coordination efforts between the six IRWM regions within the Central Coast Funding Area.

### ***Coordination with Agencies***

The Greater Monterey County RWMG is composed of a diverse mix of agencies, organizations, nonprofit organizations, educational institutions, and interest groups, including several federal, state and local government agencies and districts. The participation of these agencies and local districts on the RWMG 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 either the planning or the implementation stage of the IRWM Plan. Additionally, the Greater Monterey County RWMG has entered into 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 in this section.

## **Section R: Climate Change**

The intent of the Climate Change standard in the Proposition 84/1E 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 global climate change and its anticipated impacts for the Greater Monterey County region, including an initial 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.

### ***Climate Change Overview***

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. 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). IPCC scientists predict that the serious consequences of climate change will continue to grow and expand. The rapid and unprecedented increase in surface temperature is accelerating the planet's water cycle, which will make extreme storms and droughts more frequent and severe (U.S. Global Climate Research Program 2009). These events will likely disrupt and damage food and fresh water supplies. The extreme increases in temperature to come will continue to melt portions of the Greenland ice shelf and cause the oceans to thermally expand, both of which will raise the average level of all oceans. This continuing rise in sea level will have multiple effects, including coastline destruction, the displacement of major population centers, and economic disruption.

### ***State Response to Climate Change: Legislation and Policy***

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. This section describes some of the more significant pieces of legislation and policy that have been enacted by the State in response to climate change.

### ***Predicted Effects of Climate Change***

Climate change models predict changes in temperature, precipitation patterns, water availability, and sea levels, and these altered conditions can have severe 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 year. A study conducted by the Pacific Institute in 2009 claimed that, “Rising sea levels will be among the most significant impacts of climate change to California” (Heberger et al. 2009). Monterey and Santa Cruz counties were identified as the two counties most vulnerable to flood-related risks of sea level rise in California in terms of population, due to the vast low lying areas of the Pajaro and Salinas valleys. In addition, Monterey County, along with 12 other coastal counties, is expected to see a disproportionate impact of sea level rise on DACs.

The changes in sea levels, temperature, and precipitation from global climate change that are anticipated to occur with climate change will affect California’s public health, habitats, ocean and coastal resources, water supplies, agriculture, forestry, and energy use (California EPA 2010), and result in increased droughts and flooding. Climate change could 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. Climate change is also 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.

An online modeling tool called “Cal-Adapt” was used to project changes in various climate variables that may affect water resources within the Greater Monterey County IRWM planning area. The model shows emissions scenarios A2 (High Emissions Scenario) and B1 (Low Emissions Scenario) for temperature changes and rainfall changes in four areas of the Greater Monterey County IRWM region. In addition, sea level rise and possible changes in fog patterns are also discussed.

#### *Predicted Impacts of Climate Change in the Greater Monterey County Region*

This section provides 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 Greater Monterey County region. The section also provides a more detailed discussion of potential impacts of climate change in the Monterey Bay region, as presented at a December 2011 regional workshop called “Preparing for the Future: Climate Change and the Monterey Bay Shoreline.” The discussion focuses on the impacts of coastal erosion, coastal inundation, seawater intrusion, and coastal storms and waves.

#### *Evaluating the Adaptability of Water Management Systems in the Region to Climate Change*

The RWMG conducted an initial climate impact risk assessment to help water resource managers evaluate these risks and to consider potential adaptation measures. Table R-6, “Climate Impact Risk Analysis,” shows results based on consequences for five socio-economic factors (including public safety, local economy and growth, community and lifestyle, environment and sustainability, and public administration); and Table R-7, “Environmental Resource-focused Climate Impact Risk Analysis,” shows results based on consequences to environmental factors alone. Table R-8, “Determining Priority Impacts” illustrates an initial “priority impact” assessment based on these risk analyses, which the RWMG can use to prioritize implementation actions and future studies. The climate risk analyses and priority impact assessment indicate the following climate risks to be top priority for the RWMG and other water managers in the Greater Monterey County 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.

### ***Initial Adaptation Strategy***

To develop an adaptation strategy for the Greater Monterey County IRWM region, adaptation actions and response scenarios from the California Natural Resources Agency's *2009 California Climate Adaptation Strategy* were selected for the Greater Monterey County region. High priority responses along with climate mitigation actions are listed in Table R-10, "Adaptation and Response Strategies Based on Risk Assessment." The "high priority responses" were prioritized by the Climate Task Force according to the risk assessment described above and in accordance with the objectives of the IRWM Plan.

The prioritized list of adaptation actions is considered a first step toward developing a comprehensive adaptation strategy for the Greater Monterey County IRWM planning region to address the impacts of climate change. The adaptation and climate mitigation actions will be further evaluated by the RWMG in collaboration with the Climate Task Force 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.

### ***Future Studies and Regional Needs***

The Climate Task Force has agreed that future research and program funds should be directed towards the three priority climate risk areas noted above. Future IRWM Plan projects should strive to help fill data gaps and promote the priority response strategies and initial actions. To ensure that the momentum developed by the Climate Task Force towards climate resilience planning was not lost, the Central Coast Wetlands Group at Moss Landing Marine Laboratories submitted an implementation project proposal for the IRWM Plan (2012). The project is intended to provide resources to regional partners to compile the necessary information needed to understand the region's adaptive capacity to mitigate impacts associated with the priority climate risk factor, *Coastal inundation of urban development, other land uses, and impacts to river and wetland ecosystems*.

### ***Climate Change Mitigation and GHG Emissions Reduction Strategy***

A full GHG emissions reduction strategy for the region will be created by Monterey County in the near future to meet State mandates (AB 32, CEQA). In the meantime, several effective GHG reduction strategies can be addressed by the IRWM Plan and the projects funded and managed by this working partnership. 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, and are listed in this section. The recommended GHG reduction and climate mitigation actions will be further evaluated by the RWMG, with substantial input from a Climate Task Force made up of local scientists and water managers, to define possible next steps, responsible entities, and funding resources.

### ***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 are briefly described in this section.

## Introduction

Integrated regional water management is a relatively new approach to water resource management in California. It is an approach that is being strongly promoted by State water managers and legislators as a way to increase regional self-sufficiency, encouraging local water resource managers to take a proactive, leadership role in solving water management problems on a local level through collaborative regional planning. This regional approach is considered absolutely necessary in order for water managers to be able to cope with the impending water management challenges ahead.

The *California Water Plan* is the State's blueprint for managing water resources. Updated every five years, the *California Water Plan* provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. The *California Water Plan Update 2009* identifies the most pressing water management issues and challenges faced statewide, and provides recommendations (in the form of 13 objectives and over 115 related actions) to help ensure California's sustainable water use and reliable water supplies through the year 2050 and on for future generations. The authors of *California Water Plan Update 2009* write with a certain sense of urgency:

*California is facing one of the most significant water crises in its history... We must adapt and evolve California's water systems more quickly and effectively to keep pace with ever changing conditions now and in the future. Population is growing while available water supplies are static and even decreasing. Climate change, as evidenced by changes in snowpack, river flows, and sea levels, is profoundly impacting our water resources. The Delta and other watersheds and ecosystems continue to decline. The state's current water and flood management systems are increasingly challenged by legal remedies and regulatory protections, with economic and societal consequences. The entire system—water and flood management, watersheds, and ecosystems—has lost its resilience and is changing in undesirable ways.* (vol. 1, p. 2-5 and p. 2-26)

Planning for and adapting to the effects of climate change, in particular, “will be among the most significant challenges facing water and flood managers this century” (ibid., vol. 1, p. 2-9). While the exact conditions of future climate change remain uncertain, the effects of climate change on hydrology (snowpack, river flows), storm intensity, temperature, winds, and sea levels are already evident in California. The average early spring snowpack in the Sierra Nevada decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage, and sea level rose 7 inches along California's coast (vol. 1, p. 4-36). The authors conclude: “For more than 200 years, California water and flood management systems have provided the foundation for the state's economic vitality, providing water supply, sanitation, electricity, recreation, and flood protection. However, the climate patterns that these systems were designed for are different now and may continue to change at an accelerated pace. These changes collectively result in significant uncertainty and peril to water supplies and quality, ecosystems, and flood protection; and our water systems cannot be operated as they were originally designed” (vol. 1, p. 2-9).

Integrated regional water management offers an approach for managing the uncertainties that lie ahead. While the traditional approach to water resource management has typically involved separate and distinct agencies managing different aspects of the water system, i.e., water supply, water quality, flood management, and natural resources, integrated regional water management considers the hydrologic system as a whole. The IRWM planning process brings together water and natural resource managers, along with other community stakeholders, to collaboratively plan for and ensure the region's continued water supply reliability, improved water quality, flood management, and healthy functioning

ecosystems—allowing for creative new solutions, greater efficiencies, and an increased promise of long-term success.

In 2008 the Association of California Water Agencies (ACWA) developed a set of policy principles for environmental and economic sustainability, including the following five overriding principles (ibid., vol. 1, p. 5-21):

- Reliable, adequate water supplies and a healthy ecosystem must be primary co-equal goals for sustainable water management.
- Sustainable solutions will require comprehensive programs that combine substantial investments in ecosystem enhancement and water supply infrastructure.
- Providing reliable, high quality water supplies remains the primary mission of ACWA’s public agency members.
- Water investment and management decisions must recognize that investing in an environmentally sustainable system serves the economic interests of water users statewide.
- New investments are required to progress toward sustainability and adapt to changing environmental conditions like climate change.

The ACWA developed these principles because “ACWA member agencies believe that California’s water policies today are unsustainable” (ibid.). The IRWM planning approach represents an effort to make California’s water policies more sustainable. IRWM planning recognizes the critical link between water supply reliability and healthy ecosystems, and seeks to manage these systems in a way that is adaptive to changing conditions and sustainable for future generations.

## **LEGISLATIVE BACKGROUND**

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, administered jointly by the State Water Resources Control Board (SWRCB) and the Department of Water Resources (DWR). The purpose of the IRWM Program is to “encourage integrated regional strategies for management of water resources and to provide funding, through competitive grants, for projects that protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water.” Proposition 50 authorized \$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.” 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 State 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 California’s drinking water supply system by rebuilding delta levees that are vulnerable to earthquakes and storms.

In order to be eligible for IRWM grant funds through Proposition 84 or Proposition 1E, a project must be contained within an adopted IRWM Plan. According to the California Water Code §10540(c), an IRWM Plan must address at a minimum all of the following:

1. Protection and improvement of water supply reliability, including identification of feasible

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

This IRWM Plan has been developed for the Greater Monterey County region to fulfill the goals of IRWM planning in our region, and as a prerequisite for obtaining IRWM grant funding through Propositions 84 and 1E for regional planning and project implementation. This Plan may also serve as a basis for obtaining grant funds through other sources, such as the federal Clean Water Act Section 319 Nonpoint Source Implementation Program, the U.S. Bureau of Reclamation's Title XVI Program, and other federal, state, and private funding programs.

#### **EVOLUTION OF THE GREATER MONTEREY COUNTY IRWM PLAN**

To meet requirements for the Proposition 50 IRWM Grant Program, six IRWM Plans were initially developed within the Central Coast region:

- Pajaro River Watershed IRWM Plan (May 2007)
- Monterey Peninsula, Carmel Bay and South Monterey Bay IRWM Plan (November 2007, amended March 2009)
- Salinas Valley IRWM Functionally Equivalent Plan (May 2006, amended October 2008)
- Northern Santa Cruz County IRWM Plan (October 2005)
- San Luis Obispo County IRWM Plan (December 2005, amended July 2007)
- Santa Barbara Countywide IRWM Plan (May 2007)

The first three plans covered geographic areas within Monterey County. Together these plans represented most of the Salinas Valley, all of the Pajaro River watershed, all of the Carmel River and San Jose Creek watersheds, and the Monterey Peninsula. However, many key areas of Monterey County were not represented within any of these plans, creating significant coverage voids for the purposes of IRWM planning and project implementation. These areas include, specifically: the Big Sur coastal watersheds and communities on the western side of the Santa Lucia Range, from Pt. Lobos south to the San Luis Obispo County line; the larger Salinas River watershed from the Salinas River National Wildlife Refuge at the Pacific Ocean south to the San Luis Obispo County line and including the east and west ranges of the valley (including a small portion of western San Benito County); and the Gabilan watershed.

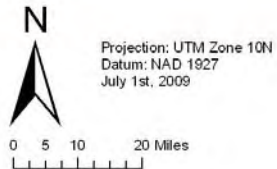
In February 2008, representatives of the Central Coast IRWM regions decided that the Salinas Valley IRWM Functionally Equivalent Plan (FEP) region should be expanded and an entirely new region created for the purposes of IRWM planning and implementation. The proposed new region—the Greater Monterey County IRWM region—would address IRWM plan coverage voids in Monterey County and would bring previously underrepresented areas into the IRWM planning process, including such key areas

as the Big Sur coastal watersheds, the larger Salinas watershed, the Gabilan watershed, and parts of northern Monterey County. The maps on the following page illustrate the change in geographic coverage from the Salinas Valley IRWM planning region to the Greater Monterey County IRWM planning region.

This IRWM Plan for the Greater Monterey County region supersedes and replaces the Salinas Valley IRWM FEP, and meets all requirements established by Proposition 84 and Proposition 1E as specified in the Integrated Regional Water Management Grant Program Guidelines, Appendix C: Guidance for IRWM Plan Standards (DWR 2010, and DWR 2012). This Plan is intended to be a living document that will be updated and amended as needed to meet the changing conditions in the region as well as the changing legislative standards of the State's IRWM Grant Program.

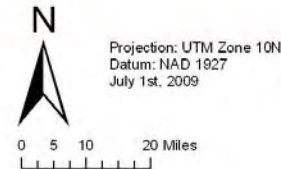


**Figure Intro-1:** Change in geographic coverage from the Salinas Valley IRWM planning region to the Greater Monterey County IRWM planning region:



**Central Coast IRWMP Regions**

- Salinas Valley FEP
- Monterey Peninsula, Carmel Bay and South Monterey Bay
- Northern Santa Cruz County
- Pajaro River Watershed
- San Luis Obispo County
- County lines
- Water bodies



**Central Coast IRWMP Regions**

- Greater Monterey County
- Monterey Peninsula, Carmel Bay and South Monterey Bay
- Northern Santa Cruz County
- Pajaro River Watershed
- San Luis Obispo County
- County lines
- Water bodies

## Section A: Governance

### A.1 DESCRIPTION OF REGIONAL WATER MANAGEMENT GROUP

The Greater Monterey County Regional Water Management Group (RWMG) is the group responsible for development of this Integrated Regional Water Management (IRWM) Plan. According to California Water Code §10539, a RWMG is “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 [IRWM planning], 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.”

Eighteen organizations have come together to form the Greater Monterey County RWMG for the purposes of integrated regional water management planning and project implementation within the Greater Monterey County IRWM region. These organizations were invited to join the RWMG based on the intention to create a diverse and inclusive RWMG with adequate and balanced representation of water resource management issues and geographic areas in the Greater Monterey County IRWM region. The member entities include government agencies, nonprofit organizations, educational organizations, water service districts, private water companies, and organizations representing agricultural, environmental, and community interests, as follows:

Big Sur Land Trust
California State University Monterey Bay
California Water Service Company
Castroville Community Services District
City of Salinas
City of Soledad
Elkhorn Slough National Estuarine Research Reserve
Environmental Justice Coalition for Water
Garrapata Creek Watershed Council
Marina Coast Water District
Monterey Bay National Marine Sanctuary
Monterey County Agricultural Commissioner’s Office
Monterey County Water Resources Agency
Monterey Regional Water Pollution Control Agency
Moss Landing Marine Laboratories
Resource Conservation District of Monterey County
Rural Community Assistance Corporation
San Jerardo Cooperative, Inc.

The Greater Monterey County RWMG includes all of the agencies and organizations necessary to address the objectives involved in the development of the IRWM Plan. Seven of the 18 RWMG organizations have statutory authority over water supply and/or water management within the Greater Monterey County region: Castroville Community Services District, City of Salinas, City of Soledad, Marina Coast Water District, Monterey Bay National Marine Sanctuary, Monterey County Water Resources Agency, and the Monterey Regional Water Pollution Control Agency. The following provides a brief description of each



RWMG member, their relationship to water management issues, and if applicable, their statutory authority over water supply or water management.

**The Big Sur Land Trust:** The Big Sur Land Trust is a 501(c)3 non-profit organization established in 1978 whose mission it is to conserve the significant lands and waters of California's Central Coast for all generations. Working with private and public partners over the past 30+ years, The Big Sur Land Trust has successfully conserved more than 30,000 acres of shoreline, wildlife habitat, streams, forests, grasslands, rangelands and riparian corridors along the Big Sur Coast, Monterey Bay shoreline, and other special places in Monterey County.

**California State University Monterey Bay:** California State University Monterey Bay is represented on the RWMG by the Watershed Institute, a research and community action institute of the university. The Watershed Institute consists of a coalition of researchers, restoration ecologists, educators, planners, students, and volunteers working together to promote sustainable management of watersheds in the Monterey Bay region and around the world. The Watershed Institute's Central Coast Watershed Studies Team (CCoWS) conducts watershed and ecosystem research at sites throughout the planning region, including stormwater quality monitoring in agricultural, natural, and urban settings, water quality studies, aquatic ecology research, and watershed assessment. The Return of the Natives Restoration Education Project (RON), the education and outreach arm of the Watershed Institute, conducts community-based watershed restoration projects at sites throughout the planning region.

**California Water Service Company:** California Water Service Group is the third-largest publicly traded water utility in the United States. The company provides water utility services to more than two million people in 100 cities through six operating subsidiaries (four of which are regulated by state public utility commissions and two of which are not). The company's largest subsidiary, California Water Service Company (Cal Water), began providing water utility services in the Salinas area in 1962. Cal Water's Salinas District serves more than 130,000 people, delivering approximately 20,000 acre-feet (AF) of groundwater per year through a system that includes 59 wells, 300 miles of main pipeline, and 8.6 million gallons of storage capacity.

**Castroville Community Services District:** The Castroville Water District was formed in 1952 under the County Water District Act for the purpose of installing and operating water supply and distribution system facilities for the community of Castroville. In 2007, the Castroville Water District joined with County Service Area 14 to form the Castroville Community Services District. The District provides water, sewer, and stormwater services to the Castroville community, Monte de Lago, North Monterey County High School and Moro Cojo subdivision, as well as recreation facilities, open space, street lighting, private street maintenance, pest control and abatement services within the district boundaries. The District serves more than 6,800 customers, delivering approximately 1,000 acre-feet/year (AFY) of water, all of which comes from the Salinas Valley Groundwater Basin.

**City of Salinas:** The City of Salinas is the largest city within Monterey County with a population of approximately 150,000 people. The City is a compact urban community within a unique agricultural setting, situated at the northern end of the Salinas Valley. It is also the employment center for Monterey County, supporting approximately one-third of all jobs within the county. The City maintains storm drains and the sewer system, and operates an industrial waste facility for the treatment and disposal of process water from local agricultural industries and others with process water requirements. The City is served by two public water service providers, California Water Service Company and Alco Water Service Company. The City of Salinas is the only Phase I entity for stormwater in the Central Coast Regional Water Quality Control Board (RWQCB) region.

**City of Soledad:** The City of Soledad, incorporated as a general law city in 1921, is located in the southern Salinas Valley approximately 25 miles south of the City of Salinas. The City has no common boundaries with other municipalities and is surrounded completely by unincorporated areas of Monterey County, most of which is agricultural land. The City has a population of about 26,000 people, an estimated 10,000 of which live in one of the two prisons operated by the State Department of Corrections (although they are not contiguous with the rest of the City, the prisons are inside the City limits). The City of Soledad provides a broad range of public facilities and services. The Public Works Department, Water Quality Control Division is responsible for operation and maintenance of the City's water wells and water distribution system, sanitary sewer system and brand new Water Reclamation Facility, and the City's storm drain system.

**Elkhorn Slough National Estuarine Research Reserve:** The National Estuarine Research Reserves System is a network of 27 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. The Elkhorn Slough National Estuarine Research Reserve (ESNERR) is managed by the California Department of Fish and Game (CDFG) and is operated in partnership with NOAA. ESNERR is located on the southeast shore of Elkhorn Slough, one of the relatively few coastal wetlands remaining in California. The 1,400-acre reserve is a hub of activity and hosts programs that promote education, research, and conservation in Elkhorn Slough, with 50,000 visitors annually. Portions of the slough are managed as a State Ecological Reserve and Wildlife Management Area by the CDFG, and the beaches at the mouth of the slough are managed for public access by California State Parks.

**Environmental Justice Coalition for Water:** The Environmental Justice Coalition for Water (EJCW) is a 501(c)3 non-profit organization representing a network of more than 50 grassroots and intermediary organizations. EJCW's mission is to educate, empower, and nurture a community-based coalition that will serve as a public voice and be an effective advocate of environmental justice issues in California water policy. EJCW ensures that policy makers listen to the concerns of community members and holds policy makers accountable for negative impacts caused by certain water policies on low-income communities and communities of color. EJCW has worked on drinking water issues in the Salinas Valley both locally (with communities such as Chualar and the San Jerardo Farmworkers Cooperative) and on a regional basis partnering with community-based organizations and nonprofits such as California Rural Legal Assistance Foundation.

**Garrapata Creek Watershed Council:** The Garrapata Creek watershed is located 10 miles south of Carmel along the Big Sur coast. The total watershed area encompasses about 10.6 square miles of land, 88 percent of which is privately owned. The Garrapata Creek Watershed Council was established in 2000 to protect the natural, cultural, and historical resources of the watershed. The Council completed the *Garrapata Creek Watershed Assessment and Restoration Plan* in 2006, and has been implementing components of the plan since that time.

**Marina Coast Water District:** The Marina Coast Water District (MCWD) is a county water district formed in 1960 and authorized by Division 12 of the California Water Code. The MCWD delivers approximately 4,500 acre-feet per year (AFY) of potable water to 38,000-42,000 customers in the City of Marina and the Ord Community. All of this water is from the Salinas Valley Groundwater Basin. The MCWD currently delivers water to the Ord Community by contract, though they are in the process of annexing that service area. The MCWD operates six wells and owns a desalination plant (currently idle), which has a capacity of 300 AFY.

**Monterey Bay National Marine Sanctuary:** The Monterey Bay National Marine Sanctuary (MBNMS)

was designated in 1992 as a federally protected marine area offshore of California’s Central Coast. The MBNMS encompasses 276 miles of shoreline and 6,094 square miles of ocean, covering everything below the water’s surface from Marin County to Cambria, from the high tide mark to as far as 53 miles offshore. MBNMS’s authority is established by the National Marine Sanctuaries Act (Title 16, Chapter 32, §§1431 et seq.) and extends to activities in coastal watersheds that drain to the Sanctuary and that affect Sanctuary resources. Specifically, MBNMS prohibits or otherwise regulates activities that include discharging or depositing from beyond the boundary of the Sanctuary any material or other matter that subsequently enters the Sanctuary and injures a Sanctuary resource or quality (15 Code of Federal Regulations [CFR] Chapter IX, Subpart M-Monterey Bay National Marine Sanctuary 922.132). This authority applies throughout the entirety of the Greater Monterey County IRWM region, since all of the region’s coastal watersheds ultimately drain to the Sanctuary. During the designation of the MBNMS, eight key water quality agencies within the Sanctuary region entered into a Memorandum of Agreement to provide a cooperative, ecosystem-based water quality management process to help protect the waters of the MBNMS from non-point source pollutants. Today the MBNMS’s Water Quality Protection Program consists of 25 federal, state and local agencies, public and private groups dedicated to protecting and enhancing water quality in the MBNMS and its watersheds.

**Monterey County Agricultural Commissioner’s Office:** The mission of the Monterey County Agricultural Commissioner is to promote and protect agriculture, the environment, and public health and welfare, and to assure consumer and business confidence in the marketplace. Under the authority of the California Department of Food and Agriculture (CDFA), the Agricultural Commissioner’s Office is the local regulatory agency for a number of agricultural programs. Major programs include: plant quarantine and export certification, pest exclusion and detection, pest eradication and management, nursery, seed, apiary, crop statistics, fruit and vegetable standardization, and direct marketing. The Agricultural Commissioner also enforces state weights and measures laws to protect the consumer and maintain equity in the marketplace. Under the authority of the California Department of Pesticide Regulation, the Agricultural Commissioner is responsible for the local enforcement of pesticide use requirements including permitting, inspections and investigations. The Monterey County Agricultural Commissioner is also an Accredited Certifying Agency of the National Organic Program. The Monterey County Agricultural Commissioner provides the RWMG with expertise on a wide range of regulatory and technical matters related to agriculture.

**Monterey County Water Resources Agency:** The Monterey County Water Resources Agency (MCWRA) is responsible for managing, protecting, and enhancing water supply and water quality, as well as providing flood protection, in the County of Monterey. 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 and its mandate was updated to provide for the control of flood and stormwaters, conservation of such waters through storage and percolation, control of groundwater extraction, protection of water quality, reclamation of water, exchange of water, and the construction and operation of hydroelectric power facilities. MCWRA operates the Nacimiento and San Antonio Reservoirs for flood management and water supply (groundwater recharge) purposes. MCWRA also operates a distribution system that delivers approximately 13,300 AF of recycled water to approximately 12,000 acres of agricultural land in the northern Salinas Valley. MCWRA has published a county-wide flood management plan and reviews hydrological data, oversees structural development, and implements land use regulations to reduce the risk of flooding. The MCWRA also performs groundwater elevation and ground and surface water quality monitoring. MCWRA was the lead agency in developing the Salinas Valley IRWM Functionally Equivalent Plan.

**Monterey Regional Water Pollution Control Agency:** The Monterey Regional Water Pollution Control Agency (MRWPCA) is a joint powers agency formed in 1972 to provide wastewater collection and

treatment. MRWPCA member communities that lie within the Greater Monterey County IRWM region include the Ord Community, Marina, Castroville, Moss Landing, Boronda, Salinas and some unincorporated areas in northern Monterey County (MRWPCA also serves the communities of Pacific Grove, Monterey, Del Rey Oaks, Seaside, and Sand City). MRWPCA is governed by a Board of Directors representing each of the jurisdictions that it serves. The agency operates a regional wastewater treatment plant located two miles north of Marina and maintains 25 pump stations connected to the treatment plant. MRWPCA also operates the water recycling facility at the Regional Treatment Plant and manages the distribution system under contract from the MCWRA. The recycling operations provide irrigation water to 12,000 acres of Castroville farmland.

**Moss Landing Marine Laboratories:** Moss Landing Marine Labs, established in 1966, hosts and administers an interdisciplinary Master of Science Degree in Marine Science for seven California State University campuses: Fresno, East Bay, Sacramento, San Francisco, San Jose, Monterey Bay and Stanislaus. It is the second oldest marine laboratory on Monterey Bay, serving approximately 120 students. Since the early 1990s Moss Landing Marine Labs has participated in the development of water quality management and wetland restoration activities that enhance coastal resources and reduce human impacts on the marine environment. The Moss Landing Marine Lab Restoration Group and Central Coast Wetlands Group have provided technical assistance to study these dynamic systems. They have developed numerous habitat management and restoration plans, have implemented numerous restoration activities and have helped build an infrastructure of local scientists working collaboratively to protect and restore aquatic resources within the Monterey Bay area.

**Resource Conservation District of Monterey County:** The Resource Conservation District (RCD) of Monterey County was established in 1942 as a non-regulatory special local district, authorized under Division 9 of California Public Resources Code. The RCD's mission is to conserve and improve natural resources, integrating the demand for environmental quality with the needs of agricultural and urban users. The RCD of Monterey County has been at the forefront of collaborative, watershed-based natural resource management and protection in Monterey County and the Central Coast. 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, including assistance with conservation planning and design, project funding, permitting, and implementing management practices. During the past 10 years, RCD/NRCS teamwork has resulted in the establishment of voluntary conservation and restoration projects on over 80 farms by collaborating with over 160 farmers and land managers. The RCD also works with local researchers to develop new ways to improve water quality and to evaluate the effectiveness of management practices.

**Rural Community Assistance Corporation:** RCAC is a nonprofit organization that provides technical assistance, training, and financing to rural, disadvantaged communities to help them achieve their goals and visions. RCAC's work encompasses a wide range of services including environmental infrastructure; affordable housing development; economic and leadership development; and community development finance. RCAC's services are generally available to disadvantaged communities with populations of 10,000 or fewer, as well as tribal communities. Headquartered in West Sacramento, California, RCAC serves rural communities in 13 western states including Hawaii and Alaska and is part of a national nonprofit network called Rural Community Assistance Partnership. RCAC has been working closely with the San Jerardo Cooperative over the past several years regarding their drinking water issues and has been actively assisting them with their wastewater needs (including the Round 1 Proposition 84 Implementation Grant wastewater project).

**San Jerardo Cooperative, Inc.:** San Jerardo is a cooperative housing complex for low-income farm working families, located seven miles southwest of Salinas. The Cooperative was built in the 1970s and currently houses 64 families. Over the past two decades, the community had suffered from serious

drinking water, wastewater, and human health concerns. Extremely high concentrations of nitrates and 1,2,3-trichloropropane in the drinking water were determined to be a public health risk, requiring intervention by the courts and Monterey County. In November 2010 the Cooperative received a new drinking water system. However, the community's drinking water supply continued to be threatened due to discharges of nitrate, trichloropropane, and other pollutants released from the community-owned wastewater treatment system. The Cooperative recently received grant funds through the Proposition 84 IRWM Implementation Grant program to install much-needed repairs to the wastewater treatment facility. Through their efforts to gain safe drinking water and adequate wastewater treatment, San Jerardo community members have become experts on drinking water contamination, and have agreed to act as a representative on the RWMG for disadvantaged communities in the Salinas Valley.

The table on the following page summarizes the water resource and geographic areas represented by members of the RWMG.

**Table A-1: RWMG Members: Water Resource Management and Geographic Areas Served**

<b>RWMG Member</b>	<b>Water Supply</b>	<b>Water Quality</b>	<b>Wastewater Treatment</b>	<b>Flood Management</b>	<b>Environmental Resource Protection</b>	<b>Agricultural Interests</b>	<b>Land Use Planning</b>	<b>Environmental Justice</b>	<b>Geographic Areas Represented in Region</b>
The Big Sur Land Trust					x				Entire region
CSUMB Watershed Institute		x			x			x	Entire region
California Water Service Co.	x	x							Salinas Valley
Castroville Community Services District	x	x							Castroville area (northern Salinas Valley/northern coast)
City of Salinas		x	x	x			x		City of Salinas (northern/central Salinas Valley)
City of Soledad	x	x	x	x			x		City of Soledad (southern Salinas Valley)
Elkhorn Slough National Estuarine Research Reserve		x			x				Elkhorn Slough (northern coast)
Environmental Justice Coalition for Water		x						x	Entire region
Garrapata Creek Watershed Council		x			x				Garrapata Creek watershed (Big Sur)
Marina Coast Water District	x	x							Marina and Ord Community (northern Salinas Valley/northern coast)
Monterey Bay National Marine Sanctuary		x			x				Entire region (mean high water, with education and outreach in the watersheds)
Monterey County Agricultural Commissioner's Office						x			Entire region
Monterey Regional Water Pollution Control Agency	x	x	x						Several cities and unincorporated areas in Monterey County
Resource Conservation District of Monterey County		x			x	x			Entire region
Monterey County Water Resources Agency	x	x		x		x			Entire region
Moss Landing Marine Laboratories		x			x				Entire region
Rural Community Assistance Corporation								x	Entire region
San Jerardo Cooperative, Inc.		x						x	San Jerardo (Salinas Valley)



## **A.2 GOVERNANCE STRUCTURE AND PROCESS**

### **A.2.1 Description of Governance Structure**

Members of the RWMG have entered into a Memorandum of Understanding (MOU) to acknowledge cooperative efforts in the planning region and to form an institutional structure to develop and implement an IRWM Plan (the MOU and bylaws can be found in the Appendices). The MOU and bylaws formalize the collaborative planning effort, describe the level of participation expected of RWMG members, and outline a process for completing the IRWM Plan and for making amendments in the future. RWMG members share joint responsibilities for ensuring effective and comprehensive IRWM planning and implementation for the region, including development and update of the IRWM Plan, administration and financial support for the IRWM program, project implementation and data management, and continued IRWM planning beyond the State IRWM Grant Program. The RWMG meets on a monthly basis.

Leading the RWMG in development of the IRWM Plan and the overall IRWM planning effort is the IRWM Plan Coordinator. The IRWM Plan Coordinator is a non-voting member of the RWMG and an independent consultant, supported through a combination of private grant funds, State IRWM Planning Grant funds, and RWMG member contributions. The IRWM Plan Coordinator is responsible for leading the RWMG through every step of the IRWM planning process as outlined in the Proposition 84 and 1E IRWM Program Guidelines, and overseeing the planning process to ensure it meets both the letter and spirit of the original legislation. The IRWM Plan Coordinator's responsibilities include, among other things, conducting the monthly RWMG meetings, convening subcommittees, and generally facilitating decision-making on the part of the RWMG to achieve IRWM Plan "milestones"; communicating with stakeholders to keep them informed of IRWM events and to ensure fair and inclusive representation in the planning process; writing and updating the IRWM Plan (with input and oversight from the RWMG and stakeholders); acting as liaison between the Greater Monterey County RWMG and the Department of Water Resources (DWR), and other RWMGs in the Central Coast Funding Area and state; and conducting regular IRWM Plan performance and monitoring activities.

It is recognized that composition of the RWMG will change over time. Incorporation of new members will be decided on a case-by-case basis by a simple majority vote of the RWMG, with the general understanding that a new entity will be considered for inclusion only if such inclusion would result in a more balanced representation on the RWMG of geographic regions, disadvantaged communities (DACs), or water resource management interests within the Greater Monterey County IRWM region.

### **A.2.2 Decision-making**

The RWMG represents a diverse and balanced group of entities involved in (or directly affected by) water resource or watershed management, representing all major geographic areas within the region. Decision-making has proven to be a cooperative and collaborative process throughout the development of this IRWM Plan. The RWMG also ensures public involvement in its decision-making processes through various means, including:

- Regular email updates to stakeholders on the IRWM planning process
- A regularly updated website, that includes the latest news and events, dates and locations of RWMG meetings, contact information, and all significant IRWM-related documents (<http://www.greatermontereyirwmp.org/documents/minutes/>)
- Public comment periods on all major IRWM Plan "milestones"
- Public workshops



In addition, stakeholders are always invited to participate in the monthly RWMG meetings, and meeting minutes are posted on the website following each RWMG meeting. Please see Section P, Stakeholder Involvement, for a full description of public involvement in the RWMG’s decision-making process.

The Greater Monterey County 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. The protocols for decision-making are clearly outlined in the RWMG Bylaws (Appendix C).

The RWMG has been created to be a “working” group, with RWMG members expected to actively participate in the monthly RWMG meetings and on committees. Committees are convened as needed to assist the RWMG with all aspects of plan development, with IRWM Plan project solicitations, and with ongoing IRWM planning. Any RWMG member can volunteer to participate on any committee. The term of commitment varies; most committees disband after the specified task is achieved, but in the case of ongoing committees (such as the Funding Committee), the term of commitment is decided on a case-by-case basis. The RWMG approves the creation of committees during regularly scheduled RWMG meetings (i.e., in public meetings), and committees always bring recommended actions back to the RWMG for approval via formal vote of the RWMG. The following provides an example and overview of some of the committees convened during the development of this Plan:

- ***Issues and Conflicts Committee:*** The Issues and Conflicts Committee spent several weeks (May – July 2009) interviewing local water resource management experts on matters related to water supply, water quality, flood management, and natural resources in order to gain an understanding of the most significant water resource management issues for the region. In addition, public workshops were held in two different locations (Big Sur and Soledad, in September 2009) to obtain stakeholder input regarding their perception of issues and conflicts in the region. The committee considered all of these sources and developed a summary of the issues and conflicts in the region based on that information. The RWMG discussed the recommendations of the committee and voted to approve a final list of “issues and conflicts” at the October 2009 RWMG meeting.
- ***Goals and Objectives Committee:*** A committee was convened in July 2009 to identify goals and objectives for the purpose of IRWM planning in the Greater Monterey County region. The committee used the list of “issues and conflicts” as the basis for developing the initial goals and objectives. Stakeholders were given ample opportunity to provide comments (via a 30-day public comment period, which was extended an additional three months) and after prolonged discussion, the RWMG voted to approve the final goals and objectives at the March 2010 RWMG meeting. Following the release of the Proposition 84 & 1E IRWM Guidelines in August 2010, a second committee was convened to re-assess the goals and objectives in light of the new guidelines and to make the objectives more measurable. Following a 30-day public comment period, the final goals and objectives were approved by the RWMG in September 2011.
- ***Project Ranking Committee:*** In 2010 for the first round of IRWM Plan projects, a Project Ranking Committee was convened to develop a system for ranking projects that was fair and objective, that clearly reflected the goals and objectives of the region, and that adequately took into consideration IRWM program preferences in order to ensure regional competitiveness for

State IRWM funds. Stakeholders were given an opportunity to provide input into the draft project ranking system via a 30-day public comment period. The RWMG voted to approve the project ranking system, with an allowance for ongoing “adaptive management,” at the May 2010 RWMG meeting. The RWMG has subsequently added minor revisions to this project ranking system, informed by the experience of having prioritized the first (2010) group of IRWM Plan projects and also by having gone through the application process in Round 1 for Proposition 84 IRWM Implementation Grants (2011). The revised project ranking system was subject to a minimum 30-day public comment period and was approved by the RWMG at the September 2011 RWMG meeting.

- ***Project Review Committee:*** For the first IRWM Plan project solicitation in 2010, four separate Project Committees were created to review project proposals according to the primary water resource focus of each project – water supply, water quality, flood/watershed management, or natural resources. These committees consisted of RWMG members plus various experts from the local community in each of these water resource fields (including resource managers, research scientists, farmers, and other specialists). The role of the Project Committees was essentially to ensure that projects were consistent with laws, regulations, and local plans, to review the projects for technical feasibility, costs, and soundness, and to provide feedback both to project proponents and to the RWMG regarding any concerns, recommendations for strengthening or further developing the projects, and/or overall evaluation. After this first review, the projects were then sent to an “Integration Committee,” comprised of members from each of the four Project Committees, whose task it was to seek further opportunities for project integration. This process (involving four Project Committees plus an Integration Committee) worked well but was extremely labor intensive and time consuming. In 2011 for the second IRWM Plan project solicitation, the RWMG decided to simplify the process and create just one Project Review Committee, comprised solely of RWMG members, whose responsibility it was to both review and rank the projects (according to a RWMG-approved ranking system), and then identify potential opportunities for integration. This system has proven to be much more efficient, and will continue to be used for future IRWM Plan project solicitations.
- ***IRWM Plan Draft Review Committee:*** This committee, consisting of RWMG members, worked with the IRWM Plan Coordinator to review and revise drafts of the IRWM Plan before submitting them to the full RWMG and to stakeholders for comment and review.
- ***Funding Committee:*** The Funding Committee is an ongoing committee made up of RWMG members. The committee is responsible for determining: 1) ongoing funding of the IRWM Plan and IRWM planning process over time; and 2) potential funding sources for IRWM Plan projects beyond IRWM grants, including federal, other state, and private funding sources.

### **A.2.3 Effective Communication**

The Greater Monterey County RWMG governance structure fosters effective communication both within the RWMG and outside of the RWMG with stakeholders, IRWM Plan 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 Coordinator works to ensure that stakeholders, project proponents, and the general public are well informed of the latest Greater Monterey County IRWM activities and accomplishments. The IRWM Plan Coordinator 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 Coordinator so that stakeholders can voice their comments, concerns, or questions about the IRWM planning process. The Plan Coordinator will also send this information via US Post for any stakeholders who do not have email access.

The RWMG communicates with federal and state government agencies as needed, with some of those agencies serving as members of the RWMG and as such, able to act in an advisory role. In July 2009, several members of the RWMG met with the Secretary of Natural Resources Agency, John Laird, to keep him informed about the Greater Monterey County IRWM planning process and to discuss opportunities for improving the process on a State level. In addition, 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. Please see Section Q, Coordination, for a more detailed description of how the RWMG communicates with neighboring regions and government agencies.

#### **A.2.4 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.

An informal review of the IRWM Plan will occur with each IRWM Plan project solicitation, which is expected to occur on an annual basis or at minimum with each successive IRWM Implementation Grant solicitation. The informal review will consist of a re-assessment and update of 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 informal 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 the bylaws.

Formal plan review may include a review and re-assessment of RWMG composition, regional boundaries, and other “big picture” issues related to IRWM planning in the Greater Monterey County region. A formal 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 entirely on whether adequate funding is available.

Finally, a Plan Performance Review will occur on an approximately bi-annual basis. 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 (as described in Section J, Plan Performance and Monitoring). Project data from all projects implemented through the Plan will be tracked using the data management system as described in Section K, 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.

### **A.3 ADOPTION OF THE PLAN**

A notice of intention to prepare the Plan, and then a notice of intention to adopt the Plan, was published in accordance with §6066 of the Government Code. Each of the RWMG members have accepted, approved, or adopted the Greater Monterey County IRWM Plan through resolution by their governing boards or by other means according to organizational protocol. The Greater Monterey County IRWM Plan was formally approved on March 20, 2013 by the RWMG at a regularly scheduled RWMG meeting that was open to the public. Please see Appendix A for 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.

## Section B: Greater Monterey County Region Description

### B.1 REGIONAL BOUNDARY

#### B.1.1 Description of Greater Monterey County IRWM Regional Boundary and its Relation to Neighboring Regions

The Greater Monterey County Integrated Regional Water Management (IRWM) region includes the entirety of Monterey County exclusive of the Pajaro River Watershed IRWM region and the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region established under Proposition 50. The Greater Monterey County IRWM region also includes a small portion of San Benito County where the Salinas River watershed extends outside of Monterey County. Generally, the region includes the entire Salinas River watershed north of the San Luis Obispo County line, all of the Gabilan and Bolsa Nueva watersheds in the northern part of the county, and all of the coastal watersheds of the Big Sur coastal region within Monterey County.

Areas within Monterey County that are not represented in this IRWM Plan (but that are represented in other IRWM Plans) include: the Pajaro River watershed, represented in the Pajaro River Watershed IRWM Plan; and the Carmel River watershed, the San Jose Creek watershed, areas overlying the Seaside Groundwater Basin, and all areas within the Monterey Peninsula Water Management District jurisdictional boundary (including the Monterey Peninsula cities of Carmel-by-the-Sea, Del Rey Oaks, Pacific Grove, Monterey, Sand City, and Seaside), which are represented in the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Plan.

The Greater Monterey County IRWM region lies entirely within the Central Coast Regional Water Quality Control Board (RWQCB) district and is part of the IRWM Central Coast Funding Area. Adjacent IRWM regions include:

- Pajaro River Watershed IRWM region
- Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region
- San Luis Obispo County IRWM region

Together these four regions, plus the Northern Santa Cruz County and the Santa Barbara County IRWM regions, form the Central Coast IRWM Funding Area. The Greater Monterey County Regional Water Management Group (RWMG) works cooperatively with neighboring IRWM regions to identify and coordinate inter-regional water resource management issues, and participates in periodic meetings with representatives from each of the six Central Coast IRWM regions to discuss region-wide IRWM issues. Please see Section Q, Coordination, for a more detailed description of how the RWMG communicates and coordinates with the other IRWM regions.

The maps on the following pages illustrate the Greater Monterey County IRWM Region. Figure B-1 shows the region in context with county boundaries, water agency boundaries, and cities and large communities. Figure B-2 shows the region in context with the other five IRWM regions in the Central Coast IRWM Funding Area.



**Figure B-1: Greater Monterey County IRWM Region**



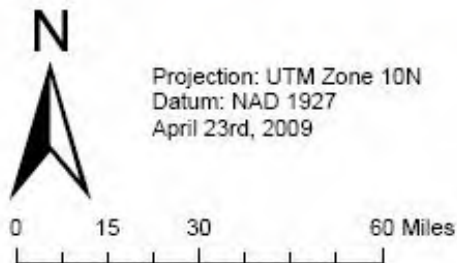
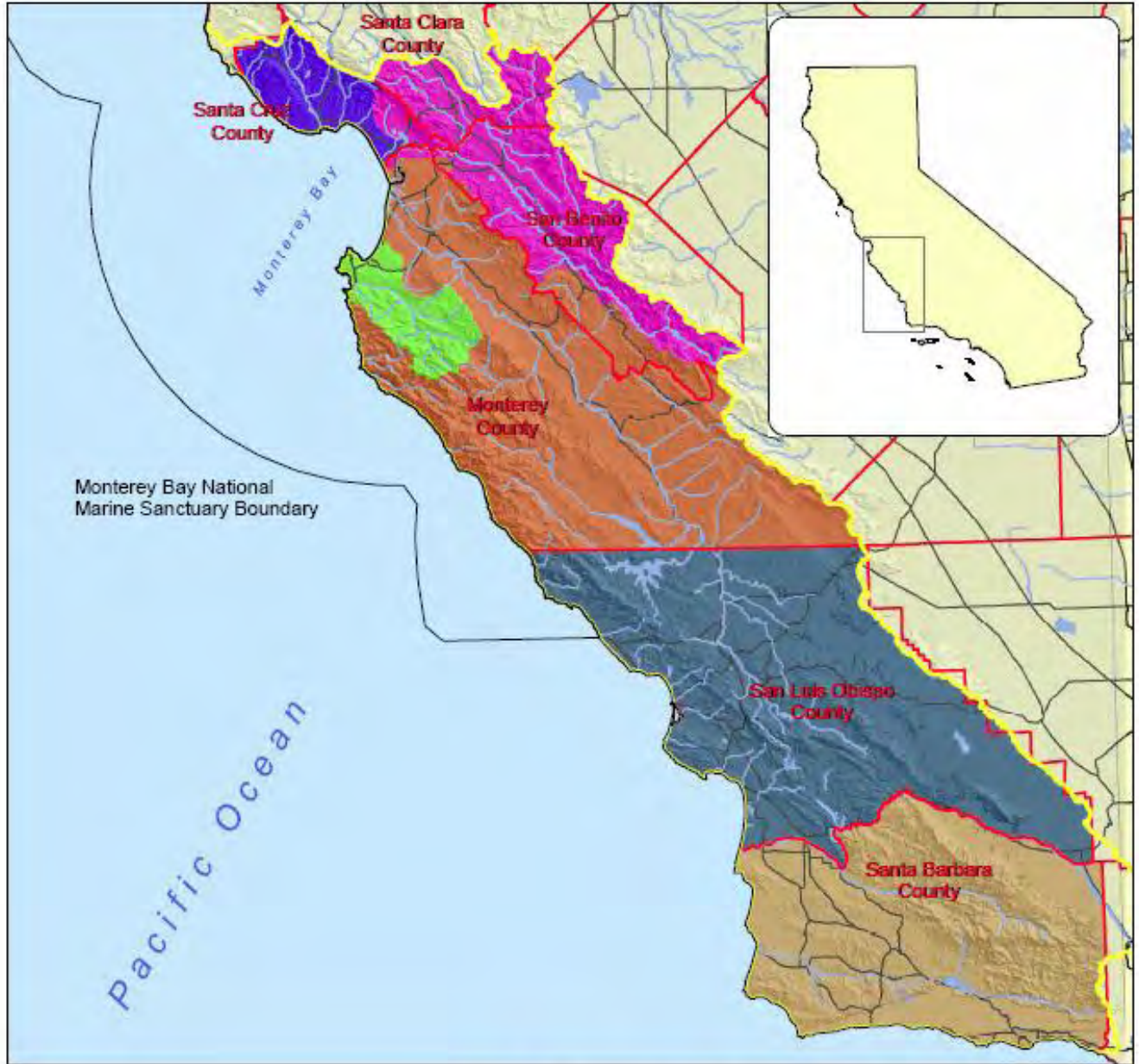
0 5 10 20 Miles  
 |-----|-----|-----|-----|

Projection: UTM Zone 10N  
 Datum: NAD 1927  
 May 21st, 2012



- |                                     |       |
|-------------------------------------|-------|
| Greater Monterey County IRWM region | MCWRA |
| County lines                        | PVWMA |
| City, Village, Town                 | SBCWD |
| Water bodies                        | MPWMD |

**Figure B-2: Greater Monterey County IRWM Region in Context with the Other Central Coast IRWM Regions**



**Central Coast IRWMP Regions**

- |   |   |   |                  |
|---|---|---|------------------|
|  | Greater Monterey County                               |  | Roads            |
|  | Monterey Peninsula, Carmel Bay and South Monterey Bay |  | RWQCB 3 boundary |
|  | Northern Santa Cruz County                            |  | County lines     |
|  | Pajaro River Watershed                                |  | Water bodies     |
|  | San Luis Obispo County                                |   |                  |
|  | Santa Barbara County                                  |   |                  |



### **B.1.2 How the Boundaries were Determined and Why the Region is Appropriate**

The Greater Monterey County IRWM region is based on watersheds, groundwater basins, jurisdictional boundaries, existing partnerships, and historical planning efforts. As noted earlier, the IRWM Plan for the Greater Monterey County region represents an expansion and modification of a former plan—the Salinas Valley Integrated Regional Water Management Functionally Equivalent Plan (FEP)—that was developed by the Monterey County Water Resources Agency (MCWRA) in May 2006. The new Greater Monterey County region encompasses service areas of multiple local agencies and will promote significant opportunity for integration of water management activities related to water supply, water quality, environmental stewardship, groundwater management, and flood management. Expanding the Salinas Valley IRWM FEP boundary has served to make the region more inclusive, inviting more partners and stakeholders to the table and opening up new opportunities for cooperation and integration of efforts.

Expanding the Salinas Valley IRWM FEP boundary has also served to eliminate previous IRWM Plan coverage voids. As noted above, the new regional alignment includes key areas that have not been previously covered in any other IRWM Plan. These include, specifically: the Big Sur coastal watersheds and communities on the western side of the Santa Lucia Range, from Pt. Lobos south to the San Luis Obispo County line; the larger Salinas River watershed from the Salinas River National Wildlife Refuge at the Pacific Ocean south to the San Luis Obispo County line and including the east and west ranges of the valley; the Gabilan watershed; and portions of western San Benito County.

The Greater Monterey County region, as defined above, is appropriate for IRWM planning because: it provides complete coverage of important watersheds that had not been represented in prior IRWM plans; it aligns with historical water resource management and existing partnerships in the area; and it provides considerable opportunity for further cooperation and integration of water resource management efforts in the region. The Greater Monterey County region was approved by the California Department of Water Resources (DWR) in May 2009 as an IRWM planning region through the Regional Acceptance Process.

## **B.2 REGIONAL OVERVIEW**

This section offers a brief overview of the Greater Monterey County region in terms of its physical setting, social and cultural values, and economy in order to provide context for the water resource system and management in the region.

### **B.2.1 Physical Setting**

The Greater Monterey County IRWM region lies almost entirely within Monterey County on the central California coast, 110 miles south of San Francisco and 320 miles north of Los Angeles. Monterey County has approximately 105 miles of coastline and is bordered by Santa Cruz County to the north, San Luis Obispo County to the south, and San Benito, Kings, and Fresno Counties to the east. Elevation within the county ranges from sea level to 5,862 feet at Junipero Serra Peak, which is located 12 miles inland in the Santa Lucia Range.

Monterey County is famous for its spectacular Big Sur coast, mild year-round weather, and for the Salinas Valley, one of the most productive agricultural regions in the world. Prominent land features in the county include two major northwest-southeast trending mountain ranges—the Santa Lucia Range along the coast, and the Gabilan Range along the county’s eastern border, both of which are part of the Pacific Coast Range. Cradled in between the Santa Lucia and Gabilan mountain ranges is the gentle expanse of the Salinas Valley; and at the center of the Salinas Valley flows the Salinas River, the largest river on California’s Central Coast.

At the northern coastal end of the Greater Monterey County region, between the Pajaro Valley and the Salinas Valley, is an area known as “North County.” North County extends from the Pajaro River southward to Espinoza Road and the mouth of the Salinas River. All of the North County area is included within the Greater Monterey County IRWM region except for the area that lies within the Pajaro River watershed. North County has a more undulating topography than the Salinas Valley, and much of the land is cultivated in agricultural crops. The coastal area of North County contains wide sandy beaches and the primary commercial fishing harbor for the entire county.

The Santa Lucia Mountains have been described as “a chaos of ridges and canyons” bordering the Pacific Ocean (Henson and Usner 1993, p. 8). The Santa Lucia Range stretches approximately 100 miles from just south of Carmel to a point north of the San Luis Obispo County line, and extends as much as 20 miles inland. Along the coast is a single main ridge, the Coast Ridge, which is actually a jumble of narrow spur ridges separated by deep canyons that run perpendicular to the ocean. The steepest slope in the contiguous United States occurs within the Coast Range at Cone Peak, ranging from sea level to 5,155 feet in a distance of just three miles. The jagged peaks, steep slopes, and narrow coastal canyons of the Coast Ridge are what have made the Big Sur coastline so famous, attracting some three million visitors each year. The geologic drama continues out of view of most tourists, as the steep ridges of the Santa Lucia Mountains continue to fall sharply beneath the Pacific Ocean. Just 50 miles offshore, the Pacific Ocean reaches a depth of 12,000 feet. Two deep submarine canyons—the Sur Submarine Canyon and the Partington Submarine Canyon—cut into the continental shelf near the Big Sur coast, and eventually merge to become one of the deepest submarine canyons on earth (ibid.).

On the eastern side of the Santa Lucia Range, the mountain slopes descend abruptly down to the Salinas Valley. The Salinas Valley, famous for its productive soils, is a broad gentle basin filled with several thousand feet of sediment that has been captured over the millennia from the surrounding mountains. The valley is 130 miles long, 10-20 miles wide, narrowing to only about 3 miles wide in its southeastern end and rising in altitude from sea level at the Monterey Bay to approximately 400 feet near Bradley, and containing about 640,000 acres of broad bottomland (MCWRA 2008, p. 10; Monterey County Planning Department 2010b). Wending its way along the floor of the Salinas Valley is the Salinas River, extending about 155 miles from its headwaters at the Santa Margarita Reservoir in San Luis Obispo County and flowing north to its mouth at the Monterey Bay. The river drains approximately 4,043 square miles of land.<sup>1</sup>

The Gabilan Mountains, like the Santa Lucia Mountains, are composed of granite and metamorphic rocks and are similarly characterized by steep slopes and complex drainage patterns. The Gabilans, however, are drier than the Santa Lucia Mountains, being located further inland in the rain shadow of the Santa Lucia Range. The Gabilan Range includes several mountain peaks over 3,000 feet, the highest being North Chalone Peak (3,304 feet) located in Pinnacles National Monument in the southern portion of the range (Monterey County Planning Department 2010b).

The climate in Monterey County is considered Mediterranean, with dry summers, rainy winters, and moderate temperatures year-round. Precipitation in the region falls mainly between November and April. Marked variations exist in rainfall amounts between the Big Sur coast and inland areas, as well as from year to year and from sea level to altitude along the coast. Average annual rainfall is 15 inches in the City of Salinas and 11 inches in King City in the Salinas Valley, whereas at Pfeiffer Big Sur State Park near

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<sup>1</sup> This statistic is from Newman et al. 2003 (CSUMB Watershed Institute Land Use Mapping report). There is some discrepancy between various plans regarding this number: Monterey County 2010 General Plan EIR claims the drainage area to be 3,950 square miles, the Monterey County General Plan claims it to be 3,300 square miles, the Monterey County Groundwater Management Plan 5,000 square miles, and the Salinas River Management Plan 4,600 square miles.

the coast annual rainfall averages about 42 inches (with a low on record of 18 inches in 1990 and a high of 89 inches in 1983), and at higher elevations in the Santa Lucia Mountains precipitation is substantially higher (e.g., average annual rainfall is 78 inches at Mining Ridge at an elevation 4,760 feet, with an annual low on record of 44 inches in 1987 and an annual high of 173 inches in 1983) (Henson and Usner 1993, p. 44).

**B.2.2 Social and Cultural Values**

The existing social and cultural values in Monterey County have been very much shaped by the landscape, as well as by the three major cultural groups that have occupied the region: American Indians of the Costanoan (Ohlone), Esselen, and Salinan groups; Spanish-Mexicans; and Americans (Gordon 1996; Henson and Usner 1993).<sup>2</sup> Spanish explorers first sailed past the Monterey/Big Sur coast in the mid-1500s, but did not land in Monterey Bay until the early 1600s. The Franciscan missionaries began constructing their missions in the late 1700s, establishing missions in Monterey (1770, then moved to Carmel in 1771), in the San Antonio River Valley (1771) along the eastern side of the Santa Lucia Mountains, and in Soledad (1791) in the central-southern Salinas Valley. The American Indians were both voluntarily and forcibly brought into the missions by the Spanish (Monterey County Planning Department 2010b).



The Indian populations were ultimately decimated due to introduced European diseases, particularly whooping cough and measles, and by violence in the missions and declining birth rates (e.g., the Costanoan population was estimated to be 11,000 at the time of the first European arrival, and by 1920, only 56 survivors remained). In 1826, after Mexico’s secession from Spain, the governor of Alta California emancipated the Indians from the missions. A small number of their descendants still live in the region. The Ohlone Costanoan Esselen Nation, a recently founded group with a membership of about 500 based in the Carmel Valley region, has been petitioning the federal government to regain recognition as a formal Federally Recognized Tribe (ibid.).

Spanish occupation of the Monterey County region significantly expanded the grasslands, especially in the Salinas Valley, to support an economy based primarily on cattle grazing. While the few gardens that existed were localized mainly around the missions, they are significant for having introduced certain Old World crops to the region, including wine grapes, and olive, apple, and pear trees. The Spanish also left a legacy of place names in Monterey County, for example Salinas, which means “salty marsh” in Spanish (Gordon 1996, p. 56).

In 1833, the Spanish missions were secularized and the extensive mission lands were distributed by the Mexican government to Spanish-speaking settlers as land grants, or ranchos. The boundaries of these

<sup>2</sup> Source for map: www.MTYcounty.com. Used by permission.

ranchos are still clearly evident, shown on aerial photographs where field strips, furrows, and plant rows abut at different angles on opposite sides, or marked by the edges of chaparral tracts (ibid, p. 61). The boundaries of the original ranchos serve to a large extent as today's property boundaries within the region, particularly on the larger tracts of agricultural and ranching lands. Many of the ranchos have continued as working ranches to the present day, not only in the Salinas Valley but along the Big Sur coast as well.

Americans began settling in Monterey County in the 1800s during the period of Mexican control. The discovery of gold in the Sierra Nevada foothills in 1849 brought droves of homesteaders to the county, and as the best parcels in Monterey and the Salinas Valley became occupied, homesteading spread to the rugged Big Sur coast. Many of the first American settlers were cattlemen like the Spanish before them, and sheep were raised in large numbers, both in the Salinas Valley and in the hills of the Big Sur coast. Grazing eventually gave way to irrigated agriculture. By 1870, commercial agriculture was well underway in the Salinas Valley. A major drought in 1863 and 1864 essentially wiped out the cattle industry, and grain production became the county's principal agricultural activity. Sugar beet cultivation and dairying began to replace grain farming by 1897. The extension of the Southern Pacific Railroad from Pajaro to Salinas, along with improved irrigation systems, refrigerated freight cars, and other innovations in technology, encouraged more and more intensive row crop cultivation and set the stage for the Salinas Valley to become one of the most productive agricultural regions in the world (Monterey County Planning Department 2010b).

Today, agriculture dominates the lifestyle and permeates cultural and social values in the Salinas Valley. Agriculture is unique in the Central Coast region compared with agriculture in other parts of the state, such as the Central or Imperial Valley, since the majority of operations in the Salinas Valley are less than 50 acres and many properties have been held in families for many generations (Casagrande and Watson 2005). Monterey County and the Salinas Valley in particular celebrate this agricultural lifestyle with numerous events throughout the year, including the Castroville Artichoke Festival, the Salinas Valley Fair, the Harvest Festival in Greenfield, the Great Wine Escape, and the California Rodeo Salinas (the 100<sup>th</sup> rodeo was celebrated in July 2010). The region also honors its most famous literary celebrity, John Steinbeck, who wrote lyrically about the Salinas Valley and Monterey County in many of his books, with the National Steinbeck Center located in the City of Salinas and the annual Steinbeck Festival.

Along the Big Sur coast, social and cultural values have developed as an expression of that region's unique geographic landscape and related social history. When the Spanish missions were secularized in 1833, two large land grants (ranchos) were made in the Big Sur coastal area, one of which, El Sur Ranch in the Point Sur area, is still in part a working ranch today (Henson and Usner 1993). The discovery of gold in the Sierra Nevada in 1849 brought an influx of homesteaders to the Big Sur coast, and from the 1860s to the early 1900s a loose-knit community of pioneers established themselves among the rugged and isolated canyons and hillsides of the coast. They initially carved out a rough living for themselves, hunting, fishing, and foraging for food along the coast much like the natives before them, and eventually came to raise cattle and pigs and grow much of their own food. Small-scale industries, such as tanoak harvesting, and limestone and gold mining, were established but were generally short-lived.

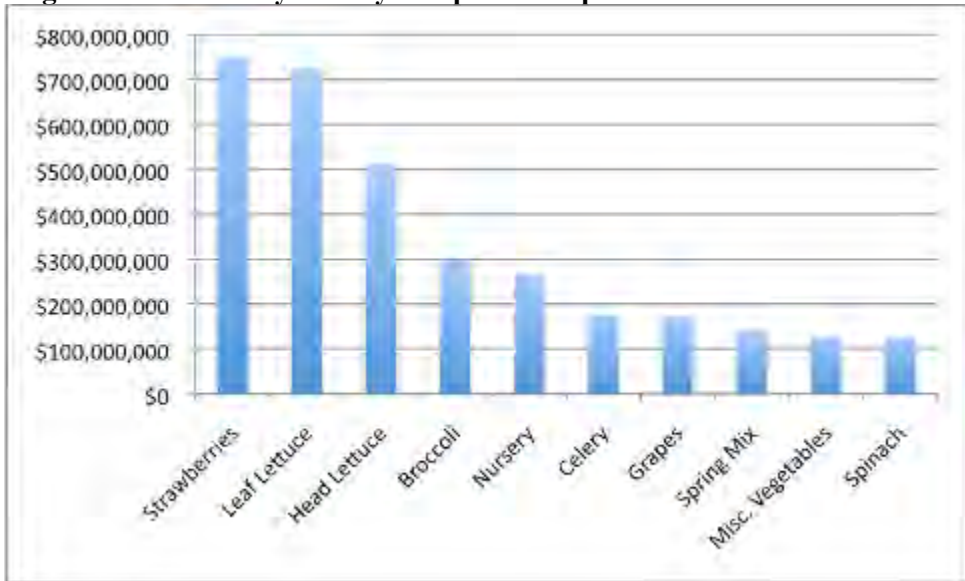
The completion of Highway One in 1937 paved the way for a different type of settler in Big Sur, opening up the wild and dramatic coast to those seeking adventure and inspiration. Artists, artisans, and writers—such as Robinson Jeffers, Ansel Adams, and Henry Miller—came to visit and many to settle in the region, creating a strong cultural identity for which the Big Sur region is still known today. It is a cultural identity and ethic born of the landscape, one that continues to express the fierce independence and pioneering spirit of the early American settlers, as perhaps of the native people who inhabited the land for some 2,500 years prior, despite the considerable changes in actual lifestyle (ibid.).

**B.2.3 Economic Overview**

Agriculture dominates the economy of Monterey County, accounting for 27 percent of the county’s workforce (Beacon Economics 2011) and generating over \$4 billion in 2010 (Monterey County Agricultural Commissioner’s Office 2011). A recent report produced by the Monterey County Agriculture Commissioner’s Office (2012) claims that, when both the farm and food-processing sectors plus their multiplier effects are taken into account,<sup>3</sup> Monterey County agriculture actually contributes a total of \$8.2 billion to the local economy, including \$5.1 billion in direct economic output and \$3.1 billion in additional economic output in the form of expenditures by agriculture companies and their employees.

Farm employment has remained strong throughout the recession. A weak dollar has led to a boost in agricultural exports from Monterey County, translating into an increased demand for labor. The county supplies the United States and the world with strawberries, lettuce, nursery crops, broccoli, wine grapes and numerous other crops, including 59 percent of the nation’s lettuce, 53 percent of the nation’s broccoli, and 30 percent of the nation’s strawberries.<sup>4</sup> The Salinas Valley accounts for most of the agricultural production in the county. Because of the intensity of agricultural production, Salinas Valley has been dubbed the “Salad Bowl of the World.” The Salinas Valley is also an important viticultural area, with eight American Viticultural Association appellations located in the region in addition to the overall “Monterey” appellation. Figure B-3 shows the county’s top ten crops, and Figure B-4 shows revenues and acreages for the county’s major crop categories in 2010.

**Figure B-3: Monterey County’s Top Ten Crops 2010**

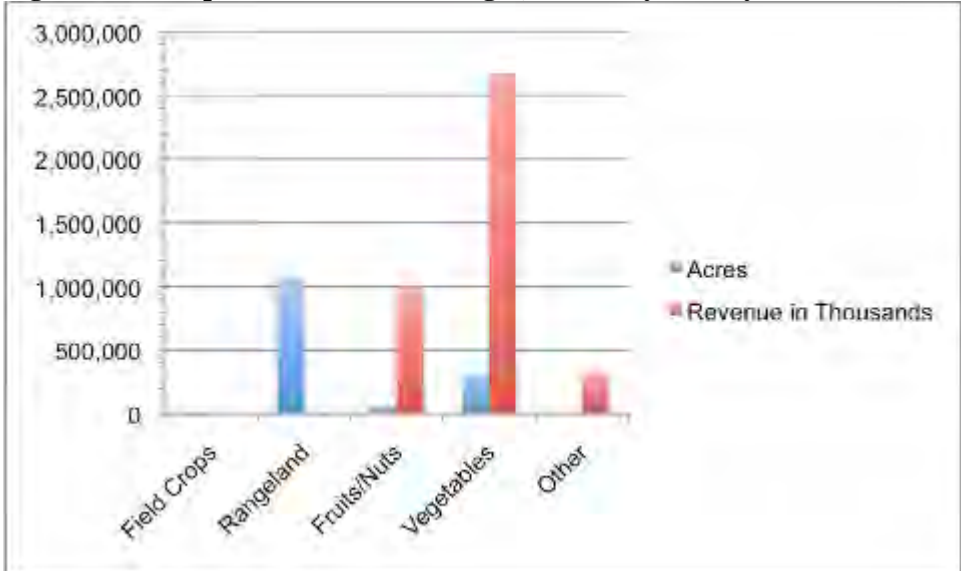


Source: Monterey County Agricultural Commissioner 2010 Crop Report

<sup>3</sup> The multiplier effects of agriculture take two forms: *indirect effects* and *induced effects*. Indirect effects consist of “business to business” supplier purchases; for example, when a grower buys farm equipment, fertilizer, seed, insurance, banking services, and other inputs. Induced effects consist of “consumption spending” by agriculture business owners and employees, for example when they buy housing, healthcare, leisure activities, and other things for their households. (Monterey County Agricultural Commissioner’s Office 2012)

<sup>4</sup> This information is based on the Monterey County 2010 Crop Report, the USDA Noncitrus Fruits and Nuts 2010 Summary, and the USDA Vegetables 2010 Summary.

**Figure B-4: Crop Revenues and Acreages, Monterey County 2010**

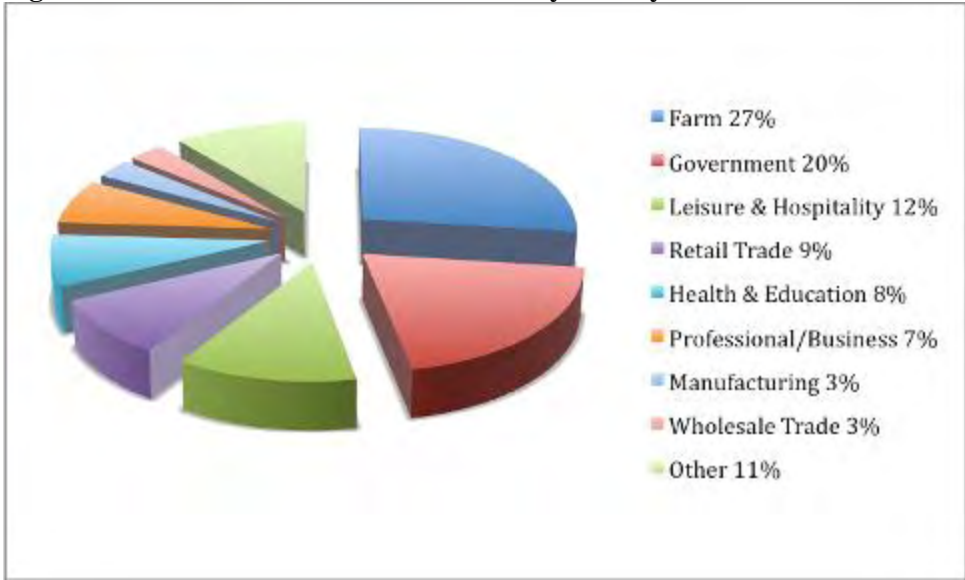


Source: Monterey County Agricultural Commissioner 2010 Crop Report. Note: Gross revenues for Vegetables in 2010 totaled \$2,677,072,000. Rangeland (which in the Crop Report is included in the “Field Crops” category) totaled 1,066,494 acres and accounted for \$10,665,000 in gross revenue. Most of the gross revenues produced in the “Fruits and Nuts” category came from strawberries (\$751,114,000) and from wine grapes (\$172,916,000). “Other” includes the crop categories of Seed Production, Cut Flowers & Cut Foliage, and Nursery Products.

Following farm-related employment, government is the second largest employment sector in the county, accounting for 20 percent of the county’s workforce in 2010. Many of the public sector jobs are associated with the State correctional facilities in Soledad. Leisure and retail trade follow as the county’s next largest employment sectors, accounting for about 12 percent and 9 percent of the county’s workforce respectively. Figure B-5 illustrates the distribution of Monterey County jobs in 2010 in the various employment sectors (Beacon Economics 2011).



**Figure B-5: Distribution of Jobs in Monterey County 2010**



Source: 2011 Monterey Economic Forecast (Beacon Economics 2011)

In the Big Sur region, the economy is based mainly on tourism and public services (including U.S. Forest Service, State Parks, and military employment). An estimated 3-4 million visitors come to Big Sur each year to enjoy the spectacular views, the State Park trails, National Forest wilderness areas, and rugged coastal beaches. Other economic activities in the Big Sur region include ranching and a small amount of gold mining. Development in Big Sur is naturally constrained by the rugged mountainous terrain, limited availability of water, unstable soils on steep slopes, and dangers of fire and flood. Given these constraints, along with the strict land use regulations mandated by the County’s Local Coastal Plan for the Big Sur Coast (1981), development is not expected to rise sharply or change significantly in the foreseeable future. Primary employment will most likely continue to be in the tourist and public sectors.

**B.3 DESCRIPTION OF WATERSHEDS AND WATER SYSTEM**

The following sections provide an overview of the watersheds, significant environmental resources, and water systems in the region, including surface waters, groundwater, reclaimed water, desalination, floodwater, and water supply infrastructure. These systems are integrally interconnected. The Greater Monterey County IRWM region receives no “imported” water, that is, no water from the State Water Project or from any other water source imported from outside of its boundaries (except for water from the Salinas River, which flows naturally from San Luis Obispo County). Therefore, maintaining the region’s water systems is absolutely critical for ensuring the health, prosperity, and long-term sustainability of local communities in the region. Maintaining adequate water supply and good water quality, in turn, depend on the health and proper functioning of the watersheds and wilderness areas that sustain and protect the region’s water resources.

**B.3.1 Watersheds**

The Greater Monterey County IRWM region includes six major watersheds (or portions thereof). The Salinas River watershed is by far the largest watershed in the region, encompassing an area of approximately 3,950 square miles within Monterey and San Luis Obispo Counties. The watershed includes the Salinas Valley, which extends from the Salinas River headwaters in the La Panza and Garcia Mountains in San Luis Obispo County to Monterey Bay, a length of approximately 170 miles. Other major watersheds in the Greater Monterey County region include the Santa Lucia watershed, comprised

of the numerous coastal watersheds along the Big Sur coast (including the Big Sur River watershed and Little Sur River watershed, among many others), the Estrella River watershed which is located in the southern part of the county (most of this watershed is actually located in San Luis Obispo County), and the Bolsa Nueva and the Gabilan Creek watersheds at the northern end of the county. The region also includes a small portion of the Estero Bay watershed at the southern end of the county along the Big Sur coast. Figure B-6 illustrates major watershed boundaries within the Greater Monterey County IRWM region.

**Figure B-6: Major Watersheds of the Greater Monterey County IRWM Region**



In terms of hydrologic units, the Greater Monterey County region includes the following hydrologic unit areas (as outlined by the RWQCB in the Central Coast Basin Plan):

**Table B-1: Hydrologic Units in the Greater Monterey County IRWM Region**

Hydrologic Unit #	Hydrologic Unit/Area/Subarea
306.00	Bolsa Nueva
308.00	Santa Lucia
309.00	Salinas
309.10	Lower Salinas Valley
309.20	Chualar
309.30	Soledad
309.40	Upper Salinas Valley
309.60	Arroyo Seco
309.70	Gabilan Range
309.80	Paso Robles
309.82	Nacimiento Reservoir
309.83	San Antonio Reservoir

### **B.3.2 Biological Resources**

Monterey County occurs within one of the richest biological regions in North America (Ricketts et al. 1999; Abell et al. 2000). Monterey County is especially rich in biological resources because of its highly varied terrain, large elevation range, extensive coastline, broad range of microclimates, and diverse substrate materials. This variability is reflected in the large array of plant communities and resident plant and animal species. For example, there are nearly 3,000 species of plants that occur in Monterey County according to Calflora, a database of California plants (to see the list, visit: <http://www.calflora.org/>). Of these, 287 plant species are listed on the California Department of Fish and Game’s (CDFG) 2012 California Natural Diversity Database as “State and Federally Listed Endangered, Threatened, and Rare Plants of California,” and 101 plant species are considered to be rare or sensitive by the California Native Plant Society. This section provides an overview of the region’s significant ecological processes and environmental resources in terms of vegetation, wilderness, conservation, and open space areas, fisheries, species and habitats of special concern, and management issues.

Note: Much of this Biological Resources section has been either excerpted or summarized from Section 4.9 of the 2010 Monterey County General Plan Environmental Impact Report (EIR) (Monterey County Planning Department 2010b).

#### **B.3.2.a Vegetation**

Natural vegetation throughout the county is typical of that occurring in the coastal ranges and interior valleys of central California. The coastal Big Sur coastal range is dominated by redwood, oak woodland, coastal chaparral, and annual grassland. The Salinas Valley is dominated by agriculture and, in the southern county, by significant stands of oak woodlands. The Gabilan Range to the east is dominated by annual and native grassland, and by mixed oak forests. In the northern coastal section of the region are beach dunes near the former Fort Ord and marshlands around the Elkhorn Slough as well as rare maritime chaparral species.

The region includes many vegetation types or plant communities that are considered to be “sensitive natural communities” under the California Environmental Quality Act (CEQA). These include: freshwater marsh, riparian/wetland, native grassland/valley needlegrass grassland, coastal prairie/coastal terrace

prairie, maritime chaparral, oak woodland, blue oak woodland, oak savannah, mixed conifer, redwood forest, dune and dune scrub, saltwater marsh and tidal mudflats. Other plant communities occurring in the region include coastal scrub, interior scrub and chaparral (baccharis chaparral, baccharis scrub, Gabilan scrub, and mixed chaparral), eucalyptus groves, and annual grassland. Table B-2 below provides approximate acreages for vegetation communities that occur in Monterey County.

**Table B-2: Monterey County Vegetation Communities, Estimated for 2006**

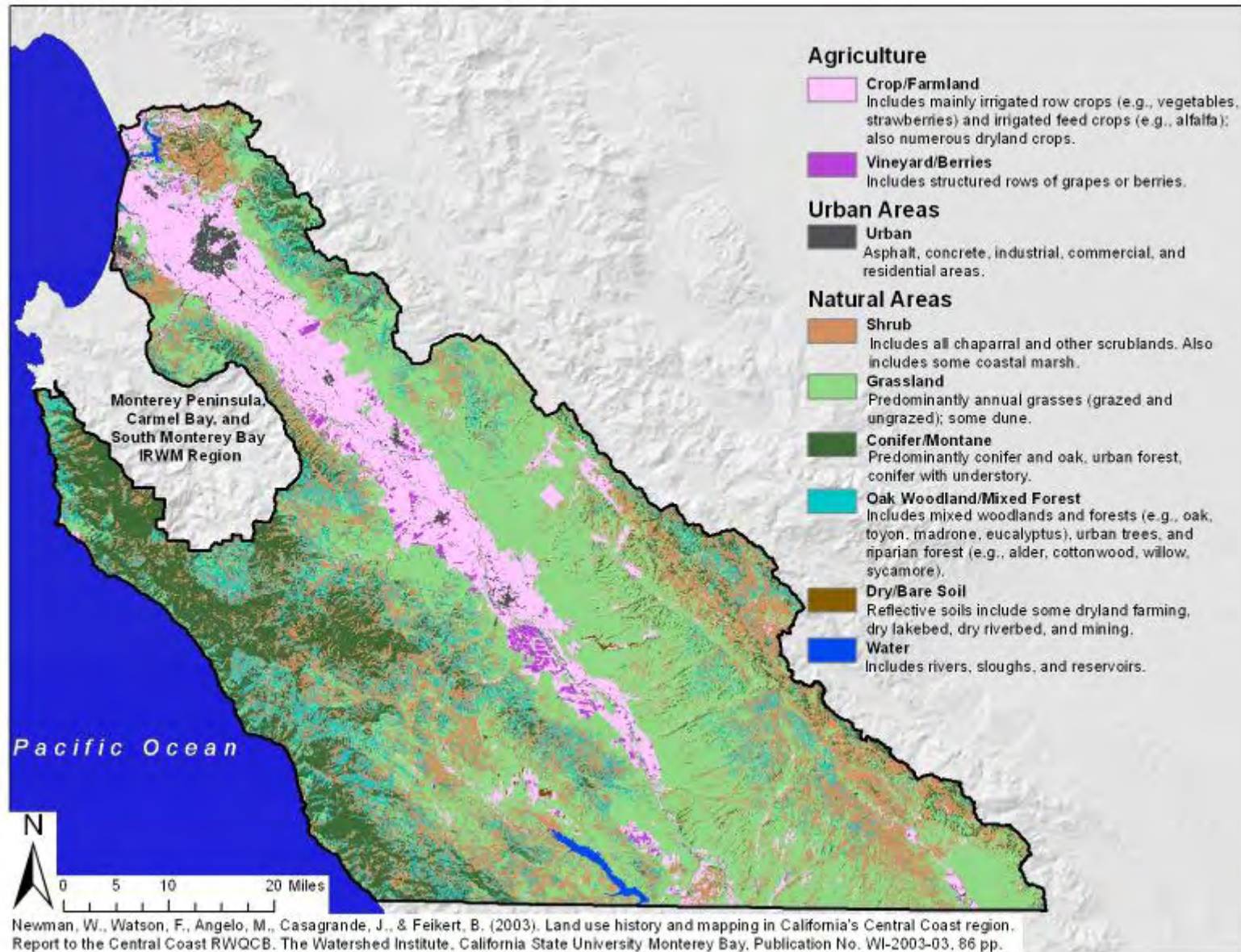
<b>Vegetation Community</b>	<b>Acres</b>
Annual Grassland	711,714
Oak Woodland	416,786
Agriculture	262,199
Baccharis Scrub	204,258
Oak Savanna	201,194
Gabilan Scrub	115,040
Urban/Non-Veg	62,284
Sparse Vegetation/Bare Soil	32,789
Mixed Conifer	25,532
Riparian/Wetland	24,891
Redwood Forest	21,734
Maritime Chaparral	12,115
Coastal prairie	9,426
Blue Oak Woodland	5,606
Saltwater Marsh	5,304
Dune Scrub	2,812
Baccharis Chaparral	2,138
Monterey Pine Forest	2,010
Eucalyptus	1,158
Golf Course	580
Coastal Scrub	512
Valley Needlegrass Grassland	392
Dune	281
Freshwater Marsh	148
Coastal Terrace Prairie	97
Native Grassland	81
<b>Total</b>	<b>2,121,082</b>

Source: Monterey County Planning Department 2010b, Section 4.9.3. Includes cities and coastal areas. Note: The table includes areas beyond the boundaries of the Greater Monterey County IRWM region, for example in the Monterey Peninsula region, the Carmel River watershed, and the Pajaro River watershed.

Figure B-7 below illustrates the general vegetation and land use divisions within the Greater Monterey County region in terms of agricultural, urban, and natural areas.



**Figure B-7: Land Uses in the Greater Monterey County IRWM Region**



### **B.3.2.b Wilderness, Conservation Areas, and Open Space**

The Greater Monterey County region includes approximately 500,000 acres<sup>5</sup> of land dedicated to wilderness, conservation areas, and open space. Some of the most significant of these areas are described below.

**Los Padres National Forest:** The magnificent Los Padres National Forest stretches across nearly 220 miles from the Big Sur coast to the western edge of Los Angeles County, encompassing 1.75 million acres of land. Within the Los Padres National Forest and included in the Greater Monterey County region are two spectacular wilderness areas, the 31,500-acre Silver Peak Wilderness and the 240,000-acre Ventana Wilderness. Los Padres is owned and managed by the U.S. Forest Service, though there are a significant number of privately owned properties that exist inside the forest boundaries as in-holdings. Most of the Los Padres National Forest is composed of steep, rugged coastal mountains with watersheds that supply 19 reservoirs. Los Padres contains a wide range of ecosystems, from seacoast and marine habitats to redwood forests, mixed conifer forests, oak woodlands, grasslands, pinyon juniper stands, chaparral and semi-desert areas, which are home to more than 468 fish and wildlife species (including 23 threatened or endangered wildlife species, 20 regionally sensitive wildlife species, and 34 forest-level sensitive wildlife species). Los Padres provides habitat for and is involved with the reintroduction of California condors, bald eagles, peregrine falcons, tule elk, bighorn sheep and many endangered plants.<sup>6</sup>

**Pinnacles National Monument:** Owned and managed by the U.S. National Park Service, Pinnacles National Monument encompasses about 26,000 acres in the southern portion of the Gabilan Mountains. The Monument was established in 1908 to preserve the incongruent and beautiful rock formations for which Pinnacles is named. The park's striking beauty is attributable, in part, to the Monument's geologic formations, showcase chaparral habitat, finely intergraded ecosystems, and protected native plant and animal diversity. More than 80 percent of the park (15,985 acres) is designated as the Pinnacles Wilderness area. Prairie falcons breed in this area in some of the highest densities of anywhere in North America. Peregrine falcons have also recently returned to the Monument to breed (though in far fewer numbers). A California condor re-establishment program has been in place since 2003.<sup>7</sup>

**Salinas River National Wildlife Refuge:** The Salinas River National Wildlife Refuge is located approximately 11 miles north of Monterey and three miles south of Castroville, at the point where the Salinas River empties into Monterey Bay. The 367-acre refuge was established in 1974 because of its "particular value in carrying out the national migratory bird management program." The area encompasses several habitat types including sand dunes, pickleweed salt marsh, river lagoon, riverine, and a saline pond, and provides habitat for several threatened and endangered species, including the California brown pelican, Smith's blue butterfly, the western snowy plover, the Monterey sand gilia, and the Monterey spineflower.<sup>8</sup>

**Fort Ord National Monument:** In April 2012, President Obama declared the Fort Ord Public Lands to be a national monument under the 1906 Antiquities Act. Fort Ord was a former military base established in 1917 and closed in 1994. Approximately half of Fort Ord's 14,651 acres is under the stewardship of the U.S. Bureau of Land Management (BLM). The other half is barred from public use because it could still contain old unexploded ordnance from military years. The Army Corps of Engineers is cleaning up those

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<sup>5</sup> Estimated by the Big Sur Land Trust staff, personal communication between BSLT staff and IRWM Plan Coordinator, January 18, 2012.

<sup>6</sup> Excerpted from the USDA Forest Service website: <http://www.fs.usda.gov/lpnf>.

<sup>7</sup> Excerpted from the National Park Service website: <http://www.nps.gov/pinn/index.htm>.

<sup>8</sup> Excerpted from the US Fish and Wildlife website: <http://www.fws.gov/sfbayrefuges/salinasriver/>



lands and expects to have them ready for public use by 2019.<sup>9</sup> The goal of the community-based Fort Ord Reuse Plan (1997) is to: "Promote the best use of land through well planned and balanced development which ensures educational and economic opportunities as well as environmental protection." Habitat preservation and conservation are primary missions for the Fort Ord National Monument. BLM protects and manages 35 species of rare plants and animals along with their native coastal habitats. The National Monument also includes more than 86 miles of trails for the public to explore on foot, bike or horseback.<sup>10</sup>

**State Parks, Beaches, and Wildlife Preserves:** The California Department of Parks and Recreation operates six state parks in the Big Sur region: Garrapata State Park (2,879 acres), Andrew Molera State Park (4,766 acres), Pfeiffer Big Sur State Park (1,006 acres, centered around the Big Sur River and nicknamed a "mini Yosemite"), Julia Pfeiffer Burns State Park (3,762 acres, featuring an 80-foot waterfall and redwoods over 3,500 years old), Limekiln State Park (716 acres), and the Point Sur Historic Park. Other state parks of note in the Greater Monterey County region include Fort Ord Dunes State Park, a 979-acre state park on Monterey Bay, and Fremont Peak State Park, a state park located in the Gabilan Range. State beaches in the Greater Monterey County region include Marina State Beach, a 170-acre protected beach that features some of the highest sand dunes on the Central California coast; Salinas River State Beach, located at the south end of Moss Landing; and Moss Landing State Beach. Moss Landing Wildlife Area is a California State wildlife preserve administered by the CDFG and located on the shore of Elkhorn Slough, just north of Moss Landing. The Moss Landing Wildlife Area protects 728 acres, with access allowed only by foot; all plants and animals are protected.

**Other Parks and Protected Areas:** One of Central Coast California's most significant undeveloped open spaces is Palo Corona Regional Park. The Big Sur Land Trust, The Nature Conservancy, State of California, and Monterey Peninsula Regional Park District partnered to acquire the 10,000-acre Palo Corona Ranch in 2004. The 10,000-acre ranch was then divided between the CDFG and the Park District to be protected as public conservation and parkland in perpetuity. The CDFG added the southern 5,500 acres of the former ranch to its existing 640-acre Joshua Creek Ecological Preserve, and the Park District created the new Palo Corona Regional Park with the northern 4,350 acres of the former ranch. The park establishes a critical environmental link in a protected 70-mile long wild land corridor that begins at the Carmel River and extends southward to the Hearst Ranch in San Luis Obispo County. The Palo Corona Regional Park includes the headwaters of 13 watersheds and protects significant habitat areas, wildlife corridors, wildlife, and endangered species.

Toro County Park, owned by Monterey County Parks, is a popular recreational park located six miles from downtown Salinas. Along with many recreational facilities and over 20 miles of hiking trails, the park's 4,756 acres is also home to many types of wildlife, including the occasional mountain lions and golden eagles.

Another significant protected area in the Greater Monterey County region is Landels-Hill Big Creek Reserve located along the Big Sur coast. This 3,848-acre reserve is owned and managed by the University of California Natural Reserve System and the University of California at Santa Cruz. In addition to protecting the outstanding natural resources of the area, the purpose of the reserve is to support university research and education. Joshua Creek Canyon Ecological Preserve, mentioned previously, is also in Big Sur, owned by CDFG and comprising approximately 6,140 acres.

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<sup>9</sup> Excerpted from online article, "Fort Ord declared a national monument by Obama," written by Ellen Huet in the San Francisco Chronicle, dated April 21, 2012: <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2012/04/20/BAVN1O6SL3.DTL>

<sup>10</sup> From the BLM website: [http://www.blm.gov/pgdata/content/ca/en/fo/hollister/fort\\_ord/index.html](http://www.blm.gov/pgdata/content/ca/en/fo/hollister/fort_ord/index.html)

### ***Estuarine, Coastal, and Ocean Protected Areas***

**Monterey Bay National Marine Sanctuary:** The Greater Monterey County region is situated adjacent to the federally protected Monterey Bay National Marine Sanctuary (MBNMS), encompassing four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA).<sup>11</sup> The MBNMS was designated in 1992 as a federally protected marine area offshore of California’s Central Coast. Supporting one of the world’s most diverse marine ecosystems, it is home to numerous mammals, seabirds, fishes, invertebrates and plants in a remarkably productive coastal environment. The Sanctuary encompasses 276 miles of shoreline and 6,094 square statute miles of ocean, covering everything below the water’s surface from Marin County to Cambria, from the high tide mark to as far as 53 miles offshore. The MBNMS was established for the purpose of resource protection, research, education, and public use of this national treasure, and is part of a system of 13 National Marine Sanctuaries administered by the National Oceanic and Atmospheric Administration (NOAA).

**Elkhorn Slough National Estuarine Research Reserve:** The Elkhorn Slough National Estuarine Research Reserve, part of the MBNMS, provides some of the most important freshwater marsh and brackish marsh habitat for wildlife in California. The slough is located in the northern coastal area of the Greater Monterey County IRWM region, and is one of the few coastal wetlands remaining in California. The main channel of Elkhorn Slough, which winds inland nearly seven miles, is flanked by a broad salt marsh second in size in California only to San Francisco Bay. The reserve lands also include oak woodlands, grasslands and freshwater ponds that provide essential coastal habitats that support a great diversity of native organisms and migratory animals. More than 400 species of invertebrates, 80 species of fish, and 200 species of birds have been identified in Elkhorn Slough. The channels and tidal creeks of the slough are nurseries for many species of fish. At least six threatened or endangered species utilize the slough or its surrounding uplands, including peregrine falcons, Santa Cruz long-toed salamanders, California red-legged frogs, brown pelicans, least terns and sea otters. Additionally, the slough is on the Pacific Flyway, providing an important feeding and resting ground for many types of migrating waterfowl and shorebirds.

Elkhorn Slough is protected by a combination of private, federal, and state landowners including the Elkhorn Slough National Estuarine Research Reserve, the Moss Landing Wildlife Area, and the Nature Conservancy. In 1989, the Elkhorn Slough Wetland Management Plan was prepared for the California State Coastal Conservancy and the Monterey County Planning Department to address the preservation and protection of wetlands and other sensitive resources.

**Big Creek:** Big Creek State Marine Reserve (SMR) and Big Creek State Marine Conservation Area (SMCA) are two adjoining marine protected areas that lie offshore of Big Sur on California’s central coast. The combined area of these marine protected areas is 22.5 square miles. The SMR protects all marine life within its boundaries. Fishing and take of all living marine resources is prohibited. Within the SMCA fishing and take of all living marine resources is prohibited except the commercial and recreational take of salmon, albacore, and the commercial take of spot prawn.

**Moro Cojo Estuary State Marine Reserve:** Moro Cojo SMR is a marine protected area established to protect the wildlife and habitats in Moro Cojo Slough. Moro Cojo Slough is located inland from Monterey Bay, directly south of the Elkhorn Slough. The area covers 0.5 square miles. The SMR protects all marine life within its boundaries.

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<sup>11</sup> Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS).

**Figure B-8: Wilderness, Conservation Areas, and Open Space in the Greater Monterey County Region**

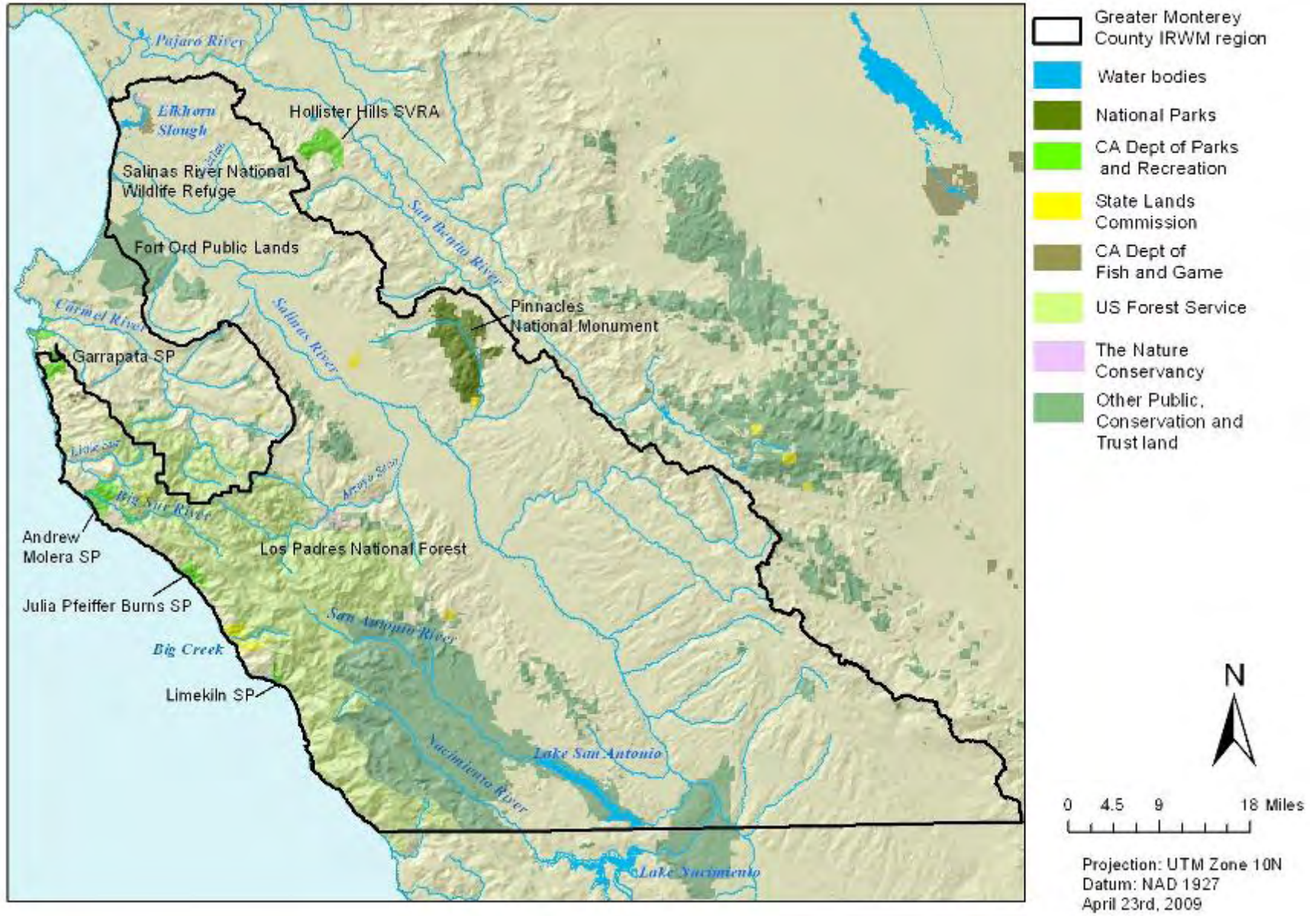
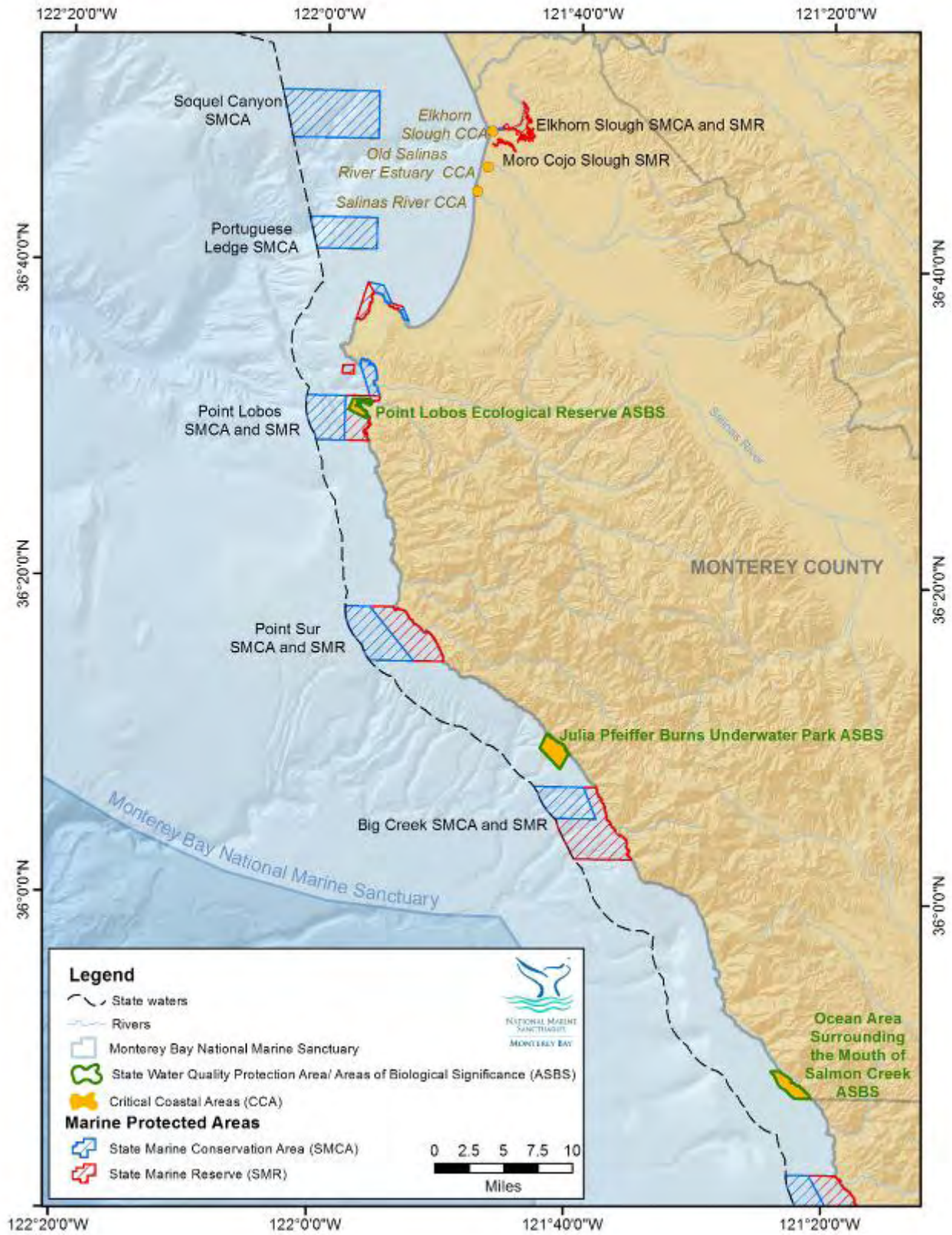




Figure B-9: Estuarine, Coastal, and Ocean Protected Areas within the Greater Monterey County Region



### **B.3.2.c Fisheries**

The region’s creeks and streams provide habitat for several federally protected species, including most notably South-Central California Coast steelhead (*Oncorhynchus mykiss*), federally listed as threatened in 1997 (and reconfirmed in 2006). The South-Central California Coast steelhead populations have declined from annual runs totaling 27,000 spawning adults to less than 500. The South-Central California Coast steelhead Distinct Population Segment (DPS) extends from the Pajaro River south to (but excluding) the Santa Maria River at the southern border of San Luis Obispo County, and includes those portions of coastal watersheds that are at least seasonally accessible to steelhead entering from the ocean. The major inland steelhead watersheds in the South-Central California Coast Steelhead Recovery Planning Area include the Pajaro, Salinas, and Carmel Rivers (NMFS 2007).

Within the Greater Monterey County IRWM region, critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries. According to a South-Central California Coast Steelhead Threats Assessment conducted in 2008, “Dams and water diversions (including groundwater extractions) on the major rivers of the Interior Coast Range BPG [Biogeographic Population Group] (Salinas and Pajaro Rivers) have had the most severe adverse impacts on the steelhead populations in this BPG, cutting off access to upstream spawning and rearing habitats and reducing both the magnitude and duration of flows, as well as altering the timing, necessary for immigration of adults and emigration of juveniles. Agricultural activities (including agricultural effluents) have also significantly impacted steelhead habitats through encroachment into the riparian corridor and degradation of water quality. ... Estuarine habitat loss is also a significant threat source to steelhead populations” (Hunt & Associates 2008, p. 23). Many growers and ranchers in the region have been working to implement best management practices to improve riparian habitat through such initiatives as the Natural Resources Conservation Service’s (NRCS) Environmental Quality Incentives Program (EQIP).

Along the Big Sur coast in Monterey County, major steelhead watersheds include Big Sur River, Little Sur River, and Big Creek. In Garrapata Creek along the Big Sur coast, steelhead populations were assessed as part of the watershed assessment and restoration planning effort in 2006, and specific recommendations were made and were implemented to reduce upslope erosion along the creek. Efforts to control invasive species are planned in the lower watershed area, and plans exist to remove in-stream barriers. In addition, steelhead enhancement recommendations have been developed for the Big Sur River, Little Sur River and Big Creek by state and federal resource agencies.

### **B.3.2.d Species and Habitats of Special Concern**

There are 100 CEQA-defined special-status plant species and 47 CEQA-defined special-status fish and wildlife species that are known to occur in Monterey County. Listed CEQA-defined special-status species are plants and animals that are legally protected under the California Endangered Species Act (CESA) and federal Endangered Species Act (FESA). Non-listed CEQA-defined special-status species are plants and animals that are not listed under CESA or FESA but which meet the CEQA definition of a rare, threatened, or endangered species (State CEQA Guidelines Section 15380). Appendix I lists the special status plant and animal species that inhabit Monterey County, along with their protection status, California distribution, and habitat needs.

Among the 100 special-status plant species, the following are considered endangered or threatened (under CESA and/or FESA): beach layia, coastal dunes milk–vetch, Contra Costa goldfields, Hickman’s cinquefoil, Menzies’s wallflower, Monterey clover, robust spineflower, sand gilia, Santa Cruz tarplant, Santa Lucia mint, Seaside bird’s–beak, Tidestrom’s lupine, Yadon’s rein orchid, Yadon’s wallflower,

Gowen cypress, Monterey spineflower, and purple amole.

The special-status fish and wildlife species known to occur in Monterey County include seven species of invertebrates (including the Smith's blue butterfly, bay checkerspot butterfly, and vernal pool fairy shrimp), 13 species of reptiles/amphibians (including the California red-legged frog, California tiger salamander, Arroyo toad, Santa Cruz long-toed salamander, and southwestern pond turtle), two species of fish (including the south-central California coast steelhead and tidewater goby), 20 species of birds (including the bald eagle, golden eagle, California brown pelican, California clapper rail, least Bell's vireo, and western snowy plover), and five species of mammals (including most notably the San Joaquin kit fox).

More than 70,000 acres in the county are designated as critical habitat by the U.S. Fish and Wildlife Service (USFWS). Critical habitat is defined by FESA as specific areas in which physical or biological features essential to the conservation of a protected species are present. The USFWS has designated critical habitat for the western snowy plover, California red-legged frog, California tiger salamander, Monterey spineflower, Santa Cruz tarplant, and purple amole in Monterey County (Monterey County Planning Department 2010b, Section 4.9). In addition, as noted above, NOAA Fisheries has designated several rivers and streams as critical habitat in Monterey County, including those along the Big Sur coast and several waterways within the Salinas River basin, for the South-Central California Coast DPS of steelhead (Federal Register [FR] 70: 52488).

### **B.3.2.e Watershed Management Issues**

Management issues in the Greater Monterey County region watersheds are typical of those in watersheds throughout coastal California. Some of the most significant watershed management issues include the decline of aquatic species, and in particular, steelhead, erosion, invasive species, and fire management. While these four issues stand out in particular, numerous other water-related and water management issues and conflicts exist in the region, causing varying degrees of management challenges to landowners and resource managers. A list of such issues was compiled in October 2009 based on interviews with dozens of land use managers, water managers, and research scientists in the region. The list of regional issues and conflicts is included at the end of this chapter in Section B.7. Note that one issue that does not appear on the list but that some say may underlie many of the other issues is a general lack of scientific knowledge regarding the complexity and natural functioning of ecological systems.<sup>12</sup> Poor management decisions can often be made due to a simple lack of understanding.

The management issues related to steelhead, erosion, invasive species, and fire management are described briefly below.

**Steelhead:** Critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries. The National Marine Fisheries Service has identified seven principal threats that have contributed to the destruction, modification, or curtailment of the habitat or range of the South-Central California Coast steelhead. These include: 1) alteration of natural stream flow patterns; 2) physical impediments to fish passage; 3) alteration of floodplains and channels, including the degradation or elimination of riparian areas; 4) sedimentation; 5) urban and rural waste discharges; 6) spread and propagation of exotic species (such as bass and bullfrogs that prey on juvenile steelhead, and non-native plants such as *Arundo donax* and Tamarix); and 7) loss of estuarine habitat.

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<sup>12</sup> Personal communication with Nikki Nedeff, Ecological Consultant to IRWM Plan Coordinator (June 10, 2011).



In the Salinas River system, two major factors contributing to the decline of steelhead are reduced in-stream flows limiting migration into the upper tributaries, and the reduction and degradation of riparian habitat due to agriculture, building construction, and other land use practices. As noted above, growers and ranchers in the region have been working to implement best management practices to improve riparian habitat, but conditions continue to deteriorate. Along the Big Sur Coast, steelhead enhancement recommendations have been developed for the Big Sur River, Little Sur River, and Big Creek by State and Federal resource agencies. Steelhead habitat recommendations have also been made for Garrapata Creek as part of a 2006 watershed assessment, and implementation has begun.

**Erosion:** Erosion is a widespread problem in Monterey County, due in part to the erosive nature of local soils as well as from land use practices. These land use practices include farming on steep slopes, unmaintained or improperly designed dirt roads, altered water channels that increase water velocities and alter the natural sediment balance, and areas that have been denuded of vegetation by fire, overgrazing, or clearing. Erosion from roads, agriculture, and unstable stream banks may carry pollutants and can be detrimental to aquatic habitat and organisms.

The Resource Conservation District (RCD) of Monterey County has been addressing erosion and sediment issues related to agricultural practices and farm/ranch roads in Monterey County for decades.<sup>13</sup> The RCD has provided assistance to Hispanic and other hillside (primarily strawberry) farmers for winter erosion control in the Elkhorn Slough, Moro Cojo and Gabilan watersheds. Projects include furrow alignment, furrow and road seeding, irrigation efficiency evaluations (i.e., runoff reduction for specific programs), and engineered practices for particularly problematic sites, including steep slopes with active gullies and erosion. Engineered practices include sediment traps, stormwater detention structures, underground outlets (capturing water at the top and midsections of a field and conveying it underground via pipe to a safe outlet at the bottom of the hill), and other pond-type structures. The RCD has also tested multiple “vegetated treatment systems” on land draining into the Salinas River, Elkhorn Slough, the Salinas Reclamation Ditch, and Blanco Drain.

In addition, the RCD provides education to farmers and private landowners on effective rural road management through individual site visits, workshops, and materials development. With assistance from the USDA NRCS, the Santa Cruz RCD, and the California Coastal Conservancy, the RCD is currently developing and implementing a Rural Roads Erosion Control Assistance Program to help private road associations and landowners identify and treat road erosion and drainage problems for long-term, low maintenance management that reduces sediment movement from rural roads to local waterways. Such projects benefit community access and safety as well as local wildlife dependent on healthy streams and rivers. The RCD recently developed a Private Roads Maintenance Field Guide for Monterey County that includes technical information on design and implementation of road drainage and maintenance practices.<sup>14</sup>

In addition, the MBNMS produced an *Agriculture and Rural Lands Action Plan* in 1999 that includes strategies to improve both public and private planning and maintenance practices for rural roadways in order to reduce erosion. The Sanctuary’s Agriculture Water Quality Coordinator is an active participant in pursuing implementation of those strategies with the RCDs and other partners described above.

**Invasive Species:** An invasive species is a non-native plant or animal species that, when introduced to an ecosystem, causes or is likely to cause economic or environmental harm, or harm to human health. Invasive plant species are usually able to out-compete local native plant species for water and space

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<sup>13</sup> Source for this paragraph: RCD Spring 2011 newsletter, *Conservation Connections*: <http://www.rcdmonterey.org/pdf/RCDMCnews-spring2011.pdf>

<sup>14</sup> See RCD website: <http://www.rcdmonterey.org>.

because they are more prolific, have more vigorous growth, and lack predators that would otherwise help to keep them in check. They degrade habitat for other wildlife, domestic animals, recreation, and other land use activities.<sup>15</sup> In addition, weedy species can increase wildfire hazard and frequency, which is considered particularly problematic in Monterey County where wildfires pose a major threat. Non-native animal species tend to out-compete native species due to lack of natural predators, competition for habitat, and in some instances, preying on native species. Invasive species affect terrestrial, freshwater, estuarine, and marine systems throughout the region and pose a major challenge to private landowners, farmers, ranchers, and resource managers.

The invasive plant and animal species inhabiting the Greater Monterey County region are too numerous to list,<sup>16</sup> but “top offenders” for non-native plants in Monterey County include: *Arundo donax*, yellow star thistle, cape ivy, French broom, pampas/jubata grass, and wakame (a marine invasive plant, which is under eradication in Monterey Bay). The noxious weed *Arundo donax* deserves special mention: the *Arundo* infestation in the Salinas River represents the second-largest invasion in California of this nonnative invasive species. *Arundo* is an aggressive perennial grass that has overtaken approximately 2,500 acres of the Salinas River, forming enormous monocultures with virtually no food or habitat value for native wildlife. Non-native “top offender” animal species in Monterey County include red squirrels, red fox, and bullfrogs. Appendix J includes lists of non-native invasive plant and animal species found in the Monterey County area, compiled from various sources.

**Fire Management:** The Big Sur coast area is susceptible to major wildfires, and while wildfires are a necessary part of the natural cycle they can cause serious degradation to water and other natural resources. Major wildfires can cause excessive erosion and impaired water quality in creeks, destroy or damage small community water and wastewater systems, and damage public and private roads. Runoff from rain can wash debris from wildfires into coastal creeks and the ocean, with potentially detrimental effects on nearshore marine communities.

A series of record-breaking wildfires burned through Big Sur and the Santa Lucia Range during the summer of 2008. The Indians Fire began on June 8th and was ignited by an unpermitted campfire, while the Basin Complex Fire was ignited by lightning on June 21st, and merged with the Indians Fire by June 25th. About 240,000 acres of federal, state, and private lands—83 percent of which was a part of the Monterey District of the Los Padres National Forest—burned in the fire, making it the seventh largest fire in California history. The fire extended south to Fort Hunter Liggett and north to Carmel Valley, creating a footprint 40 miles north-south and 15 miles east-west. Watershed evaluations were conducted following the fire, and research and monitoring projects were set up to track terrestrial inputs from the fires and determine if those inputs alter water chemistry, quality, and clarity of nearshore waters. The projects also measured community-level responses in the rocky intertidal and adjacent kelp forests.

As development in the wildland/urban interface continues to grow, wildfires also pose an increasing threat to human lives and infrastructure. Fire management at the wildland/urban interface brings to fore competing interests between those whose mission it is to protect structures and those whose mission it is to protect forestlands. While foresters and environmentalists tend to consider natural fires (or when appropriate, prescribed burns) to be healthy for the forest and helpful or even necessary for reducing the intensity of wildfires, those whose job it is to fight structure fires, and certainly most homeowners, tend to

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<sup>15</sup> See Monterey County Agricultural Commissioner’s Office website: <http://ag.co.monterey.ca.us/pages/invasive-weeds>.

<sup>16</sup> The California Invasive Plant Inventory Database, compiled by the California Invasive Plant Council (Cal-IPC), includes 166 invasive plant species in the “Central West” region (as of September 2011), which roughly comprises the Monterey County area. See California Invasive Plant Council website: <http://www.cal-ipc.org/ip/inventory/weedlist.php?region=CW>

consider all fires destructive and dangerous. This dichotomy poses a growing challenge for foresters, fire fighters, policy makers, land use planners, and others involved in fire management issues in the region.

A relatively recent effort responding to this challenge, led by the US Forest Service and facilitated by The Nature Conservancy, is FireScape Monterey.<sup>17</sup> FireScape Monterey is a collaborative approach to wildfire management that aims to bring all stakeholders to the table (including those that are traditionally opposed), to “leave swords at the door” and develop wildfire management practices that make sense from a “landscape” fire management point of view rather than a “jurisdictional” point of view. The effort covers a very broad geographic area, including the Los Padres National Forest and Ventana Wilderness, north to Marina, east to Salinas, down the Salinas River to Lake Nacimiento, with the intent of including a sphere of influence that will eventually cover all of Monterey County. FireScape Monterey is in the process of developing goals and strategies and an implementation plan.

### **B.3.2.f A Note About Climate Change and Biological Resources**

It is important to note that many of the important biological resources in the region—particularly species and communities that are indigenous or unique to the region, or that are otherwise considered “special status”—may become increasingly vulnerable in future years due to the impacts of climate change. 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.

Climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity. The Inter-governmental Panel on Climate Change (IPCC) stated 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). The following provides just a few examples of anticipated climate change impacts on biological resources in the local region:

- Sea level rise will impact current estuary brackish water interface towards more marine systems. Coastal wetland systems are likely to be inundated with increasing frequency, leading to the dieback of tidal marshes and the salinization of fresh and brackish marshes.
- Changes in precipitation, increased drought, higher flood peaks, and lower spring/summer runoff will likely stress and may threaten many aquatic and plant communities.
- Migration patterns and species distribution will change.
- Shifts in existing biomes could also make ecosystems vulnerable to invasive species encroachment.
- Wildfires may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate.
- Changes in hydrograph (driven by rainfall 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, coastal redwoods and giant kelp that are susceptible to changes in certain locally favorable climate variables (fog duration, coastal upwelling) will become more vulnerable as these conditions change.

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<sup>17</sup> For more information, visit the FireScape Monterey website: <http://firescape.ning.com/>.

The RWMG, with assistance from a Climate Task Force comprised of regional scientists, water managers, and coastal policy professionals, has conducted an analysis to assess priority climate change impacts to 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. Table R-8 in Section R depicts the relative risk of each climate change impact scenario, along with a relative level of urgency to act (priority level). Table R-8 shows the results of two separate analyses: one that considers the cumulative consequences from the combined impacts to five different social, economic, and environmental factors (including specifically: public safety, local economy and growth, community and lifestyle, environment and sustainability, and public administration); and a second analysis that considers the consequences for environmental resources and sustainability only. Table B-3 below shows the results of the second analysis. The table highlights the climate change impacts that are considered highest priority (i.e., “extreme” and “high” priority) for the region in terms of consequences for environmental resources, and that therefore require more urgent action.

**Table B-3: Priority Climate Change Impacts Based on Environmental Consequences**

Priority Level	Climate Change Consequences
<b>Water Supply</b>	
Extreme	Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration
	Local rainfall changes are estimated to be reduced by 3-10 inches
	Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion
	Droughts will be more frequent and severe
High	Rangelands are expected to be drier
	Domestic landscaping water needs will be higher
<b>Water Quality</b>	
High	Lower seasonal surface flows can lead to higher pollutant concentrations
	Changes in storm intensity will increase sediment loading in many systems
<b>Flooding</b>	
Extreme	Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise
High	Regional levees will provide less protection during higher storm flow events
	Natural creeks throughout the region and managed conveyance within the Salinas Valley will see higher flow rates leading to increased erosion and flooding
<b>Ecosystem Vulnerabilities</b>	
Extreme	Sea level rise will impact current estuary brackish water interface towards more marine systems
	Coastal wetland systems are especially vulnerable to the combined influences of climate change
High	Migration patterns and species distribution will change
	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)

Please see Section R, Climate Change, for a full discussion of climate change and its potential consequences for water supplies and natural resources in the Greater Monterey County region.

**B.3.3 Water System**

This section describes the water system in the Greater Monterey County IRWM planning region as it pertains to surface freshwater systems, groundwater basins, reclaimed water, desalted water, floodwater, estuarine, coastal, and ocean waters, and wastewater. These separate water systems work collectively as part of the water system being managed in the Greater Monterey County region, all within the context of

the region’s watersheds and natural resources described above. Note that the Greater Monterey County IRWM region receives no “imported” water (except for Salinas River water that originates in San Luis Obispo County), and therefore maintaining the region’s water system is absolutely critical for ensuring the health, prosperity, and long-term sustainability of local communities in the region. The region’s water system is managed for water supply, water quality, flood protection, and for the healthy functioning of the region’s natural resources.

The various elements of the water system in the Greater Monterey County region are interconnected. Surface waters within the region’s watersheds—including reservoirs, rivers, creeks, rainfall, irrigation water applied to fields, agricultural drainage ditches, urban runoff, and unlined wastewater ponds—flow either downstream into coastal wetlands and coastal waters or down into the ground, infiltrating groundwater basins. The quality of that water affects both drinking water supplies and the health of the region’s aquatic resources. As water is used, wastewater is created. Much of this wastewater is reclaimed for agricultural and landscape use. The use of recycled water not only increases the region’s water supply, but helps protect the groundwater from seawater intrusion by providing an alternative source of irrigation and landscaping water. Desalted water, both from coastal waters and from wastewater, is currently being pursued to supplement the region’s water supply. Floodwater is managed to protect lives and property, and the management of floodwater and of floodplains directly affects the health of the surrounding natural resource systems. Each element of the water system is part of this collective, integrally linked system. The individual elements of that water system are described in turn below.

**B.3.3.a Surface Waters**

The significant surface waters of the Greater Monterey County IRWM region include the Salinas River in the Salinas Valley and its tributaries; the San Antonio and Nacimiento Reservoirs, which control water flows to the Salinas River and, consequently, impact recharge of the Salinas Valley Groundwater Basin; the numerous rivers originating in the Santa Lucia Mountains along the Big Sur coast, which provide the main source of water for water users in that portion of the region; the Elkhorn Slough and Moro Cojo Slough; the Monterey Bay, and the coastal waters of the Monterey Bay National Marine Sanctuary.

The MBNMS is a federally protected marine area offshore of California's central coast. Stretching from Marin to Cambria, from the high tide mark to as far as 53 miles offshore, the MBNMS encompasses a shoreline length of 276 miles and 6,094 square miles of ocean. The MBNMS was established for the purpose of resource protection, research, education, and public use, and is part of a system of 13 National Marine Sanctuaries administered by NOAA. 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. The MBNMS 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. The Greater Monterey County region includes approximately 65 miles of coastline adjacent to the MBNMS, and the main channel of the Elkhorn Slough.

Located in the northern coastal area of the Greater Monterey County region, Elkhorn Slough, Moro Cojo Slough and the surrounding areas that drain to Moss Landing Harbor provide some of the most important estuarine habitat for wildlife in California, including extensive areas of salt marsh, brackish marsh, freshwater marsh, intertidal mudflats and open water. The main channel of Elkhorn Slough, which winds inland nearly seven miles, is flanked by a broad salt marsh that is the largest in California south of San Francisco Bay. The diversity of both birds and marine invertebrates in the Elkhorn Slough is among the highest in the United States, and the slough is an important breeding area for sharks, rays and commercially harvested flatfish.

The Salinas River is the third longest river in the state of California and the largest water system in

Monterey County, extending about 155 miles from its headwaters at the Santa Margarita Reservoir in San Luis Obispo County to its mouth at the Monterey Bay. The Salinas River drains approximately 4,043 square miles of land. Several tributaries enter the river along the length, including Pancho Rico Creek, Santa Rita Creek, Estrella Creek, Chalone Creek, San Lorenzo Creek, El Toro Creek, Prunedale Creek, Arroyo Seco River, Nacimiento River and San Antonio River.

The Arroyo Seco River is the largest undammed tributary to the Salinas River and is an important source of groundwater recharge to the Salinas Valley Groundwater Basin. The river is 40 miles long and drains 275 square miles of watershed, most of which lies in the rugged coastal range areas southwest of Greenfield and Soledad. The dramatic topographical relief of its drainage area and the fact that there are no dams on the Arroyo Seco make the river prone to flash flooding. The river is therefore significant for Salinas River flood management. Watersheds bordering the Arroyo Seco drainage are the Carmel River and Big Sur River to the northwest, multiple small creeks flowing into the Pacific on the west, the San Antonio River to the south, and other smaller tributaries of the Salinas on the east. As it is the only perennial Salinas River tributary without dams, the Arroyo Seco also sustains a small population of steelhead trout. In recognition of this fishery, as well as its obvious scenic and recreational values, the Arroyo Seco River and its tributary, Tassajara Creek, have been determined eligible for National Wild & Scenic River status by the U.S. Forest Service.

The San Antonio and Nacimiento Rivers are by far the largest tributaries to the Salinas River, with watersheds of about 330 and 328 square miles, respectively. Dams owned and operated by the MCWRA control both of these rivers. The San Antonio River has its headwaters in the Santa Lucia Mountains and flows in a southeasterly and easterly direction through the Los Padres National Forest and Fort Hunter Liggett Military Base to its confluence with the Salinas River, for a total length of 58 miles. The Nacimiento River, located about five miles southwest of the San Antonio River, originates in the Santa Lucia Mountains and flows southeasterly through the Los Padres National Forest, Fort Hunter Liggett, and Camp Roberts to its confluence with the Salinas River, for a total length of 54 miles. Nacimiento and San Antonio Rivers contribute approximately 200,000 acre-feet/year (AFY) and 70,000 AFY, respectively, to the Salinas River.

The Nacimiento and San Antonio Dams—built in 1957 and 1967, respectively—were constructed to control floodwaters and to release water into the Salinas River for percolation to underground aquifers throughout the summer. At maximum pool, the Nacimiento Reservoir’s storage capacity is 377,900 AF with a surface elevation of 800 feet and a surface area of 5,400 acres. The Nacimiento Reservoir yields on average about 62 percent of the total water in the Salinas River system. At full pool, the San Antonio Reservoir has a volume of 335,000 AF, surface elevation of 780 feet, and a maximum depth of 180 feet. The San Antonio Reservoir yields on average about 13 percent of the total water in the Salinas River system.

The Nacimiento and San Antonio Reservoirs are considered the most prominent elements of the region’s water infrastructure. The watersheds of both the Nacimiento and San Antonio Reservoirs lie astride the boundaries of Monterey and San Luis Obispo Counties; and although the Nacimiento Reservoir is owned and operated by the MCWRA, it is actually located entirely within San Luis Obispo County, outside of the Greater Monterey County IRWM region. San Luis Obispo County has existing entitlements to 17,500 AFY of water from the Nacimiento Reservoir. MCWRA has recently coordinated efforts with the San Luis Obispo County Flood Control and Water Conservation District to implement the Nacimiento Water Project, which includes construction of a pipeline and appurtenant facilities from Nacimiento Reservoir south to the communities of Paso Robles, Templeton, Atascadero and San Luis Obispo to convey the District’s existing water entitlement from the reservoir to areas of use.



Average annual flows to the ocean from the Salinas River are around 360,400 AFY,<sup>18</sup> most of which occurs during the period of November through March. This period corresponds to the months of peak seasonal rainfall and coincides with a seasonal reduction in irrigation activities in the valley. During the spring and summer months, the reservoirs on the Nacimiento and San Antonio Rivers regulate flow to maximize groundwater recharge via the Salinas River channel. A natural clay layer underlies the river in the northern portion of the valley, which inhibits natural recharge in this area. Previous reservoir operations maintained flow as far north as the Spreckels area. Since April 2010, with the implementation of the Salinas Valley Water Project, flows are managed to provide increased recharge in the Salinas River channel, and deliver river water from the Salinas River Diversion Facility to the seawater intrusion area, thus reducing the pumping stress on the aquifer system, and reducing seawater intrusion advancement.

To the northeast of the Salinas River watershed is the smaller Gabilan Creek watershed, which contains five waterways—Gabilan Creek, Alisal Creek, Natividad Creek, Santa Rita Creek, and Tembladero Slough—along with the historic Carr Lake, a 450-acre former wetland and seasonal lake in the City of Salinas now primarily under agricultural production. The Gabilan Creek watershed, which includes the City of Salinas, is one of the most polluted watersheds emptying into the MBNMS. The Salinas Reclamation Ditch and Tembladero Slough are tied for third in having the most pollutant impairments identified on the 303(d) on the Central Coast, each listed with 14 pollutant impairments. Moss Landing Harbor, which lies at the bottom of the Gabilan watershed, is listed for 10 pollutant impairments, including pesticides, toxicity, pathogens, and sediment.

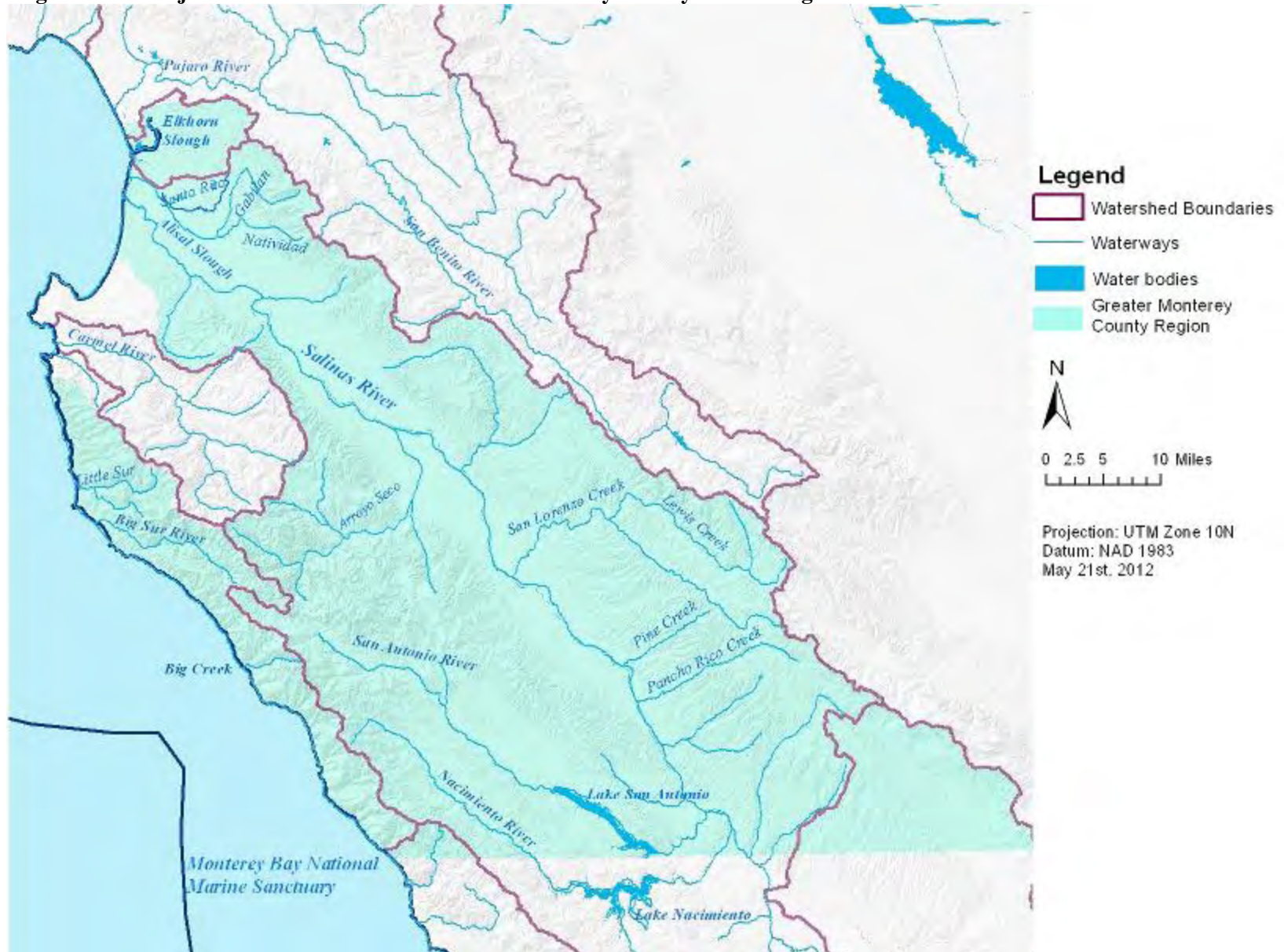
In the Big Sur portion of the region, major rivers include the Big Sur River, Little Sur River, and Big Creek, as well as numerous coastal creeks. The Big Sur River was designated a Wild and Scenic River in 1992. Major tributaries to the river include Pfeiffer-Redwood, Juan Higuera, and Pheneger Creeks. The Big Sur River flows in a northerly direction through the Big Sur Valley, at the north end of which lies an extensive floodplain and lagoon. The Big Sur River has a drainage area of about 61 square miles and an average annual runoff of 64,900 AFY (based on USGS stream gauge records), with peak flows in January.

Figure B-10 on the following page illustrates the major surface water bodies in the Greater Monterey County IRWM Region.

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<sup>18</sup> Source: Annual data report on United States Geological Survey (USGS) website: <http://wdr.water.usgs.gov/wy2010/pdfs/11152500.2010.pdf>

Figure B-10: Major Surface Waters in the Greater Monterey County IRWM Region

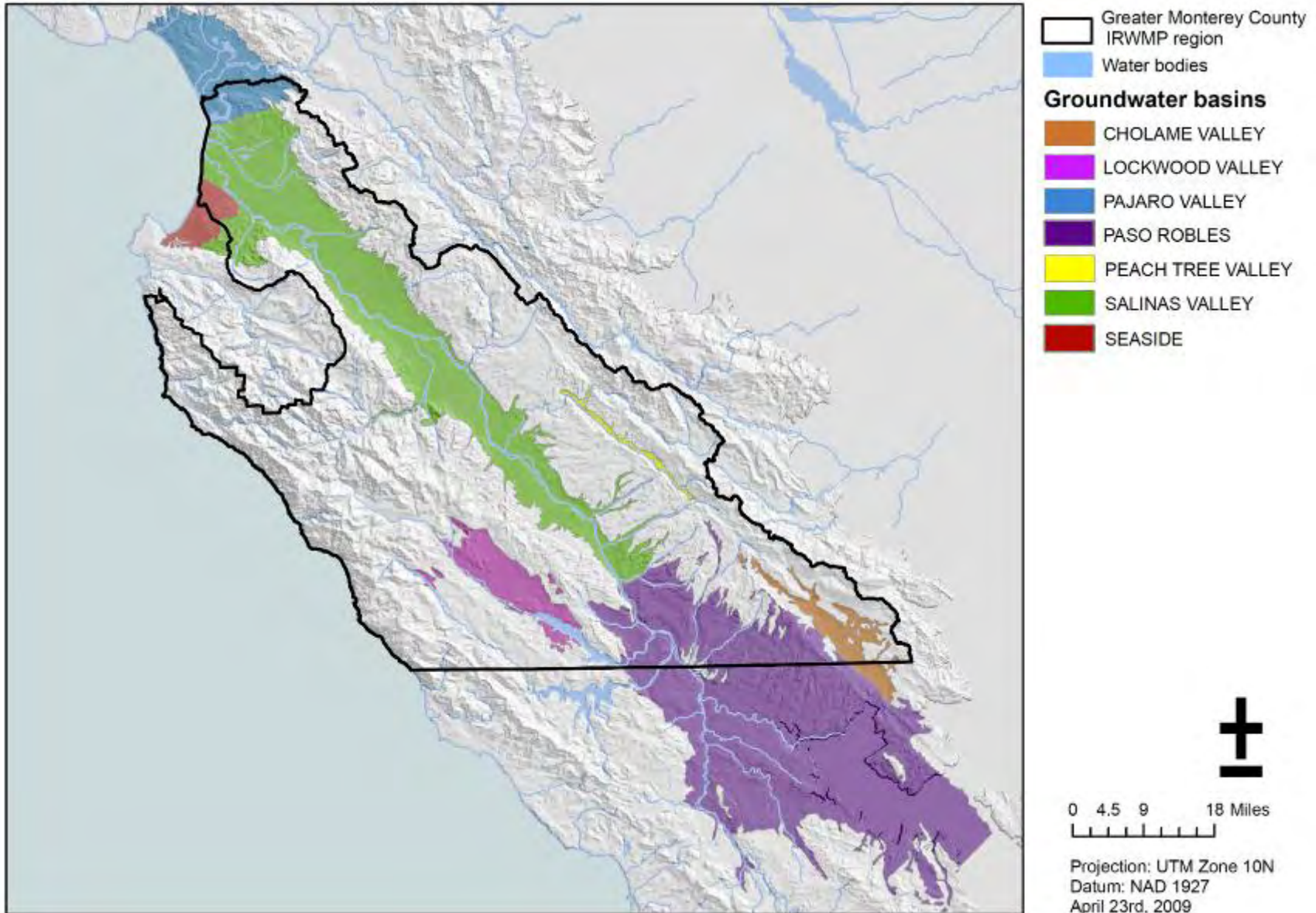


### **B.3.3.b Groundwater Basins**

Groundwater is the main source of water for most water users in the planning region with the exception of residents along the Big Sur coast, who depend entirely on surface water and shallow wells for their water supply, and of residents in an area near Greenfield in the Salinas Valley, who have a diversion from the Arroyo Seco River. The largest groundwater basin in the planning region is the Salinas Valley Groundwater Basin. The basin is located entirely within Monterey County and consists of one large hydrologic unit comprised of five subareas: Upper Valley, Arroyo Seco, Forebay, Pressure, and East Side. These subareas have different hydrogeologic and recharge characteristics, though they are not separated by barriers to horizontal flow and water can move between them. The Upper Valley, Arroyo Seco and Forebay subareas are unconfined and in direct hydraulic connection with the Salinas River.

Other, considerably smaller groundwater basins in the planning region include Lockwood Valley, Cholame Valley, and Peach Tree Valley basins at the southern end of the county, Paso Robles Groundwater Basin, about a quarter of which lies in Monterey County and the remainder in San Luis Obispo County, and a portion of the Pajaro Valley Groundwater Basin at the northern end of the county. Figure B-11 illustrates the groundwater basin boundaries in the Greater Monterey County IRWM region, and Figure B-12 illustrates the subareas of the Salinas Valley Groundwater Basin.

**Figure B-11: Major Groundwater Basins in the Greater Monterey County IRWM Region**





**Figure B-12: Subareas of the Salinas Valley Groundwater Basin**



According to the 2010 MCWRA Ground Water Extraction Data Summary Report, total groundwater pumping from the Agency’s Zones 2, 2A and 2B of the Salinas Valley Groundwater Basin (shown on Figure B-12) in the 2010 reporting year was 460,443 AF. This figure is based on reporting from 97 percent of the 1,846 wells in the Salinas Valley for the 2010 reporting year. Note that data is submitted by individual reporting parties and is not verified by Agency staff. Agricultural pumping accounted for 90.4 percent of total groundwater pumping and urban uses accounted for the remaining 9.6 percent of the reported extractions, as shown in Table B-4 below.

**Table B-4: 2010 Total Extraction Data by Basin Subarea and Type of Use**

Subarea	Agricultural Pumping Reported (AF)	Urban Pumping Reported (AF)	Total Pumping Reported (AF)
Pressure	87,880	15,663	103,544
East Side	74,512	16,788	91,300
Arroyo Seco and Forebay	125,145	7,002	132,147
Upper Valley	128,883	4,568	133,452
<b>Total Reported</b>	<b>416,421</b>	<b>44,022</b>	<b>460,443</b>

Source: 2010 MCWRA Ground Water Extraction Data Summary Report, with 97% reporting.

Groundwater recharge in the Salinas Valley is principally from infiltration from the Salinas River, Arroyo Seco, and to a much less extent, other tributaries to the Salinas River, and from deep percolation of rainfall. Both natural runoff and conservation releases from Nacimiento and San Antonio Reservoirs contribute to the flow in the Salinas River. It is estimated that stream recharge accounts for approximately half of the total basin recharge. The recharge area is generally believed to end at a point between Chualar and the City of Salinas. Average precipitation in the Salinas Valley ranges from 15 to 60 inches in the mountain ranges on either side of the valley, and from 10 to 15 inches within the valley itself. Most of the precipitation occurs in winter, from November through March. Deep percolation of applied irrigation water is the second largest component of the groundwater budget, but because it represents recirculation of existing groundwater rather than an inflow of “new” water, it is not considered a source of recharge. Below is a more detailed description of the five subareas of the Salinas Valley Groundwater Basin.

The Upper Valley subarea includes approximately 99,000 acres near the south end of the Salinas Valley from Greenfield to Bradley. Groundwater recharge to the Upper Valley subarea occurs primarily from percolation in the channel of the Salinas River. The Forebay subarea, from Gonzales to Greenfield, consists of approximately 60,000 acres of unconsolidated alluvium. Principal sources of recharge to the Forebay subarea are percolation from the Salinas River and groundwater outflow from the Upper Valley and Arroyo Seco subareas.

The Arroyo Seco subarea consists of approximately 22,000 acres of land located on the west side of the Salinas River between Soledad and approximately two miles south of Greenfield. The principal source of groundwater replenishment in the Arroyo Seco subarea is percolation from the Arroyo Seco River and its tributary, Reliz Creek. Average annual flow in the Arroyo Seco River is approximately 40 percent of average annual flow in the Salinas River. This predominance of flow from the Arroyo Seco River precludes flow in the Salinas River from recharging the upper portion of the Arroyo Seco Cone even though the area is in hydraulic continuity with the alluvium of the Salinas Valley.

The Pressure subarea includes approximately 114,000 acres between Gonzales and Monterey Bay. It is composed mostly of confined and semi-confined aquifers separated by clay layers (aquicludes) that limit the amount of vertical recharge. Three primary water-bearing strata have been identified in the Pressure subarea: the 180-Foot Aquifer, the 400-Foot Aquifer, and the Deep (900-Foot) Aquifer. The Deep Aquifer has only recently begun to be used as a water supply source. The aquifer is being tapped near the coast for both urban and agricultural uses, by entities including the Marina Coast Water District (MCWD) which is using Deep Aquifer water to replace groundwater in the shallower aquifers that is unusable due



to seawater intrusion, the Castroville Community Services District, the Monterey Dunes Colony, and by some agricultural users. The 180-Foot, 400-Foot, and Deep Aquifers are separated by aquitards, although some vertical recharge occurs locally where the aquitards are thin or absent. The uppermost aquitards allow some limited recharge from the Salinas River directly to the 180-Foot Aquifer in the area near Spreckels. The areas of thin or absent aquitards also allow some interconnection between the shallow 180-Foot and deeper 400-Foot Aquifers. The three aquifers of the Pressure subarea are all situated below sea level; there is hydrologic continuity with the ocean in all three aquifers.

The East Side subarea consists of 87,000 acres and includes unconfined and semi-confined aquifers in the northern portion of the basin that historically received some of their recharge from percolation from stream channels on the west slope of the Gabilan Range. As a result of extractions in excess of recharge, the declines in groundwater level in the East Side subarea have increased subsurface recharge from the Pressure subarea and the Forebay subarea. The groundwater level in the East Side subarea is declining more rapidly than any other subarea in the Salinas Valley basin. The inflow from the Pressure and Forebay subareas is now a larger source of recharge than the stream channels coming from the Gabilan Range.

Other, considerably smaller groundwater basins in the planning region include a portion of the Pajaro Valley Groundwater Basin in the North County area, Lockwood Valley, Cholame Valley, and Peach Tree Valley basins at the southern end of the county (located entirely within Monterey County), and a portion of the Paso Robles basin (approximately a quarter of which is located in Monterey County and the remainder in San Luis Obispo County).

The only source of groundwater recharge in the North County area, except for the extreme southwestern portion of that area, is rainfall. This area has significant water supply and water quality problems in many of its aquifers, including falling water levels in its eastern areas, seawater infiltration and intrusion in the western areas, and nitrate ion contamination due to septic tank proliferation and the historic use of commercial fertilizers (LandWatch Monterey County 2008).

### **B.3.3.c Reclaimed Water**

The MCWRA, in partnership with the MRWPCA, built two projects to retard the advancement of seawater intrusion: a water recycling facility at the Regional Treatment Plant and a reclaimed water distribution system that delivers recycled water to approximately 12,000 acres of agricultural users near Castroville. The MRWPCA owns and operates the regional wastewater treatment plant at the northern end of the City of Marina. Wastewater from the Monterey Peninsula, Salinas, Marina, Moss Landing and the Ord Community is conveyed to the Monterey County Water Recycling Plant for processing. The plant has the capacity to generate approximately 21,600 AFY of recycled water. Of that amount, 13,300 AFY of tertiary treated recycled water is delivered directly to the Castroville area for agricultural irrigation during the irrigation season (the Castroville Seawater Intrusion Project, or CSIP); the remaining 8,300 AFY of available capacity would be generated during the non-irrigation season, but cannot directly be delivered for irrigation purposes due to current lack of seasonal storage facilities (though plans exist to expand the current storage facilities, as described in Section B.5.5.a below).

The CSIP effort uses almost all of the recycled water from the regional generating facility during the summer months, to the extent that there is virtually no wastewater discharged from the regional wastewater treatment plant during peak agricultural irrigation season. The MCWD has recycled water rights to a small fraction of the summer-time recycled water flows and is proposing to distribute that recycled water to regional golf courses, municipalities, and institutions for the irrigation of large landscapes and public common areas. This project is called the “Regional Urban Water Augmentation Project” (RUWAP), and is included as a proposed project in this IRWM Plan. The project will provide

service largely to the developed (and developing) parts of the Ord Community and will be supported by developer resources paid to the Fort Ord Reuse Authority (FORA).

The Groundwater Replenishment Project is another reclaimed water project in the Monterey Bay area, located in the adjacent Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region. The Groundwater Replenishment Project will involve further purification of tertiary treated recycled water at the MRWPCA Regional Treatment Plant, which will then be injected into the Seaside Groundwater Basin. The process will recharge the Seaside aquifer and help prevent seawater intrusion. Though the Groundwater Replenishment Project will address water supply issues on the Monterey Peninsula, the Greater Monterey County IRWM region would indirectly benefit by virtue of its neighbor's water supply shortfalls being addressed.

The City of Soledad owns and operates wastewater treatment plant facilities located one mile southwest of the City. The City completed construction of a new 5.5 million gallons/day (MGD) water reclamation facility at the wastewater treatment plant in February 2010, with a plan to provide tertiary treated water for agricultural and urban landscape irrigation, but had not yet constructed the delivery system. Through Round 1 of the Proposition 84 IRWM Implementation Grant program, the City has received funds to construct the recycled water pump station and design and construct the transmission mains needed to connect the recycled water transmission mains already constructed to the pump station. Completion of this project will enable delivery of recycled water to multiple landscaped areas currently being irrigated with potable water. The project will also include a feasibility study and preliminary conceptual design for the neighboring communities of Gonzales and Greenfield for delivery of their cities' wastewater to the Soledad Water Reclamation Facility for processing. The City plans to build a second facility (the Scalping Plant) by the year 2028, and assuming that plant is built and on line, the two facilities together are projected to produce approximately 6.1 MGD. At this capacity, up to 6,800 AFY of water could be produced for agricultural and urban landscape irrigation.

#### **B.3.3.d Desalted Water**

Desalination has been discussed and studied in Monterey County since the 1980s to augment existing, regional, groundwater and surface potable water supplies. One desalination plant currently exists in the Greater Monterey County region. The MCWD owns a small seawater desalination plant that has a capacity of 300 AFY, located at the District's former wastewater treatment plant site on Reservation Road. The source water for the plant comes from a shallow well located on Marina State Beach. This was constructed as a pilot facility, used to verify that adequate seawater supply could be produced from beach wells, and to test the use of beach injection wells for the disposal of brine. The Monterey Bay is a national marine sanctuary, so open ocean intakes and discharges are not allowed. The facility has been idle for several years, though MCWD has signed a developer agreement that obligates the District to re-operate the facility if needed. The supply is currently allocated to the Ord Community under an agreement with three developers in the Marina portion of the Ord Community (MCWD 2011).

MCWD, MCWRA and California American Water (CalAm) have worked together and with other interested agencies and persons during the past decade to develop desalination to augment regional water supplies. The Monterey Peninsula (adjacent IRWM region) needs to replace their current water supply with another water source to stop illegal withdrawals from the Carmel River. A proposed solution is desalination. To date, different desalination concepts and locations have been analyzed in different environmental documents certified by MCWD and by the California Public Utilities Commission (CPUC) under the CEQA. There have been multiple site proposals for a new desalination facility, though the one with the most traction would be a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis (RO) desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about a

combined 10 MGD of product water. Intake facilities would include intake wells and a pipeline to convey extracted water to desalination facilities for treatment. A great deal of work has been done by MCWD, MCWRA, and CalAm to develop a plant that has slant wells for the seawater intakes. Desalination facilities would include a pretreatment system, an RO system, a post-treatment system, clearwell tanks, and brine disposal. The proposed plant could utilize the MRWPCA’s existing ocean outfall for the brine disposal. At the time of the writing of this report, there is not a definitive solution developed for desalination, though the timeline to provide the alternative water source for the Monterey Peninsula is January 1, 2017.

### **B.3.3.e Floodwater and Flood Management**

Floodwaters and floodplains are part of the collective water system in the Greater Monterey County IRWM region and must be considered alongside the other water systems being managed. The Flood Protection and Floodplain Management goal in this IRWM Plan is to “develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes.” Plenty of opportunities exist in the region to increase integrated flood management, and the RWMG hopes to achieve that objective by promoting integrated flood management projects through the IRWM planning process. The following section briefly describes floodwater and flood management in the Greater Monterey County region. A more detailed discussion is included as a separate chapter of this Plan (Section C, Flood Management).

Flooding is a major issue in the Greater Monterey County IRWM region. The damages caused by flooding in the Salinas Valley today are far more substantial than they were a century ago. Along the Big Sur coast, streams and rivers draining the steep coastal mountains are subject to short, intense floods, capable of producing significant damage to property. Historic records from 1911-2007 show flooding and flood damage to have occurred on a fairly regular basis (every few years) within Monterey County.

The agency with primary responsibility for flood control and floodplain management in Monterey County is the MCWRA. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal. In addition, several other organizations—most notably the RCD of Monterey County and the NRCS—contribute significantly to flood control and floodplain management efforts in the region through sediment and erosion control programs and grant incentives, though they have no jurisdictional flood control authority per se.

The MCWRA employs both structural and non-structural approaches to flood control and floodplain management in the County. Structural approaches include the Nacimiento and San Antonio Dams, constructed in 1957 and 1967 respectively. The agricultural community funded construction of both the Nacimiento and San Antonio Reservoirs. Nacimiento Dam is a large earthfill dam, constructed primarily for flood control and water supply (including percolation into the Salinas Valley aquifer); recreational benefits were also realized after construction was completed. The dam and reservoir are located in San Luis Obispo County and are owned and operated by MCWRA. The drainage basin for Nacimiento Reservoir covers 324 square miles with half of the basin area in Monterey County and the other half in San Luis Obispo County. San Antonio Dam is an earthfill dam also owned and operated by MCWRA. Like the Nacimiento Reservoir, the San Antonio Reservoir is operated for flood control and water supply (including groundwater percolation). The dam is located approximately seven miles southwest of Bradley on the San Antonio River in Monterey County, and has a 330 square mile watershed.

The Salinas Reclamation Ditch, originally named Reclamation Ditch District No. 1665, was constructed in 1917 to drain the marshlands in the northern Salinas Valley for agricultural and urban uses. The ditch was an enlargement of an existing waterway (Gabilan Creek) that connected a series of seven shallow lakes roughly between the City of Salinas and Castroville. A 2005 report developed by the Central Coast

Watershed Studies (CCoWS) team at California State University Monterey Bay for the MCWRA (*Final Report: Monterey County Water Resources Agency—Reclamation Ditch Watershed Assessment and Management Strategy*) describes the development of the Reclamation Ditch as follows:

*The original hydrology of the Watershed was somewhat different than what it is today. Gabilan Creek and Natividad Creek flowed into Carr Lake, a natural basin near the center of Salinas. To the south, the Alisal Watershed drained into Smith Lake. Between Smith Lake and the southern border of Salinas were two other small lakes, Heinz and Mud Lakes. These basins received local runoff and presumably overflow from Smith Lake during heavy storms.*

*The chain of lakes continued to the Northwest, between Salinas and Castroville. These lands were characterized by rolling, grass covered hills, each forming small individual drainages (Cozzens, 1944). At the end of each of these small drainages were natural depressions that formed small lakes, or ponds, during winter (Bechtel Corp., 1959). They included, Merritt Lake, Espinosa Lake, Santa Rita Slough, Vierra Lake, Fontes Lake, Boronda Lake, Markley Swamp, and Mill Lake. The lakes naturally had poor drainage and were only connected during periods of high runoff. The whole system ultimately drained into Tembladero Slough and into Moss Landing Lagoon (now Moss Landing Harbor) (Cozzens, 1944; Bechtel Corp., 1959).*

*Starting as early as the mid-19th Century, attempts were made to drain portions of the swamps, for use as productive farmlands. Much of the initial work was conducted by Chinese laborers. In the winter of 1890, Carr Lake filled and flooded its adjacent lands, and eventually spilled into the City of Salinas. As a result, Jesse D. Carr modified, or increased, the slow natural drainage of the lake and in doing so, reclaimed approximately 1,475 acres of the lake bottom (Anderson, 2000; Breschini et al., 2000). Eventually, this led to the draining of all the major lakes and much of the adjacent swamplands between Salinas and Castroville. From then on, protecting the newly created valuable farmlands from the natural flooding would become a constant battle. (Casagrande and Watson, 2005, Part A, p. 31, including their original citations)*

The Salinas Reclamation Ditch watershed area covers approximately 157 square miles of rural, agricultural, and urban lands located in northern Monterey County and a small mountainous region in San Benito County. While the original purpose of the Reclamation Ditch was drainage (for land reclamation), the Ditch came to be used and depended upon by local residents as a flood control channel. Rapid agricultural and urban development throughout the 1900s, however, significantly changed the hydrology of the watershed, causing a dramatic increase in the rate and amount of runoff from storms. By the end of the 1950s it was clear that the system lacked capacity to manage the flooding from storms and from increased water runoff that resulted from expanded urbanization and agricultural development (Casagrande and Watson 2005).

In 1967, the Monterey County Flood Control and Water Conservation District (now MCWRA) took over maintenance on portions of the Salinas Reclamation Ditch from the Northern Salinas Valley Mosquito Abatement District. After two major floods in the 1990s that resulted in substantial damage to agricultural lands west of Salinas, the MCWRA initiated an evaluation of the Reclamation Ditch and a committee was convened to assist MCWRA in planning for an improved drainage system (1999). That committee, the Reclamation Ditch Improvement Plan Advisory Committee (RDIPAC), has made several recommendations for improvements and provided guidance during the development of several studies such as the Potrero Tide Gates study (September 2000) as a result of changes in the watershed. The implementation of those recommendations is included as a proposed project in this IRWM Plan.

As noted above, the original function of the Reclamation Ditch was intended to “reclaim lands” for other uses, specifically agricultural uses. As the watershed characteristics changed throughout the decades, the Reclamation Ditch’s function changed to providing some relief from local flooding, though it is not a solution for flood control protection. The *MCWRA Reclamation Ditch Watershed Management Strategy* (Casagrande and Watson 2005) suggests several possible management options for maintaining the Salinas Reclamation Ditch, reflecting a more integrated flood management approach. Goals include:

- Improve water quality
- Reduce flooding of developed land
- Create parklands and natural areas
- Determine steelhead status
- Protect rare and special status species
- Reduce mosquitoes
- Facilitate food safety and agricultural pest control
- Reduce harbor sedimentation
- Achieve sustainable water supply
- Maintain economic viability

Non-structural approaches to flood management include land use management tools such as regulation and flood insurance, and emergency response systems. MCWRA developed the *Monterey County Floodplain Management Plan* in 2002 with the goal of creating an action 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, the plan describes the County’s flood control system (infrastructure), identifies flood zones defined by the Federal Emergency Management Agency (FEMA), including maps depicting Repetitive Loss Properties (RLPs) and 100-year floodplains, provides a general hazard assessment (including atmospheric, geologic, hydrologic, seismic, fire, system failure, and general flood hazards), 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.

#### **B.3.3.f Estuarine, Coastal, and Ocean Waters**

As noted previously, the Greater Monterey County region is situated adjacent to the federally protected MBNMS. Within the MBNMS are four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA).<sup>19</sup> The Elkhorn Slough National Estuarine Research Reserve, part of the MBNMS, is located in the northern coastal area of the Greater Monterey County IRWM region, and is one of the few coastal wetlands remaining in California. The slough provides some of the most important freshwater marsh and brackish marsh habitat for wildlife in California. Another significant estuary within the Greater Monterey County region is Moro Cojo Slough, located directly south of the Elkhorn Slough. The Moro Cojo State Marine Reserve protects all marine life within its boundaries. These estuarine, coastal, and ocean waters are described in more detail in Section B.3.2.b, above.

#### **B.3.3.g Wastewater**

Wastewater treatment services are provided in the northern part of the Greater Monterey County region by the Monterey Regional Water Pollution Control Agency (MRWPCA). The MRWPCA provides

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<sup>19</sup> Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS).

regional wastewater conveyance, treatment, disposal, and recycling services to all of the sewered portions of northern Monterey County, including in the Greater Monterey County IRWM planning region the City of Salinas, Boronda, Marina, Castroville, Moss Landing, the Ord community, and some unincorporated areas in northern Monterey County. The MRWPCA owns the Regional Treatment Plant on the Salinas River.

As noted above, the MRWPCA, in partnership with the MCWRA, built two projects to retard the advancement of seawater intrusion: a water recycling facility at the Regional Treatment Plant and a reclaimed water distribution system that delivers recycled water to approximately 12,000 acres of agricultural users near Castroville. Wastewater from the Monterey Peninsula, Salinas, Marina, Moss Landing and Ord Community is conveyed to the Monterey County Water Recycling Plant for processing. The wastewater at the Regional Treatment Plant undergoes secondary treatment with trickling filters, followed by activated carbon, dual media filtration, and chlorine disinfection for recycled water. MRWPCA Regional Treatment Plant has a capacity to treat 29.6 million gallons/day (MGD) of wastewater. During the summer months, 100 percent of the treated effluent (approximately 4,600 AFY) from the Regional Treatment Plant is recycled during the summer months for agricultural irrigation of artichokes and a variety of crops. Wastewater is not recycled during the winter months, but is discharged without chlorination to Monterey Bay (Cal Water 2010b).

For other areas of the planning region, wastewater treatment is provided by the municipalities, water districts, or private water utilities that service those areas, or in more rural regions (such as in Big Sur), via septic tanks. Municipalities in the region include Gonzales, Greenfield, King City, Soledad, Marina, and Salinas (the latter two of which are served by MRWPCA). The City of Gonzales's municipal wastewater treatment plant operates at 1.30 MGD and serves all residential, commercial and industrial customers in the City (LAFCO 2010a). The City of Greenfield's Wastewater Treatment Plant has a capacity to receive a flow of 2.0 MGD, while the plant currently provides a peak month average daily flow of 0.983 MGD (LAFCO 2010b). The King City Wastewater Treatment plant uses primary and secondary ponds, with facilities for non-recoverable industrial wastewater. The average flow capacity is 1.2 MGD, which is well below the design capacity of 3.0 MGD. In June 2010 the City Council approved a contract of over \$900,000 to make improvements to the wastewater ponds including expansion of capacity (LAFCO 2010c).

While the MRWPCA Regional Treatment Plant provides the residential wastewater service for the Salinas service area, the City of Salinas owns and operates an Industrial Wastewater Treatment Plant with a capacity to treat 4 MGD (but currently receives 2 MGD from industrial customers in Salinas). Treated wastewater from the industrial wastewater treatment plant is not recycled (LAFCO 2010d).

The City of Soledad completed an upgrade and expansion of its wastewater treatment plant in January 2010. The plant capacity was elevated from 3.1 MGD to 5.5 MGD. With completion of the project, the plant meets the effluent limits adopted by the State Water Resources Control Board (SWRCB). In addition, the City of Soledad contractually provides wastewater treatment services to two State prisons that lie within City boundaries, with inmate populations of approximately 6,350 and 3,800 (LAFCO 2010e).

Several water and community services districts provide wastewater treatment services in the more rural areas of the Salinas Valley. The Chualar Community Service Area was formed in 1993 and provides stormwater management and wastewater disposal services to residential and commercial users in the unincorporated village of Chualar, a 175-acre service area located about nine miles south of Salinas and comprising approximately 1,190 people. The wastewater treatment plant does not currently use best



available technology and is subject to flooding, as occurred in 1995 (LAFCO 2006a).<sup>20</sup> The San Lucas County Water District is an independent special district formed in 1965 to provide potable drinking water and sewer services (collection, treatment and disposal) to residential and commercial users within the unincorporated community of San Lucas, located in the Salinas Valley about nine miles south of King City with a population of approximately 270 people. The San Ardo Water District is an independent special district created in 1955 for the delivery of potable water, sewer services, and wastewater disposal and treatment services to the unincorporated community of San Ardo, located about 10 miles south of San Lucas and serving a population of approximately 520 people (LAFCO 2006c).

In 2003, CalAm was granted permission by the CPUC to create its Monterey Wastewater Division and Service Area, and acquired the assets of Las Palmas Ranch, Laguna Seca Ranch, and the Carmel Valley County Sanitation District water systems. The Las Palmas Ranch Wastewater System is made up of two plants, that combined, are designed to handle 235,000 gallons per day, serving approximately 1,000 connections. By the end of 2004, CalAm was granted permission to purchase and operate wastewater operations in the communities of Spreckels, Oak Hills, and Indian Springs, which together serve approximately 900 connections.<sup>21</sup>

See Table B-6 in Section B.4.2.b below for a summary of water supply (for purveyors with more than 200 connections) and wastewater treatment providers in the Greater Monterey County region.

#### **B.4 INTERNAL BOUNDARIES**

Internal boundaries of relevance to IRWM planning within the Greater Monterey County region include political boundaries (i.e., county, municipal, and military base boundaries); service areas of individual water, wastewater, and flood control districts; service areas of land use agencies; groundwater basins; and watersheds.

##### **B.4.1 Political Boundaries**

The Greater Monterey County IRWM region includes most of the land area of Monterey County, as well as a small portion of San Benito County where the Salinas River watershed extends outside of Monterey County along San Benito County's western border. The region includes six incorporated cities, which comprise 69 percent of the region's population (and 56 percent of the county population as a whole). The six cities include: Salinas, Soledad, Marina, Greenfield, King City, and Gonzales. Also included within the region are several unincorporated communities, including in the Salinas Valley: Prunedale (the largest community with a population of 17,560), Castroville (population 6,481), and the significantly smaller communities of Moss Landing, Las Lomas, Spreckels, Chualar, San Lucas, San Ardo, Lockwood, Bradley, and Parkfield. Along the Big Sur coast, unincorporated communities include: Big Sur, Lucia, and Gorda. Population for the cities and communities of the region are shown in Table B-5 below.

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<sup>20</sup> Population estimates for Chualar based on 2010 US Census data.

<sup>21</sup> Source: Email communication with CalAm staff (and IRWM Plan Coordinator), December 13, 2011.

**Table B-5: 2010 Population for Cities/Communities in Region**

Community	Population
Big Sur CCD <sup>a</sup>	1,710
Boronda CDP	1,710
Bradley CDP	93
Castroville CDP	6,481
Chualar CDP	1,190
Elkhorn CDP	1,565
Gonzales city	8,187
Greenfield city	16,330
King City city	12,874
Las Lomas CDP	3,024
Lockwood CDP	379
Marina city	19,718
Moss Landing CDP	204
Pine Canyon CDP	1,822
Prunedale CDP	17,560
Salinas city	150,441
San Ardo CDP	517
San Lucas CDP	269
Soledad city	25,738
Spreckels CDP	673
Toro Park CCD <sup>b</sup>	10,680
<i>Monterey County</i>	<i>415,057</i>

Source: 2010 US Census. “CCD” means “Census County Division.”  
“CDP” means “Census-designated Place.”

a. This geographic area was called “Coastal CCD” in 2000 and “Coastal Division” from 1960-1990.

b. This geographic area was called “Toro CCD” in 2000 and “Toro Division” from 1960 – 1990.

Military areas in the region include Fort Hunter Liggett, a United States Army Reserve command post encompassing 165,000 acres on the eastern side of the Santa Lucia Mountains, and Camp Roberts, a National Guard training base located in southern Monterey County and northern San Luis Obispo County, encompassing approximately 17,000 acres within Monterey County. Figure B-13 below illustrates political boundaries within the Greater Monterey County region.

**Figure B-13: Boundaries of Counties, Cities, Communities, and Military Areas in the Greater Monterey County IRWM Region**



**B.4.2 Service Areas of Water, Wastewater, and Flood Control Districts**

**B.4.2.a Water Supply Districts**

Water supply in the region is managed by several agencies, both public and private. MCWRA, formed in 1947, is the primary water management agency for Monterey County and is responsible for managing, protecting, and enhancing water supply and water quality, as well as providing flood protection, in the County. A small portion of the Greater Monterey County region lies within the jurisdictional boundaries of the San Benito County Water District (SBCWD). This portion is in the northeastern portion of the region where the Salinas River watershed falls within San Benito County. The SBCWD was formed in 1953 to control, manage and conserve waters and provide water services to customers (primarily agricultural water users) within the district. In addition, a small portion of the planning area—in the northernmost section where the Greater Monterey County IRWM planning region abuts the Pajaro River Watershed IRWM planning region—lies within the jurisdictional boundaries of the Pajaro Valley Water Management Agency (PVWMA). The PVWMA was formed in 1984 to manage existing and supplemental water supplies to prevent further increase in and continue reduction of long-term overdraft, and to ensure sufficient water supplies within its boundaries.

**B.4.2.b Service Areas for Major Water Purveyors and Wastewater Treatment Providers**

Table B-6 below summarizes the water suppliers and service areas for connections greater than 200, and wastewater treatment providers in the Greater Monterey County IRWM region. Note that there are no water suppliers in the Big Sur coastal region with connections greater than 200.

**Table B-6: Water Supply (Connections >200) and Wastewater Treatment Providers**

Service Supplier	Service Area (within Greater Monterey County IRWM Region)	Population Served	Water Supply	Wastewater Treatment
Alco Water Service Company	Service areas within the City of Salinas – north and east sides	29,152	x	
California American Water Company	Toro Water Company	408	x	
	Ambler Park	396	x	
	Chualar	186	x	
	Las Palmas	1,046		x
	Indian Springs	180		x
	Oak Hills	460		x
	Spreckels	270		x
	Ralph Lane	28	x	
California State Parks	Julia Pfeiffer Burns State Park		x	
	Andrew Molera State Park		x	
	Pfeiffer Big Sur State Park		x	x
	Fremont Peak State Park		x	
California Utilities	Toro Area	1,100 connections + -		x
California Water Service Company	King City	10,260	x	
	Salinas District (including 70% of the City of Salinas, plus Bolsa Knolls, Las Lomas, Oak Hills, Country Meadows, Salinas Hills, and Buena Vista)	134,870	x	
Camp Roberts	National guard base	5,986	x	x
Castroville Community Services District	Community of Castroville	7,000	x	
Chualar Community Services Area	Community of Chualar	1,190		x
City of Gonzales	City of Gonzales	9,114	x	x
City of Greenfield	City of Greenfield	17,898	x	x
City of Soledad	City of Soledad	16,729	x	x

	Salinas Valley State Prison and Corrections Training Facility/Soledad Prison	11,200		x
Fort Hunter Liggett	Army base	5,500	x	x
King City	King City	12,874		x
Little Bear Water Company	Area southwest of King City	2,314	x	x
Marina Coast Water District	City of Marina and Ord Community	30,480	x	
Monte Del Lago Park	Monte Del Lago Mobile Home Community	750	x	
Monterey County Parks	Lake San Antonio		x	x
Monterey Regional Water Pollution Control Agency	City of Salinas, Marina, unincorporated areas within the County (plus Monterey Peninsula cities which are outside the GMC IRWM region)	250,000 (includes areas outside the IRWM region)		x
Pajaro Sanitation District operated by Monterey County Public Works	Las Lomas Area	3,024		x
Pajaro/Sunny Mesa Community Services District	Pajaro area (lies outside of IRWM region), Elkhorn, Prunedale area, plus Sunny Mesa and Hillcrest subdivisions	7,225	x	
Salinas Valley State Prison	Facility grounds in Soledad	5,719	x	
San Ardo Water District	Community of San Ardo	517	x	x
San Lucas County Water District	Community of San Lucas	269	x	x
Soledad Prison/Corrections Training Facility	Facility grounds in Soledad	7,175	x	
Spreckels Water Company	Community of Spreckels and Tanimura Antle Plant	673	x	

Source: 2007 Data from State of California, Department of Finance, compiled by Association of Monterey Bay Area Governments, except for the following:

- Alco population estimate based on email communication with Alco President, December 13, 2011.
- California American Water Company population from email communication with CalAm, December 13, 2011.
- California Water population estimates from King City 2010 UWMP and Salinas District 2010 UWMP;
- Castroville CSD population estimate based on email communication with CCSD General Manager, October 2011.
- Chualar CSD population estimate based on 2010 US Census data;
- City of Gonzales population estimate from LAFCO 2010 MSR for the City of Gonzales;
- City of Greenfield population estimate from LAFCO 2010 MSR for the City of Greenfield;
- King City population estimate for wastewater services based on 2010 US Census data;
- Las Lomas population estimate (for Pajaro Sanitation District) based on 2010 US Census data;
- Marina Coast Water District population estimate from MCWD 2010 UWMP;
- Pajaro/Sunny Mesa CSD population estimate from LAFCO 2006 MSR for the North County Area of Monterey County;
- San Ardo population estimate based on 2010 US Census data;
- San Lucas population estimate based on 2010 US Census data;
- Soledad population estimate from the Soledad 2010 UWMP;
- Spreckels population estimate based on 2010 US Census data.

Major water suppliers in the region include the MCWD, the Castroville Community Services District, the California Water Service Company, Alco Water Service Company, and the municipalities of Gonzales, Greenfield, Soledad, and King City. The U.S. Army and California State Parks supply water for use on their properties within the region. The majority of residents and businesses in the Big Sur coastal region obtain water from private wells and springs. California State Parks treats and provides its own water supply at each of the State Parks in Big Sur, including Andrew Molera State Park, Pfeiffer Big Sur State Park, Julia Pfeiffer Burns State Park, and Fremont Peak State Park, which lies within Monterey and San Benito Counties.

Figure B-14 on the following page illustrates the jurisdictional boundaries of the water management agencies and water districts in the region (MCWRA, SBCWD, and PVWMA) along with the boundaries of the Monterey Peninsula Water Management District (MPWMD), which manages water for the Monterey Peninsula area, adjacent to the Greater Monterey County IRWM planning area. The map also shows general boundaries for major water purveyors in the Greater Monterey County IRWM region.



**Figure B-14: Water Supply Districts and Purveyors in the Greater Monterey County IRWM Region**



0 4 8 16 Miles

Projection: UTM Zone 10N  
 Datum: NAD 1927  
 May 21st, 2012



- Greater Monterey County IRWM region
- Small Water Purveyors
- Water bodies
- MCWRA
- PVWMA
- SBCWD
- MPWMD

The following provides a description of the major water purveyors in the Greater Monterey County IRWM region. (Note that wastewater providers are described above in Section B.3.3.g.)

### **Alco Water Service**

Alisal Water Corporation, dba Alco Water Service (Alco), is an investor-owned public utility water company that has been providing public utility water service to the Alisal community, which was eventually incorporated into the City of Salinas, since 1932. Alco's rates and service quality are regulated by the CPUC and its water quality is regulated by both the California Department of Public Health (CDPH) and the CPUC. The CPUC also regulates the design, construction and operation of the utility's facilities. As of 2011, Alco maintains nine wells, six active wells and three standby wells with a combined total capacity of 15,136 million gallons per year and an existing pump capacity of 9,244 million gallons per year. Current demand, based on year 2010 figures, is approximately 1,381 million gallons of groundwater per year to the Salinas area.

At the City of Salinas's request, the CPUC conducted a complete review of Alco's water quality, water system and its operation, as well as its customer service in providing water service; the review was completed by the CPUC in 2009. The CPUC's review determined that Alco's water quality meets all State and Federal water quality standards, that Alco's water service to its customers meets the requirements set forth by the CPUC, and that Alco has sufficient production capacity and adequate facilities to provide service in its certificated service area, which includes the City of Salinas's Future Growth Area.

### **California American Water Company**

California American Water Company (CalAm) is a regulated utility serving approximately 50 communities throughout the state with high-quality water and wastewater services. In the California Central Coast area, CalAm serves an estimated 120,000 people through more than 40,000 residential and business water service connections.<sup>22</sup> Within the Greater Monterey County IRWM Plan area, the company provides service to approximately 3,000 water and wastewater connections. Communities served within this area include Toro, Ambler Park, Las Palmas and Spreckels, which are all located between the Monterey Peninsula and Salinas Valley. Also included are the communities of Ralph Lane and Indian Springs in Salinas, Oak Hills in northern Monterey County and Chualar in southern Monterey County. All of these systems are independent of each other. All communities that are served by CalAm within the Greater Monterey County region draw their water supply entirely from the Salinas Valley Groundwater Basin.

The quality of water delivered to customers throughout the Monterey System meets or exceeds all State and Federal drinking water requirements. Groundwater pumped by many of the system's wells is of high quality, and requires no treatment other than disinfection, which is accomplished by chlorination. Water from wells serving Ambler Park is high in iron and manganese, and water from Toro and Ambler Park requires arsenic removal treatment. CalAm operates separate facilities for treating and filtering the raw groundwater from these wells prior to distribution.

### **California Water Service Company**

California Water Service Company (Cal Water) is regulated by the CPUC and serves approximately 130,000 residents (70 percent of the urban users) in the City of Salinas and some of the surrounding areas, including the unincorporated communities of Bolsa Knolls, Las Lomas, Oak Hills, Country Meadows, Salinas Hills, and Buena Vista.<sup>23</sup> Alco Water Company serves the remaining portion of the City of

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<sup>22</sup> Source for all information in this section: Email communication with CalAm staff from IRWM Plan Coordinator (December 13, 2011).

<sup>23</sup> Source for all information in this section regarding the Cal Water Salinas District: Cal Water 2010b.

## Salinas.

Cal Water relies solely on groundwater sources from the Pressure and Eastside sub-areas of the Salinas Valley Groundwater Basin. The Pressure sub-area is a region of gradually declining groundwater elevations, and the groundwater level in the Eastside sub-area is declining more rapidly than any other sub-area in the Salinas Valley. The aquifers surrounding the City of Salinas have seen a reduction in groundwater storage and the encroachment of the saline front due to saltwater intrusion. The intruding seawater has advanced into the 180-Foot Aquifer to within one mile of Cal Water's closest well. Cal Water has shifted production as much as possible out of the 180-Foot and Eastside Aquifers and located it further south and more in the 400-Foot Aquifer of the Pressure area. Cal Water does not pump from the Deep (900-Foot) Aquifer.

The Salinas District has a total of 59 wells, including one leased well. In 2010, 42 of these wells were active and operational and one was in Standby status. The design capacity of the active operational wells is 30,990 gallons/minute (GPM), or an annualized equivalent of 49,987 AFY, a rate that could produce 44.6 MGD. The five-year average, average day demand is 18.4 MGD and the average maximum day demand is 30.1 MGD. The historic high for these parameters occurred in 2004 for average day at 19.4 MGD and in 2005 for maximum day at 31.8 MGD.

The drinking water delivered to customers in the Salinas District meets or surpasses all Federal and State regulations. However, over the years, some of the District's wells have experienced declines in water quality due to nitrates, volatile organic compounds (VOCs), MTBE, uranium, and iron and manganese. Since 1999 Cal Water has removed one well from service due to high levels of MTBE. Six wells during the past 13 years were placed on inactive status because of noncomplying water quality. The most common problem has been nitrates, which can be removed by treatment. Cal Water has installed nitrate treatment on four wells. Another emerging concern is MTBE, the additive used in gasoline, getting into the groundwater and contaminating well water. One well has been put on inactive status because of MTBE. Some wells have shown a trend toward increases in VOCs, which can be removed by activated carbon. A major future water quality concern is arsenic. There is a possibility that the State of California may set a lower arsenic standard such as 5 parts/billion (ppb) or even less. This new maximum contaminant level (MCL) could impact the availability of several wells for water production. In addition, two regional water quality conditions that may ultimately impact the availability and use of the Salinas water supply are seawater intrusion and nitrate contamination. A very aggressive well replacement program is needed to maintain adequate supply in the Salinas District.

Cal Water also serves approximately 10,260 residents in King City.<sup>24</sup> Groundwater is the sole source of water furnished to King City District customers. Although the aquifers of the Salinas Valley have been in a state of overdraft for many years, the City is not significantly impacted by the overdraft due to its proximity to the San Antonio and Nacimiento Reservoirs. The MCWRA releases flows from these reservoirs to provide groundwater recharge throughout the year. As a result, groundwater levels in the King City area have been remarkably stable, and have always recovered quickly after drought events.

The water supply for King City is obtained from Cal Water-owned wells and is pumped directly into the distribution system and into an elevated steel tank. There are currently six operating groundwater wells within the King City District. The design capacity of these wells is 10,100 GPM or 14.5 MGD, if operated continuously. The five-year average, average day demand is 1.70 MGD and the five-year average maximum day demand is 2.85 MGD. The historic high for these parameters occurred in 2004 at 1.82 MGD for average day and 3.07 MGD in 2006 for maximum day.

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<sup>24</sup> Source for all information regarding the Cal Water King City District: Cal Water 2010a.

The drinking water delivered to customers in the King City District meets or surpasses all Federal and State regulations. However, while the Cal Water King City system has not experienced supply deficiencies, contaminants continue to threaten water supply reliability. Six of the King City wells have been deactivated because of elevated nitrate concentrations in the water produced. The MCL for nitrate in drinking water is 45 milligrams/liter (mg/L). In these six wells the MCL has been exceeded resulting in the well being taken out of service. Spreading of this condition to the remaining six wells would be a problem for the District. Loss of additional capacity could cause pressure loss during peak flow periods.

### **Castroville Community Services District**

The Castroville Community Services District (CCSD), formed in 1952 as the Castroville Water District, serves more than 6,800 customers in the unincorporated town of Castroville through 1,567 connections. CCSD currently delivers approximately 1,000 AFY of water, all of which comes from the Pressure subarea of the Salinas Valley Groundwater Basin. The CCSD system encompasses approximately 13 miles of pipeline and includes two water storage tanks with a capacity of 1.1 million gallons. The stored water is distributed to customers via an average pumping of 800,000 gallons/day; however, CCSD has a maximum capacity to pump up to 4.5 MGD to meet peak demands if needed (LAFCO 2006b).

CCSD operates three production wells, with an estimated capacity of just under 5 MGD. Castroville's wells in the 180/400-Foot Aquifer of the Salinas Valley Groundwater Basin had been experiencing increased salinity (identified as chlorides and total dissolved solids) due to seawater intrusion. In 2007, CCSD drilled a new well, Well No. 2B, into the Deep (900-Foot) Aquifer to reduce pumping from the shallower aquifers. Water quality testing indicated that arsenic levels in the new well exceeded the MCL for drinking water. CCSD applied for and has received funds in Round 1 of the Proposition 84 IRWM Implementation Grant Program to complete construction of Well 2B, including arsenic removal treatment equipment, allowing the production drinking water from the Deep Aquifer to meet drinking water requirements. The CSIP, managed by MCWRA and described in Section B.3.3.c above, has successfully reduced agricultural water demand in the Castroville region and has consequently stopped most of the migration of seawater intrusion to areas directly west (coastward) of Castroville. Nonetheless, CCSD plans to move a number of its production wells east to ensure supply reliability.

### **City of Gonzales**

The City of Gonzales provides potable water and wastewater treatment to a population of about 9,114. The City operates four production wells in the Pressure subarea. In FY 2010/2011 the City delivered 1,284 AF (418 million gallons) of potable water to its citizens and businesses from its four active wells. The City's water system has been operating on a reliable basis for many years even during periods of prolonged drought. Nitrates and MTBE have become constituents of concern at the Pressure 180-Foot level, which could threaten the water supply. However, the City has not found it necessary to consider groundwater treatment since it began sealing its wells at the 400-Foot level in 1988. The City's wells feed directly into the distribution systems which consist of one 1.0 MG and two 3.0 MG storage tanks for a total storage capacity of 7 MG. The municipal wastewater treatment plant currently operates at 1.30 MGD and serves all residential, commercial and industrial customers in the City.<sup>25</sup>

### **City of Greenfield**

The City of Greenfield is the fastest growing city in Monterey County. Greenfield's 2010 population was estimated at 17,898, a 41.5 percent increase from 2000 (LAFCO 2010b). This percentage increase over the ten-year period was almost double that of any other city in Monterey County. According to the Greenfield General Plan for 2005-2025, the City's population is expected to reach buildout by 2025, more than doubling its size from the present population and exceeding 38,000 residents (note, the City's

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<sup>25</sup> Sources: LAFCO 2010a; City of Gonzales website (November 2011: <http://www.ci.gonzales.ca.us/public-work.php>); and email communication with City of Gonzales Director of Public Works (November 30, 2011).

projections differ significantly from those of the Association of Monterey Bay Area Governments [AMBAG], which estimates a population of less than 30,000 by 2030).

The City of Greenfield Public Works Department is responsible for water supply and delivery in the City of Greenfield. The City utilizes local groundwater as its sole source of water supply. The City is located within the Forebay sub-basin of the Salinas Valley Groundwater Basin. The City's water system currently includes two storage tanks (a 1.0 MG tank and a 1.5 MG storage tank installed in November 2009), four operational wells (one of which is non-potable, used for irrigation), and over 17 miles of transmission and distribution pipelines. The City's 2005-2025 Water System Capital Improvement Plan (CIP) identified a need for total buildout storage of 3.75 MG (City of Greenfield 2008). The municipal water system has the capacity to pump approximately 8.0 MGD while the maximum current demand is reported at approximately 1.8 MGD (LAFCO 2010b). The City routinely tests its wells to ensure that the groundwater pumped meets US Environmental Protection Agency (EPA) and California Department of Public Health (CDPH) drinking water standards. The water quality of the primary wells is good and currently meets all regulatory standards (LAFCO 2006c).

The City of Greenfield also provides wastewater treatment services to city limit customers, consisting of primary treatment. The City's Wastewater Treatment Plant has a capacity to receive a flow of 2.0 MGD, while the plant currently provides a peak month average daily flow of 0.987 MGD.<sup>26</sup>

### **City of Soledad**

The City of Soledad is located in southern Monterey County approximately 25 miles south of Salinas. Two California State Prisons are located within the City of Soledad, but are not served by the City's municipal water system. The City's potable water supply is entirely groundwater, from the Forebay Subarea of the Salinas Valley Groundwater Basin. The City owns and operates eight groundwater wells, only four of which are currently operational with a combined capacity of 6,618 AFY. Two of the wells are in the process of being decommissioned due to high rates of nitrates. Two more wells are planned for construction within the next three to five years. Since 2005, the City has completed construction of three new 1 MG storage tanks, storage booster pumps have been installed in low pressure zones of the system, and construction of a new water transmission main and pressure regulating valve has been completed. The City now has a total of four 1 MG tanks. Contaminants of local concern are pesticides and total dissolved solids (TDS). The water quality of the primary wells is good and meets all standards. As previously stated, two wells have elevated nitrate concentrations and some organic chemical contamination, and are in the process of being decommissioned.

The City of Soledad operates one wastewater treatment plant, which treats the wastewater from the Prison as well as the City. The City of Soledad very recently completed an upgrade of the City Plant which, in addition to increasing plant treatment capacity to 5.5 MGD with a disposal capacity of 4.3 MGD, also treats wastewater to meet waste discharge requirement effluent limits for recycled water use. In 2010, the City completed an upgrade of its water reclamation facility to meet tertiary treatment requirements. The City of Soledad recently received funds through Round 1 of Proposition 84 IRWM Implementation Grants to fund completion of design of a recycled water delivery system to both agricultural and recreational areas in and near the City, as well as fund research into the feasibility and conceptual design of providing treatment of the wastewater of the City's of Gonzales and Greenfield. The project will construct a recycled water pump station, and design and construct the final transmission pipes needed to connect the recycled water transmission mains already constructed to the new pump station. Completion of the project will enable delivery of recycled water to multiple landscape areas in the City currently being irrigated with potable water (City of Soledad 2010).

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<sup>26</sup> LAFCO 2010b and personal communication with City of Greenfield Public Works staff (January 2012).



### **Marina Coast Water District**

The Marina Coast Water District was formed in 1960 to provide potable water service to the community of Marina (MCWD 2011). MCWD's current service area in Central Marina encompasses 3.2 square miles. The MCWD also provides potable water delivery and wastewater conveyance services to 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 2010, the MCWD delivered a total of approximately 3,970 AF of potable water to 30,480 customers, including 1,743 AF to 19,700 customers in the City of Marina and 2,226 AF to 10,760 customers in the Ord Community. The source of water supply for the MCWD is the Salinas Valley Groundwater Basin. MCWD owns and operates three water production wells in the Deep (900-Foot) Aquifer for the Central Marina service area, and three wells in the 400-Foot Aquifer for the Ord Community service area. MCWD is adding a new well in the Deep Aquifer. In August 2005, the Central Marina and Ord Community water systems were connected; integrated operations allow water to flow between the two systems to meet peak demands and improve overall services.

Significant water quality issues include seawater intrusion and groundwater contamination from land use activities on the former Fort Ord Army Base. The former Fort Ord was identified by the US EPA as a National Priority List federal Superfund site on the basis of groundwater contamination discovered on the installation in 1990. In 2001, trichloroethylene (TCE), a cleaning solvent, was detected by the Army in one of the three water supply wells at the former Fort Ord. MCWD continues to monitor the affected well, and all other wells, for TCE and other contaminants on a regular basis.

The Salinas Valley Groundwater Basin has been in an overdraft condition with seawater intrusion of about 8,900 AFY at its coastal margins. Historically, MCWD supplied its Marina service area with water from 11 wells screened in the 180-Foot and 400-Foot Aquifers. Between 1960 and 1992, some of those wells indicated varying degrees of seawater intrusion and were replaced, first moving from the 180-Foot aquifer to the 400-Foot aquifer, and later moving to the Deep Aquifer. MCWD is currently the only significant user of the Deep Aquifer. Recent studies for MCWRA indicate that the seawater intrusion front continues to migrate inland in the vicinity of Marina and the Ord Community. There is some concern that the Deep Aquifer may become affected by seawater intrusion. MCWD operates a monitoring well installed between Monterey Bay and the Marina production wells.

MCWD has senior water rights to recycled water from the MRWPCA treatment plant, though is not currently exercising them. MCWD also owns a desalination plant with a potential capacity of 300 AFY, although this plant is currently idle and would require plant upgrades before restarting. MCWD signed a developer agreement in 2006 that would obligate the District to re-operate the desalination plant if needed. At present, discussions are underway between MCWD, MCWRA, California American Water (which supplies water to the Monterey Peninsula region), and MRWPCA for a replacement to the proposed construction and operation of a major regional desalination facility. There have been multiple site proposals for a new desalination facility, though the one with the most traction would be a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis (RO) desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about a combined 10 MGD of product water.

### **Pajaro/Sunny Mesa Community Services District**

The Pajaro/Sunny Mesa Community Services District water system was formed and has been in operation since 1986. The District provides potable water services, fire flows, parks, streetlights, and sanitary sewer services to thousands of residents of North Monterey County. The District provides these services from the Pajaro River in the north, to Moss Landing in the west, to the Highway 101 corridor in the south. It is the only public agency that provides public potable water services in the Pajaro, Elkhorn, and Prunedale

areas (Pajaro lies outside of the Greater Monterey County IRWM region, but the communities of Elkhorn, Prunedale, and Sunny Mesa are located within the region).<sup>27</sup>

The Pajaro/Sunny Mesa Community Services District lies within the Pajaro Groundwater Basin. Groundwater management and planning is governed by the Pajaro Valley Water Management Agency (PVWMA). The Community Services District owns and operates multiple water systems, including one serving Pajaro and another water system serving the Sunny Mesa area. The District owns and operates 23 wells, 1.8 million gallons of water storage, about 62,000 lineal feet of water mains. These facilities do not meet current needs of the District.<sup>28</sup>

### **Water Purveyors in the Big Sur Region**

Water supply along the Big Sur coast is provided by many small mutual water companies. Among these are Coastlands Mutual Water Company, Rancho Chapparal, Clear Ridge, Garrapata Water Company and Buck Creek Water Company. Residents and businesses obtain their water from either private wells or springs.

Coastlands Mutual Water Company is the largest water supplier in the Big Sur coastal region, serving 40 connections.<sup>29</sup> Coastlands uses surface water for its water supply, drawing most of its supply from Post Creek (with spring boxes located above the Ventana Inn) and a smaller portion of its supply from Mule Creek (serving about 8 connections on that system). Surface water is captured in spring boxes, filtered and chlorinated and piped to each resident's property. Extra capacity is stored at each property owner's personal water storage facility as well as in a community 100,000-gallon storage tank on high ground adjacent to the subdivision.

Coastlands has recently begun monitoring water usage; for 2009, water usage averaged approximately 7,900 gal/day. The company owns two storage tanks (a 15,000-gallon tank and the 100,000-gallon community water tank, the latter of which was installed in 2003 to improve water supply reliability), pipelines, and a skid-mounted water filtration system. The company recently installed 4" pipelines from the 100,000-gallon tank to a particularly steep and isolated area to help with fire suppression. The water quality in Big Sur is generally of excellent quality; however, because Coastlands depends on surface water as its sole water source, turbidity is a significant problem, particularly following wildfire events. The Company is considering the possibility of drilling a well to address this problem.

#### **B.4.2.c Flood Control Districts**

As described above in Section B.3.3.e Floodwater and Flood Management, the agency with primary responsibility for flood control and floodplain management in Monterey County is the MCWRA. The MCWRA owns and operates the Nacimiento and San Antonio Dams, and is responsible for maintaining some portions of the Salinas Reclamation Ditch. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal.

#### **B.4.3 Service Areas of Land Use Agencies in the Region**

Land use agencies in the region include the six incorporated cities noted above, plus the County of Monterey which is responsible for land use planning in the unincorporated areas of the county. In

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<sup>27</sup> Source: Pajaro/Sunny Mesa Community Services District website: <http://pajarosunnymesa.com/>

<sup>28</sup> Source: Email communication with Pajaro/Sunny Mesa CSD General Manager (December 1, 2011).

<sup>29</sup> Source: Email communication with Coastlands President (December 1, 2011).

In addition, the U.S. Forest Service makes land use decisions for the federal lands within the Los Padres National Forest, the Bureau of Land Management (BLM) is responsible for land use decisions on its land holdings (including lands in South Monterey County and about 15,000 acres of property on the former Fort Ord, designated for open space and habitat management uses), and California State Parks is responsible for land use planning in its six State Park units within the region. The U.S. Army is responsible for land use planning on Fort Hunter Liggett, Camp Roberts, and its residential holdings on the former Fort Ord. Various other federal and state agencies hold small properties throughout the County, which are outside local land use authority.

In addition, as stipulated in the Coastal Act, the California Coastal Commission (CCC) has authority to certify land use policy in the coastal zone. CCC retains land use authority in areas of original jurisdiction and for all work below the mean high tide level. In addition, CCC has limited appeal authority over the following coastal permit applications (Chapter 20.88 Capital Improvement Program):

- Approved projects between the sea and the first through public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tide line of the sea where there is no beach, whichever is the greater distance.
- Approved projects in county jurisdiction located on tidelands, submerged lands, public trust lands, within 100 feet of any wetland, estuary, or stream or within 300 feet of the top of the seaward face of any coastal bluff.
- Any approved project involving development that is permitted in the underlying zone as a conditional use. Uses listed as principal uses are not appealable to the CCC unless they fall within the above categories by location.
- Any project involving development that constitutes a major public works project or a major energy facility.

Pursuant to the California Coastal Act, Monterey County amended its General Plan in the 1980s to adopt a Local Coastal Program (LCP) made up of land use plans (policy) and coastal implementation plans (regulatory) that govern land use within the coastal zone. Monterey County’s LCP consists of four planning areas including, within the Greater Monterey County IRWM region, North County and Big Sur Coast. Policies for development within these areas are established in land use plans that have been certified by the CCC.

#### **B.4.4 Boundaries of Watersheds and Groundwater Basins**

The watersheds and groundwater basins in the region are described in detail in the sections above. For a map illustrating the boundaries of the region’s watersheds, please see Figure B-6 in Section B.3.1. For a map illustrating the boundaries of the region’s groundwater basins, please see Figures B-11 and B-12 in Section B.3.3.b.

### **B.5 WATER SUPPLY AND DEMAND**

Water for the Greater Monterey County IRWM region is supplied entirely from its own water supply sources, including groundwater and surface water supplies. No water is “imported” from outside the region’s boundaries (except, as mentioned previously, for the water that flows via the Salinas River from San Luis Obispo County). Water use in the region is directly affected by land use and population, and will be increasingly impacted by climate change factors. The following sections describe historic land use, population, and water use trends in the region, and projected water demand over a 25-year planning horizon based on projected land use and population trends.

While the discussion of water supply and demand focuses mainly on water quantity, it assumes that the water is also of sufficient quality for its intended use. Thus, municipal water demand assumes water that will generally meet drinking water standards, agricultural water demand assumes a level of water quality suitable for irrigation purposes, and environmental water demand assumes certain water quality parameters, such as suitable water temperature and clarity needed to support aquatic and riparian species.

### B.5.1 Population Trends

Table B-7 below shows population trends for cities and communities in the Greater Monterey County IRWM region since 1960.

**Table B-7: Population of Cities and Selected Communities 1960 - 2010**

	1960	1970	1980	1990	2000	2010
Big Sur Coastal Division	659	898	1,271	1,391	1,180	1,710
Castroville, CDP	2,838	3,235	4,396	5,272	6,724	6,481
Chualar, CDP	-	580	580	700	1,444	1,190
Elkhorn	-	-	-	1,458	1,591	1,565
Gonzales	2,138	2,575	2,891	4,660	7,525	8,187
Greenfield	1,680	2,608	4,181	7,464	12,583	16,330
King City	2,937	3,717	5,495	7,634	11,094	12,874
Las Lomas CDP	-	-	1,740	2,127	3,078	3,024
Marina	-	-	20,647	26,436	25,101	19,718
Prunedale CDP	-	-	-	7,393	16,432	17,560
Salinas	28,957	58,896	80,479	108,777	151,060	150,441
San Ardo, CDP	-	460	460	533	501	517
San Lucas, CDP	-	202	202	439	419	269
Soledad	2,837	4,222	5,928	7,146	11,263	25,738

Source: US Census Bureau (except for Chualar, San Ardo, and San Lucas 1970-1990 data: this data was taken from the Salinas Valley IRWM FEP but the original source is uncertain).

Population in the Big Sur area of the Greater Monterey County region has remained relatively stable over the past hundred years. In the Salinas Valley and North County areas, however, population has expanded considerably. Most of the urban development in the region has occurred in the cities of Salinas, Soledad, Gonzales, Greenfield, and King City. The greater Salinas area has experienced particularly rapid growth and development in recent years, with Salinas absorbing approximately 70 percent of Monterey County's growth within the last 20 years (from 1990 to 2010). This growth is occurring despite the fact that infrastructure and services are minimal outside of the incorporated communities with the majority of dwellings on individual wells and septic systems.<sup>30</sup>

Despite the general upward trend, growth has slowed considerably in the past decade compared to the previous decade due to the economic downturn. For example, the City of Gonzales experienced 61.5 percent growth from 1990-2000, and 8.8 percent growth from 2000-2010; the City of Greenfield experienced 68.6 percent growth from 1990-2000, and 29.8 percent growth from 2000-2010; and the City of Salinas actually experienced slightly negative growth in the past decade (-0.4 percent), whereas it had experienced 38.9 percent growth from 1990-2000. One exception is the City of Soledad, whose growth more than doubled in the past decade from 11,263 to 25,738 residents (128.5 percent).<sup>31</sup>

AMBAG calculates population projections for urban areas in the Counties of Monterey, San Benito, and Santa Cruz. Table B-8 shows projected populations for selected cities and communities in the Salinas

<sup>30</sup> This last statement is excerpted from LAFCO 2006a, however using US Census 1990 – 2010 data for a 20-year percentage.

<sup>31</sup> Based on US Census data.

Valley and North County areas, projected to the year 2035. Most of the data in this table is from the AMBAG 2008 Regional Forecast; projections for communities not included in the AMBAG Forecast have been estimated as noted below. Note that the cities and communities included in the table below have been chosen to exactly match the urban areas included in the MCWRA Groundwater Extraction Summary Reports (GWESR), in order to facilitate calculating “future water demand” for urban areas in the Salinas Valley (see Section B.5.4.a, Urban Water Use Projections, below). The population for “Other Areas” (which is different from “Unincorporated Monterey County”) has been estimated “backwards” from the GWESR, rather than from a known existing population.

**Table B-8: Population Projections for Cities and Communities in the Salinas Valley**

	2010	2020	2030	2035	Avg. Annual Growth:
Castroville, CDP	6,481	7,200	8,500	9,000	1.6%
Chualar, CDP	1,190	1,236	1,234	1,239	0.2%
Gonzales	8,187	15,969	20,941	23,418	7.4%
Greenfield	16,330	21,855	27,348	30,337	3.4%
King City	12,874	17,269	22,482	24,726	3.7%
Marina Coast Water District (includes City of Marina and Ord Community)	32,184	57,718	69,887	75,887	5.4%
Other Areas	78,804	81,877	81,771	82,073	0.2%
Salinas	150,441	163,234	170,913	173,359	0.6%
San Ardo, CDP	517	537	536	538	0.2%
San Lucas, CDP	269	279	279	280	0.2%
Soledad (City and State Prisons)	25,738	33,760	38,801	41,405	2.4%
Unincorporated Monterey County	109,509	113,778	113,628	114,052	0.2%
<i>Monterey County</i>	<i>415,057</i>	<i>483,733</i>	<i>515,549</i>	<i>530,362</i>	<i>1.1%</i>

Sources: US Census 2010 data, plus AMBAG Monterey Bay Area 2008 Regional Forecast for 2020-2035 data, with exception of: Castroville population projections were estimated (as a “best guess”) by Castroville Community Services District General Manager (email communication, December 5, 2011); Chualar 2020 projection from AMBAG as cited in LAFCO 2006 North County MSR; Chualar 2030-2035 and San Ardo and San Lucas 2020-2035 projections based on AMBAG projected growth rate for Unincorporated Monterey County. MCWD population estimates are from the MCWD 2010 Urban Water Management Plan. The 2010 population for “Other Areas” was calculated by dividing AF of water used in 2010 for “Other Areas” (11,735 AF) by the average per capita water use in years 2008-2010 (0.1489133, see Section B.5.4.a below); population for years 2020-2035 was then calculated according to Unincorporated Monterey County growth rate.

Continuous growth is expected in the cities of Gonzales, Greenfield, Salinas, King City, and Soledad, as reflected in their respective General Plans. Growth for many of the smaller communities, however, is expected to fluctuate over the years, with an average annual growth rate of about 0.2 percent over the next 20+ years.

### **B.5.2 Land Use Trends**

The primary land use in Monterey County is agriculture, representing about 56 percent of the total land area and occupying more than 1.4 million acres of land. The second largest land use consists of public and quasi-public uses (such as parks, recreational, community, and military facilities), comprising about 23 percent of the total land area. About 16 percent of the land area in the county is devoted to resource conservation and other uses. The remaining 5 percent of the county has been developed with residential, industrial, and commercial uses. Another minor land use includes the exploitation of mineral and oil reserves, including oil drilling in the San Ardo area and several small “family-sized” gold mines in the Los Burros Mining District in the southern Santa Lucia Mountains in Big Sur (Monterey County Planning Department. 2010b, Section 4.1).

Historically there has been a strong military presence in Monterey County with Fort Ord located in the



northern Salinas Valley along the coast, Fort Hunter Liggett located on the eastern side of the Santa Lucia Mountains, and Camp Roberts located at the southern end of the county. Recent base closures have resulted in a reduction in the military presence and reuse of the former Fort Ord (recently designated a National Monument, and is also the location of California State University Monterey Bay, plus new residential development and other facilities). Fort Hunter Liggett, encompassing 165,000 acres within the Santa Lucia Mountains, is owned by the United States Army and is used primarily as a training facility. Camp Roberts is also owned by the U.S. Army and while it is used by all branches of the armed forces, it is licensed to the California National Guard and is their largest training base, encompassing 43,000 acres.

In the Big Sur area, the predominant land uses are public recreation and private residential development. Cattle grazing occurs on several of the large private land holdings and on a few grazing allotments on public land. Approximately 65 percent of the Big Sur coastal region (a 234-square mile area, approximately 70 miles long and averaging 3.3 miles in width) is in public ownership held by the U.S. Forest Service (Los Padres National Forest), the State Department of Parks and Recreation, and the University of California (which owns Landels-Hill Big Creek Reserve, 3,848 acres). The California Department of Parks and Recreation operates six state parks in the Big Sur region: Garrapata State Park (2,879 acres), Andrew Molera State Park (4,766 acres), Pfeiffer Big Sur State Park (1,006 acres), Julia Pfeiffer Burns State Park (3,762 acres), Limekiln State Park (716 acres), and the Point Sur Historic Park. Approximately 1,200 private parcels exist in the Big Sur Land Use Area, including dozens of private holdings throughout the National Forest, which are only accessible by forest service roads.

Land use activities in Big Sur have changed considerably since its early European settlement. In the 1880s, subsistence ranching, logging of redwoods, harvesting of tan bark, and mining of limestone and gold supported a local population of nearly 1,000 people (Monterey County Planning Department 1981). The completion of Highway One in 1937 made the rugged and wild Big Sur coast far more accessible to the outside world, shifting patterns of interaction and use of the land. Today, single-family residences comprise the major land use on private land, occurring either in rural residential clusters or scattered along Highway One. Commercial uses, including restaurants, small grocery stores, and service stations are generally concentrated in the Big Sur Valley. Small visitor-serving commercial areas include Big Sur, Lucia, and Gorda. Recreational uses include public and private campgrounds, visitor accommodations, restaurants, State Park lands, and the Los Padres National Forest. The Big Sur Local Coastal Plan (LCP), which was certified in 1986, was intended to provide comprehensive policy guidance to balance the development needs of area property owners and the local community with resource protection and public recreation over time. As a result of the LCP, current land use trends are intended to remain largely unchanged over time (Diehl 2006).

While land use activities in Big Sur have remained relatively stable over the past 100 years, land use in the Salinas Valley has changed quite dramatically. Table B-9 below shows agricultural and urban land use trends over the past 40 years for the Greater Monterey County IRWM region, based on DWR Land Use Surveys.<sup>32</sup> The table shows a steady increase in both urban and irrigated agricultural acreage over the

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<sup>32</sup> DWR land use surveys are typically performed every seven years and consist of aerial surveys followed by field verification. The reason for the discrepancies in the Region's total land area from year to year is unclear. The geographic area covered in Table B-8 includes the following DWR Data Analysis Units (DAUs): Pressure (048), East Side (049), Forebay (050), Upper Valley (051), Monterey Peninsula (052), Arroyo Seco North (053), Gabilan Ranges (054), Lockwood (055), Santa Lucia Range (057), and Bolsa Nueva (058). The boundaries of these DAUs align almost perfectly with the boundaries of the Greater Monterey County IRWM region, with the exception of DAU 052 (approximately 44% of the land area lies within the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Region), DAU 057 (approximately 5% lies within the Monterey Peninsula IRWM Region), and DAU 053 (less than 1% lies within the Monterey Peninsula IRWM Region). For the purposes of determining land use, 100% of the acreages in DAUs 057 and 053 have been included as part of the Greater Monterey County

years, occurring mainly in the Salinas Valley and North County. Urban acreage grew about 33,225 acres from 1968 to 2005 (nearly tripling), while irrigated agricultural acreage grew about 45,427 acres over that time period. As irrigated agriculture and urban populations have expanded, so have the water needs of the region. Note that although several thousand acres of agricultural land have been converted to urban uses, land continues to be brought into agricultural production (Monterey County Planning Department 2010b). This is reflected in the considerable decline in native vegetation (about 80,000 acres) since 1968.

**Table B-9: Land Use in the Greater Monterey County IRWM Region**

Land Use Type	1968	1976	1982	1989	1997	2005
<b>Irrigated Ag</b>	175,173	209,669	210,546	207,580	219,114	220,600
<b>Non-irrigated Ag</b>	17,033	49,098	58,361	32,944	30,534	14,532
<b>Total Agricultural Acreage</b>	192,206	258,767	268,907	240,524	249,648	235,132
<b>Semi-Agricultural Acreage</b>	1,221	2,389	2,832	3,621	3,214	2,945
<b>Urban Acreage</b>	18,508	25,127	28,224	39,114	49,300	51,733
<b>Native Vegetation</b>	1,698,324	1,624,238	1,611,160	1,625,996	1,600,527	1,618,718
<b>Total Acres</b>	1,910,259	1,910,521	1,911,123	1,909,255	1,902,689	1,908,528

Source: DWR Land Use Surveys. Semi-agricultural acreage includes farmsteads, dairies, livestock feed lots, and poultry farms.

Agriculture in the Salinas Valley is quite different from what it was 150 years ago. Cattle ranching and grain were the primary agricultural activities in the 1850s. As shipping became increasingly available (beginning in 1866 with construction of a major shipping terminal in Moss Landing) and water became increasingly accessible (beginning with gravity-fed irrigation systems, and advancing to wells driven by steam and wind power pumps, and then by gas and electric pumps), farmers shifted from grain to more water intensive crops such as sugar beets, and then to more lucrative crops such as lettuce.

Agricultural trends for selected crop categories (field crops, vegetables, and fruits/nuts) and for some selected crops (sugar beets, lettuce, broccoli, wine grapes, and strawberries) are shown on Table B-10 and illustrated by Figures B-15 and B-16 below, based on Monterey County Agricultural Commissioner Crop Reports from 1930 – 2010.

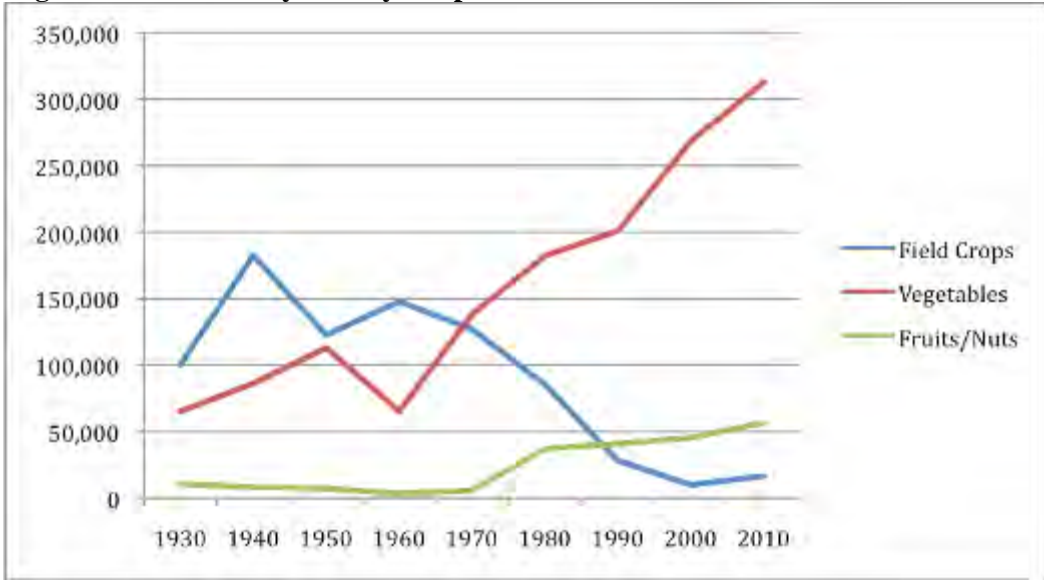
**Table B-10: Acreage Trends for Selected Crop Categories in Monterey County 1930 – 2010**

	1930	1940	1950	1960	1970	1980	1990	2000	2010
<b>Field Crops</b>	100,540	182,518	122,660	147,894	126,945	85,223	28,080	10,015	16,654
<b>Sugar Beets</b>	250	21,356	23,617	20,200	14,305	11,385	2,740	0	0
<b>Vegetables</b>	65,250	86,235	113,009	65,423	138,164	182,330	200,967	268,489	312,691
<b>Lettuce</b>	50,000	48,202	59,717	51,421	55,473	67,684	78,811	115,088	140,000
<b>Broccoli</b>	0	1,735	6,580	0	23,700	43,395	48,700	61,500	60,926
<b>Fruits/Nuts</b>	10,550	8,294	7,285	3,369	5,778	37,200	40,864	45,458	56,768
<b>Grapes</b>	400	116	0	0	0	33,724	33,154	36,265	43,321
<b>Strawberries</b>	250	148	506	0	2,600	2,785	5,830	6,990	10,664

Source: Monterey County Agricultural Commissioner Crop Reports 1930 - 2010. "Field crops" does not include rangeland (previously called "pasture/dry land" in the Crop Reports).

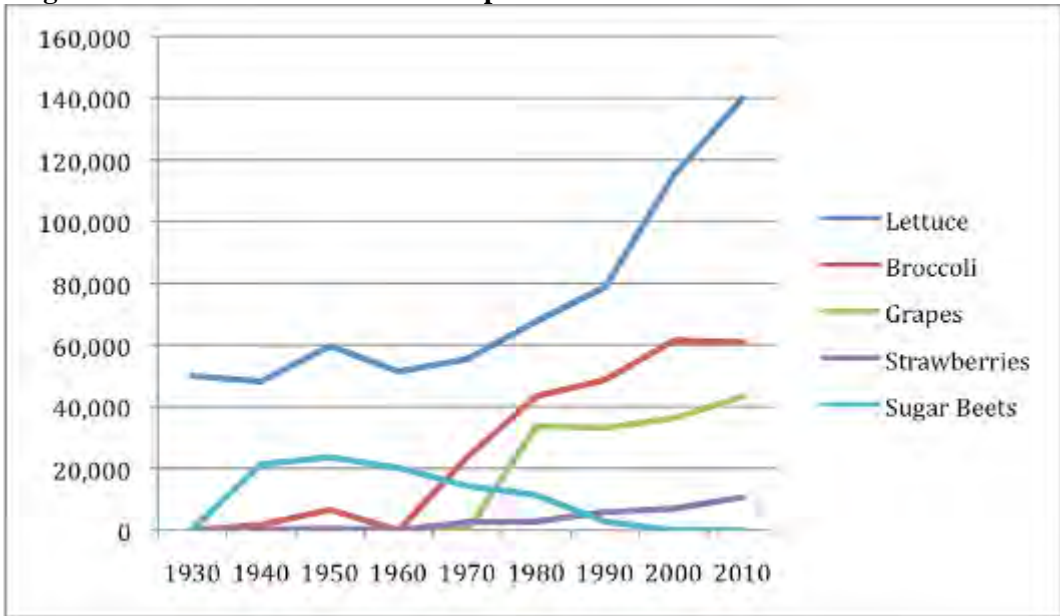
Region, and the land use acreages in DAU 052 included as part of the Greater Monterey County Region (about 56%) were estimated based on 2010 Google Maps.

**Figure B-15: Monterey County Crop Trends: 1930 – 2010**



Source: Monterey County Crop Reports

**Figure B-16: Trends for Selected Crops: 1930 – 2010**



Source: Monterey County Crop Reports

Of particular importance historically were the disappearance of sugar beets and a decline in field crops production, corresponding with the steep increase in truck crops. These changes demonstrate the dynamics of crop production in the Salinas Valley and depict a pattern towards more lucrative—and generally more water intensive—crops such as lettuce, broccoli, artichokes, and strawberries. The increase in the fruits/nuts category since 1970 is due mainly to heightened production of wine grapes and strawberries. While the strawberry acreage appears modest relative to other crops such as lettuce, the strawberry value in 2009 became for the first time the county’s number one crop, surpassing leaf lettuce and in 2010, grossing \$751 million in revenues (with leaf lettuce grossing \$725 million in 2010).

Agriculture is expected to remain the predominant land use in the Salinas Valley well into the future. Although agricultural land use in the Salinas Valley is not expected to change dramatically over the next 25 years, the pressure to convert agricultural land to urban land will intensify as the population in the Salinas Valley continues to grow. In the North County area, agriculture will likely remain the predominant land use in areas with good soils; however, in steeply sloped areas, rural residential will likely become the predominant land use. Note that “urban development” in North County is quite different than in the Salinas area. In North County, 1-5 acres rural residential is the typical mode, so even the “developed” areas are much less dense than around Salinas.<sup>33</sup>

**B.5.3 Water Use Trends**

Water use information in the Big Sur coastal area has not been systematically tracked, and therefore historic water use trends cannot be assessed. Water suppliers in the Big Sur region report that water supply is not a problem for the area; any water management issues, when they occur, have more to do with infrastructure limitations such as inadequate filtration or insufficient storage capacity. This section will therefore focus entirely on water use trends in the Salinas Valley and North County (i.e., water use from the Salinas Valley Groundwater Basin).

Water use information in the Salinas Valley has been systematically tracked only since the early 1990s; however, MCWRA has estimated historic (1970-1994) agricultural and urban water use with the help of a modeling tool called the Salinas Valley Integrated Ground and Surface Water Model (SVIGSM). The SVIGSM is a sophisticated modeling tool developed for analysis of hydrologic conditions in the Salinas Valley. The SVIGSM was calibrated to be utilized as a planning level analytical tool, and since then it has been applied to a number of projects, including CSIP and the Salinas Valley Water Project (SVWP).

Table B-11 below shows 25 years of historic water use in the Salinas Valley as estimated by SVIGSM; it was modeled based upon historic agricultural land use and cropping pattern analysis between 1970 and 1994 (MCWRA 1997a). While urban water use shows a steady increase over the 25-year period, agricultural water use shows a slightly declining trend (though there is less of a discernable pattern for agricultural use).

**Table B-11: Estimated Water Use 1970-1994 in the Salinas Valley, Utilizing the Salinas Valley Integrated Ground and Surface Water Model**

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Groundwater Pumping (AF)
1970	564,298	17,127	581,425
1971	568,064	17,619	585,683
1972	611,384	18,231	629,535
1973	545,882	18,845	564,725
1974	500,875	19,457	520,332
1975	524,948	20,072	545,020
1976	500,261	20,681	520,942
1977	563,798	21,465	585,150
1978	503,630	21,941	525,559
1979	566,337	22,508	588,845
1980	475,635	23,118	498,753
1981	491,257	23,868	515,092
1982	415,170	24,654	439,826

<sup>33</sup> Information about North County from Bryan Largay, Elkhorn Slough National Estuarine Research Reserve, November 2010 email communication with IRWM Plan Coordinator.

1983	422,071	25,139	447,214
1984	513,759	25,557	539,319
1985	487,486	25,966	513,456
1986	453,867	26,381	480,328
1987	495,354	26,790	522,349
1988	481,758	27,202	509,166
1989	465,537	26,255	491,907
1990	426,615	28,029	454,789
1991	454,862	29,890	484,977
1992	453,027	32,086	485,235
1993	435,698	34,283	470,190
1994	449,015	36,478	485,691
<b>Average</b>	<b>494,824</b>	<b>24,546</b>	<b>519,420</b>

Source: MCWRA 1997a

In February of 1993, the Monterey County Board of Supervisors adopted Ordinance No. 3663 that required water suppliers in the Agency’s Zones 2, 2A and 2B to report water use information for groundwater extraction facilities and service connections. That ordinance was replaced in October 1993 by Ordinance No. 3717, which modified certain requirements in the previous ordinance but kept the groundwater extraction reporting requirements in place for wells with a discharge pipe with an inside diameter of at least three inches.

MCWRA began collecting groundwater extraction data from well operators for agricultural and urban water uses in 1992. Agricultural water use consists of water used for irrigation, while urban water use includes all household consumption as well as commercial and industrial water use. Because agriculture is the main economic activity in the Salinas Valley, commercial and industrial water use is relatively low and therefore considered to be a function of the population. The groundwater extraction data, provided by over 300 well operators, is compiled in the Ground Water Extraction Management System portion of MCWRA Information Management System, a relational database maintained by the MCWRA, and summarized in annual Ground Water Extraction Summary Reports (GWESR). Since 1991, MCWRA has also required the annual submittal of Agricultural Water Conservation Plans, which outline the best management practices (BMPs) that are adopted each year by growers in the Salinas Valley. In 1996, another ordinance was passed that required the filing of Urban Water Conservation Plans. This program provides an overview of per capita water use and BMPs being implemented by urban water users as conservation measures.

Table B-12 below summarizes the GWESR data from 1995 to 2010. The agricultural data cover reporting from November 1 (previous year) through October 31 of the reporting year (the “water year”); the urban data cover the calendar year of the reporting year. Note that reported data provided by the water purveyors is not 100 percent accurate; reporting has varied over the years from 82 percent to 98 percent, and therefore the water use reflected in the table below is lower than actual use. In addition, data is submitted by individual reporting parties and is not verified by MCWRA staff. Note that a second source of agricultural water use not reflected in this table currently includes 13,300 AFY of tertiary treated recycled water from the MRWPCA plant, delivered to approximately 12,000 acres of agricultural users near Castroville.

**Table B-12: Agricultural and Urban Water Use in the Salinas Valley 1995-2010**

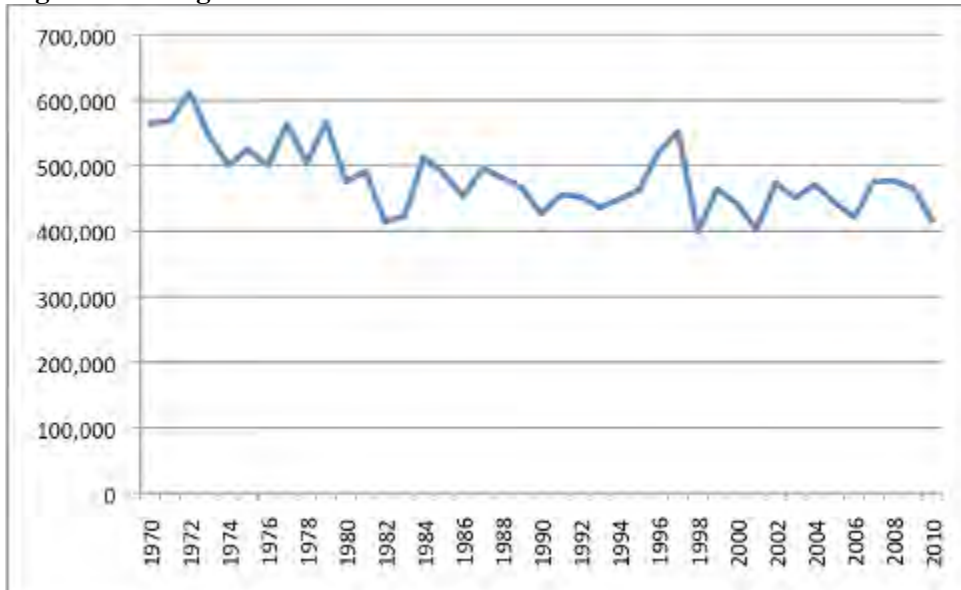
Year	% Reported	Agricultural Pumping (AFY)	Urban Pumping Reported (AFY)	Total Pumping (AFY)
1995	98%	462,628	41,884	504,512
1996	96%	520,804	42,634	563,438
1997	93%	551,900	46,238	598,138
1998	93%	399,521	41,527	441,048
1999	91%	464,008	40,559	504,567
2000	89%	442,061	42,293	484,354
2001	82%	403,583	37,693	441,276
2002	93%	473,246	46,956	520,202
2003	97%	450,864	50,472	501,336
2004	97%	471,052	53,062	524,114
2005	98%	443,567	50,479	494,046
2006	96%	421,634	49,606	471,240
2007	97%	475,155	50,440	525,595
2008	97%	477,124	50,047	527,171
2009	97%	465,707	45,517	511,224
2010	97%	416,421	44,022	460,443

Source: MCWRA GWESR from website: <http://www.mcwra.co.monterey.ca.us/>.

Note: The extraction amounts reflected in this table are lower than actual extraction amounts, since reporting was less than 100% in each reporting year (as shown).

Figures B-17, B-18, and B-19 below illustrate agricultural and urban water use trends from 1970-2010 using the combined data from SVIGSM and GWESR. Agricultural pumping accounts for about 90 percent of groundwater extraction in the Salinas Valley Groundwater Basin. While urban pumping accounts for a relatively small proportion of groundwater extraction, note that urban use has been slowly increasing relative to agricultural water use over the years. According to SVIGSM estimates, agricultural pumping accounted for approximately 97 percent of groundwater extraction in the mid-1970s and for approximately 93 percent in the mid-1990s, and according to GWESR data, has accounted for approximately 90 percent of groundwater extraction in recent years, with urban pumping accounting for the remaining 10 percent.

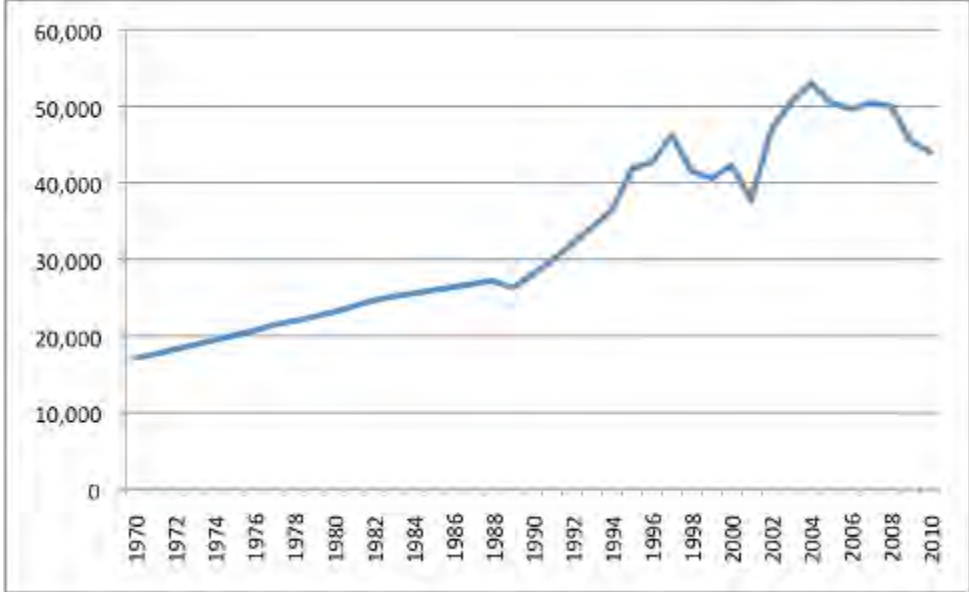
**Figure B-17: Agricultural Water Use Trends 1970-2010**



Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

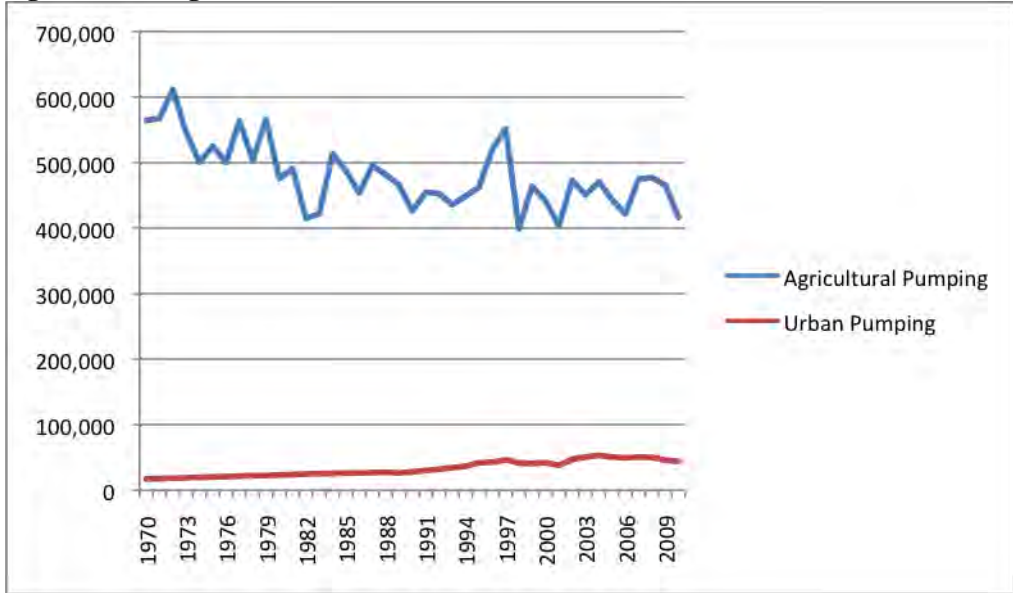


**Figure B-18: Urban Water Use Trends 1970-2010**



Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

**Figure B-19: Agricultural and Urban Water Use Trends 1970-2010**

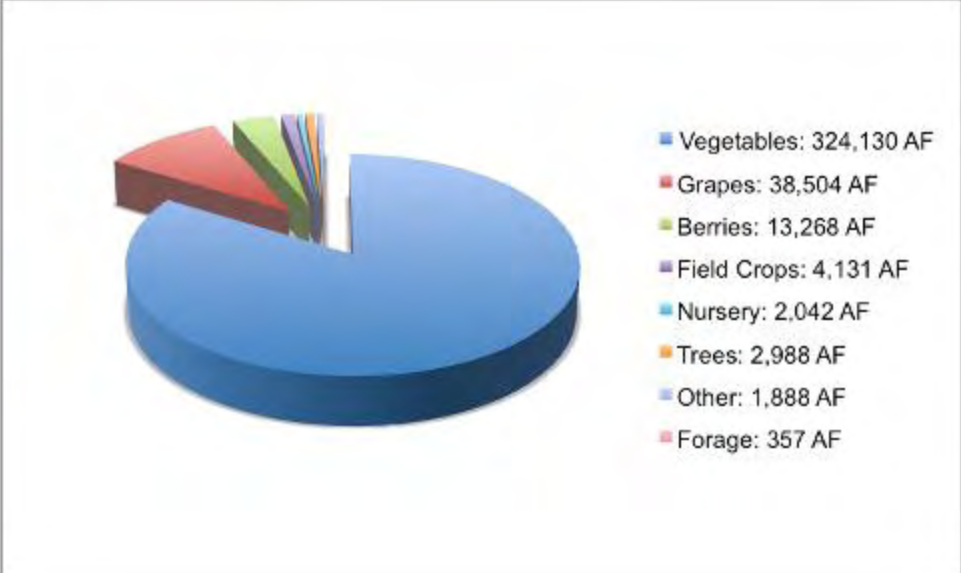


Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

The two figures below provide more detail for both agricultural and urban water use for the most recently reported year (calendar year for urban data, water year for agricultural data). Figure B-20 below illustrates the relative amounts of water used for different crop categories in the Salinas Valley in 2010. Note that 324,130 AF of water was extracted from the Salinas Valley Groundwater Basin to irrigate vegetables, totaling 84 percent of the total agricultural pumping. Groundwater extracted for grapes totaled 38,504 AF, or 10 percent of the total agricultural pumping. These data are based on 97 percent reporting of the 1,846

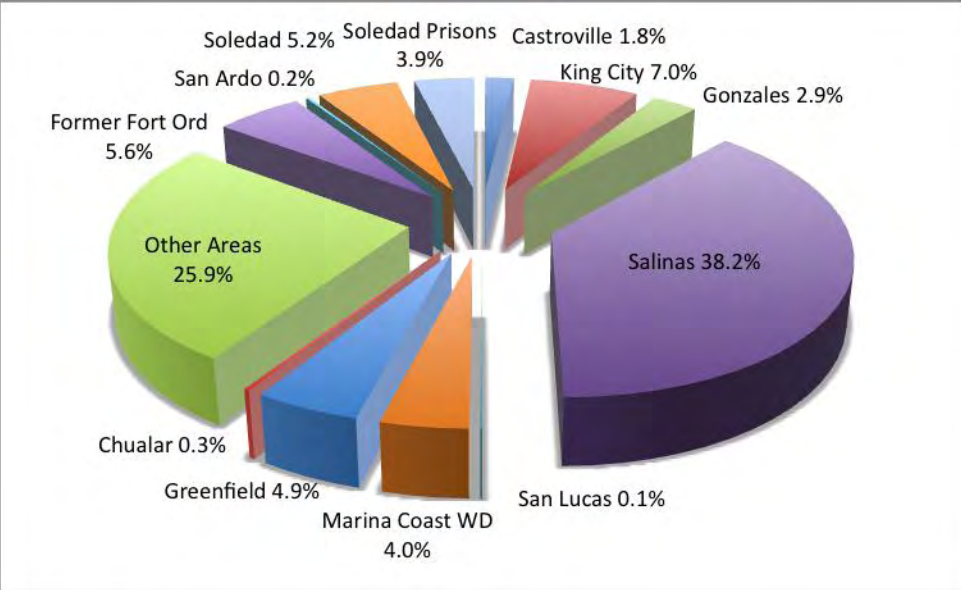
wells in the Salinas Valley for the 2010 reporting year. Figure B-21 shows relative groundwater extraction amounts attributed to urban (residential, commercial/institutional, industrial, and governmental) pumping for 2010 in the Salinas Valley.

**Figure B-20: Acre-feet of Salinas Valley Groundwater Basin Water applied to Selected Crop Categories in 2010**



Source: MCWRA 2010 GWESR

**Figure B-21: Distribution of Salinas Valley Groundwater Extraction for Urban Areas in 2010**



Source: MCWRA 2010 GWESR

**B.5.4 Future Water Demand**

In the Big Sur coastal region, population and land use trends are expected to remain relatively constant over the next 20+ years, due to the fairly restrictive land use policies in the Local Coastal Plan. As a result, water demand is also expected to remain relatively stable over the 20-year planning horizon. As noted above, currently there is no shortage of water in the Big Sur coastal region; water supply problems, when they occur, have more to do with infrastructure limitations such as inadequate filtration or insufficient storage capacity. Environmental water needs may change over time with climate change, but the extent and nature of those impacts are still unclear. For the purposes of IRWM planning, therefore, water demand/supply is expected to remain relatively stable (and essentially non-problematic) over the next 20+ years in the Big Sur coastal region.

The remainder of this section will focus entirely on the Salinas Valley and North County areas of the Greater Monterey County IRWM region, i.e., the areas that depend solely on the Salinas Valley Groundwater Basin for water supply. Future water demand can be estimated based on projected urban water uses (including industrial uses) and agricultural water uses, plus environmental water needs. The following sections describe each of these in turn for the Salinas Valley and North Coast areas of the Greater Monterey County IRWM region.

**B.5.4.a Urban Water Use Projections**

Three different methods for projecting urban water use over the next 20 years are considered and compared for the purposes of this IRWM Plan. Each method is valid, and results are broadly consistent though differences do exist. For planning purposes, the most conservative estimate will be used. This section describes each of these three methods.

***First Method: MCWRA GWESR and AMBAG Population Projections***

The first method utilizes the GWESR data, US Census population data, and AMBAG population projections for urban areas in the Salinas Valley (see Table B-8 in Section B.5.1 above for population projections for the years 2020-2035). Note that “urban water use” in GWESR includes water used for residential, commercial/institutional, industrial, and governmental uses (including city landscaping).

In order to calculate future water demand using this first method, an average urban water use estimate was determined for the year 2010 by averaging urban water use from 2008-2010 (to account for variability within any one year) for selected cities and communities within the Salinas Valley (locations were chosen based on availability of 2010 US Census data). Next, an average per capita water use was determined based on US Census year 2010 population, as follows:

**Table B-13: Determining Average Per Capita Water Use**

	<b>Average GW Use (AF) from 2008-2010</b>	<b>Population</b>	<b>Average Per Capita Water Use (AF)</b>
Castroville	792	6,481	0.122203364
King City	2,926	12,874	0.227305681
Gonzales	1,422	8,187	0.173649281
Salinas	19,833	150441	0.131834628
San Lucas	40	269	0.149938042
Greenfield	2,335	16,330	0.142967953
San Ardo	117	517	0.226305609
Soledad City	2,419	14,538	0.166391526
Soledad Prisons	2,015	11,200	0.179880952
<b>TOTAL</b>	<b>31,899</b>	<b>220,837</b>	<b>0.144445904</b>

Sources: US 2010 Census and MCWRA 2008-2010 GWESR. In all three reporting years,

MCWRA received data for 97% of wells; consequently, the water use amounts reflected in this table will be somewhat lower than actual water use.

Finally, per capita water use was multiplied by the projected populations for each city for the years 2020, 2030, and 2035 to determine future urban water demand in the Salinas Valley. For communities not included in the table above, the average per capita water use rate of 0.144446 was used. Table B-14 illustrates future urban water demand using this method.

**Table B-14: Future Water Demand (AFY) for Urban Areas in Salinas Valley, Calculated from MCWRA GWESR and Population Projections**

	Urban Water Demand (AFY)			
	2010 (actual data)	2020	2030	2035
Castroville, CDP	810	880	1,039	1,100
Chualar, CDP	121	179	178	179
Gonzales	1,282	2,773	3,636	4,067
Greenfield	2,152	3,125	3,910	4,337
King City	3,089	3,925	5,110	5,620
Marina Coast Water District (Marina + Ord Community)	4,234	8,337	10,095	10,962
Other Areas	11,383	11,827	11,811	11,855
Salinas	16,819	21,520	22,532	22,855
San Ardo, CDP	100	122	121	122
San Lucas, CDP	36	42	42	42
Soledad City	2,293	3,754	4,593	5,026
Soledad State Prisons	1,702	2,015	2,015	2,015
<b>Total Urban Areas</b>	<b>44,022</b>	<b>58,497</b>	<b>65,083</b>	<b>68,179</b>

Sources: 2010 data reflects actual urban water use from the 2010 MCWRA GWESR, with 97% reporting. 2020-2035 estimates are based on: MCWRA GWESR 2008-2010 (averaged raw data, with 97% reporting in each reporting year) and AMBAG population projections for Salinas Valley cities, 2020-2035 (with exceptions as noted in Table B-8, Population Projections for Cities and Communities in the Salinas Valley). Future water demand for “Other Areas” has been calculated by first estimating population (see above), then multiplying by average per capita water use.

***Second Method: Data Reported by Water Purveyors***

A second method for estimating future water demand for urban areas in the Salinas Valley is based on data reported by the water purveyors. The sources for these data are varied, and include Urban Water Management Plans (UWMPs), personal communications with water managers, and a 2005 survey administered to water purveyors.<sup>34</sup> For urban areas that are too small to have a UWMP, the future water demands were estimated using the methodology described above (i.e., using GWESR and population projections). Table B-15 below presents the current and future water demand identified for each urban area of the Salinas Valley using this second method.

<sup>34</sup> RMC Water and Environment Survey conducted in October 2005.

**Table B-15: Future Water Demand for Urban Areas in Salinas Valley, Based on Information Provided by Water Purveyors**

Urban Water Purveyors	Urban Water Demand (AFY)			
	2010	2020	2030	2035
Castroville – Castroville Community Services District <sup>a</sup>	813	1,200	1,600	1,800
Chualar – CalAm <sup>b</sup>	121	179	178	179
Gonzales – City of Gonzales <sup>c</sup>	1,867	3,112	4,800	
Greenfield – City of Greenfield <sup>d</sup>	3,398	5,666	6,800	
King City – California Water Service <sup>e</sup>	1,724	1,985	2,448	2,721
Marina Coast Water District – City of Marina <sup>f</sup>	1,962	3,181	4,044	
Marina Coast Water District – Ord Community <sup>f</sup>	2,592	6,715	8,172	
Other Areas <sup>b</sup>	11,383	11,827	11,811	11,855
Salinas – California Water Service (70% Salinas population plus outlying areas) <sup>g</sup>	16,940	19,840	22,504	23,984
Salinas – Alco (30% Salinas population) <sup>h</sup>	4,240	8,307	10,550	
San Ardo – San Ardo California Water District <sup>b</sup>	100	122	121	122
San Lucas – San Lucas County Water District <sup>b</sup>	36	42	42	42
Soledad – City of Soledad <sup>i</sup>	2,355	3,281	4,212	
Soledad State Prisons – California State Prisons <sup>j</sup>	1,702	1,702	1,702	1,702
<b>Total Urban Areas</b>	<b>49,233</b>	<b>67,159</b>	<b>78,984</b>	(incomplete data)

Sources:

- a) Estimated by CCSD General Manager (email communication with IRWM Plan Coordinator, December 5, 2011)
- b) Calculated according to GWESR and population projections (as described in Method One, above).
- c) October 2005 RMC Water and Environment Survey
- d) 2008 City of Greenfield UWMP
- e) 2010 King City UWMP (California Water Service Company)
- f) 2010 Marina Coast UWMP
- g) 2010 Salinas District UWMP (California Water Service Company), accounting for SBx7-7 (20x2020) urban water conservation targets
- h) Estimated by Alco for years 2010 and 2020 (email communication with Alco President, December 13, 2011); year 2030 was estimated based on Alco 2025 and 2027 urban water projection trends (adding 5% to the 2027 projection).
- i) 2010 City of Soledad UWMP
- j) 2010 GWESR: Actual 2010 Soledad State Prison ground water usage, and assuming stable prison population 2020-2035.

***Third Method: Salinas Valley Integrated Ground and Surface Water Model***

The third method for assessing urban water demand in Salinas Valley utilizes the SVIGSM. In 1997, MCWRA published the Salinas Valley Water Project Report, which utilized the SVIGSM to estimate current (1995 conditions) and future (2030) water demands. This method shows a projected urban water use increase from 45,000 AFY in 1995 to 85,000 AFY in 2030 (a 90 percent increase).

***Urban Water Use Projections: Comparison of the Three Methods***

Table B-16 below compares the results of the three methods used to estimate future urban water use. The results differ but are not entirely inconsistent. All three methods are valid, but for the purposes of IRWM planning, the most conservative water use estimate—resulting from the SVIGSM method—will be used.

**Table B-16: Comparison of Urban Water Use Projection Methods**

Method	Urban Water Use in the Salinas Valley (AFY)					
	1995	2000	2010	2020	2030	2035
1. Ground Water Extraction Summary Reports and Population Projections	41,884 (with 98% reporting)	42,293 (with 89% reporting)	44,022 (with 97% reporting)	58,497	65,083	68,179
2. Reports from Purveyors			49,233	67,159	78,984	
3. SVIGSM Method	45,000				85,000	

**B.5.4.b Agricultural Water Use Projections**

Conclusions about future agricultural water use could not be drawn based on analysis of historical (1970-2010) agricultural water use data from GWESR, as the data suggests no significant trend. Therefore, the SVIGSM, taking into account projected land use changes, will be used to estimate future agricultural water demand for the Salinas Valley. As noted earlier, agriculture is expected to remain the predominant land use in the Salinas Valley well into the future, though the pressure to convert agricultural land to urban will intensify as the population in the Salinas Valley continues to grow. The SVIGSM predicts that agricultural needs, which make up a far greater share of water use, will decrease by approximately 60,000 AFY from the year 1995 to the year 2030, a 13 percent reduction. This prediction was based on several assumptions, including increased irrigation efficiencies, changes from high to low water demand crops, and a slight reduction in agricultural land use resulting from conversion to urban uses.

**Table B-17: Agricultural Water Demand Based on SVIGSM Modeling**

Basin Groundwater Pumping	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
Agricultural Water Use	418,000	358,000

Source: MCWRA 1998.

**B.5.4.c Environmental Water Needs**

Ecological and environmental water needs must also be taken into consideration when considering future water supplies for the region. Unfortunately, environmental water needs are not well quantified for the Greater Monterey County IRWM planning region. The lack of numerical data for environmental water needs—and the preponderance of data for urban and agricultural water needs—suggests that environmental water needs may be getting overlooked in water resource planning. Addressing environmental water needs will become more and more critical as ecosystems become increasingly vulnerable to the impacts of climate change. It is the intention of the RWMG to provide quantified data for environmental water needs in future updates of this IRWM Plan. In the meantime, the following section describes the types of environmental water uses in the region that will be most significant in the planning context.

All plant and animal species, terrestrial and aquatic, depend on water for their survival, but the consideration of “environmental water needs” in water resource planning tends to focus on in-stream and riparian water needs to support special status or other significant species, such as steelhead trout. It may also focus on adequate delivery of water to support the healthy functioning of important ecosystems such as floodplains, wetlands, and coastal waters. At present, environmental water needs are considered more often in the context of a regulatory or permitting process rather than as a component of planning.

The restoration of adequate in-stream flows, as well as the floodplain functions that depend on flow, is the statewide priority for the CDFG. The CDFG has developed Streamflow Recommendations (minimum flows) for rivers and streams throughout the state to assure the continued viability of their fish and wildlife resources. The CDFG has also developed a list of 22 other streams regarded by State and Federal fish and wildlife agencies as high priority for future in-stream flow studies. The only river on that list located within the Greater Monterey County region is the Big Sur River (ranked #5 out of 22). Objectives for the major rivers, estuaries, and wetlands of northern and central California are tabulated in Chapter 5 of the California Water Plan Update 2009, along with the amount of water needed to meet each of them (DWR 2009a, vol. 1, p. 4-16).

Environmental water needs include not only adequate water supply but adequate water quality suitable to the needs of the “water user” (e.g., cool in-stream water temperatures for steelhead). In the Greater



Monterey County IRWM region, environmental water needs will need to be identified primarily for:

- Rivers and streams that provide habitat, or potential habitat, for steelhead and other special status aquatic species. Within the Greater Monterey County IRWM region, critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast, including Big Sur River, Little Sur River, San Carpoforo and Arroyo de la Cruz Creeks, and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries.
- Significant wetlands and estuaries such as Elkhorn Slough and Tembladero Slough; and
- Protected coastal waters such as the federally protected MBNMS, which encompasses four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA).<sup>35</sup> One of the main environmental water uses in the region, according to DWR, is for the 366-acre Salinas River National Wildlife Refuge, where the Salinas River empties into Monterey Bay (DWR 2005, as cited in Monterey County Planning Department 2010b, p. 4.3-5).

**B.5.4.d Future Water Demand: Conclusions**

The projected water demands for water supply from the Salinas Valley Groundwater Basin are summarized in Table B-18 below. Water demand estimates of the Salinas Valley are based on the SVIGSM model for both urban and agricultural uses, with environmental water needs currently unknown. The SVIGSM model predicts an overall decrease in water use on the order of 20,000 AFY from 1995 to the year 2030. While agricultural water use is expected to decrease by about 60,000 AFY over this time period, urban use is expected to increase by about 40,000 AFY.

**Table B-18: Future Water Demand**

Water Use	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
Urban	45,000	85,000
Agricultural	418,000	358,000
Environmental	unknown	unknown
<b>Total Demand</b>	<b>463,000+</b>	<b>443,000+</b>

Source: SVIGSM

**B.5.5 Future Water Supply**

Water use in the Salinas Valley Groundwater Basin has significantly outpaced water supply over the past several decades, resulting in overextraction and in extensive seawater intrusion. Despite the overall future reduction in total basin water use predicted by the SVIGSM, the current groundwater problems in the basin are projected to continue into the future. Table B-19 below shows SVIGSM estimates for Salinas Valley Groundwater Basin overdraft, seawater intrusion, and Salinas River outflow to the ocean for the year 2030. Though basin overdraft is predicted to decrease 3,000 AF by the year 2030, overdraft will nonetheless continue to be a problem for the Salinas Valley basin (estimated at 14,000 AFY in 2030). In addition, seawater intrusion will continue to worsen (from 8,900 AF in 1995 to 10,300 AF in 2030). A strategy is clearly needed to offset groundwater pumping in order to meet the objective of achieving hydrologic balance within the Salinas Valley Groundwater Basin.

<sup>35</sup> Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS).

**Table B-19: Basin Overdraft, Seawater Intrusion, and Salinas River Outflow for the Salinas Valley**

	<b>Baseline or Existing (1995) Conditions (AFY)</b>	<b>Projected Future Baseline (2030) Conditions (AFY)</b>
Basin Overdraft (does not include seawater intrusion)	17,000	14,000
Seawater Intrusion	8,900	10,300
Salinas River Outflow to Ocean	238,000	249,000

Source: MCWRA 1998. Note: Both conditions assume that deliveries from the Monterey County Water Recycling Project are being made, with 13,300 AFY delivered for 1995 conditions and 15,900 AFY delivered under 2030 conditions. Basin overdraft is defined as the average annual rate of groundwater extraction over and above the total recharge to the groundwater basin. Seawater intrusion is defined as the average annual rate of subsurface flow from the Monterey Bay into the groundwater aquifers. All numbers shown assume that the Salinas Valley Water Project is not in place.

**B.5.5.a Locally Proposed Solutions to Local Water Supply Issues**

The RWMG is promoting a mix of resource management strategies to help achieve and maintain hydrologic balance in the Salinas Valley Groundwater Basin. Goals and objectives in this IRWM Plan encourage projects that will improve water supply reliability and protect groundwater and surface water supplies. Objectives include:

- Increase groundwater recharge and protect groundwater recharge areas.
- Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.
- Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.
- Diversify water supply sources, including but not limited to the use of recycled water.
- Maximize water conservation programs.
- Capture and manage stormwater runoff.
- Optimize conjunctive use where appropriate.
- Promote projects to prevent seawater intrusion.

Several projects proposed in this IRWM Plan are intended to address these water supply objectives. Projects include, for example: the Granite Ridge Regional Water Supply Project, a project being proposed by the MCWRA to alleviate existing water supply and water quality deficiencies in the Granite Ridge area of northern Monterey County; the Recycled Water Element of the Regional Urban Water Augmentation Project (RUWAP), a recycled water distribution system being proposed by MCWD; and an Interlake Tunnel between Lake Nacimiento and Lake San Antonio being proposed by the Nacimiento Regional Water Management Advisory Committee.

A portfolio of possible additional water supply projects, called the Monterey Regional Water Supply Program, has been formulated as part of a regional collaborative process to address pending regional water supply shortages and to develop a regionally supported solution. This portfolio currently contains ten water supply projects—spanning the Greater Monterey County and Monterey Peninsula IRWM regions—that have potential to enhance the region’s water supplies (note that RUWAP is part of this portfolio). Projects with potential benefits for the Greater Monterey County IRWM region include:

- Regional Urban Water Augmentation Project (RUWAP)
- A Regional Desalination Project for the Monterey Bay Area
- Regional Recycled Water Storage Project
- RUWAP/Castroville Seawater Intrusion Project (CSIP) Expansion

- Monterey County Regional Conservation Program
- Monterey Regional Cogeneration Project

The Monterey Regional Water Supply Program will be implemented in multiple phases. Projects that have potential benefits for the Greater Monterey County IRWM region are described below, along with additional water supply projects proposed for the region including expanded storage at the Salinas Valley Reclamation Plant (SVRP), the Granite Ridge Regional Water Supply Project (included as a proposed project in this IRWM Plan), and the Interlake Tunnel between Lake Nacimiento and Lake San Antonio (also included as a proposed project in this Plan).

***Regional Urban Water Augmentation Project***

RUWAP is a recycled water distribution system developed by MCWD in cooperation with FORA. The MCWD currently owns, operates and maintains the potable water distribution, wastewater collection, and recycled water distribution systems in their service areas that encompass the City of Marina and the Ord Community. The MRWPCA operates the Regional Treatment Plant (RTP) to treat and discharge wastewater, the Salinas Valley Reclamation Plant (SVRP) to take treated wastewater to tertiary levels, and the regional wastewater interceptor facilities. The SVRP tertiary treatment facility is located approximately two miles north of Marina. Institutional agreements between MCWD and MRWPCA are in place and define the access to recycled water generated by MRWPCA. MCWD owns a contiguous piece of land next to the RTP/SVRP where MCWD will take ownership of the recycled water and responsibility for distribution of the recycled water to urban users within MCWD jurisdiction and, potentially, the Monterey Peninsula.

Tertiary-treated recycled water produced at the SVRP is currently distributed to agricultural irrigators in the Salinas Valley via the Castroville Seawater Intrusion Project. RUWAP consists of a recycled water distribution system to provide up to 3,000 AFY of tertiary-treated disinfected recycled water from MRWPCA’s existing SVRP to urban users in the MCWD service area and the Ord Community for municipal irrigation. RUWAP includes a connection to the SVRP, an onsite pump station referred to as the Water Augmentation Pumping Plant (WAPP), a new distribution system consisting of approximately 39,000 linear feet of pipeline within existing roadway rights-of-way, one recycled water storage tank (called the Blackhorse Reservoir) at an existing storage tank site, one intermediate pump station (called the 5<sup>th</sup> Avenue Pump Station) located in the City of Marina, and pressure reducing valves and appurtenances.

Currently, up to 10,000 AF of the treated effluent from the SVRP is discharged annually via MRWPCA’s existing outfall into Monterey Bay. By distributing additional recycled water with RUWAP, discharges of treated effluent to Monterey Bay will be reduced, thus providing a benefit to the adjacent marine environment within the MBNMS, in addition to the potable water offset resulting from the use of recycled water for urban irrigation. There is additional treated water available that will continue to be discharged via the outfall on an annual basis, but seasonal storage is required in order to expand RUWAP and/or CSIP and to maximize recycled water. This seasonal storage of recycled water would be implemented as a separate project as described in a following section.

***A Regional Desalination Project for the Monterey Bay Area***

The Monterey Peninsula (adjacent IRWM region) needs to replace their current water supply with another water source to stop illegal withdrawals from the Carmel River. A proposed solution is a desalination plant. Desalination has been discussed and studied in Monterey County since the 1980s to augment existing, regional, groundwater and surface potable water supplies. MCWD built and operated a desalination pilot plant in the 1990s; in 1996, MCWRA and MCWD agreed that it would be appropriate for MCWD to plan for and develop new water supplies from reclamation and desalination to meet MCWD’s needs; and, Sand City (in adjacent Monterey Peninsula IRWM region) recently developed a

small plant to desalinate brackish water.

There have been multiple site proposals for a new desalination facility, though the one with the most traction would be a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis (RO) desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about a combined 10 MGD of product water. Intake facilities would include intake wells and a pipeline to convey extracted water to desalination facilities for treatment. A great deal of work has been done by MCWD, MCWRA, and CalAm to develop a plant that has slant wells for the seawater intakes. Desalination facilities would include a pretreatment system, an RO system, a post-treatment system, clearwell tanks, and brine disposal. The proposed plant could utilize the MRWPCA's existing ocean outfall for the brine disposal. At the time of the writing of this report, there is not a definitive solution developed for desalination, though the timeline to provide the alternative water source for the Monterey Peninsula is January 1, 2017.

***Expanded Storage at SVRP***

This project is a MRWPCA project and is not considered to be part of the Monterey Regional Water Supply Program. As previously mentioned, the SVRP produces recycled water that is distributed to the CSIP for agricultural irrigation during the months of February through October. Wastewater entering the SVRP is treated to meet the requirements of Title 22 for distribution as recycled water. Before being distributed, the recycled water is conveyed to an existing 80-AF storage pond at the southeast corner of the MRWPCA plant site. Storage is required to equalize the supply and demand for recycled water produced at the plant. As it is currently operated, the SVRP shuts down from November to January of each year, when demand from the CSIP system for irrigation purposes is minimal.

The SVRP facility has operational problems at low flows, primarily due to the prolonged storage (detention) time in the basin and the production of algae in the recycled water. To counteract this prolonged detention time and algae production problems, an Engineering Feasibility Study in 2001 evaluated the construction of a 6-AF (2-MG) storage basin at the SVRP site. Such a facility could be used to maximize use of recycled water throughout the year, allowing production, storage and distribution of recycled water from November through February, when the SVRP would otherwise be shut down. Construction of the 2-MG storage basin would supplement the current supply to CSIP and provide a new supply to RUWAP, described above. The first phase of the urban reclamation project would require between 1,727 AFY (with conservation) and 2,077 AFY (without conservation) of recycled water to meet the anticipated urban demand. With the long-term projected CSIP demand at approximately 19,000 AFY, total agricultural and urban water demand from the SVRP/CSIP system would range from 20,727 AFY to 21,077 AFY depending on conservation practices. From November through February, the total demand would range from 1,331 AF (demand without conservation) to 1,318 AF (demand with conservation). It is expected that part of this demand could be met through production and storage of recycled water in the 2-MG storage basin during this period.

***Regional Recycled Water Storage Project***

Additional seasonal storage, in the form of either surface and/or subsurface storage, is required within the Monterey region in order to maximize use of the recycled water produced at the SVRP. Seasonal storage would consist of storing recycled water produced at the SVRP during winter months for later use during the peak irrigation period by either agricultural and/or urban irrigators. The Regional Recycled Water Storage could be located adjacent to the SVRP or may be located at a distance along the RUWAP and/or CSIP systems. However, regardless of the location or type of seasonal storage developed, this project would allow for the expansion of urban and/or agricultural recycled water use within the Monterey region.

### ***RUWAP/CSIP Expansion***

Once the Regional Recycled Water Storage Project is implemented, additional recycled water will be available during peak irrigation months to augment agricultural irrigation via expansion of the CSIP and/or urban recycled water with expansion of RUWAP. Both projects will offset existing potable water supplies derived from groundwater pumping in the Salinas Valley and Seaside Groundwater Basins and/or by Carmel River diversions. Agricultural and urban users have already been identified that would benefit from expanding use of recycled water resulting from expansions of both projects.

### ***Monterey County Regional Conservation Program***

The Monterey County Regional Conservation Program would result in conservation savings of up to 1,000 AF over the next three years. Although this savings in water is not considered a new supply source, it can reduce overall demand and the need for additional new potable water supplies. In general, conservation measures to be implemented under this program would include, but are not limited to:

- Water audits for residential, large landscape, and commercial/industrial customers.
- Residential rebates for heavy use appliances including toilets and washers as well as irrigation system equipment and landscape improvements to target reductions in outdoor water usage.
- Residential plumbing retrofits including low-flow showerheads and faucet aerators, leak detection kits, evapotranspiration-based (ETo) irrigation equipment and timers. The ETo controllers would automatically control an outdoor sprinkler system using real-time or historical weather data, utilizing data such as humidity, temperature, solar radiation, soil moisture, and rain gauge sensors.
- Commercial rebates for devices such as high efficiency or dual flush toilets, water-less urinals, waterbrooms, dishwashers, and others.
- School Education Programs targeting grades K-12.
- Implementation of the Expanded Water Conservation and Standby Rationing Plan allowing for mandatory water rationing and conservation during either legal or actual supply shortages, including reductions ranging from 15 percent to 50 percent reduction goals.

### ***Monterey Regional Cogeneration Project***

The Monterey Regional Waste Management District (MRWMD) provides integrated waste management services to the greater Monterey Peninsula. Materials that cannot be recycled are deposited in a landfill on MRWMD's 475-acre property, which has capacity to accept solid waste for the next 100 years. Methane gas is produced as a by-product of decomposition of material within the landfill; MRWMD currently captures the methane and uses it as fuel to produce electricity in a 5,000 kW cogeneration facility. As the landfill capacity increases, the MRWMD is evaluating plans to construct an additional 5,000 kW cogeneration plant on the southern side of the landfill site, immediately adjacent to the proposed desalination facilities.

The combined power from both the existing and new cogeneration facilities would be sufficient to provide all of the power needed for operation of the desalination facilities, specifically the desalination water treatment plant and distribution pumping. The power would be delivered to the desalination plant through a new power transmission line running directly from the co-generation facilities to a substation at the regional facilities. This would provide an "over-the-fence" power delivery of up to 10,000 kW for the desalination plant and any adjunct facilities. Powering the regional facilities from the Monterey Regional Cogeneration Project provides the following added benefits:

- Significantly reduced greenhouse gas emissions.
- Reduced carbon footprint for the regional water supply facilities.
- Power potentially provided at a cost lower than buying from PG&E.
- Power will not be required from PG&E on a regular basis. Connection, if any, to PG&E will be for backup only, and so a locally controlled power supply will be created.

### ***Granite Ridge Regional Water Supply Project***

The Granite Ridge Regional Water Supply Project is a project being proposed by the MCWRA to alleviate existing water supply and water quality deficiencies in the Granite Ridge area of northern Monterey County. Groundwater is the single source of water supply for the Granite Ridge area and is highly limited due to an underlying granitic formation. The Granite Ridge project will enable MCWRA to provide potable water service in a way that complies with US EPA and CDPH drinking water standards. The Granite Ridge Project will enable MCWRA to improve the reliability of water supply by interconnecting existing smaller systems into a consolidated water supply system with a new groundwater well to improve supply reliability. The project has been developed to meet four objectives:

- *Increase water supply availability:* Water supply availability would be increased through the creation of a new water distribution system that would obtain its water supply from the higher producing alluvium wells of the Salinas Valley East Side subarea. Relocating the supply sources takes advantage of the water supply benefits made available through implementation of the SVWP.
- *Improve reliability of water supplies:* The reliability of water supplies would be improved by pumping from an area with enhanced long-term hydrologic balance between recharge and withdrawal, and interconnecting existing smaller systems into a consolidated water supply system with backup well pumping and storage capabilities.
- *Provide supply meeting drinking water quality standards:* The project would supply potable water that meets drinking water quality standards, thus providing the residents in Granite Ridge with uniform access to improved water quality.
- *Enhance fire protection:* Fire protection would be enhanced by installing system storage, water transmission and fire hydrants meeting North County Fire District requirements.

### ***Interlake Tunnel between Lake Nacimiento and Lake San Antonio***

This project proposed by the Nacimiento Regional Water Management Advisory Committee consists of building an interlake tunnel between Lake Nacimiento and Lake San Antonio. With the recent changes in allowed water storage derived from the modification of the Lake Nacimiento dam spillway due to the completion of the SVWP, there has been a renewed interest in capturing all of the rainwater run-off. This past year, despite the increased storage capacity of Lake Nacimiento, tens of thousands of AF of water were released for flood control, ultimately flowing to the ocean. Over the same period Lake San Antonio had a minimum of 20 percent of its storage capacity available—twice what was needed to store the extra runoff from Lake Nacimiento. During the winter season, this tunnel would transfer extra rainwater that would be released, traveling the Salinas River and ending up as “wasted water” in the Pacific Ocean. The water from these two lakes would then be used downstream for groundwater recharge, abatement of saltwater intrusion, and the promotion of fish habitats. Increasing the total available supply of water will benefit all of these uses, industries, and communities.

### **B.5.5.b Potential Impacts of Climate Change on Water Supply and Demand**

Typically, water demand projections are based on past water use along with population projections. However, given climate change as a “new” factor, it may no longer be adequate to simply rely on historical water years when projecting future demand or supply. Local governments, agencies, and organizations in the Greater Monterey County IRWM region are only in the beginning stages of considering and planning for the effects of climate change on water supply, other critical services and infrastructure, and natural resources in the region (though state and federal projects do consider climate change in their reliability assessments, so any region that is connected to such projects will have it factored in to some degree).



The water supply and demand projections provided in this IRWM Plan do not reflect anticipated effects of climate change, since the effects have not yet been well quantified in those terms. As water managers (along with regional scientists, local government agencies, and other key decision-makers) obtain better analytical tools for understanding the specific effects of climate change, the water supply and demand projections in this IRWM Plan will reflect that information. The RWMG will continue to work closely with other community leaders and scientists throughout the state to obtain and refine the tools needed to better understand and plan for the impacts of climate change in the Greater Monterey County region.

In the meantime, the RWMG—with assistance from a Climate Task Force comprised of regional scientists, water managers, and coastal policy professionals—has conducted preliminary climate risk analyses. These analyses indicate the following climate risks to be top priority for the Greater Monterey County 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 RWMG is aware of the following significant impacts that climate change is expected to have on water supply and demand, generally:

- Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion.
- 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.
- Droughts are expected to be more frequent and severe.
- Average rainfall is expected to change (though at this point it is unclear whether rainfall in the local region will increase or decrease; a decrease will lead to diminished water supplies, but even if it increases, the rainfall may tend toward more sporadic and intense storms, which may not produce the water supply benefits that a more even distribution would provide).
- Climate change will also likely have adverse effects on water quality, which in turn will affect the beneficial uses (habitat, water supply, etc.) of surface water bodies and groundwater in the region. Changes in precipitation may 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.

Please see Section R, Climate Change, for an overview of the most current information and regional activity regarding climate change in the Monterey Bay area.

### **B.5.6 Water Supply and Demand: Conclusions**

Water use in the Salinas Valley Groundwater Basin has significantly outpaced water supply over the past several decades, resulting in overextraction and seawater intrusion. The SVIGSM modeling estimated basin overdraft in 1995 to be approximately 17,000 AFY, with an additional 8,900 AFY of the groundwater supplies affected by seawater intrusion (defined as the average annual rate of subsurface flow from the Monterey Bay into the groundwater aquifers).

Conditions are expected to improve somewhat by 2030, at least in terms of basin overdraft. SVIGSM modeling predicts basin overdraft in the Salinas Valley Groundwater Basin to be approximately 14,000 AFY in 2030, about 3,000 AFY less than baseline (1995) conditions. This improvement is attributed to an expected overall decrease in water use on the order of 20,000 AFY from 1995 to the year 2030: while urban water use is predicted to increase by about 40,000 AFY (totaling 85,000 AFY in 2030), agricultural water use is predicted to decrease by about 60,000 AFY (totaling 358,000 AFY in 2030). The SVIGSM model based the predicted decline in agricultural water use over the 35-year time period on several factors, including increased irrigation efficiencies, changes from high to low water demand crops, and a slight reduction in agricultural land use resulting from conversion to urban uses. It is important to note, however, that the SVIGSM modeling does not take into account the potential impacts of climate change.

The SVIGSM predicts total water use in the year 2030 to be 443,000 AFY. This projection does not take into account environmental water demand. If environmental water needs are factored in, total water demand in the year 2030 will likely be considerably higher than the predicted 443,000 AFY. The RWMG intends to include environmental water needs, as well as the impacts of climate change, in future modeling efforts for the region.

Finally, “water demand” in the region is met not only by ensuring an adequate water supply, but by ensuring adequate water supply infrastructure to meet the storage, treatment, and distribution needs of water users. The IRWM Plan promotes projects that address specific infrastructure needs as well as overall water supply reliability for the region, in terms water conservation projects, water recycling projects, desalination, and other “water supply enhancement” projects. It is the hope and intention of the RWMG that projects developed and funded through the IRWM planning process will, over time, reverse the trend of basin overdraft in the Salinas Valley Groundwater Basin, halt the advance of seawater intrusion, and ultimately help achieve hydrologic balance and water supply reliability for the Greater Monterey County IRWM region.

## **B.6 WATER QUALITY**

This section describes current water quality conditions in the Greater Monterey County IRWM region for surface and groundwater, regional water quality goals and objectives (including Central Coast Basin Plan, Watershed Management Initiative, and specific watershed goals), and current efforts to protect and improve water quality in the IRWM planning region.

### **B.6.1 Water Quality: Current Conditions**

#### **B.6.1.a Surface Waters: Rivers and Waterways**

The quality of surface waters in the region is greatly influenced by land use practices. Primary causes of pollutants to surface waters include urban runoff, agricultural runoff, erosion and sedimentation, and septic systems. Erosion is a widespread problem in Monterey County, due in part to the erosive nature of local soils as well as from land use practices (including farming on steep slopes, unmaintained or improperly designed dirt roads, altered water channels that increase water velocities and alter the natural

sediment balance, and areas that have been denuded of vegetation by fire, overgrazing, or clearing).

The coastal rivers of the Big Sur region, where urban and agricultural land uses are minimal, are generally considered to be of excellent to good water quality. Big Sur rivers, creeks, and coastal waters are primarily affected by erosion and sedimentation (e.g., from roads and construction, and from periodic wildfire events), septic systems located close to the rivers, and trash from park visitors.

The North County portion of the region is comprised of the Monterey County portion of the Pajaro Valley Groundwater Basin that lies within the Salinas River watershed, the Elkhorn Coastal Plain, and the Hilly Area including Prunedale. The North County area has significant erosion problems. The sandy soils and slopes in the interior hills are especially conducive to erosion. This has become more problematic in recent years due to intensified strawberry farming activity, particularly since strawberry farming practices often involve covering the fields in plastic,<sup>36</sup> creating impermeable surfaces for runoff. Cultivation practices particularly in the Elkhorn Highlands and to a lesser extent in the Carneros Creek watershed have led to high erosion/sedimentation rates. There is relatively little urban land use in the North County area, and urban runoff sources are limited to the areas of commercial development and small communities at Moss Landing, Castroville, and Prunedale. However, because of their proximity to water bodies throughout the North County area, such as the Elkhorn Slough and creeks and sloughs tributary to the Elkhorn Slough drainage system, these limited urban uses have the potential to generate significant adverse water quality impacts (excerpted from Monterey County Planning Department 2010b, Section 4.3).

In the Salinas Valley, surface waters are impacted largely by intensive agricultural use (including grazing) and nonpoint source pollutants from urban uses. Salinas Valley surface waters are especially impaired by nitrates, pesticides, toxicity, and pathogens. Nitrate contamination is of particular concern in the Salinas Valley, resulting mainly from the use of nitrogen-based synthetic fertilizers for irrigated agriculture (though elevated nitrate levels also exist near septic systems and wastewater treatment plants). Urban runoff from communities along the Salinas Valley impacts the Salinas River, Salinas Reclamation Ditch, and other tributaries ultimately flowing to the Monterey Bay.

The City of Salinas monitors water quality as part of National Pollutant Discharge Elimination System (NPDES) Phase I requirements. The City of Salinas is the only Phase I Municipal Separate Storm Sewer System (MS4) in the Central Coast Region and is covered by an individual NPDES permit. Cities within the planning region enrolled under the Phase II General Permit for Stormwater Discharges include King City, Soledad, and Marina (the Monterey Regional Stormwater Management Program covers the City of Marina and unincorporated areas in Monterey County).

For a more in-depth discussion of impaired surface waters in the region, see “Impaired Water Bodies and Total Maximum Daily Loads (TMDLs)” in Section B.6.3.a below.

#### **B.6.1.b Estuaries**

The following information is excerpted from the *Monterey Bay National Marine Sanctuary Condition Report 2009* (Office of National Marine Sanctuaries, 2009, pp. 72-74).<sup>37</sup>

Over the past 150 years, human actions have altered the tidal, freshwater, and sediment processes in Elkhorn Slough and its watersheds. Such impacts have substantially changed the water quality

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<sup>36</sup> Specifically: Whole fields are covered in plastic for fumigation. During the growing period, only the planting beds are covered; furrows are bare soil.

<sup>37</sup> To see a summary of impacts on the estuarine environment, go to the MBNMS website: [http://sanctuaries.noaa.gov/science/condition/mbnms/welcome\\_est.html](http://sanctuaries.noaa.gov/science/condition/mbnms/welcome_est.html)

conditions and have increased the levels of pollution and eutrophication in the slough (Elkhorn Slough Tidal Wetland Project Team 2007). Approximately two dozen wetlands comprising nearly 637 acres of estuarine habitats in the Elkhorn watershed are currently behind water control structures and levees. Control structures have caused many sites in Elkhorn Slough to have very restricted tidal exchange, thus resulting in poor water quality conditions, as evident through low dissolved oxygen and elevated levels of organic matter accumulation (ibid.).

A main cause of water and sediment quality degradation is agricultural non-point source pollution (Caffrey 2002; Phillips et al. 2002; ESNERR, NOAA, and CDFG 2009). Relatively high levels of nutrients and legacy agricultural pesticides, such as DDT, have been documented within the Elkhorn Slough wetlands complex, with the highest concentrations measured in areas that receive the most freshwater runoff (ibid.). Pathogens, pesticides, sediments, low dissolved oxygen levels and ammonia have impaired sections of Elkhorn Slough and water bodies adjacent to the slough (Moro Cojo Slough and Moss Landing Harbor). A Central Coast Ambient Monitoring Program (CCAMP) study conducted between 2001 and 2006 showed problematic levels of dissolved oxygen, dissolved inorganic nitrogen, ortho-phosphate, and chlorophyll, and poor water clarity at the mouth of the slough in Moss Landing Harbor (Sigala, Fairey, and Adams 2007). Toxicity due to organophosphate (such as diazinon and chlorpyrifos) and pyrethroid pesticides has been documented in adjacent watersheds (Hunt et al. 2003; Anderson et al. 2006; Phillips et al. 2006), pointing to the potential for similar toxicity problems in Elkhorn Slough.

Use of persistent pesticides for agriculture in the area has been phased out, but high concentrations are still present in the sediment and can become re-suspended by erosion (ESNERR, NOAA, and CDFG 2009). As legacy organochlorines were phased out in the 1970s and 1980s, organophosphate pesticides such as diazinon and chlorpyrifos became widely used, and these pesticides have been found at toxic concentrations in many Central Coast watersheds (Hunt et al. 2003). Pyrethroid pesticides are now increasingly applied along the Central Coast and have been found at toxic concentrations in watershed sediments (Anderson et al. 2006; Phillips et al. 2006). Management efforts by a number of organizations are aimed at reducing inputs of pollutants to estuarine habitats, however, these management activities have yet to show measurable decreases in contaminants in Elkhorn Slough (ESNERR, NOAA, and CDFG 2009).

Water bodies adjacent to the main channel of Elkhorn Slough, including Moro Cojo Slough, Old Salinas River Estuary, and Salinas River Lagoon, are impaired by nutrients and low dissolved oxygen levels. Elkhorn Slough is currently classified as moderately eutrophic (Bricker et al. 2007); however, the report noted concerns for the future based on the susceptibility of the system and predicted nutrient loads (ibid.). Eutrophication can lead to an array of harmful effects including reduction in water quality (specifically low dissolved oxygen levels), fish mortality, and the loss of biodiversity (Cloern 2001), and has been identified by the Millennium Ecosystem Assessment as one of the largest and most dangerous threats to coastal ecosystems in the United States and globally.

#### **B.6.1.c Coastal Marine Waters**

Significant surface waters of the Greater Monterey County IRWM region also include the coastal waters that lie immediately offshore the region's boundaries. The Greater Monterey County region lies adjacent to the MBNMS, which spans nearly 300 miles of California coastline. The Sanctuary receives runoff from all of the region's major watershed areas. Offshore areas of the Sanctuary are in relatively good condition, but nearshore coastal areas show a number of problems resulting largely from nonpoint sources of pollution. The following information is excerpted from the *Monterey Bay National Marine Sanctuary*

*Condition Report 2009* (Office of National Marine Sanctuaries, 2009, pp. 55-59).<sup>38</sup>

Pollutants associated with urban development and agricultural cultivation exert pressure on nearshore water quality conditions in the sanctuary. The greatest loads of nutrients and persistent contaminants in the sanctuary are delivered via the rivers that drain heavily cultivated watersheds (Los Huertos, Gentry, and Shennan 2003; CCLEAN 2007).

Certain portions of the nearshore ocean, such as along the Big Sur Coast, are relatively free from direct inputs of watershed based contaminants, compared to areas that drain relatively large human-altered watersheds such as the Salinas and Pajaro (Conley, Hoover, and De Beukelaer 2008). While there is no overall regional trend for changes in pollutant concentrations at coastal confluences of watersheds that drain to the sanctuary, significant increases at some locations are cause for concern (ibid.). Non-point sources flow into rivers that drain to the sanctuary and deliver substantial loads of persistent organic pollutants (e.g., PCBs, PAHs, dieldrin, DDT) to the nearshore environment (CCLEAN 2006). The Central Coast Long-term Environmental Assessment Network (CCLEAN) monitoring program has reported PCB levels that exceed the California Ocean Plan standards and determined that the four largest rivers that drain to Monterey Bay, the Salinas, Pajaro, Carmel, and San Lorenzo Rivers, were the source of most of the PCBs (CCLEAN 2006 and 2007).

Of the 51 water bodies draining directly to the sanctuary that were monitored for impairment, 15 were determined to be impaired by elevated nutrient levels (SWRCB 2006). Sources of nutrients, such as phosphorus, nitrate, and urea, to the nearshore environment include waste products from mammals, runoff from agriculture fields, leaking septic tanks, and sewage discharge systems. Rivers vary in their load contributions relative to different nutrients (CCLEAN 2006). Nitrates from the Pajaro and Salinas Rivers and Tembladero Slough are far greater in comparison to other major rivers that drain to the sanctuary (CCLEAN 2007). ...Harmful algal bloom (HAB) events have been linked with freshwater runoff events (Kudela and Chavez 2004). Biotoxins produced by HABs have been shown to accumulate in filter feeders, such as anchovy and mussels, and can cause health effects in nearshore mammals and seabirds that consume tainted prey (Fritz et al. 1992; Scholin et al. 2000; Kreuder et al. 2005).

Although the majority of the sanctuary's nearshore waters generally do not pose risks to human health, there are localized areas and isolated impacts that pose serious health risks. Pollutants present in nearshore waters are absorbed into the tissues of organisms such as mussels and fish. High levels of contaminants such as pesticides and metals can pose a human consumption risk. Toxins (domoic acid and paralytic shellfish poison) are produced by certain algal species and have been observed at levels in Monterey Bay that are potentially harmful to human health via bioaccumulation in the food web (Jester 2008). ... Periodic beach warnings and closures, due to the presence of pathogen indicators (*E. coli*, fecal coliform, total coliform, *Enterococcus*) that can cause illness in beach goers, are common at some locations (Ricker and Peters 2006).

#### **B.6.1.d Groundwater Quality**

The MCWRA has an existing monitoring program focused on monitoring water supply levels and water quality changes over time. Conditions currently tracked by the MCWRA include: seawater intrusion; nitrate and other groundwater quality conditions; factors influencing basin balance (i.e., data for rainfall, stream flows, reservoir operations, groundwater levels, etc.); and land use and water needs. Two major

<sup>38</sup> To see a summary of impacts on the nearshore environment, go to the MBNMS website: [http://sanctuaries.noaa.gov/science/condition/mbnms/welcome\\_near.html](http://sanctuaries.noaa.gov/science/condition/mbnms/welcome_near.html)

water quality problems affecting the Salinas Valley Groundwater Basin are nitrate contamination and seawater intrusion. Note that much of the information below regarding nitrate contamination and seawater intrusion has been excerpted from Technical Memorandums to EPA Region IX from MCWRA, dated July 30, 2010 (MCWRA 2010a and MCWRA 2010b).

**Nitrate Contamination**

Nitrogen, in the form of nitrate, is the most significant nutrient affecting groundwater quality in the lower Salinas River watershed. The US EPA established the current drinking water standard (DWS) and health advisory level of 45 mg/l NO<sub>3</sub>. Levels of nitrate in groundwater that exceed that level pose a threat to human health and to other biological organisms that depend on groundwater. Particularly in rural, private wells, incidence of methemoglobinemia, or blue baby syndrome, appears to be the result of high nitrate levels. Nitrate may also interact with organic compounds to form N-nitrosamines, which are known to cause cancer (Mahler, Colter, and Hirnyck 2007). Many organic compounds could link with nitrate to form N-nitrosamines, including some pesticides. This is potentially significant because wells with high nitrate levels are also sometimes associated with high pesticide levels. Neither the immediate nor the chronic health effects of N-nitrosamines in humans are well understood.

Nitrate contamination in the Salinas Valley was first documented in a report published by AMBAG in 1978. Nitrate may occur naturally in groundwater due to biologic activity or decomposition of geologic deposits, but rarely do natural concentrations exceed the Primary DWS of 45 mg/l NO<sub>3</sub>. Nitrate contamination in the Salinas Valley is due primarily to use of nitrogen-based synthetic fertilizers for irrigated agriculture, and commonly occurs in the unconfined and semi-confined aquifers that underlie areas of intense agricultural activity. However, nitrate contamination can also be caused from septic system failures, from wastewater treatment ponds located in floodplains that convey sewage during flood events, and from livestock waste.

Nitrate contamination is present throughout the Salinas Valley in varying concentrations. In 2007, 37 percent of the 152 wells sampled in the Salinas Valley Groundwater Basin showed nitrate levels greater than the maximum DWS of 45 mg/l NO<sub>3</sub>, with concentrations highest in the Upper Valley and East Side Subareas. In the Upper Valley Subarea, 68 percent of wells had nitrate concentrations reported at greater than the DWS, with a maximum concentration of 425 mg/L NO<sub>3</sub> and a mean concentration of 90 mg/L NO<sub>3</sub>; and in the East Side Subarea, 60 percent of wells had nitrate concentrations reported at greater than the DWS, with a maximum concentration of 502 mg/L NO<sub>3</sub> and a mean concentration of 106 mg/L NO<sub>3</sub>, as shown in the table below (MCWRA 2010a):

**Table B-20: 2007 Summary of Nitrate-NO<sub>3</sub> Concentrations for Study Wells in Salinas Valley Basin**

Hydrologic Subarea	Number of Wells Sampled	Mean NO <sub>3</sub> (mg/L)	Median Concentration NO <sub>3</sub> (mg/L)	Maximum Concentration NO <sub>3</sub> (mg/L)	Percent of Wells Greater than DWS
Upper Valley	19	90	78	425	68%
East Side	15	106	63	502	60%
Forebay	41	79	54	290	54%
Pressure 180-Foot Aquifer	28	49	20	284	32%
Pressure 400-Foot Aquifer	44	12	3	143	7%
Pressure Deep Aquifer	5	1	1	2	0%
All Locations	152	56	20	502	37%

Source: Technical Memorandum from MCWRA to EPA Region IX, dated July 30, 2010 (MCWRA 2010a)

The MCWRA has documented increasing trends of nitrate levels in the Salinas Valley Groundwater Basin. Three hundred and seventy (370) wells were sampled in 1993, 152 wells were sampled in 2007, and 96 of those wells were sampled in both years. The change in groundwater nitrate concentration in those 96 wells ranged from a maximum 75 mg/L decrease to a maximum 255 mg/L increase. Many



nitrate concentrations for wells in the Pressure subarea showed no change in nitrate concentration from 1993 to 2007 (ibid.).

Between 1993 and 2007, the percentage of wells sampled within the Salinas Valley Groundwater Basin with concentrations of NO<sub>3</sub> greater than the DWS increased from 25 percent to 37 percent (ibid.). Significant increases in both mean and median concentrations of NO<sub>3</sub> were also observed, as shown in the table below:

**Table B-21: 1993 and 2007 Comparison of Nitrate-NO<sub>3</sub> Concentrations for Study Wells in Salinas Valley Basin**

Hydrologic Subarea	Mean NO <sub>3</sub> (mg/L)			Median Concentration NO <sub>3</sub> (mg/L)			Percent of Wells Greater than DWS	
	1993	2007	Mean Change 1993 - 2007	1993	2007	Median Change 1993 - 2007	1993	2007
Upper Valley	96	90	-6	59	78	+19	53%	68%
East Side	70	106	+36	36	63	+27	45%	60%
Forebay	41	79	+38	33	54	+21	36%	54%
Pressure 180-Foot Aquifer	23	49	+26	6	20	+14	14%	32%
Pressure 400-Foot Aquifer	11	12	+1	3	3	0	7%	7%
Pressure Deep Aquifer	1	1	0	1	1	0	0%	0%
All Locations	38	56	+18	13	20	+7	25%	37%

Source: Technical Memorandum from MCWRA to EPA Region IX, dated July 30, 2010 (MCWRA 2010a)

All of the Salinas Valley cities have had to replace domestic water wells due to high nitrate levels that exceed the drinking water standard. In 1988, a report by the SWRCB documented that nitrate levels in the Salinas Valley groundwater had impaired its beneficial use as a drinking water supply. In response to that report an Ad Hoc Nitrate Advisory Committee was formed by the MCWRA to examine nitrate in the Salinas Valley Groundwater Basin and recommend a course of action. Their report was published in 1990 and echoed the concerns and findings of the SWRCB. In a July 1995 staff report, the SWRCB ranked the Salinas Valley as their number one water quality concern due to the severity of nitrate contamination. Development and implementation of a nitrate management program for the Salinas Valley has become a priority for the SWRCB. In 1998, MCWRA convened a Nitrate Technical Advisory Committee (NTAC) to re-evaluate current nitrate management needs. The NTAC recommendations were incorporated into a MCWRA Nitrate Management Program. Eleven of the 13 Nitrate Management Program Elements were implemented as objectives for two Clean Water Act 319(h) grants which concluded in 2002, and some of the program elements have been incorporated into ongoing Agency programs.

### Seawater Intrusion

As both irrigated agriculture and urban development have increased during the past several decades, groundwater demand has exceeded available recharge. Seawater intrusion was first observed in a few wells in the Castroville area in 1932, and was documented in Bulletin 52 (DWR 1946). By the 1940s, many agricultural wells in the Castroville area had become so salty that they had to be abandoned. 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 the most impacted by lack of recharge.

Groundwater quality during phase I, early intrusion of seawater, is characterized by increasing chloride

and conductivity concentrations. Early intrusion also includes a cation base exchange; there is an exchange of calcium and sodium between the aquifer matrix and intruding seawater. As intrusion proceeds, groundwater is mixed with seawater, trending directly toward seawater quality. Seawater is high in chlorides. Chloride, according to the California Safe Drinking Water Act, has a Secondary DWS upper limit of 500 mg/L. This upper limit indicates drinking water impairment and is used as the benchmark for determining the isocontours used in developing maps of the seawater intrusion front, shown on the following pages. In addition to the fact that chloride concentrations above 500 mg/L impair drinking water, chloride ion concentrations above 350 mg/L are considered to be injurious to plants, according to guidelines for agricultural suitability of irrigation water (Todd Engineers 1989).

In 2011, the total acres overlying the seawater intrusion front in the Pressure 180-Foot Aquifer equaled 28,142 acres, having advanced 351 acres since 2009. The total acres overlying the seawater intrusion front in the Pressure 400-Foot Aquifer in 2011 equaled 12,573 acres, having advanced 476 acres since 2009 (MCWRA website, September 2011). Figures B-22 and B-23 on the following pages illustrate the extent of seawater intrusion in the Salinas Valley. Seawater has intruded approximately seven miles inland in the 180-Foot Aquifer and three miles inland in the 400-Foot Aquifer. As a result of seawater intrusion, urban and agricultural supply wells have been abandoned, destroyed, and relocated. In the past several years there has been an increase in the number of Pressure Deep Aquifer (900-Foot Aquifer) wells that have been drilled in the Castroville coastal area. For this reason MCWRA has begun to sample Pressure Deep Aquifer wells as part of its Coastal Sampling Program. Thus far, the Deep Aquifer is not known to be impacted by seawater intrusion (MCWRA 2010b).

The current land use overlying the intruded aquifers is predominantly agricultural production. Large agricultural wells are owned and operated by the private sector and used for drawing groundwater for irrigation purposes. As noted previously, MCWRA constructed CSIP in the mid-1990s, aimed at providing recycled water to agricultural growers within the seawater intrusion front area. These growers use the recycled water in lieu of pumping groundwater. Since 1998, recycled water deliveries have ranged from approximately 7,500-14,000 AFY. As a result of the CSIP, the seawater intrusion front has slowed, but has not been halted (*ibid.*). More recently, MCWRA has developed the Salinas Valley Water Project as a means to increase the availability of recycled water, thereby further reducing agricultural pumping from intruded Pressure Subarea Aquifers. Both the CSIP and the Salinas Valley Water Project are described in Section B.6.3.b (Efforts to Improve Groundwater Quality in the Salinas Valley Groundwater Basin) below.

Despite best efforts on the part of water managers and water users in the region to reverse the trend of seawater intrusion, the problem is expected to become worse as a result of climate change in future years. One of the most serious anticipated consequences of climate change for the Monterey Bay region is sea level rise. Sea level rose approximately seven inches (18 cm) over the past century (1900–2005) along most of the California coast (Cayan et al. 2008). 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. 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. Sea level rise will significantly increase the pressure of saltwater on the coastal Salinas Valley Groundwater Basin aquifers, causing increased seawater intrusion in critical groundwater supplies.

Figure B-22: Seawater Intrusion in the Salinas Valley Groundwater Basin: Pressure 180-Foot Aquifer

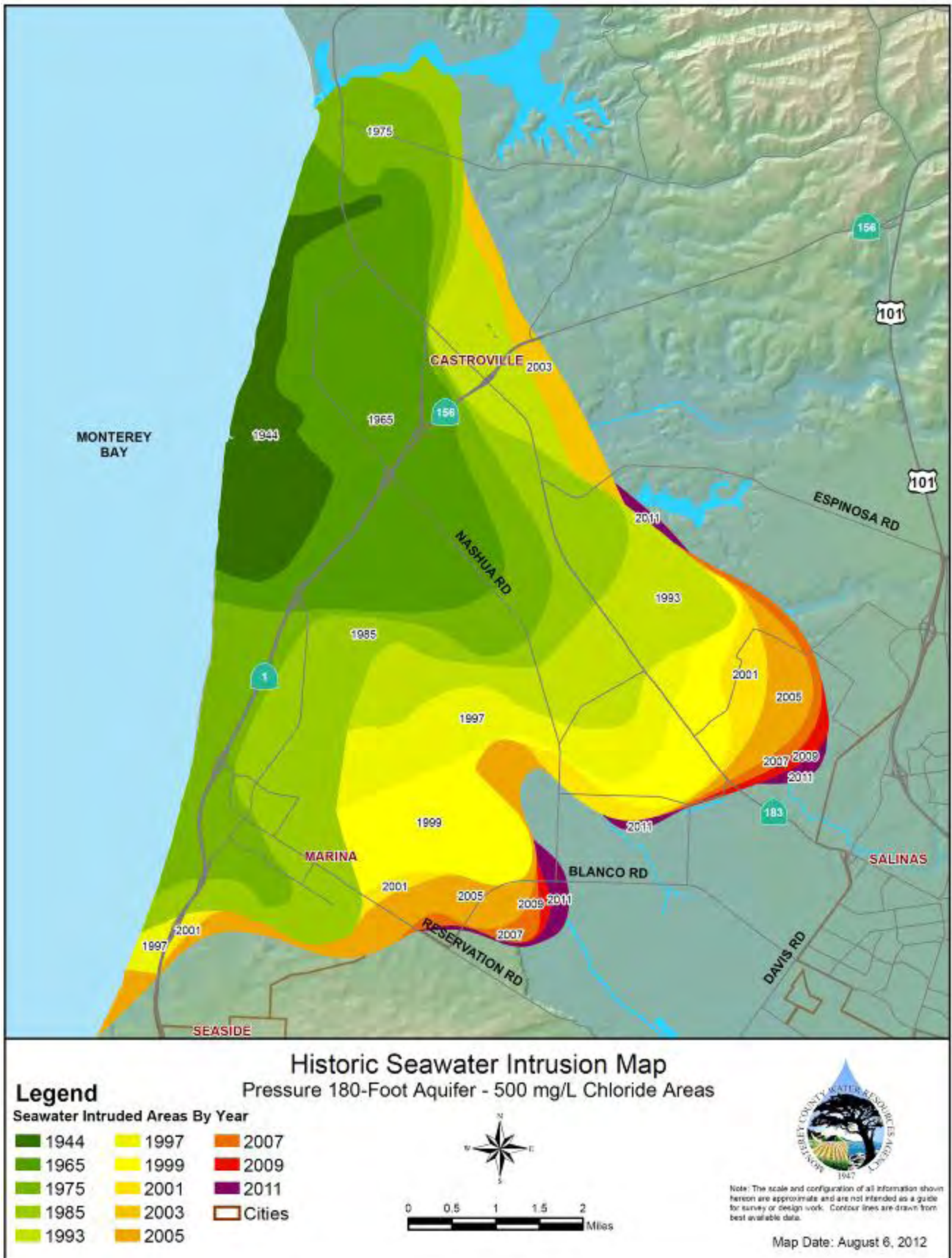
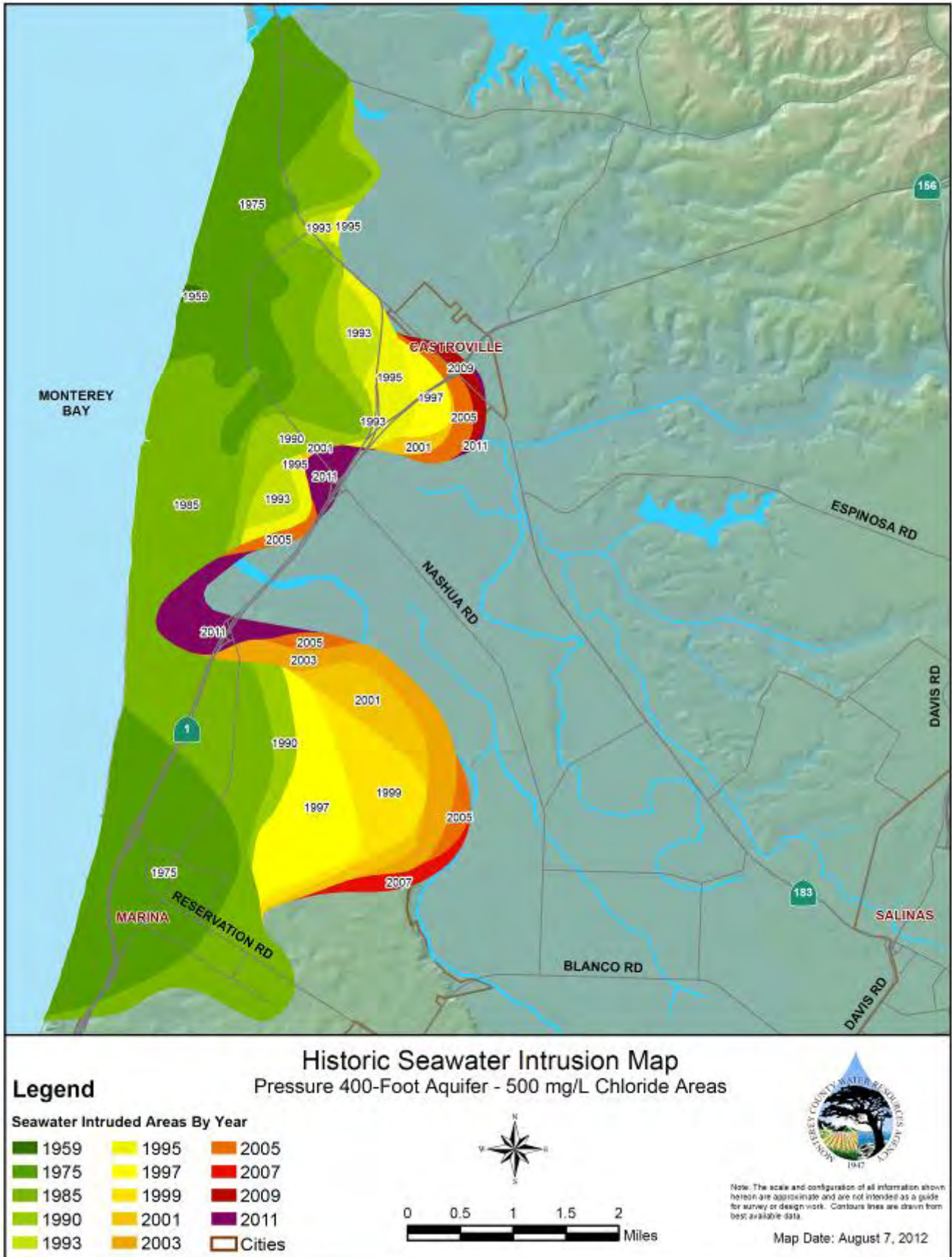




Figure B-23: Seawater Intrusion in the Salinas Valley Groundwater Basin: Pressure 400-Foot Aquifer



## **B.6.2 Regional Water Quality Goals and Objectives**

This section describes regional water quality goals and objectives that have been established on a state level by the Central Coast RWQCB. The water quality goals and objectives that have been established specifically for the Greater Monterey County IRWM region by the RWMG as part of this IRWM planning effort are described in Section D, Objectives.

### **B.6.2.a Basin Plan Goals**

California's Porter-Cologne Water Quality Control Act (1969) establishes the responsibilities and authorities of the State's nine Regional Water Quality Control Boards and the State Water Resources Control Board. The Porter-Cologne Act names the Regional Boards "...the principal State agencies with primary responsibility for the coordination and control of water quality" (Section 13001). Each Regional Board is directed to formulate a water quality control plan for all areas within its region. The Central Coastal Basin Plan is the water quality control plan formulated and adopted by the RWQCB for the Central Coast region (see RWQCB 2011).

The objective of the Central Coastal Basin Plan is to show how the quality of the surface and ground waters in the Central Coast Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists various water uses (Beneficial Uses), then describes the water quality which must be maintained to allow those uses (Water Quality Objectives). The Implementation Plan then describes the programs, projects, and other actions necessary to achieve the standards established in the plan. The RWQCB implements the Basin Plan by issuing and enforcing waste discharge requirements to individuals, communities, or businesses whose waste discharges can affect water quality. These requirements can be either State Waste Discharge Requirements for discharges to land, or federally delegated NPDES permits for discharges to surface water. The Basin Plan is also implemented by encouraging water users to improve the quality of their water supplies, particularly where the wastewater they discharge is likely to be reused.

The Central Coast RWQCB has established the following planning goals for water quality in the Central Coast Region (p. IV-2):

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

### **B.6.2.b Watershed Management Initiative Goals**

Each of the nine RWQCBs in the state is responsible for developing a Watershed Management Initiative (WMI) Chapter as part of the State's five-year Strategic Plan for water resource protection. Together the nine Chapters constitute the State's Watershed Management Initiative Integrated Plan. The aim of the

WMI is to plan and prioritize activities within and amongst watersheds; integrate various surface and groundwater regulatory programs; promote local, collaborative efforts; and focus limited resources on priorities.

In the WMI, the Central Coast RWQCB outlines water quality priorities for the region, identifies priority watersheds and water quality issues, describes watershed management strategies. The WMI includes the following Water Quality Priorities (RWQCB 2002, List D-7 from the 2004 Update, Appendix D):

- Agriculture: Addressing water quality impacts from irrigated agriculture, a major land use in the region that has been identified as a potential source of impairment for many of the water bodies on the 303(d) list (constituents of concern include nutrients, pesticides and sediment) by implementing the conditional waiver for irrigated lands.
- Total Maximum Daily Loads: Developing and implementing TMDLs throughout the region.
- Urban Runoff: Addressing beach closure issues, implementing Phase II of the NPDES Stormwater Program.
- Point Source Regulatory Programs: Streamlining permit writing, renewing major permits and several existing Waste Discharge Requirements, performing inspections.
- Basin Planning: Developing a riparian corridor policy, revising or developing water quality objectives.
- Monitoring: Maintaining the Central Coast Ambient Monitoring Program, integrating data from the agricultural cooperative monitoring program.
- Clean-up: Overseeing perchlorate, MTBE, military base, hazardous waste, and underground storage tank cleanups.

As part of the WMI planning process, the RWQCB has identified nine priority watersheds. Two watersheds within the Greater Monterey County IRWM region are included on that list: the Salinas River watershed and the Elkhorn Slough, with the Salinas River watershed being targeted as a “highest priority watershed.” Pollutants of concern in the Salinas River watershed include seawater intrusion, nitrates and minerals in groundwater, nutrients, pesticides, heavy metals, and sedimentation. Water quality problems include overpumping of groundwater, agricultural activities, urban development and runoff, past mineral mining, and gravel mining. The primary water quality concerns in the Elkhorn Slough watershed include erosion, pesticides, bacteria and scour. Many of these water quality concerns are generated from surrounding agricultural activities. Several Moss Landing Harbor activities, including ongoing dredging, impact the slough at its confluence with the harbor.

Table D-7 in the WMI Appendix D (updated 2004) lists the following Targeted Projects and Activities for the Salinas River and Elkhorn Slough watersheds as well as Central Coast region-wide efforts (the Table includes the other seven priority watersheds as well):

Region-wide:

1. Projects that support implementation of the Conditional Waiver for Irrigated Lands (“agricultural waiver”), including:
  - a. Projects that support implementation of the Cooperative Monitoring Program
  - b. Projects that support development and implementation of farm water quality management plans for irrigated operations to address irrigation management, nutrient management, pesticide management and erosion control
  - c. Projects that implement and test the effectiveness of management practices
2. Projects that implement approved or developed TMDLs (see below)



3. Projects that support development of scheduled TMDLs

Salinas Watershed:

1. Agricultural waiver implementation (monitoring, education, BMP implementation)
2. Riparian and wetland protection and restoration
3. Urban runoff reduction/increase infiltration

Elkhorn Slough Watershed:

1. Agricultural waiver implementation (monitoring, education, BMP implementation)
2. Riparian and wetland protection and restoration

### **B.6.2.c Water Quality Goals and Objectives for Watersheds in the Region**

Watershed assessments and management plans have been completed to varying extents for several watersheds in the region, including the San Antonio River and Nacimiento River watersheds in the southern portion of the region (and northern San Luis Obispo County), Garrapata Creek watershed in Big Sur, and the Elkhorn Slough watershed, Moro Cojo Slough watershed, and Reclamation Ditch/Gabilan watershed area, all of which are located in the northern Salinas Valley. A watershed management plan for the Big Sur River watershed has recently been initiated by the Monterey County RCD with a grant from the California Department of Fish and Game (September 2012). The plan will be developed through a stakeholder-driven process, with completion expected within about 18 months.

The section below briefly summarizes the watershed goals and objectives resulting from each of the existing watershed management planning efforts, along with recommended actions.

**San Antonio and Nacimiento Rivers Watershed Management Plan:** The *San Antonio and Nacimiento Rivers Watershed Management Plan*—a watershed management plan for the combined San Antonio River and Nacimiento River watersheds—was developed by the Nacimiento and San Antonio (Nacitone) Watersheds Steering Committee and Central Coast Salmon Enhancement, Inc. for the MCWRA and the SWRCB in October 2008. Goals and objectives in the plan are organized around 11 issue areas, including: Recreation, Monitoring and Information Needs, Preventing Pollution from Point and Nonpoint Sources, The Role of Agriculture, Fire in the Watersheds, Taking Enforcement Action, Coordination and Communication, Watershed Health: Plants and Animals, Roads and Culverts, Education and Outreach, and Invasive Species. Top priorities that emerged from the stakeholder process include steps to continue the watershed planning process plus the following short-term priority actions (i.e., 1-2 years):

- Monterey County, San Luis Obispo County and resident associations should work together to develop and implement programs to control invasive species.
- Continue existing water quality monitoring. In addition, establish a comprehensive water quality monitoring program with uniform collection, analysis and reporting protocols across pertinent jurisdictions for technical and public sector use. ... [As part of the SuperFund site cleanup program,] encourage the US EPA to conduct a lake bottom sediment study of Nacimiento reservoir to better understand mercury contamination.
- Support the work of existing Local Fire Safe Councils.
- Conduct road system survey to prioritize needs for erosion control.
- Collaborate on the design and implementation of educational stewardship campaigns targeting watershed residents and visitors with customized messages such as “Be A Watershed Citizen.”

**Garrapata Creek Watershed Assessment and Restoration Plan:** The *Garrapata Creek Watershed Assessment and Restoration Plan* was developed by the Garrapata Creek Watershed Council for the

Garrapata Creek Watershed Community and the CDFG in July 2006. The plan focuses on critical issues related to steelhead and invasive species, both as indicators of overall watershed health and as important restoration goals. Specific areas of assessment included: the watershed’s hydrologic function and sediment transport; geologic setting; road-produced sediment (erosion issues); the current status of the steelhead population and distribution in the watershed; migration barriers to steelhead in the creeks; the Garrapata Lagoon and its function for steelhead; and the watershed’s vegetation composition and the health of the riparian corridor. The keystone limiting factors in the watershed were found to be as follows, in order of importance:

- Sediment delivery to the streams from road erosion in the watershed is causing adverse conditions to Garrapata Creek and tributaries.
- Non-native plant species invasion has restricted riparian habitat and has caused significant negative impacts, including the development of invasive monocultures that impedes the recruitment of native riparian species in the watershed.
- Steelhead migration barriers in the lower reaches of Garrapata Creek and tributaries prevent fish from utilizing all of the habitat available for spawning and rearing.

Goals and objectives were established around each of these limiting factors. Specific recommendations included reducing sediment loading through better road management, improving fish migration, eliminating or reducing non-native plant species, and re-vegetating and stabilizing creek banks with native vegetation. One major restoration opportunity that stood out above all others was reducing sediment delivery to the creeks from unpaved roads. An upslope erosion reduction project was completed in 2010.

**Elkhorn Slough Watershed Conservation Plan:** This plan was developed for the Elkhorn Slough Foundation and The Nature Conservancy by Scharffenberger Land Planning & Design in 1999. The Conservation Plan was developed to identify critical resources within the Elkhorn Slough watershed, to identify and address threats, and to maintain the long-term viability of Elkhorn Slough and its related upland communities as a significant coastal system. In 2002, a second report was produced based on the Elkhorn Slough Watershed Conservation Plan. *Elkhorn Slough at the Crossroads: Natural Resources and Conservation Strategies for the Elkhorn Slough Watershed* identifies key natural resources of the slough and suggests strategies for conserving them. The proposed vision for the slough includes an intact and interconnected network of natural communities including over 4,000 acres of coastal marsh within Elkhorn Slough and Moro Cojo Slough, enhanced freshwater wetlands of McClusky Slough, a restored stream-side forest along the lower Carneros Creek Floodplain and a series of upland ridges with unfragmented maritime chaparral in the Elkhorn Highlands.

**Moro Cojo Slough Management and Enhancement Plan:** The *Moro Cojo Slough Management and Enhancement Plan* was developed by The Habitat Restoration Group for the Monterey County Planning and Building Inspection Department and the State Coastal Conservancy in October 1996. The plan includes the following water quality and nonpoint pollution objectives:

1. Identify alternative methods to address water quality problems at the source.
2. Minimize sedimentation and soil erosion through the use of vegetation cover and other erosion control measures.
3. Improve and/or create stormwater detention facilities to protect/enhance water quality of the slough from agricultural and urban runoff.
4. Manage water and drainage to accommodate agricultural uses on adjacent lands.
5. Avoid actions that impact groundwater.
6. Coordinate with mosquito abatement district on measures to minimize impacts to sensitive habitat

features.

7. Develop a monitoring program to evaluate the success of the slough management program.

The RCD of Monterey County has provided considerable assistance to farmers in Moro Coho Slough on winter erosion control, including furrow alignment, furrow and road seeding, irrigation efficiency evaluations, and engineered practices for steep slopes. Engineered practice implementation has included sediment traps, stormwater detention structures, underground outlets, and other pond-type structures.

**Northern Salinas Valley Watershed Restoration Plan:** The *Northern Salinas Valley Watershed Restoration Plan* was the Final Report of a study entitled, “Nonpoint Pollution in Coastal Harbors and Sloughs of the Monterey Bay Region” prepared by Moss Landing Marine Laboratories and the Watershed Institute for AMBAG in January 1997, and funded under Section 205(j) of the federal Clean Water Act. The plan focuses on the northern Salinas Valley, encompassing all of the water courses that flow from the Gabilan Mountains east of Salinas into Moss Landing Harbor. The plan promotes the restoration of former wetland and riparian areas (“wet corridors”) throughout the watershed as the primary means for water quality restoration, with wetlands and riparian areas acting as natural sediment and pollution filters.

**Reclamation Ditch Watershed Assessment and Management Strategy:** This study, completed in 2005 by the Central Coast Watershed Studies (CCoWS) team of the Watershed Institute at California State University Monterey Bay for MCWRA, focuses on the same geographic area as the Northern Salinas Valley Watershed Restoration Plan – a 157 square-mile watershed with its headwaters in the Gabilan Range and its terminus at a set of tide gates at the entrance to Moss Landing Harbor.<sup>39</sup> Management goals listed in the plan relate to water quality, flood control, parklands, determining fish passage and steelhead presence/absence, special status species protection, mosquito abatement, food safety and agricultural pest control, harbor sedimentation, sustainable water supply, and economic viability. Management actions are listed for each goal. Those specifically related to water quality include:

1. Support the 2004 Conditional Waiver of Agricultural Waste Discharge Requirements developed by the Central Coast RWQCB.
2. Support agricultural discharge source control.
3. Evaluate City of Salinas stormwater (i.e., implement a monitoring program to determine the degree to which City runoff contributes to water quality concerns).
4. Support urban water quality source control (employing appropriate technologies and regulatory instruments for mitigating urban sources of pollution).
5. Implement urban water quality treatment measures, specifically, modify the function of existing urban stormwater detention basins in the City of Salinas to detain magnitude 2-year storms or less (as opposed to 10-year storms or larger).
6. Install vegetated treatment systems, such as constructed wetlands, vegetated furrows, and grassed waterways, to reduce sources of water quality constituents and treat those constituents that are detrimental in waterways. These systems should be located and managed so as to minimize risks relating to food safety and agricultural pests.

Relevant to this last strategy, the RCD of Monterey County has tested multiple vegetated treatment systems on land draining into the Salinas River, Elkhorn Slough, the Salinas Reclamation Ditch, and Blanco Drain (between the Salinas River and the Reclamation Ditch).

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<sup>39</sup> Casagrande and Watson 2005. The Final Report is available for download on MCWRA’s website: [http://www.mcwra.co.monterey.ca.us/Agency\\_data/RecDitchFinal/RecDitchFinal.htm](http://www.mcwra.co.monterey.ca.us/Agency_data/RecDitchFinal/RecDitchFinal.htm)

### **B.6.3 Efforts to Improve Water Quality in the Greater Monterey County Region**

Efforts to improve water quality throughout the Greater Monterey County IRWM region are being carried out on the federal, state, regional, and local watershed levels through both regulatory and non-regulatory programs, and through collaborative partnerships that involve government agencies, non-profit organizations, research institutions, and private landowners. The following describes some of the major ongoing efforts to protect and improve water quality in the region, while recognizing that many smaller scale water quality improvement projects and monitoring studies, too numerous to describe here, are making great progress toward water quality improvements in the region.

#### **B.6.3.a Regulatory Water Quality Programs**

##### ***Impaired Water Bodies and Total Maximum Daily Loads***

The RWQCBs are responsible for assessing the water quality of all water bodies in their regions. This information is compiled into a statewide Water Quality Assessment, a database that lists water bodies alphabetically by water type (lakes, streams, wetlands, groundwater, etc.) and assesses each water body as having “good,” “intermediate,” “impaired,” or “unknown” water quality. Formally, an impaired water body is one that does not meet water quality standards even after technology based discharge limits on point sources are implemented (i.e., water quality standards are not attainable even with Best Available Treatment/Best Control Technology).

Section 303(d) of the federal Clean Water Act requires each State to maintain a list of impaired water bodies and to develop TMDLs for all impaired water bodies. A TMDL estimates the maximum amount of a pollutant that a water body can receive and still meet water quality standards. A TMDL must be developed for each stressor or pollutant for each water body threatened or impaired. Establishing a TMDL includes gathering data about the sources of the pollutant, including both point and nonpoint sources, and allocating the pollutant loads from the various identified sources. Once a TMDL is established, an implementation plan must be developed to describe how that water body will meet water quality standards.

The Central Coast RWQCB is the State agency responsible for identifying impaired water bodies within the Central Coast region. On August 4, 2010, the SWRCB approved the 2010 Integrated Report, which is California’s 2008-2010 Section 303(d) list of impaired waters requiring TMDLs and 305(b) report on the quality of the State’s waters, and on November 12, 2010 the Integrated Report was approved by the US EPA.

Within the Greater Monterey County IRWM region, 29 water bodies have been determined by the RWQCB to be impaired under Section 303(d) of the Clean Water Act. These water bodies are shown in Table B-22 and illustrated in Figure B-24 on the following pages. The 2010 California 303(d) List of Water Quality Limited Segments for water bodies within the Greater Monterey County IRWM region is also included as Appendix G, with the identified pollutants.<sup>40</sup>

Impairments are found to occur within the Salinas, Gabilan, and Bolsa Nueva watersheds (no impairments are listed for water bodies in the Big Sur coastal watersheds). The region has 332 miles of impaired rivers (20 rivers/creeks, including over 100 miles of the Salinas River), 2,339 acres of impaired estuaries (mostly Elkhorn Slough with 2,034 acres listed, but also including the Salinas River Lagoon, Moro Cojo Slough, Salinas River Refuge Lagoon, and Old Salinas River Estuary), 79 acres of impaired harbor (Moss

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<sup>40</sup> To see the Section 303(d) List of water bodies for all of California, go to the RWQCB’s website: [http://www.waterboards.ca.gov/water\\_issues/programs/tmdl/integrated2010.shtml](http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml).

Landing Harbor), and 5,580 acres of impaired lakes/reservoirs (most of which – 5,417 acres – includes San Antonio Reservoir, listed for mercury). Note that Nacimiento Reservoir, which is not located within the Greater Monterey County IRWM region but is an important water supply source for the region, is also listed for mercury and metals (5,736 acres). The entire Salinas Valley Groundwater Basin, which includes four sub-basins, is listed as impaired and as only partially supporting beneficial uses due to nitrate contamination and seawater intrusion (RWQCB 2002, p. 29).

The water bodies in the lower Salinas Valley have some of the worst pollutant impairments on the Central Coast. The Lower Salinas River (from the estuary to Gonzales Road) has the most pollutant impairments identified on the 303(d) list of any other water body on the Central Coast, with 19 impairments. Second is Orcutt Creek in Santa Maria (Santa Barbara County) with 15 impairments, but tied for third are the Salinas Reclamation Ditch and Tembladero Slough, each with 14 pollutant impairments. In addition, the Old Salinas River Channel and Quail Creek are both listed for 11 impairments.<sup>41</sup> More important than the number of pollutant impairments identified are the magnitude of the problems. Each of these water segments is impaired for toxicity and high levels of pesticides, nutrients and indicator bacteria. Moss Landing Harbor, which lies at the bottom of the Salinas Reclamation Ditch (Gabilan) watershed, is listed for 10 pollutant impairments, including pesticides, toxicity, pathogens, and sediment.

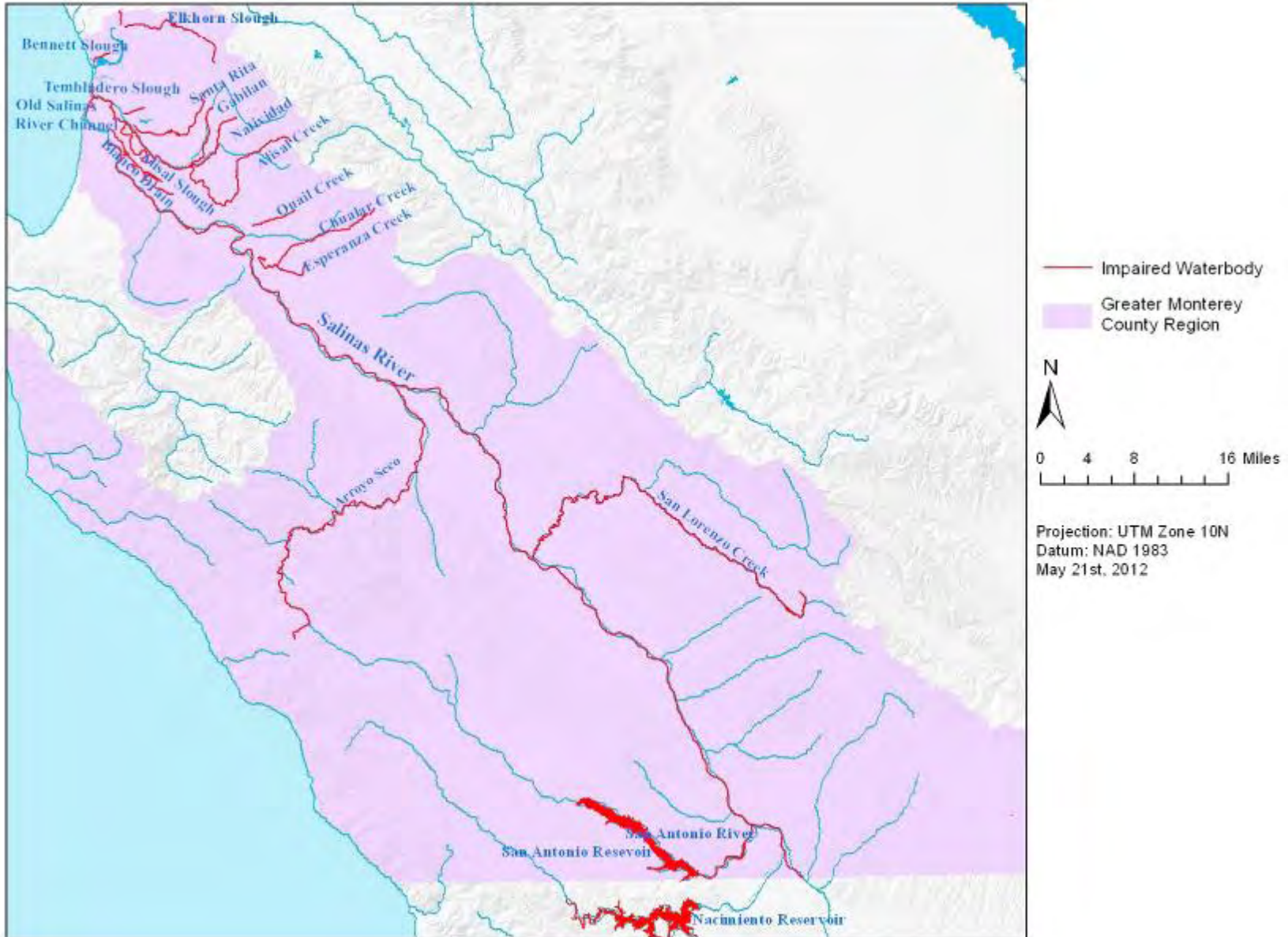
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<sup>41</sup> To see the fact sheets for each of these water segments, go to the following link:  
[http://www.waterboards.ca.gov/water\\_issues/programs/tmdl/2010state\\_ir\\_reports/category5\\_report.shtml](http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml)





**Figure B-24: Impaired Surface Waters in the Greater Monterey County IRWM Region**



### ***Central Coast Irrigated Lands Agricultural Order***

Many surface water bodies in the Greater Monterey County region, as well as groundwater, are impaired because of pollutants from agricultural sources. Discharges from agricultural lands include surface discharges (also known as irrigation return flows or tailwater), subsurface drainage generated by installing drainage systems to lower the water table below irrigated lands (also known as tile drains), discharges to groundwater through percolation, and stormwater runoff flowing from irrigated lands. These discharges can affect water quality by transporting pollutants including pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals from cultivated fields into surface waters (RWQCB 2012a).

Both regulatory and non-regulatory approaches are being employed in the effort to improve water quality from agricultural sources in the region. In July 2004, the Central Coast RWQCB adopted an order known as the “Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Irrigated Agricultural Order R3-2010-0040).” The Central Coast RWQCB extended the 2004 Agricultural Order multiple times, and on March 15, 2012 voted to adopt an updated Irrigated Lands Order (Order No. R3-2012-0011), replacing the order that was approved in 2004.<sup>42</sup>

The 2012 Irrigated Lands Agricultural Order prioritizes conditions to control pollutant loading in areas where water quality impairment is documented in the 2010 Clean Water Act section 303(d) List of Impaired Waterbodies, and specifically addresses the growing problem of nitrate contamination in the region’s drinking water. Nitrate pollution of drinking water supplies is a critical problem throughout the Central Coast Region. More than 23 percent of the municipal drinking water wells sampled in the Salinas Valley area have been found to exceed safe drinking water limits for nitrate (RWQCB 2012b). Studies indicate that fertilizer from irrigated agriculture is the primary source of nitrate pollution in drinking water wells (Carle, Esser, and Moran 2006, as cited in 2012 Agricultural Order). Hundreds of drinking water wells serving thousands of people throughout the region have nitrate levels exceeding the drinking water standard,<sup>43</sup> presenting a significant threat to human health. The Agricultural Order prioritizes conditions to control nitrate loading to groundwater and impacts to public water systems. The Order also prioritizes conditions to address pesticides that are known sources of toxicity and sources of a number of impairments on the 2010 List of Impaired Waterbodies, specifically chlorpyrifos and diazinon.

The Agricultural Order mandates all growers within the RWQCB’s jurisdiction who discharge runoff from irrigated agricultural lands to comply with the conditions of the Order. Dischargers are required to implement, and where appropriate update or improve, management practices, which may include local or regional control or treatment practices and changes in farming practices to effectively control discharges, meet water quality standards, and achieve compliance with the Order. Dischargers must also comply with other conditions of the Agricultural Order, including monitoring and reporting requirements. For farms that pose the greatest risk to water quality, growers will be required to develop certified Irrigation and Nutrient Management Plans, Water Quality Buffer Plans if they are adjacent to the most critical creeks, and monitor their individual discharge.

### ***Federal and State Stormwater/Urban Runoff Programs***

Urban runoff in California is addressed through both state and federal programs: the State’s Nonpoint Source (NPS) Pollution Control Program, and the US EPA’s NPDES Stormwater permit program.<sup>44</sup> The

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<sup>42</sup> The 2012 Irrigated Lands Agricultural Order can be viewed at:

[http://www.waterboards.ca.gov/centralcoast/water\\_issues/programs/ag\\_waivers/ag\\_order.shtml](http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/ag_order.shtml)

<sup>43</sup> California Department of Public Health Data obtained using GeoTracker GAMA (Groundwater Ambient Monitoring and Assessment) online database, <http://geotracker.waterboards.ca.gov/gama/>, as cited in the 2012 Agricultural Order.

<sup>44</sup> Much of this section has been excerpted from the Monterey Regional Storm Water Management Program 2006.

State's NPS Pollution Control Program details how the State will promote the implementation of management measures and BMPs to control and prevent polluted runoff, as required by Section 319 of the federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]). Because of the diffuse nature of polluted runoff, which originates from multiple sources and has a widespread reach, the State's NPS Pollution Control program has emphasized financial incentives, technical assistance, and public education, rather than regulatory activities.

Coastal states are also required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal Coastal Zone Act Reauthorization Amendments (CZARA) of 1990. CZARA Section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis.

In 1972, the CWA was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with an NPDES permit. Although urban nonpoint sources contribute to stormwater runoff, runoff may be channeled into a storm drain and ultimately become a point source. Therefore, stormwater is regulated as a point source under the NPDES permit program.

Phase I of the US EPA's stormwater program was promulgated in 1990 under the CWA. Phase I relies on NPDES permit coverage to address stormwater runoff from: (1) "medium" and "large" MS4s generally serving populations of 100,000 or greater, (2) construction activity disturbing five acres of land or greater, and (3) ten categories of industrial activity. On December 8, 1999, EPA promulgated regulations known as the Stormwater Phase II Final Rule. The Phase II program expanded the Phase I program to include all municipalities within designated urbanized areas, as well as designated small municipalities outside of urbanized areas (generally those with a population of at least 10,000 and/or a population density of at least 1,000 persons per square mile), and operators of small construction sites that disturb between 1-5 acres.

The City of Salinas is the only Phase I MS4 in the Central Coast Region and is covered by an individual NPDES Phase I permit (Order No. R3-2012-0005). Stormwater runoff is generated from various land uses, including urban and agricultural uses, and discharges into the Salinas Reclamation Ditch and the Salinas River. The City's NPDES permit requires the City to reduce the discharge of pollutants in stormwater discharges to the maximum extent practicable (MEP) and protect water quality and beneficial uses. The Order also contains effectiveness assessment measures, including water quality monitoring, detailed BMP assessment requirements, and water quality action levels, designed to provide information about the effectiveness of efforts to reduce pollutant discharges and protect water quality and beneficial uses. In addition, the Order contains requirements for identifying dominant watershed processes that are impacted by stormwater management and are necessary to protect water quality and beneficial uses, and for developing control measures to protect and restore those processes. An emphasis of the Order is on acquiring an understanding of important watershed processes to inform development and stormwater management decisions, and identifying measures for maintaining and restoring watershed processes impacted by stormwater management to protect water quality and beneficial uses that the City will implement in subsequent permit terms (RWQCB 2012d and 2012e).

The City's NPDES Phase I permit was recently renewed (May 3, 2012). The new permit represents the next iterative step in stormwater requirements and includes increased specificity; a blend of water quality monitoring and BMP assessment for evaluating program effectiveness; and commencement of a watershed-based approach to stormwater management (including watershed characterization). Notably,

the new permit also includes provisions for the City to pursue IRWM objectives. Specifically, the permit states:

3) Aligning Stormwater Management with Related Planning Goals and Requirements

a) Integrated Regional Water Management –

i) Within 12 months of adoption of this Order, the Permittee shall coordinate with other stakeholders to pursue the Environmental Enhancement Objectives of the May 2006 Integrated Regional Water Management Functionally Equivalent Plan Update, or comparable water supply, water quality, and flood protection and flood management goals and objectives of the Integrated Regional Water Management Plan in use, through the Permittee’s stormwater management program.

ii) Within 2 years of adoption of the Order, the Permittee shall identify opportunities to protect, enhance, and/or restore natural resources including streams, groundwater, watersheds, and other resources consistent with the Integrated Regional Water Management Plan. At a minimum, the Permittee shall examine opportunities for stormwater capture and reuse, and stormwater infiltration for aquifer recharge. (RWQCB 2012d, p. 86)

The Phase II NPDES Program is intended to address potentially adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of stormwater discharges that have the greatest likelihood of causing continued environmental degradation. Cities within the Greater Monterey County IRWM planning region enrolled under the Phase II General Permit for Stormwater Discharges include King City, Soledad, and Marina.

While King City and the City of Soledad have individual stormwater programs, the City of Marina joined with Monterey County and several Monterey Peninsula cities to apply as co-permittees under a single General Plan, called the Monterey Regional Storm Water Management Program (MRSWMP). The MRSWMP covers the unincorporated areas of Monterey County that have been designated by the U.S. Census Bureau as being “Urbanized Areas” and that are within the County’s legal jurisdictional boundary. The purpose of the MRSWMP is to implement and enforce a series of BMPs designed to reduce the discharge of pollutants from the MS4s to the “maximum extent practicable,” to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. The BMPs are grouped under the following six “Minimum Control Measures,” which are required under the Phase II regulations:

1. Public Education and Outreach
2. Public Participation/Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention/Good Housekeeping

The Phase II Small MS4 General Permit is currently being renewed, with some significant changes being proposed from the current order (Order 2003-0005-DWQ). The SWRCB considers these changes necessary because audits of Phase II stormwater programs under the existing order have shown that many of these programs lack the specific detail necessary in their stormwater management plans to implement adequate programs (SWRCB 2012). RWQCB staff has found it difficult to determine permittees’ compliance with the existing General Permit, due to the lack of specific requirements. They have found that the permit language frequently does not contain specific deadlines for compliance, does not incorporate clear performance standards, and does not include measurable goals or quantifiable targets for

implementation. For those reasons, SWRCB staff is amending the current order (Order 2003-0005-DWQ) to include permit language that is clear enough to set appropriate standards and establish required outcomes. The new order will differ significantly from the current order by including the following:

- Specific BMP and Management Measure Requirements
- Eliminate submission of a Stormwater Management Plan (SWMP) for review and approval by the Regional Water Boards
- Electronic filing of Notice of Intents (NOIs) and Annual Reports
- Waiver Certification
- New State Water Board and Regional Water Board designation criteria
- Separate requirements for traditional and non-traditional MS4s
- New program management requirements
- Post-construction storm water management requirements
- TMDL implementation requirements
- Requirements for ASBS discharges
- Water quality monitoring and BMP assessment
- Program effectiveness assessment

The public comment period for the proposed revisions to be incorporated into the renewal ended in July 2012. SWRCB staff expect to submit the final Tentative Order for consideration of adoption by the State Water Board in August or September 2012.<sup>45</sup>

### **B.6.3.b Voluntary Water Quality Programs**

#### ***Agriculture Water Quality Alliance (AWQA)***

The MBNMS's Water Quality Protection Program (WQPP) has developed six action plans to address water quality problems in Monterey Bay and its watersheds: *Implementing Solutions to Urban Runoff; Regional Monitoring, Data Access, and Interagency Coordination; Marinas and Boating; Agriculture and Rural Lands; Beach Closures and Microbial Contamination; and Cruise Ship Discharges*.<sup>46</sup> Each plan contains a set of voluntary strategies to address the water quality problems specific to the plan. The WQPP has been working in partnership with numerous stakeholder groups in the region to implement those strategies.

The *Agriculture and Rural Lands Action Plan* (Ag Plan) was developed with extensive input from agriculture industry groups, resource agencies, and environmental groups. The plan lays out voluntary strategies for protecting water quality and the productivity of Central Coast agricultural lands through a stewardship approach. These strategies fall into six general categories: identification and adoption of more effective management practices through development of industry networks; expansion and coordination of technical assistance/outreach; public education and public relations; regulatory coordination/permit streamlining for conservation measures; improved funding mechanisms and tax incentives; and strategies for public lands and rural roads.

The Agriculture Water Quality Alliance (AWQA) was initiated in 1999 to carry out the strategies of the Ag Plan.<sup>47</sup> AWQA is a unique regional partnership that brings together farmers, ranchers, resource

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<sup>45</sup> For current information, visit this link:

[http://www.waterboards.ca.gov/water\\_issues/programs/stormwater/phase\\_ii\\_municipal.shtml](http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml)

<sup>46</sup> Summaries of these actions plans can be found in the *Monterey Bay National Marine Sanctuary Final Management Plan* (MBNMS 2008b).

<sup>47</sup> See AWQA website at: <http://www.awqa.org/index.html>



conservation agencies, researchers, and agricultural and environmental organizations. Since 1999, AWQA partners have worked together to reduce the runoff of sediments, nutrients, and pesticides from agricultural and rural lands through education and outreach, technical and financial assistance, research and monitoring, permit streamlining, and watershed coordination. AWQA’s regional approach focuses on industry-led initiatives and voluntary, collaborative solutions to tackling water quality problems, and as such offers an important non-regulatory approach to improving water quality in the region. AWQA partners meet monthly to discuss emerging issues and coordinate projects. The process has led to improved coordination and collaboration of agencies, researchers, non-profits, and industry groups.

With a mix of federal, state, and private funding, AWQA partners have made great strides towards implementing the Ag Plan. Some examples include:

- *Watershed Working Groups:* Through AWQA, farmers and ranchers throughout the region have been establishing management practices on their properties to reduce runoff in the form of sediments, nutrients and pesticides. The Central Coast Agricultural Water Quality Coalition, which represents six County Farm Bureaus whose watersheds drain to the Sanctuary, has been organizing Watershed Working Groups comprised of agricultural landowners and managers along local streams and rivers. These groups work together to identify local water quality issues and implement conservation projects.
- *Irrigation and Nutrient Management Program:* AWQA and a broad suite of partners developed the Central Coast Irrigation and Nutrient Management Program to help farmers implement irrigation and nutrient management practices to address water quantity and water quality concerns in the region. Led by the Central Coast Resource Conservation & Development Council, AWQA has secured millions of dollars in federal financial cost-share assistance under the NRCS Agricultural Water Enhancement Program (AWEP) to support implementation of irrigation and nutrient management practices in Central Coast watersheds. These practices include irrigation system and nutrient management evaluations, improved sprinkler systems, conversion to micro-irrigation, and installation of flow meters, among many others. AWEP is a non-regulatory program; participation is voluntary and confidential.
- *Permit Coordination Programs:* The time, cost, and complexity of navigating the permit process with a host of regulatory agencies can be daunting for landowners seeking to implement conservation projects on their properties. To help farmers, ranchers and other rural landowners overcome these barriers and to encourage implementation of conservation and restoration projects across Sanctuary watersheds, AWQA partners have worked to develop permit coordination programs. Led by Sustainable Conservation, RCDs, and the NRCS, the Partners in Restoration Permit Coordination Programs help landowners to quickly and effectively obtain permits from multiple agencies, and provides technical and cost-share assistance for the installation of certain conservation practices.
- *Education and Outreach:* AWQA developed a Farm Water Quality Planning Short Course through which 70 percent of growers in the region have developed farm water quality management plans for their properties.
- *Confidential Technical and Financial Assistance:* Over the past 10 years the NRCS has assisted growers in the region to voluntarily implement conservation practices through \$18M in Farm Bill support dollars, matched by \$15M of farmer investment in these same practices.



***Central Coast Joint Effort for LID and Hydromodification Control***

The Municipal NPDES Stormwater Permit requires municipalities to develop performance measures and, in some cases, numeric criteria to manage stormwater. Development of these measures and criteria requires substantial knowledge of urban hydrologic processes; appropriate use of Low Impact Development (LID) techniques; and an understanding of technical, policy and regulatory issues related to implementing municipal stormwater control requirements. The Central Coast RWQCB is providing municipalities the option of participating in a Joint Effort, led by a consultant team, to develop hydromodification control criteria to meet the Water Board’s stormwater regulations for new and redevelopment.

While there are various efforts statewide to develop hydromodification control criteria, the focus has generally been on the large Phase I communities. Compared to the Phase I communities, many Phase II communities are small, have fewer resources, and possess less in-house expertise to develop and implement hydromodification controls. By participating in a joint effort led by subject area experts, municipalities will be assisted in moving forward toward optimal water quality protection. Part 1 of the effort will develop a science-based methodology that municipalities on the Central Coast and across the state can use to determine their own specific hydromodification control criteria. Part 2 of the effort includes the technical and modeling analysis required to determine the actual hydromodification control criteria. Municipalities can then propose these resulting hydromodification control criteria to the Central Coast RWQCB to meet the requirements of their NPDES Municipal Stormwater Permit.<sup>48</sup>

***Efforts to Improve Groundwater Quality in the Salinas Valley Groundwater Basin***

From the MCWRA’s beginning in 1947, projects have been designed and developed to address the seawater intrusion issue in the Salinas Valley. Beginning with construction of the Nacimiento and San Antonio reservoirs in 1957 and 1967, respectively, these projects have generally focused on capturing surface water and utilizing that water more effectively.

- **Monterey County Water Recycling Projects:** In 1983, MCWRA received SWRCB funding to evaluate alternatives that would prevent further seawater intrusion. Numerous studies were conducted between 1983 and 1992 to determine the extent of the seawater intrusion and possible solutions. The results of these studies created a series of projects known as the Monterey County Water Recycling Projects, which are joint efforts between MCWRA and the MRWPCA. Landowners of the Salinas Valley agreed to assess themselves to help fund these multi-million dollar projects, creating the Castroville Seawater Intrusion Project (CSIP)—a water recycling facility at the Regional Treatment Plant and a pipeline distribution system to provide recycled water for agricultural irrigation. The project has successfully addressed a portion of the seawater intrusion problem in the Salinas Valley by providing reclaimed wastewater to approximately 12,000 acres of agricultural land near Castroville. The Monterey County Water Recycling Projects have been in operation since April 1998.
  
- **Salinas Valley Water Project:** The SVWP is MCWRA’s most recent project to address the problem of seawater intrusion, designed to transfer water from its reservoirs in the southern part of the Salinas Valley to the northern portion of the groundwater basin. The SVWP was completed in April 2010 and consisted of two main components, the first being the modification of the spillway at Nacimiento Reservoir, and the second being re-operation of the reservoirs and the construction of an inflatable dam diversion structure. The spillway modifications included lowering of the existing spillway, installation of an inflatable dam on the new spillway, and

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<sup>48</sup> For more information on the Central Coast Joint Effort for LID and Hydromodification Control, visit the RWQCB website:  
[http://www.swrcb.ca.gov/rwqcb3/water\\_issues/programs/stormwater/docs/lid/lid\\_hydromod\\_charette\\_index.shtml](http://www.swrcb.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml).

enlargement of the spillway chute. The inflatable dam is held in the raised position for normal operations, allowing the reservoir storage to be maintained at its present maximum elevation, and is lowered during large flood events to preclude the dam from overtopping. The second component included the re-operation of the reservoirs and the construction of an inflatable dam diversion structure with associated fish screening and pumping facilities to allow the diversion of Salinas River water into the existing CSIP distribution system. An average of 9,700 AFY of Salinas River is diverted and delivered to the CSIP system, reducing groundwater pumping by the same amount. The water is blended with recycled water, resulting in an improved and more uniform quality of water delivered through the CSIP system. The SVWP also increases groundwater recharge via the Salinas River.

#### **B.6.4 Matching Water Quality to Water Use**

Matching water quality to water use is a management strategy used to optimize the efficient use of water supplies. An example of matching water quality to water use is a water supplier choosing to use a deeper, cleaner aquifer for municipal water, which requires less treatment before delivery (resulting in potentially fewer disinfection byproducts and less energy), over a more shallow, more contaminated aquifer. Recycled water can also be treated to a wide range of purities that can be matched to different uses.

In the Greater Monterey County region, water is currently reclaimed and treated for agricultural irrigation purposes. A water recycling facility was constructed at the Regional Treatment Plant in 1998 along with a pipeline distribution system to provide recycled water for agricultural irrigation. The distribution of the recycled water occurs via CSIP. As noted above, the CSIP has successfully addressed a portion of the seawater intrusion problem in the Salinas Valley by providing reclaimed wastewater to approximately 12,000 acres of agricultural land surrounding Castroville, which greatly reduces groundwater extraction for crop irrigation.

In addition, two water suppliers within the region are preparing (or proposing) to use recycled water for municipal landscaping purposes. While the CSIP effort uses almost all the recycled water from the regional generating facility during the summer months, the Marina Coast Water District does have recycled water rights to a small fraction of the summer-time recycled water flows and is proposing to distribute that recycled water to regional golf courses, municipalities, and institutions (e.g., CSUMB) for the irrigation of large landscapes and public common areas. In addition, the City of Soledad is in the process of completing Phase II of the Soledad Water Reclamation Project (with support from Round 1 Proposition 84 IRWM Implementation Grant funds), which includes completion of design of a recycled water delivery system to both agricultural and recreation areas in and near the City of Soledad, and composting municipal sludge for reuse on City landscaping.

The potential exists to treat recycled water to a drinking water standard if the need should arise in the future, though this is not practiced currently.

#### **B.7 MAJOR WATER-RELATED ISSUES AND CONFLICTS**

The following list highlights the issues and conflicts related to water resource management that have the most regional significance within the Greater Monterey County IRWM region. This list was developed as a basis for developing the goals and objectives for the Greater Monterey County region for the purpose of IRWM planning (see Section D, Objectives).

The list of issues and conflicts was developed in several stages. A committee comprised of RWMG members was formed in May 2009 to investigate and identify the region's issues and conflicts. The committee interviewed 43 local experts in the areas of water quality, water supply, flood control, natural

resources, and public health and safety. Based on those interviews, the committee developed a summary list of water-related issues and conflicts in the Greater Monterey County IRWM region. The list was expanded at a RWMG brainstorming session, and then presented to stakeholders for input at two public workshops held in Big Sur and Soledad in September 2009. After incorporating stakeholder input, a final list of “issues and conflicts” – outlined below – was approved by the RWMG in October 2009.

### **Water Quality**

- Drinking water quality impairments, particularly in small communities in North and South County (including both private and municipal wells)
- Groundwater quality impairments due to seawater intrusion
- Surface and groundwater quality impairments due to runoff (agricultural and urban sources, including municipal outflows/stormwater), including:
  - Nitrates and other nutrients from agriculture, livestock management, septic system failures, and urban sources
  - Sediment (due to land use practices, including construction, agricultural practices, and poorly constructed/maintained roads)
  - Pesticides
  - Metals (e.g., mercury, arsenic, chromium, copper, zinc)
  - Bacteria
  - Salts
  - Trash
  - Unknown impairments in surface waters and ocean from emerging pollutants such as pharmaceuticals, personal hygiene products, etc.
- Agricultural food safety issues impacting water quality
- Impacts to marine environment
- Data gaps as outlined in the Strategic Plan for Central Coast Water Quality Monitoring Coordination and Data Synthesis (e.g., long-term data sets for trend analysis, improved dissemination of data results)
- Public recreation vs. water quality in reservoirs and rivers/creeks
- Challenges for small water system managers in complying with water quality regulations
- Need for increased public education about water quality issues
- Need for more enforcement of existing water quality regulations
- Lack of effective incentive structure (including economically feasible management practices) for protecting water quality from agricultural runoff

### **Water Supply**

- Water supply problems associated with water quality impairments, particularly:
  - Seawater intrusion
  - Nitrates
- Problems with water storage and conveyance infrastructure (inadequate, leaky, or otherwise defective water systems, particularly in regard to small water systems)
- Overconsumption/overdraft
  - Irrigation
  - Municipal supplies (including landscaping)
- Water supply unreliable in certain areas, particularly in small communities
- Need/opportunities for increased water conservation (including gray water re-use, rainwater catchment)
- Environmental water needs (fisheries, wildlife)
- Drought management
- Need for increased public education about water supply issues

### **Watershed Management and Flood Management**

- Data gaps (need for overall watershed resource assessments)
- Need for monitoring programs to assess effectiveness of projects and/or policies
- Regulatory and intergovernmental issues:
  - Interagency coordination
  - Conflicting mandates and regulations
  - Problems with regulatory compliance
  - Inconsistent enforcement of regulations
- Stormwater management/municipal drainage
- Impacts of wildfires (including water supply and water quality, debris flows)
- Need to protect and restore functioning watersheds
- Conflicts regarding flood control projects (particularly in regard to Salinas River Channel maintenance programs)
- Need to better educate rural landowners about land management/development practices that affect water resources)

### **Environmental Resources**

- Hydrologic modifications of wetlands, streams, estuaries and lagoons impact the preservation and quality of habitat by affecting circulation (water quality), habitat structure (geomorphology), and the exchange of energy and nutrients.
- Food safety issues impacting wildlife and habitat protection
- Steelhead, specifically:
  - Sustaining flows
  - Fish passage
  - Habitat (including problems caused by erosion and invasive species, e.g., sticky eupatorium weed)
- Other special status species:
  - Protection
  - Habitat restoration
- Data gaps (while noting stakeholder concern for potential “regulatory creep” with collection of new data), including especially:
  - Surface water quality
  - Sources of erosion (especially in Big Sur)
  - Environmental water needs
- Invasive species (i.e., Arundo, Cape ivy, zebra mussels)
- Upland riparian habitat

### **Climate Change**

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

### **Disadvantaged Communities**

- Water quality and water supply reliability problems in certain small communities
- Inadequate wastewater treatment in some disadvantaged communities
- Need for increased public education in disadvantaged communities

- Flood impacts from small and large watersheds

**Miscellaneous**

- Need for increased academic training and job recruitment in local water resource management sectors

## Section C: Flood Management

Flood management is an important part of Integrated Regional Water Management (IRWM) planning. The Proposition 84 IRWM Grant Program encourages implementation projects that improve flood management, particularly projects that support integrated flood management. Integrated flood management is one of the Statewide Priorities for the IRWM Grant Program. Preference is given to proposals that contain projects that promote and practice integrated flood management to provide multiple benefits including:

- Better emergency preparedness and response
- Improved flood protection
- More sustainable flood and water management systems
- Enhanced floodplain ecosystems
- Low Impact Development (LID) techniques that store and infiltrate runoff while protecting groundwater

A separate allocation of IRWM Grant Program funds also exists under Proposition 1E, the Disaster Preparedness and Flood Prevention Bond Act of 2006. To be eligible for grant funds under Proposition 1E, a project must be included in an adopted IRWM Plan, must be designed to manage stormwater runoff to reduce flooding, and must yield multiple benefits, including groundwater recharge, water quality improvement, ecosystem restoration and benefits, and/or reduction of instream erosion and sedimentation.

Flood management is considered to be an integral part of the collective water management system in the Greater Monterey County IRWM region. It is discussed briefly in the Region Description section (Section B.3.3.e Floodwater and Flood Management) and is discussed separately in this section to allow for a more in-depth review. This chapter describes the current framework for flood management in the Greater Monterey County IRWM region and identifies the potential for integrated flood management. *Note that most of the information in this chapter has been either excerpted or summarized from the Monterey County Floodplain Management Plan Update 2008 (MCWRA 2008).*

### C.1 HISTORIC FLOODING

As population and urbanization increase in a region, so does flood risk. Increased impervious surfaces and channelization of streams results in increased runoff and intensified flood flows; and increased development in floodplains, including houses, buildings, and agricultural fields, puts more property and lives at risk for flooding. The damages caused by flooding in the Salinas Valley today—even with the construction of major flood control infrastructure—are far more substantial than they were a century ago. Along the Big Sur coast, streams and rivers draining the steep coastal mountains are subject to short, intense floods, capable of producing significant damage to property. Wildfires also exacerbate flood risk in Big Sur, denuding areas of vegetation, which can lead to increased sheet flow and greater velocities during subsequent rainstorms, and causing water quality problems in coastal waters.

Historic records from 1911-2007 show flooding and flood damage to have occurred on a fairly regular basis (every few years) within Monterey County. The County experienced severe damages in:

- 1969: Two distinct floods, each of which resulted in Monterey County being declared a disaster area;
- 1978: A series of storms emanating from a southerly direction, causing extensive beachfront and coastal damage;
- 1983: “El Niño” storms that brought an extremely unusual series of high tides, storm surges, and storm waves along the coast, and heavy rains causing extensive flooding and erosion in the



Salinas Valley;

- 1995: A second significant winter storm that brought devastating flooding and extensive damage throughout the County, and in particular the Pajaro community where life was lost and extensive damage occurred in both Santa Cruz and Monterey counties; and
- 1998: A series of “El Niño” winter storms that hit various parts of California. In Monterey County there were impacts to agricultural lands and to the City of Salinas. Several communities were evacuated and Monterey County was declared a disaster area by the Federal Emergency Management Agency (FEMA).

In the 1998 storm event, the Las Lomas area experienced severe damage of eight residential parcels. Monterey County acquired the parcels through the Federal Hazard Mitigation Grant Program and all structures were removed. Each parcel was subsequently rezoned to “open space” in perpetuity. Countywide losses from that storm were estimated at over \$38 million, with agriculture-related losses totaling over \$7 million and involving approximately 29,000 damaged acres.



Flooding on the Salinas River, March 1995, looking south toward Castroville. Used by permission from MCWRA.

## C.2 FLOOD MANAGEMENT

The agency with primary responsibility for floodplain management in Monterey County is the Monterey County Water Resources Agency (MCWRA). The MCWRA also has responsibility for flood control in benefit assessment areas. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal. In addition, several

other organizations—most notably the Resource Conservation District (RCD) of Monterey County and the Natural Resources Conservation Service (NRCS)—contribute significantly to flood control and floodplain management efforts in the region through sediment and erosion control programs and grant incentives, though they have no jurisdictional flood control authority per se.

The MCWRA employs both structural and non-structural approaches to flood control and floodplain management in the county.

### **C.2.1 Structural Approaches to Flood Management**

The flood control infrastructure in the Greater Monterey County region is considered a critical component of the region's overall water management system, providing not only flood control protection but water supply and recreational benefits as well. Existing flood control infrastructure within the Greater Monterey County IRWM region includes the Nacimiento and San Antonio Dams, constructed in 1957 and 1967 respectively. Note that there are no federally constructed (i.e., U.S. Army Corps of Engineers) flood control structures in the Greater Monterey County IRWM planning region (though the Pajaro levee system, in northern Monterey County and located within the Pajaro River Watershed IRWM planning region, is a federally constructed system).

Nacimiento Dam is a large earthfill dam originally constructed for flood control, water conservation, water supply (including percolation into the Salinas Valley aquifer), and recreation. It also provides water supply and recreation activities to San Luis Obispo County. The dam is located in San Luis Obispo County but is owned and operated by MCWRA, and provides an important source of water supply for the Greater Monterey County IRWM region. The drainage basin for Nacimiento Reservoir covers 324 square miles with half the basin in Monterey County and half in San Luis Obispo County.

The Nacimiento Reservoir has a minimum pool volume of 22,300 AF and a conservation pool of 237,700 AF. Flood protection is provided by reserving storage capacity in the reservoir (known as the “flood pool”) to temporarily store flood water during the winter. The flood pool storage is 117,900 AF, and is located between elevation 777 feet and the top of the spillway, elevation 800 feet. Lake Nacimiento has spilled three times since its construction in 1957; spilling occurred in 1958, 1969, and 1983. The Nacimiento Spillway was modified as part of the Salinas Valley Water Project in 2009. Modifications to the spillway include lowering of the existing spillway, installation of an inflatable dam on the new spillway, and enlargement of the spillway chute. The modifications were necessary to enable the dam's spillway to release enough water in the event of a large storm event to ensure flood protection and safety of the dam. The adjustable spillway crest also allows for greater storage flexibility, which has resulted in an ability to store more water in the reservoir. Since modification of the spillway, Nacimiento has spilled one additional time in 2011—after which the reservoir was at full capacity on April 1.



Nacimiento Dam (used by permission from MCWRA)

San Antonio Dam is an earthfill dam that is also owned and operated by MCWRA. Like the Nacimiento Reservoir, the San Antonio Reservoir is a multi-use facility operated for flood control, water supply (including groundwater percolation), and recreation uses. The dam is located approximately 7 miles southwest of Bradley on the San Antonio River in Monterey County, and has a 330 square mile watershed. The reservoir has minimum pool storage of 23,000 AF. During the 1980s, the storage required by the Flood Rule Curve of the reservoir was increased to allow safe passage of the Probable Maximum Flood (PMF), resulting in less water conservation storage. More recent analysis of the PMF was performed using extensive data obtained during the March 1995 event, and showed that the San Antonio Dam spillway could safely pass the PMF. In July 2000, the MCWRA Board of Directors adopted a new Flood Rule Curve increasing the water conservation pool to 282,000 AF and reducing the flood pool storage to 30,000 AF. When the lake is full (spillway elevation 780 feet), it has a maximum storage capacity of 335,000 AF. The maximum elevation during flood stage is 802 feet, with a maximum temporary capacity of about 477,000 AF and a temporary surface area of about 7,500 acres. Almost 2,050 cubic feet/second (cfs) were discharged through the outlet works on March 4, 1971, and three small spills have since occurred (in 1982, 1983, and 2006).



San Antonio Dam (used by permission from MCWRA)

The Salinas Reclamation Ditch, originally named Reclamation Ditch District No. 1665, was constructed in 1917 to drain the marshlands in the northern Salinas Valley for agricultural use and urban development. The ditch connected a series of seven shallow lakes roughly between the City of Salinas and Castroville. The Reclamation Ditch watershed area covers approximately 157 square miles of rural, agricultural, and urban lands located in northern Monterey County and a small mountainous region in San Benito County, including the watersheds of Tembladero Slough, Merritt Lake, Santa Rita Creek, Espinosa Lake, Gabilan Creek, Natividad Creek, Alisal Slough, and Alisal Creek. The Ditch eventually joins Tembladero Slough near Castroville, then the Old Salinas River Channel, and eventually discharges into Moss Landing Harbor through tide gates at Potrero Road.

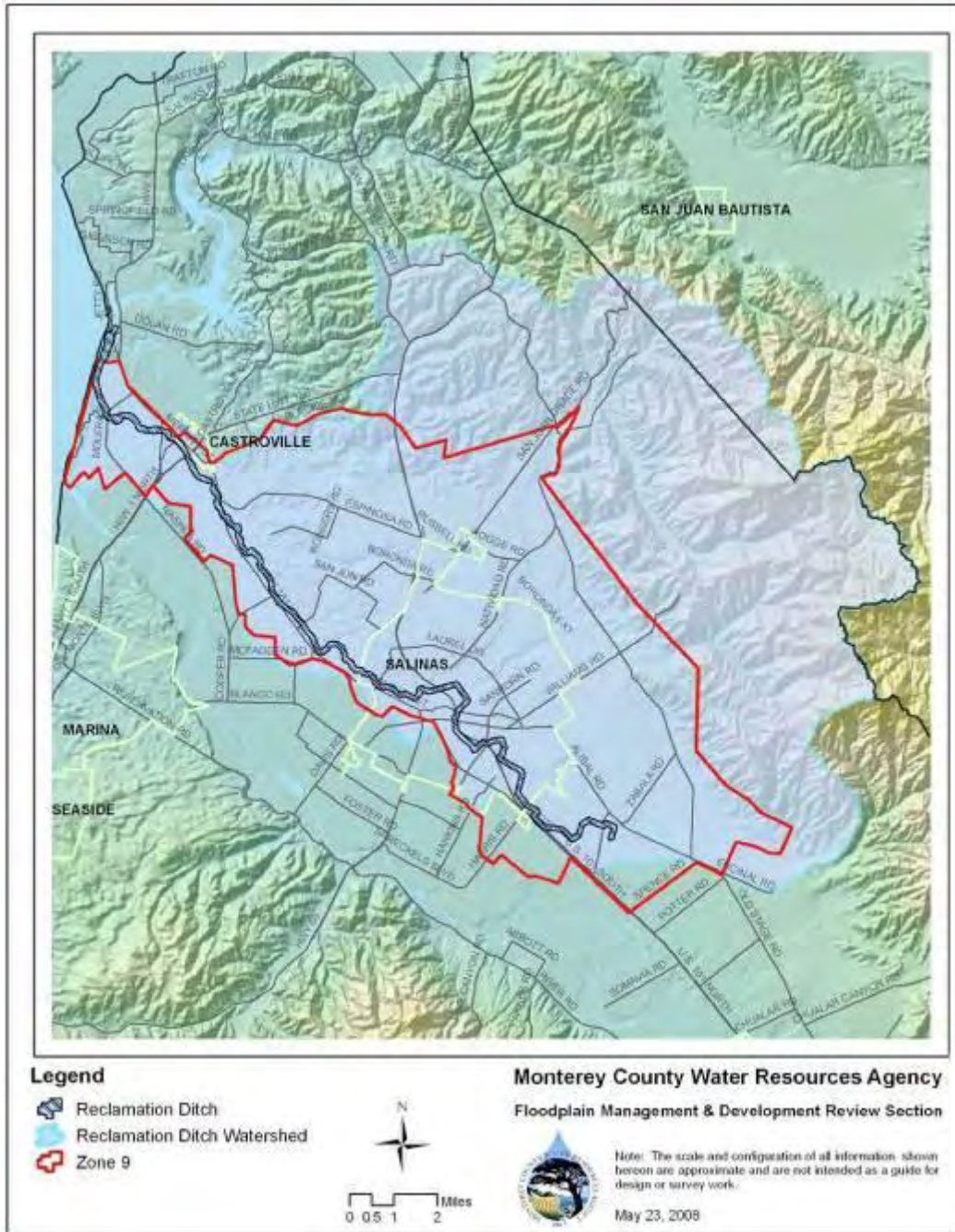
While the original purpose of the Reclamation Ditch was to reclaim lands, the Ditch came to be used and depended upon by local residents as a flood control channel. Rapid agricultural and urban development throughout the 1900s, however, significantly changed the hydrology of the watershed, causing a dramatic increase in the rate and amount of runoff from storms. Even just 24 years after completion of the Ditch, the County Surveyor began investigating the feasibility of enlarging the Ditch's drainage capacity to accommodate increased runoff. By the end of the 1950s it had become clear that the system lacked capacity to manage flooding from storms (which was not its original intent).

In 1967, the Monterey County Flood Control and Water Conservation District (now MCWRA) took over maintenance over portions of the Reclamation Ditch from the Northern Salinas Valley Mosquito Abatement District. After two major floods in the 1990s (March 1995 and February 1998) that resulted in substantial damage to agricultural lands west of Salinas, the MCWRA initiated an evaluation of the Reclamation Ditch and a committee was convened to assist MCWRA in planning for an improved drainage system. That committee, the Reclamation Ditch Improvement Plan Advisory Committee (RDIPAC), has made several recommendations for improvements and provided guidance during the development of several studies such as the Potrero Tide Gates study (September 2000) as a result of changes in the watershed. The implementation of those recommendations is included as a proposed project in this IRWM Plan.

Figure C-1 below provides a map of the Salinas Reclamation Ditch and its watershed.



**Figure C-1: Present Location of Reclamation Ditch and its Watershed**



Source: MCWRA Monterey County Floodplain Management Plan, used by permission.

### C.2.2 Non-Structural Approaches to Flood Management

Non-structural approaches to flood management include land use management tools such as regulation and flood insurance, and emergency response systems.

The MCWRA first developed the *Monterey County Floodplain Management Plan* in 2002 with the goal of creating an action 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. The Plan, updated in 2008, lists, describes, and assesses Repetitive Loss Properties (RLPs) in the County. A RLP is a property for which two or more claims of \$1,000 or more have been paid by the National Flood Insurance Program (NFIP) within any given 10-year period since 1978. Monterey County has 107 RLPs. The vast majority of these RLPs are located along the Carmel River, however, which is outside of the Greater Monterey County IRWM region. There are a total of 13 RLPs occurring within the Greater Monterey County IRWM region along 10 different waterways (including the Big Sur River, Carneros Creek, El Toro Creek, and Santa Rita Creek). There are no RLPs along the Salinas River.

The *Monterey County Floodplain Management Plan* also describes the County's flood control system (infrastructure), identifies flood zones defined by FEMA, including maps depicting RLPs and 100-year floodplains, provides a general hazard assessment (including atmospheric, geologic, hydrologic, seismic, fire, system failure, and general flood hazards), 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. The Plan also describes the County's emergency response system for flood events. In the late 1970s, Monterey County developed the first ALERT (Automated-Local-Evaluation-in-Real-Time) flood warning system. Recent enhancements to the ALERT system include the addition of a network of "satellite data concentrators and transmitters" which pass data, via satellite, to a system of secure servers. Now, in addition to accessing ALERT data from a base-station which receives radio or microwave signals directly from the monitoring stations, the system is designed so multiple operators can monitor rainfall and stream conditions throughout the county as storm events occur from anywhere internet access is available.

The *Monterey County Floodplain Management Plan* supports existing Monterey County Code floodplain management policies and objectives. Monterey County Code Chapter 16.16, Regulations for Floodplains in Monterey County, contains the minimum FEMA requirements necessary for participation in the regular phase of the NFIP, as well as the higher regulatory standards that are credited through the Community Rating System (CRS). The NFIP is a federal program, administered by FEMA that makes federally backed flood insurance available in communities that adopt and enforce floodplain management ordinances to help reduce future flood losses. Monterey County joined the NFIP in 1984. Compliance and ongoing participation in the NFIP ensures that all County residents can purchase flood insurance. The CRS is also a federal program that was implemented in 1990 to encourage communities to implement floodplain management activities beyond the minimum NFIP standards. Of the approximately 21,600 communities that participate in the NFIP, only about 1,100 participate in the CRS program. Monterey County has been a voluntary participant in the CRS since 1991. CRS allows for reductions in flood insurance premium rates according to the extent to which a community implements additional floodplain management activities. The County was upgraded in the CRS to "Class 5" in May 2007; of the 1,100 communities participating in the CRS program, only six have a higher rating than Monterey County (based on August 2009 CRS statistics).

Figure C-2 below illustrates FEMA-defined Special Flood Hazard Areas in Monterey County.



**Figure C-2: Monterey County FEMA-Defined Special Flood Hazard Areas**



Source: MCWRA Monterey County Floodplain Management Plan, used by permission.

### C.3 INTEGRATED FLOOD MANAGEMENT

Both the *California Water Plan Update 2009* and the Proposition 84/1E IRWM Program Guidelines strongly support the concept of integrated flood management. Integrated flood management “does not rely on a single approach to flood management, but instead uses various techniques, including traditional (meaning structural) flood protection projects, nonstructural measures (such as land use practices), and reliance on natural watershed functions, to create an integrated flood management system” (DWR 2009b, vol. 1, p. 2-21). The importance of integrated flood management is explained in the *California Water Plan* as follows:

*Floodplains are formed by periodic inundation and the deposition of sediment. Over time, the repeated process creates a landform that is favorable for human settlement, due to the relatively flat land, good soils, and easy access to water. Sparse settlements have grown into urban areas, greatly complicating the task of flood management, as many people now live in locations that are within historic floodplains.*

*Traditionally, flood management practices largely focused on reducing flooding and susceptibility to flood damage through physical measures intended to store floodwaters, increase the conveyance capacity of channels, and separate rivers from adjacent populations. Although this approach may reduce the intensity and frequency of flooding, it limits the natural role of floodplains to reduce flooding in developed areas.*

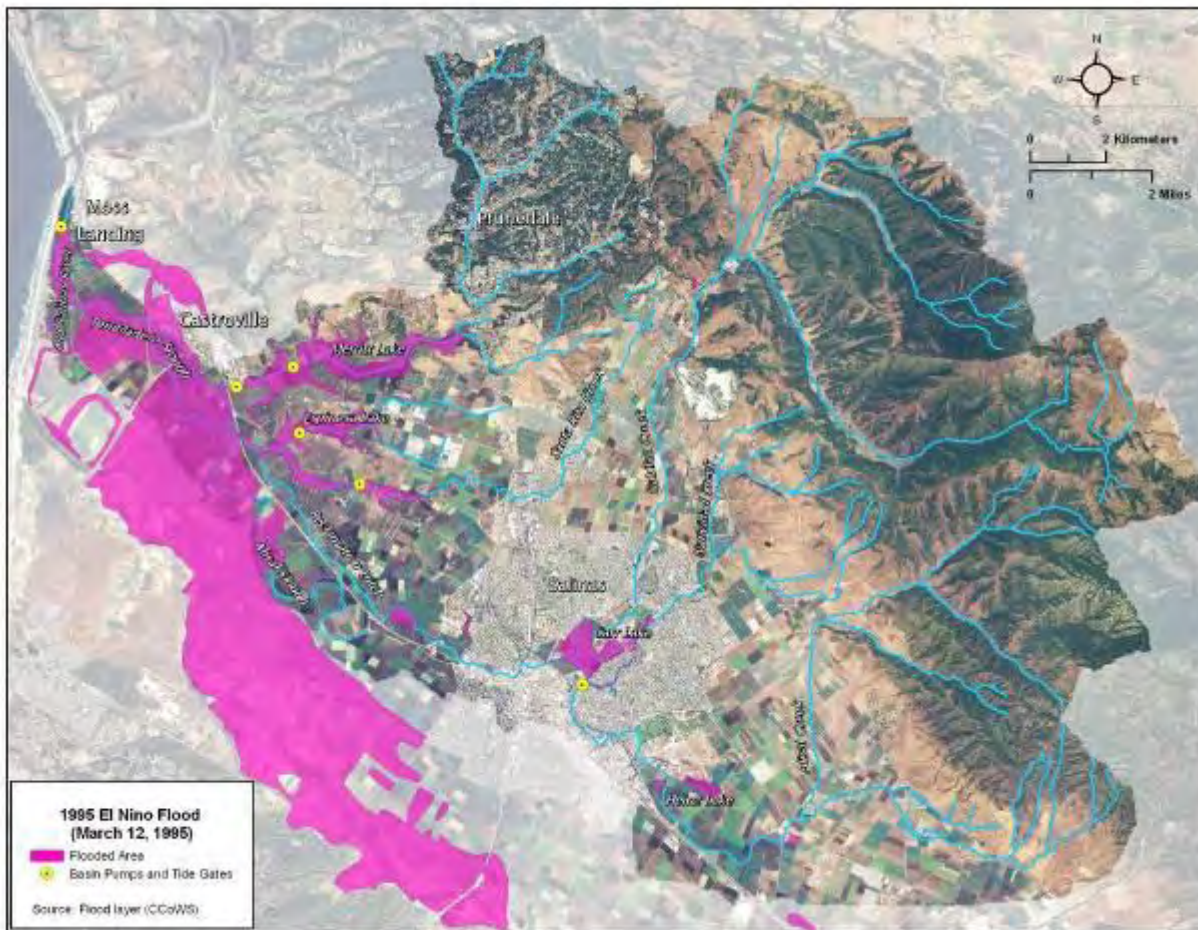
*In recent years, flood managers have recognized the potential for natural watershed features to reduce the intensity or duration of flooding. Undeveloped floodplains can store and slowly release floodwaters. Wetlands can act as sponges, soaking up floodwaters, filtering runoff, and providing opportunities for infiltration to groundwater. Healthy forests, meadows, and other open spaces can slow runoff during smaller flood events, reducing peak flows, mudslides, and sediment loads in streams.*

*A challenge for flood managers is to integrate these natural functions with more traditional flood protection methods, thus reducing floodflow peaks and their subsequent impacts during small and frequent flood events, while simultaneously providing other water resource benefits. To address this integration, the FloodSAFE California initiative and this update of the Water Plan promote the concept of integrated flood management, a comprehensive approach to flood management that considers land and water resources at a watershed scale within the context of integrated water management; employs both structural and nonstructural measures to maximize the benefits of floodplains and minimize loss of life and damage to property from flooding; and recognizes the benefits to ecosystems from periodic flooding. (DWR 2009b, vol. 1, pp. 2-21 – 2-22)*

The *Monterey County Floodplain Management Plan* recognizes the importance of protecting “the natural and beneficial functions of [the county’s] floodplains.” While substantial progress is being made to return natural floodplain function to some waterways in Monterey County (most notably the Carmel River system, which lies outside of the Greater Monterey County IRWM region), most of the waterways in the Greater Monterey County region, with the exception of the rivers and streams along the Big Sur coast, have been significantly altered. Perhaps the greatest challenges for integrated flood management in the region are the waterways in the Salinas Reclamation Ditch (Gabilan) watershed and the Salinas River. All sections of the lower watershed below, and most sections within, the City of Salinas are ditched and are at risk for flooding, as evidenced in the 1995 and 1998 floods. The map below shows flooding during the 1995 El Niño flood.



**Figure C-3: 1995 El Niño Flood**



Used by permission from CCoWS at the Watershed Institute, CSUMB.

Significant potential exists to improve riparian coverage and floodplain function along the Salinas River system and Arroyo Seco River, and along waterways in northern Monterey County, including Elkhorn Slough and its tributaries, and Moro Cojo Slough. The Salinas River system, in particular, is a challenge to approach from an integrated approach because of the adjacent agricultural lands and food safety concerns with flooding and agricultural production.

The Greater Monterey County RWMG supports integrated flood management as a desirable goal. The IRWM Plan’s Flood Protection and Floodplain Management goal is to “develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes.” IRWM Plan objectives that aim to achieve integrated flood management together include:

- Promote projects and practices to protect infrastructure and property from flood damage.
- Improve flood management infrastructure and operational techniques/strategies.
- Implement flood management projects that provide multiple benefits such as public safety, habitat protection, recreation, agriculture, and economic development.
- Develop and implement projects to protect, restore, and enhance the natural ecological and hydrological functions of rivers, creeks, streams, and their floodplains.

- Promote public education about local flood management issues and needs.

The RWMG is still in the early stages of considering how to promote integrated flood management in the region. One effort underway (and funded through the Proposition 84 IRWM Planning Grant) is the “Water Resource Project Coordination” process. The Water Resource Project Coordination process is a stakeholder outreach program that aims to bring together IRWM Plan project proponents and other stakeholders in the lower Gabilan/Reclamation Ditch watershed, to discuss and reconcile any significant conflicts between projects or project objectives, to coordinate and integrate the projects where possible, and to find new potential areas of collaboration. Through this process the RWMG also hopes to find additional opportunities for integrated flood management. Please see Section I Integration for a detailed description of the Water Resource Project Coordination process.

#### **C.4 FLOOD MANAGEMENT AND CLIMATE CHANGE**

Climate change is expected to have many serious impacts on water resources, and will pose significant challenges for water managers in the Greater Monterey County IRWM planning region. One of the anticipated impacts of climate change is increased flooding. Increased flooding is expected to occur in coastal areas due to sea level rise and storm events, as well as in upper watershed areas due to changes in precipitation patterns resulting in higher peak flood events.

A study conducted by the Pacific Institute (Heberger et al. 2009) evaluated and mapped areas of the California coast that are vulnerable to flooding with a 55-inch (1.4 meter) increase in sea level rise. 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 (ibid.). 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; Wingfield and Storlazzi 2005). Monterey and Santa Cruz counties were identified in the Pacific Institute study as the two counties most vulnerable to flood-related risks of sea level rise in terms of population, due to the vast low lying areas of the Pajaro and Salinas valleys. 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.

The Pacific Institute study also noted that a 1.4 meter sea level rise will put a wide range of critical infrastructure, such as roads, hospitals, schools, emergency facilities, wastewater treatment plants, and power plants, at risk. To help protect against the impacts of sea level rise, the study identified the need to construct, raise, or repair 53 miles of levees and seawalls in Monterey County.

Coastal inundation also poses a risk to local wetlands. The impact of sea level rise on wetlands is significant for the Greater Monterey County 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 Elkhorn Slough, will become permanently submerged (Heberger et al. 2009; Largier et al. 2010).

In the upper watersheds, natural creeks and managed conveyance will see higher flow rates leading to increased erosion and flooding. Regional river levees will provide less protection during higher storm flow events, and coastal levees and control structures will be undersized to manage the combined influences of higher river flows and sea level rise. According to *the California Water Plan Update 2009* (Volume 3), failure to take into account the impacts of climate change may lead to the underestimation of areas inundated by 100-year floods. Authors of the *California Water Plan* therefore advise that protection provided by flood control infrastructure should be raised to at least the 200-year level in order to

accommodate any inaccuracies in floodplain delineation on FEMA Flood Insurance Rate Maps and the challenges put forth by climate change.

Water managers, flood control managers, and other decision-makers in the Greater Monterey County IRWM region are in the early stages of analyzing and planning for the impacts of climate change on water resources in the region. The Greater Monterey County RWMG is working closely with scientists, government agencies, environmental and community organizations, and other leaders throughout the broader Monterey Bay and Central Coast region to obtain the most up-to-date scientific data and to refine the current analytical tools in order to develop climate change adaptation strategies. This IRWM Plan will incorporate the latest climate change information and regional planning efforts with each new Plan update.

Please see Section R Climate Change for a full discussion of climate change and its anticipated impacts in the Greater Monterey County IRWM region.

## Section D: Goals and Objectives

The Integrated Regional Water Management (IRWM) Plan goals and objectives are at the very foundation of the IRWM planning process. The goals and objectives are the response to what the Regional Water Management Group (RWMG) perceives to be the major water resource issues in the region and as such, reflect the RWMG's water resource management values and overall priorities for the region. The objectives give focus to the Plan, provide the basis for determining which resource management strategies are appropriate for use in the region, 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 (i.e., projects score higher to the extent that they address objectives in the Plan).

The following sections include: a description of the process for identifying the goals and objectives for the Greater Monterey County IRWM planning region; the list of approved goals and objectives; a matrix used to measure progress toward achieving each of the objectives; and an explanation of why the Greater Monterey County RWMG chose not to prioritize objectives.

### D.1 PROCESS FOR IDENTIFYING GOALS AND OBJECTIVES

The development of goals and objectives was based directly on the water resource issues and conflicts in the region. A committee comprised of RWMG members was formed in May 2009 to investigate and identify the region's issues and conflicts. From May – July 2009, the committee interviewed more than 40 local experts in the areas of water quality, water supply, flood control, natural resources, and public health and safety. Based on those interviews, the committee developed a summary list of water-related issues and conflicts in the Greater Monterey County IRWM region. The list was expanded at a RWMG brainstorming session, and then presented to stakeholders for input at two public workshops held in Big Sur and Soledad in the Salinas Valley in September 2009. After incorporating stakeholder input, a final list of "issues and conflicts" was approved by the RWMG in October 2009. This list is printed in Section B.7, Major Water-Related Issues and Conflicts.

Once the issues and conflicts were identified, a committee comprised of RWMG members was formed to determine the goals and objectives for the Greater Monterey County IRWM planning region. While the committee based the development of goals and objectives mainly on the issues and conflicts, they also took into consideration, and worked to ensure consistency with, the following overarching goals for the region:

**Basin Plan Objectives:** The Central Coast Basin Plan is the water quality control plan formulated and adopted by the Regional Water Quality Control Board (RWQCB) for the Central Coast region. The objective of the Basin Plan is to show how the quality of the surface and ground waters in the Central Coast Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists various water uses (Beneficial Uses), describes the water quality which must be maintained to allow those uses (Water Quality Objectives), and outlines an implementation plan for achieving those standards. In addition, the Central Coast RWQCB has established the following planning goals for water quality in the Central Coast Region (RWQCB 2011):

1. Protect and enhance all basin waters, surface and underground, fresh and saline, for present and anticipated beneficial uses, including aquatic environmental values.
2. The quality of all surface waters shall allow unrestricted recreational use.
3. Manage municipal and industrial wastewater disposal as part of an integrated system of fresh water supplies to achieve maximum benefit of fresh water resources for present and future beneficial uses and to achieve harmony with the natural environment.



4. Achieve maximum effective use of fresh waters through reclamation and recycling.
5. Continually improve waste treatment systems and processes to assure consistent high quality effluent based on best economically achievable technology.
6. Reduce and prevent accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired or threatened with impairment by sediment.

The objectives for the Greater Monterey County IRWM region promote strategies to meet the water quality standards outlined in the Central Coast Basin Plan, and are consistent with the overarching planning goals promulgated by the Central Coast RWQCB.

**20x2020 Goals:** In February 2008, Governor Schwarzenegger set a goal of a 20 percent reduction in per capita urban water use by the year 2020 (20x2020). Actions toward the 20x2020 goal were furthered by the passage of SBx7-7, which amended the California Water Code (CWC) to contain provisions not only to improve urban water use efficiency but to improve agricultural water use efficiency as well. The planning objectives for the Greater Monterey County IRWM region promote both urban and agricultural water conservation and water use efficiency, and are therefore consistent with the 20x2020 goals.

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

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

The planning objectives for the Greater Monterey County IRWM region encompass all of the objectives outlined above, and are therefore consistent with the requirements of CWC §10540(c), the minimum objectives that all IRWM Plans are required to address.

**Local Plans:** The IRWM Plan objectives reflect, and are consistent with, the objectives of local land use and water resource management plans. Consistency between the IRWM Plan and local plans is discussed in more detail in Section N, Relation to Local Water Planning.

The Goals and Objectives Committee, with consistent input from the RWMG, spent several months developing a draft list of goals and objectives based on the issues and conflicts identified for the region, ensuring consistency with the overarching regional goals outlined above. After an extended public comment period and much debate, a final list of goals and objectives was approved by the RWMG in March 2010.

In March 2011, following the release of the Proposition 84 and 1E IRWM Program Guidelines, the Goals & Objectives Committee was re-convened to reassess the goals and objectives in light of the new guidelines—specifically, to make the objectives more measurable and to reconsider the RWMG’s earlier decision not to prioritize the objectives—and to ensure that the objectives were still appropriate and relevant after a year of working with them. As a result of this process, some slight revisions were made to the objectives (mostly to eliminate redundancies), a “measurability matrix” was developed (see Section D.4 below), and the decision to not prioritize objectives was reaffirmed (see Section D.5 below). The revised goals and objectives were presented to stakeholders for a 30-day public comment period, and the final goals and objectives were approved by the RWMG in September 2011.

## **D.2 THE GOALS AND OBJECTIVES**

The goals and objectives are intended to guide regional efforts toward solving water resource problems. Goals are broad, simple statements of what the RWMG wishes to accomplish, while objectives are the more specific, tangible, and measurable activities that will help carry out the goals. The goals encompass seven categories that define the focus of this region’s IRWM planning effort. These categories are: water supply, water quality, flood protection and floodplain management, environment, regional communication and cooperation, disadvantaged communities, and climate change. Through the implementation of projects contained in the plan, the RWMG hopes to achieve the IRWM Plan objectives in order to attain the water resource goals. When implementing regional projects, project partners will strive to meet as many objectives as possible, while also recognizing that some objectives may not be fully achieved through the IRWM planning process.

Prior to developing the goals and objectives, the RWMG developed a set of “guiding principles” that outline the overall approach to IRWM planning in the Greater Monterey County region. The guiding principles might be thought of as “rules of conduct” for the overall IRWM planning effort. They are the overarching principles to which all of the objectives must adhere and help guide the RWMG’s decision-making throughout the planning process. Note that the second guiding principle, “Do not burden anyone unfairly or unnecessarily,” expresses an explicit understanding and agreement on the part of the RWMG that no IRWM Plan project can be put forward for grant funding without proof of support from the landowner(s) of the property(ies) on which the project is located.

Below are the guiding principles, goals, and objectives for the Greater Monterey County IRWM planning effort.

### **GUIDING PRINCIPLES**

- Continue to provide localized solutions to regional water supply issues
- Do not burden anyone unfairly or unnecessarily
- Project results should be measured through monitoring
- Encourage projects with multiple benefits
- Support collaboration of agencies, organizations, stakeholders, and willing landowners on the development of projects that provide water resource benefits
- Minimize negative impacts to the environment and the local economy from water resource management projects
- Recognize, respect, and consider water rights and those who hold them
- Projects should be science based

## **GOALS AND OBJECTIVES**

### **WATER SUPPLY**

#### **Goal:**

- Improve water supply reliability and protect groundwater and surface water supplies.

#### **Objectives:**

- Increase groundwater recharge and protect groundwater recharge areas.
- Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.
- Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.
- Diversify water supply sources, including but not limited to the use of recycled water.
- Maximize water conservation programs.
- Capture and manage stormwater runoff.
- Optimize conjunctive use where appropriate.
- Support research and monitoring to better understand identified water supply needs.
- Support the creation of water supply certainties for local production of agricultural products.
- Promote public education about water supply issues and needs.
- Promote planning efforts to provide emergency drinking water to communities in the region in the event of a disaster.

### **WATER QUALITY**

#### **Goal:**

- Protect and improve surface, groundwater, estuarine, and coastal water quality, and ensure the provision of high-quality, potable, affordable drinking water for all communities in the region.

#### **Objectives:**

- Promote practices necessary to meet, or where practicable, exceed all applicable water quality regulatory standards (for drinking water, surface and groundwater quality).
- Promote projects to prevent seawater intrusion.
- Incorporate or promote principles of low impact development where feasible, appropriate, and cost effective.
- Protect surface waters and groundwater basins from contamination and the threat of contamination.
- Support research and pilot projects for the co-management of food safety and water quality protection.
- Improve septic systems, sewer system infrastructure, wastewater treatment systems, and manure management programs to prevent water quality contamination.
- Support research and other efforts on salinity management.
- Support monitoring to better understand major sources of erosion, and implement a comprehensive erosion control program.
- Promote programs and projects to reduce the quantity and improve the quality of urban and agricultural runoff and/or mitigate their effects in surface waters, groundwater, and the marine environment.
- Promote regional monitoring and analysis to better understand water quality conditions.

- Support research and utilization of emerging technologies (enzymes, etc.) to develop effective water pollution prevention and mitigation measures, and source tracking.
- Promote public education about water quality issues and needs.

## **FLOOD PROTECTION AND FLOODPLAIN MANAGEMENT**

### **Goal:**

- Develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes.

### **Objectives:**

- Promote projects and practices to protect infrastructure and property from flood damage.
- Improve flood management infrastructure and operational techniques/strategies.
- Implement flood management projects that provide multiple benefits such as public safety, habitat protection, recreation, agriculture, and economic development.
- Develop and implement projects to protect, restore, and enhance the natural ecological and hydrological functions of rivers, creeks, streams, and their floodplains.
- Support research and monitoring efforts to understand the effects of flooding on transport and persistence of pathogens in food crop production areas.
- Support management of flood waters so that they do not contaminate fresh produce in the field.
- Promote public education about local flood management issues and needs.

## **ENVIRONMENT**

### **Goal:**

- Protect, enhance, and restore the region's ecological resources while respecting the rights of private property owners.

### **Objectives:**

- Support science-based projects to protect, improve, enhance, and/or restore the region's ecological resources, while providing opportunities for public access and recreation where appropriate.
- Protect and enhance state and federally listed species and their habitats.
- Minimize adverse environmental impacts of water resource management projects.
- Support applied research and monitoring to better understand environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources.
- Implement fish-friendly stream and river corridor restoration projects.
- Reduce adverse impacts of sedimentation into streams, particularly from roads and non-point sources.
- Promote efforts to prevent, control, reduce, and/or eradicate high priority invasive species.
- Promote native drought-tolerant plantings in municipal and residential landscaping.
- Consider opportunities to purchase fee title or conservation easements on lands from willing sellers that provide integrated water resource management benefits. Ensure adequate funding and infrastructure to manage properties and/or monitor easements.
- Support research and monitoring efforts to understand the effects of wildfire events on water resources.

## **REGIONAL COMMUNICATION AND COOPERATION**

### **Goal:**

- Promote regional communication, cooperation, and education regarding water resource management.

### **Objectives:**

- Facilitate dialogue and reduce inconsistencies in water management strategies/regulations between local, regional, state, and federal entities.
- Promote dialogue between federal and state regulators and small water system managers to facilitate water quality regulation compliance.
- Foster collaboration between regional entities to minimize and resolve potential conflicts and to obtain support for responsible water supply solutions and improved water quality.
- Build relationships with federal, state, and local regulatory agencies and other water agencies to facilitate the permitting, planning, and implementation of water-related projects.
- Increase stakeholder input and public education about the need, complexity, and cost of strategies, programs, plans, and projects to improve water supply, water quality, flood management, coastal conservation, and environmental protection.

## **DISADVANTAGED COMMUNITIES**

### **Goal:**

- Ensure the provision of high-quality, potable, affordable water and healthy conditions for disadvantaged communities (DACs).

### **Objectives:**

- Seek funding opportunities to ensure all communities have a water system with adequate, safe, high-quality drinking water.
- Seek funding opportunities to ensure all communities have adequate wastewater treatment.
- Ensure that DACs are adequately protected from flooding and the impacts of poor surface and groundwater quality.
- Provide support for the participation of DACs in the development, implementation, monitoring, and long-term maintenance of water resource management projects.
- Promote public education in DACs about water resource protection, pollution prevention, conservation, water quality, and watershed health.

## **CLIMATE CHANGE**

### **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.

### **Objectives:**

- Plan for potential impacts of future climate change.
- Support increased monitoring and research to obtain greater understanding of long-term impacts of climate change in the Greater Monterey County region.
- Support efforts to research alternative energy and to diversify energy sources appropriate for the region.
- Seek long-term solutions to reduce greenhouse gas (GHG) producing energy use.

- Seek long-term solutions to maintain and protect existing pristine natural resources from the impacts of climate change.
- Support research and/or implementation of land-based efforts such as carbon-sequestration on working lands and wildlands in the Greater Monterey County region.
- Promote public education about impacts of climate change, particularly as it relates to water resource management in the Greater Monterey County region.

### **D.3 MEASURING THE OBJECTIVES**

The Objectives Standard in the Proposition 84 and Proposition 1E IRWM Guidelines requires that objectives be measurable. A measurable objective means there must be some metric the RWMG can use to determine if the objective is being met as the IRWM Plan is implemented. Since the IRWM Plan is implemented through projects, the metric applies to the projects, which then relate back to the IRWM Plan objectives.

The table below lists both qualitative and quantitative measures that can be used to determine the extent to which projects implemented through the Greater Monterey County IRWM Plan carry out the various IRWM planning objectives. Note that the measurement standards provided in the table are intended to be examples and are not inclusive of all measures that could potentially be used.

Since the Greater Monterey County IRWM planning effort is still in its relative infancy, with the first round of implementation projects only in the beginning stages of implementation, the RWMG is unable as of this time to measure how well the projects carry out the IRWM Plan objectives. As projects get implemented and data is generated, a Plan Performance Matrix will be developed that lists the projects and shows how (and the extent to which) each project carries out each objective, using the numerical and/or qualitative measures listed in the table below. Please see Section J, Plan Performance and Monitoring, for a more detailed description of this process.



**Table D-1: Measuring IRWM Plan Objectives**

OBJECTIVE	QUALITATIVE MEASUREMENT	QUANTITATIVE MEASUREMENT
<b>WATER SUPPLY OBJECTIVES</b>		
Increase groundwater recharge and protect groundwater recharge areas.		Measurable increase in groundwater recharge. Acres of open space conserved for recharge areas. Number of recharge basins built and rates of infiltration.
Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.		Number of infrastructure enhancements and/or improved operational techniques to optimize the use of groundwater storage.
Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.	Identification of water storage and conveyance infrastructure needs.	Number of projects and practices designed and/or implemented to increase and optimize water storage and conveyance capacity. Measurable increase (acre feet) in water storage and conveyance capacity.
Diversify water supply sources, including but not limited to the use of recycled water.	Identification of ways and opportunities to diversify water supply sources. Increased diversity of water supply sources for the region (as compared to 2010).	Measurable increase in water supply source diversification, e.g., plans designed or implemented for new recycled water facilities or increased use/production of recycled water, desalination, cloud seeding, or other alternatives.
Maximize water conservation programs.		Number of new and/or enhanced water conservation programs designed or implemented for agricultural and urban water users.
Capture and manage stormwater runoff.	Identification of needs and opportunities. Design/development of projects.	Number of projects and practices implemented to capture and manage stormwater runoff. Rate of infiltration/pumping of stormwater in a groundwater recharge program. Low Impact Development (LID) measures.
Optimize conjunctive use where appropriate.	Identification of opportunities to increase conjunctive use.	Number of projects designed, planned, or implemented to optimize conjunctive use.
Support research and monitoring to better understand identified water supply needs.	Identification of water supply needs in the region. Coordination of existing research and monitoring efforts. Improvements in data monitoring network and data analysis.	Number of research/monitoring projects implemented, and/or monetary investment.
Support the creation of water supply certainties for local production of agricultural products.	Demonstrated efforts toward ensuring an adequate water supply for local agricultural production.	
Promote public education about water supply issues and needs.	Implementation of programs to educate the public about water supply issues and needs.	Number of presentations and outreach events, etc. to increase public education about water supply issues and needs.

Promote planning efforts to provide emergency drinking water to communities in the region in the event of a disaster.	Demonstrated planning efforts.	
<b>WATER QUALITY OBJECTIVES</b>		
Promote practices necessary to meet, or where practicable, exceed all applicable water quality regulatory standards (for drinking water, surface and groundwater quality).	Implementation of projects and programs to reduce pollutants in water bodies. Progress demonstrated in meeting drinking water objectives in groundwater.	Measurable decrease in pollutant concentrations (or loads) in 303d listed water bodies, or in the frequencies of exceedance.
Promote projects to prevent seawater intrusion.	Implementation of practices, programs, and projects to prevent seawater intrusion.	Measurable reduction in chloride levels in intruded groundwater wells. Less extraction of groundwater relative to 2010 rates. Measurable increase in use of recycled water.
Incorporate or promote principles of low impact development where feasible, appropriate, and cost effective.	Implementation of outreach events, distribution of educational materials, and communications to raise awareness about LID.	Number of LID projects implemented. Number of acres improved. Amount of runoff contained.
Protect surface waters and groundwater basins from contamination and the threat of contamination.	Implementation of innovative and effective solutions to address critical surface and groundwater contamination or threat of contamination.	Number of practices and projects identified, designed, and/or implemented to protect surface waters and groundwater basins from contamination and the threat of contamination.
Support research and pilot projects for the co-management of food safety and water quality protection.	Identification of research gaps. Outreach events disseminating co-management research results (tracking number of participants).	Number of co-management research and/or pilot projects developed and/or implemented to address research gaps.
Improve septic systems, sewer system infrastructure, wastewater treatment systems, and manure management programs to prevent water quality contamination.	Implementation of practices, projects, and programs to prevent water quality contamination from waste management systems.	Number of septic or sewer systems improved. Progress demonstrated toward meeting the water quality criteria for beneficial uses.
Support research and other efforts on salinity management.	Identification of extent of problems and potential solutions. Development of salt and nutrient management plans. Implementation of salinity management outreach programs.	Number of research projects funded (and/or monetary investment in research projects). Number of practices and programs implemented to reduce salinity.
Support monitoring to better understand major sources of erosion, and implement a comprehensive erosion control program.	Increased understanding of sources and impacts of erosion, including identification of high priority areas. Establishment of erosion control program(s). Incorporation of turbidity analysis into monitoring programs for both existing and new projects where appropriate.	Number of monitoring programs funded to better understand major sources of erosion (and/or monetary investment in monitoring programs).

Promote programs and projects to reduce the quantity and improve the quality of urban and agricultural runoff and/or mitigate their effects in surface waters, groundwater, and the marine environment.	Implementation of programs and projects to reduce the quantity and improve the quality of urban and agricultural runoff, including Irrigation Nutrient Management program, Livestock and Lands program, stormwater best management practices (BMPs), mobile lab. Implementation of regional monitoring program, including GIS layer of practices.	Number of projects/programs created. Measured improvements in water quality attributed (at least in part) to the implementation of new projects/programs.
Promote regional monitoring and analysis to better understand water quality conditions.	Implementation of regional monitoring program, including identification of long-term monitoring sites and annual assessment of water quality data. Improved understanding of water quality conditions.	
Support research and utilization of emerging technologies (enzymes, etc.) to develop effective water pollution prevention and mitigation measures, and source tracking.	Assessment of local research. Analysis of latest technologies. Application of new technologies. Implementation of demonstration projects.	Number of new research projects developed and/or implemented to explore or investigate emerging technologies.
Promote public education about water quality issues and needs.	Implementation of programs to educate the public about water quality, with an emphasis on high priority geographic areas or demographic groups. Implementation of annual IRWM Plan regional symposium.	Number of presentations and outreach events, etc. to increase public education about water quality issues and needs.
<b>FLOOD PROTECTION OBJECTIVES</b>		
Promote projects and practices to protect infrastructure and property from flood damage.	Progress demonstrated in averting potential flood damage (e.g., maintaining or increasing Community Rating Service score).	Number of projects, programs, or practices implemented to protect infrastructure and/or property.
Improve flood management infrastructure and operational techniques/strategies.	Progress shown towards improving flood management and/or operational techniques.	Number of improved techniques/strategies implemented. Monies expended.
Implement flood management projects that provide multiple benefits such as public safety, habitat protection, recreation, agriculture, and economic development.	Identification of multiple benefit projects.	Number of flood projects, programs, or practices implemented to provide multiple benefits.
Develop and implement projects to protect, restore, and enhance the natural ecological and hydrological functions of rivers, creeks, streams, and their floodplains.	Identification of natural ecological and hydrological functions of water courses in flood-prone areas.	Number of projects, programs, or practices implemented to protect, restore, or enhance the natural functions of water courses in flood-prone areas.
Support research and monitoring efforts to understand the effects of flooding on transport and persistence of pathogens in food crop production areas.	Improved understanding of flooding effects on transportation and persistence of pathogens in food-crop production areas.	Number of research/monitoring programs implemented to document effects of flooding on pathogens in food-crop production areas.
Support management of flood waters so that they do not contaminate fresh produce in the field.		Number of flood management projects, programs, or practices implemented to reduce or prevent contamination of fresh produce in the fields.

Promote public education about local flood management issues and needs.	Increased awareness among public stakeholders regarding flood management issues and needs.	Number of presentations and outreach events, etc. to increase public education about flood management issues and needs.
<b>ENVIRONMENT OBJECTIVES</b>		
Support science-based projects to protect, improve, enhance, and/or restore the region's ecological resources, while providing opportunities for public access and recreation where appropriate.	Identification of needs and opportunities. Design/development of projects.	Number of projects implemented to protect, improve, enhance, and/or restore the region's ecological resources. Acres of wetlands restored. Miles of public paths and other recreational amenities installed. Number of public outreach diaramas installed. Monetary investment in projects.
Protect and enhance state and federally listed species and their habitats.	Identification of needs and opportunities. Design/development of projects.	Number of projects implemented to protect and enhance state and federally listed species and their habitats. Number of listed species' enhancement plans addressed. Acres of essential habitat protected or restored.
Minimize adverse environmental impacts of water resource management projects.	Demonstrable measures taken by project proponents to minimize adverse environmental impacts of water resource management projects.	Quantifiable measurement will be project-specific: Mitigation measures implemented as needed or appropriate.
Support applied research and monitoring to better understand environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources.	Improved understanding of environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources as demonstrated by project/research findings, analyses, reports, etc. Identification of actions to address environmental needs. Identification of cost-effective strategies to reduce adverse impacts on ecological resources.	Number of research/monitoring programs designed, funded, and/or implemented to document environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources. Physical measurement of area researched and/or monitored, e.g., number of acres researched, number of stream miles monitored.
Implement fish-friendly stream and river corridor restoration projects.	Identification of needs and opportunities. Design/development of projects.	Number of fish-friendly stream and/or river corridor restoration projects implemented. Miles of steam opened to fish migration. Miles of stream corridor restored. Measured increase in fish populations.
Reduce adverse impacts of sedimentation into streams, particularly from roads and non-point sources.	Identification (and prioritization) of problem areas in the region, and of opportunities for improvements. Tracking and documentation of BMPs related to sedimentation.	Number of projects or practices implemented to reduce adverse impacts of sedimentation into streams. Miles of rural roads taken out of commission or enhanced to reduce erosion. Measured increase in rural road RAM (Rapid Assessment Method) score. Measured reduction in turbidity in high-sediment streams.

Promote efforts to prevent, control, reduce, and/or eradicate high priority invasive species.	Identification of problem areas and opportunities. Design/development of projects to reduce the effects of invasive species in the region.	Number of projects implemented to reduce invasive species. Acres surveyed. Acres treated. Acres/linear feet/river miles of invasive species eradicated.
Promote native drought-tolerant plantings in municipal and residential landscaping.		Number of projects designed, funded, and/or implemented that include planting of drought tolerant plants.
Consider opportunities to purchase fee title or conservation easements on lands from willing sellers that provide integrated water resource management benefits. Ensure adequate funding and infrastructure to manage properties and/or monitor easements.	Identification of opportunities. Identification of funding sources and attainment of adequate funding to manage properties and/or monitor easements.	Acres of land converted into conservation.
Support research and monitoring efforts to understand the effects of wildfire events on water resources.	Improved understanding of effects of wildfire events on water resources.	Number of research/monitoring programs implemented to document effects of wildfire events on water resources.
<b>REGIONAL COMMUNICATION OBJECTIVES</b>		
Facilitate dialogue and reduce inconsistencies in water management strategies/regulations between local, regional, state, and federal entities.	Meetings convened between local, regional, state, and federal entities to resolve noted problem areas. Implementation of strategies in MBNMS Ag Action Plan in "Regulatory Coordination and Streamlining" section. Programs to proactively coordinate strategies and regulations, such as permit coordination.	
Promote dialogue between federal and state regulators and small water system managers to facilitate water quality regulation compliance.	Meetings convened and/or partnerships developed between federal and state regulators and small water system managers for this purpose.	
Foster collaboration between regional entities to minimize and resolve potential conflicts and to obtain support for responsible water supply solutions and improved water quality.	Meetings convened between regional entities and stakeholders to resolve water-related conflicts (including those implemented through Water Resource Project Coordination [WRPC] process). Positive indication of public support for implementation of water-related projects and/or programs.	Number of new water-related projects designed, funded, and/or implemented as a direct result of WRPC (or related) process.
Build relationships with federal, state, and local regulatory agencies and other water agencies to facilitate the permitting, planning, and implementation of water-related projects.	Meetings convened and agreements reached between federal, state, and local regulatory agencies, other water agencies, and project proponents to facilitate the permitting, planning, and implementation of water-related projects.	Number of projects successfully designed, permitted, and implemented as a result of improved communication.

<p>Increase stakeholder input and public education about the need, complexity, and cost of strategies, programs, plans, and projects to improve water supply, water quality, flood management, coastal conservation, and environmental protection.</p>	<p>Implementation of annual IRWM Plan regional symposium.</p>	<p>Number of presentations and outreach events, etc. to increase stakeholder participation and public awareness about the need, complexity, and cost of strategies, programs, plans, and projects to improve water supply, water quality, flood management, coastal conservation, and environmental protection. Number of "hits" to the Greater Monterey County IRWM Plan website.</p>
<p><b>DISADVANTAGED COMMUNITIES OBJECTIVES</b></p>		
<p>Seek funding opportunities to ensure all communities have a water system with adequate, safe, high-quality drinking water.</p>	<p>List of potential funding opportunities including non-IRWM grants and other State and Federal funds. Commitment from an organization to help DACs submit applications and follow through with grant application process for future project solicitations.</p>	<p>Number of grant proposals submitted on behalf of DACs for drinking water system improvements.</p>
<p>Seek funding opportunities to ensure all communities have adequate wastewater treatment.</p>	<p>List of potential funding opportunities including non-IRWM grants and other State and Federal funds. Commitment from an organization to help DACs submit applications and follow through with grant application process for future project solicitations.</p>	<p>Number of grant proposals submitted on behalf of DACs for wastewater system improvements.</p>
<p>Ensure that disadvantaged communities are adequately protected from flooding and the impacts of poor surface and groundwater quality.</p>	<p>Communication/meetings between RWMG (or partners) and DAC representatives to discuss needs regarding protection against flooding and the impacts of poor surface and groundwater quality.</p>	<p>Number of grant proposals submitted on behalf of DACs for protection against flooding and the impacts of poor surface and groundwater quality. Number of measures implemented to protect DACs against flooding and the impacts of poor surface and groundwater quality.</p>
<p>Provide support for the participation of disadvantaged communities in the development, implementation, monitoring, and long-term maintenance of water resource management projects.</p>	<p>Outreach to DACs to encourage their participation in the IRWM planning process (via personal communication, individual meetings, email). Assistance to DACs by RWMG (or partner organization) in writing grant proposals for water-related projects. Development of grant proposals that include DAC involvement in monitoring and maintenance of water resource management projects. Identification and provision of resources needed for DAC leaders to organize their communities.</p>	<p>Monetary investment toward DAC support for water management projects.</p>



Promote public education in disadvantaged communities about water resource protection, pollution prevention, conservation, water quality, and watershed health.	Outreach efforts, including: Working with organizations that have frequent interaction with DACs (church organizations, radio, TV) and providing those organizations with educational materials as appropriate; "house meetings" and small community meetings; encouraging DAC members to attend IRWM public workshops; translation into Spanish of existing educational brochures and literature (re: watersheds, conservation programs, etc.); development of new literature as needed and appropriate, and distribution of educational materials. Demonstrable increase in understanding and awareness of these issues on the part of DAC members.	Number of events held. Number of DACs and DAC members reached.
<b>CLIMATE CHANGE OBJECTIVES</b>		
Plan for potential impacts of future climate change.	List of identified impact sites. Identification of management measures to be integrated into site-specific response efforts.	
Support increased monitoring and research to obtain greater understanding of long-term impacts of climate change in the Greater Monterey County region.	Compiled data reports on current science, documenting trends in climate changes (rain fall, temperature, sea level rise, river flows). List of proposed additions for current monitoring programs to increase understanding of climate change impacts.	Number of research/monitoring programs implemented to obtain greater understanding of long-term impacts of climate change in the Greater Monterey County region, and/or monetary investment in research and monitoring programs.
Support efforts to research alternative energy and to diversify energy sources appropriate for the region.	Compilation of research within the region on alternative energy options. Change in energy use portfolios toward greater diversification of energy sources in the region.	Number of research projects considered, designed, and/or implemented to investigate alternative energy.
Seek long-term solutions to reduce greenhouse gas producing energy use.	List of energy efficiency and conservation strategies, and other recommendations for reducing greenhouse gases.	GHG reduction estimates from implementing energy efficiency and conservation strategies in IRWM Plan projects.
Seek long-term solutions to maintain and protect existing pristine natural resources from the impacts of climate change.	Reports and plans defining new management efforts and policies to maintain and/or protect existing pristine natural resources from the impacts of climate change.	Acreage under new or expanded planning and conservation efforts.
Support research and/or implementation of land-based efforts such as carbon-sequestration on working lands and wildlands in the Greater Monterey County region.	Compilation of research on these topics.	Number of projects implemented and/or monetary investment in this research.
Promote public education about impacts of climate change, particularly as it relates to water resource management in the Greater Monterey County region.	Implementation of programs to educate the public about impacts of climate change. Implementation of annual IRWMP regional symposium.	Number of presentations and outreach events to increase public education about impacts of climate change. Number of reports and publications produced and/or distributed on climate change.

#### **D.4 PRIORITIZING THE OBJECTIVES**

After much debate and careful consideration, the RWMG has made a decision not to prioritize objectives. The rationale for this decision is as follows. The Greater Monterey County IRWM region is a broad geographic area made up of a very diverse group of stakeholders. The RWMG itself reflects that diversity. The RWMG has aimed to be as inclusive as possible of all stakeholders in the region, encouraging their active participation in the IRWM planning process and promising serious consideration of their concerns and needs. The 57 objectives included in the IRWM Plan were based on the “issues and conflicts” perceived to exist throughout the region, as described by different groups of stakeholders in all corners of the region. The RWMG therefore recognizes that each of the objectives carries special weight and significance for at least some groups of stakeholders. By prioritizing some objectives over others, the RWMG feels they would effectively be prioritizing the needs of certain stakeholders over others. In order to maintain inclusivity, and to avoid the possibility of alienating certain groups of stakeholders or discouraging their participation in the IRWM planning process, the RWMG has therefore decided not to prioritize objectives. The project ranking system reflects that decision.

## Section E: Resource Management Strategies

### E.1 RESOURCE MANAGEMENT STRATEGIES INCLUDED IN THE PLAN

The Integrated Regional Water Management (IRWM) Program requires Regional Water Management Groups (RWMGs) to consider certain resource management strategies for potential use in their regions and for possible inclusion in their IRWM Plans. The intention behind the “resource management strategy” standard in the Proposition 84/1E IRWM Plan Guidelines is to encourage regions to diversify their water management portfolios in order to become more resilient to, and to mitigate for, uncertain future circumstances (such as climate change). The operating assumption behind the standard is for RWMGs to intentionally find ways to diversify a water management portfolio. The RWMG is required to consider all of the resource management strategies listed in the *California Water Plan Update 2009* for possible inclusion in the plan, but other strategies may be considered as well.

The RWMG chose to include 37 resource management strategies in the Greater Monterey County IRWM Plan, including 28 resource management strategies from the *California Water Plan Update 2009* plus nine additional strategies. The process for selecting resource management strategies was based primarily on the region’s goals and objectives, i.e., the strategies needed to achieve the objectives of the Plan. The RWMG discussed the resource management strategies over the course of two RWMG meetings, and voted to approve the final list of resource management strategies at the March 2010 RWMG meeting.

The selected strategies “make sense” for this region, and many of the strategies are already included in Urban Water Management Plans, Stormwater Management Plans, Watershed Management Plans, Land Use Plans, and other local water resource plans developed by entities throughout the region. The IRWM Plan resource management strategies are outlined below, including a brief explanation as to why each strategy was chosen for inclusion in the Plan. Note that some of the descriptions of the resource management strategies have been quoted directly from the *California Water Plan Update 2009*.

Strategies chosen from the *California Water Plan Update 2009* include the following:

- **Agricultural Water Use Efficiency:** Water use efficiency and conservation measures serve to reduce water use, reduce energy consumption and therefore emissions of pollutants and greenhouse gasses, reduce wastewater and potentially polluted runoff, and reduce the economic and environmental costs associated with water use and water treatment. This strategy is already common practice throughout the region. Common water conservation best management practices (BMPs) implemented in the Salinas Valley 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. Since agriculture occupies more than 1.4 million acres of land and accounts for approximately 90 percent of groundwater use in the Salinas Valley, promoting agricultural water use efficiency is considered absolutely critical for helping the region meet its goal of improved water supply reliability.
- **Urban Water Use Efficiency:** Like agricultural water use efficiency, urban water use efficiency is considered an important strategy for the region. Urban water use efficiency measures are already widely practiced throughout the region, including, for example, plumbing retrofits, large landscape surveys and the development of water efficient landscape guidelines, washing machine rebates, public information campaigns, school programs, residential ultra low-flush toilet replacement programs, commercial, industrial, and institutional audits to identify water conservation opportunities, and internal water distribution system audits. Although urban use

accounts for significantly less water use than agriculture in the region, the potential benefits of urban water use efficiency and conservation are substantial. This strategy is considered an important means for helping the region meet its water supply objectives.

- **Conveyance – Regional/Local:** Conveyance includes both natural watercourses (including groundwater aquifers) and constructed facilities. The Monterey County Water Resources Agency (MCWRA) uses natural watercourses for conveyance to the extent possible and man-made structures where appropriate. The Salinas River channel is the primary means for conveyance of water in the region and to percolate water into the Salinas Valley Groundwater Basin. The MCWRA regulates water flows from the Nacimiento and San Antonio Reservoirs in order to maximize groundwater recharge, maintain in-stream flows for steelhead and other aquatic life, and manage floodwaters. The MCWRA also uses the Salinas River channel as a means to transfer water from the southern part of the Salinas Valley to the northern coastal portion of the groundwater basin in an effort to reduce seawater intrusion (as part of the Salinas Valley Water Project). Constructed components of the conveyance system include the reservoirs, pumping plants, pipelines, diversion structures, and a fish ladder. Improvements to this infrastructure are needed on a continual basis to ensure the optimal conveyance of water for urban/industrial, agricultural, and environmental uses. This strategy is considered a foundational part of the region’s water management portfolio.
- **System Re-operation:** System re-operation entails changing existing operation and management procedures for reservoirs and conveyance facilities in order to increase benefits from these facilities. An example of system re-operation in the Greater Monterey County region is the Salinas Valley Water Project, which involves re-operation of the Nacimiento and San Antonio Reservoirs along with modification of the Nacimiento spillway and construction of an inflatable dam diversion structure to allow the diversion of Salinas River water into the existing Castroville Seawater Intrusion Project (CSIP) distribution system. System re-operation enables the MCWRA to move more water through the Salinas Valley via the Salinas River. That additional water is percolated into the Salinas Valley Groundwater Basin and impounded at the new diversion facility, and then blended with recycled water for irrigation use on 12,000 acres of farmland in the Castroville area. The blended water replaces groundwater pumping in the northern coastal portion of the groundwater basin, thereby helping to reduce seawater intrusion. The MCWRA along with other water providers in the region continue to consider ways of re-operating the water supply systems in order to maximize water supplies, water quality, flood control, and benefits to environmental resources.
- **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 (though not all of these are practiced in this region): 1) transferring water from storage that would otherwise have been carried over to the following year; 2) pumping groundwater instead of using surface water delivery and transferring the surface water rights; 3) transferring previously banked groundwater either by directly pumping and transferring groundwater or by pumping groundwater for local use and transferring surface water rights; 4) making water available by reducing the existing consumptive use through crop idling or crop shifting or by implementing water use efficiency measures; or 5) making water available by reducing return flows or seepage from conveyance systems that would otherwise be irrecoverable. Water transfers are limited in the Greater Monterey County region because under current law, water supply from the Salinas Valley Groundwater Basin cannot be exported to customers in other basins; any connections made must be for emergency use only or of a “zero-balance type” (volume added must equal volume withdrawn). In 2006 the Marina Coast Water District (MCWD) investigated the possibility of

interconnecting with the Seaside Municipal Water System, with water from the Seaside Groundwater Basin, proposed as an emergency-only connection. Although not constructed at the time, the possibility of a future emergency connection still exists. Additional transfer opportunities exist within the Salinas Valley Groundwater Basin itself. For example, MCWD could purchase the rights to existing groundwater supplies currently used elsewhere in the Salinas Valley and transfer the water to the District service area. Such transfers would have to be performed on a willing-seller, willing-buyer basis and with the cooperation of the MCWRA. The use of water transfers as a resource management strategy is more evident in this region in the broad implementation of water use efficiency measures both in agricultural and urban systems, as well as in the transfer of water from surface storage to groundwater and from one end of the groundwater basin to another. This strategy has potential for expansion in the region.

- **Conjunctive Management and Groundwater Storage:** Conjunctive management and groundwater storage are part of standard practice in the Salinas Valley. Conjunctive management is the coordinated use of surface water and groundwater to maximize water use in order to meet various management objectives. The Nacimiento and San Antonio reservoirs capture and store water from winter rains, and that water is systematically released into the Salinas River according to protocols that aim to produce maximum percolation into the Salinas Valley Groundwater Basin. The water is stored in the groundwater basin and used throughout the year and over the course of many years, wet or dry, to provide a consistent source of water to virtually all water users in the Salinas Valley area.
- **Desalination:** Monterey County is a coastal county, and as such provides ample opportunity for the use of desalination as a viable resource management strategy. There is currently one desalination plant in the Greater Monterey County IRWM region. The plant is owned by the MCWD and has a capacity of 300 acre-feet/year (AFY). The facility has been idle for several years, but MCWD signed a developer agreement in 2006 that obligates the District to re-operate the desalination plant if needed. MCWD is also proposing a major new desalination facility to provide water for the Monterey Bay region (described in detail in various other sections of this plan). The proposed project consists of a 10 million-gallon/day (MGD) reverse osmosis desalination plant to treat brackish groundwater water extracted from the seawater-intruded Pressure 180-Foot Aquifer of the Salinas Valley Groundwater Basin.
- **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 1990-1995 and again in 2004. MCWRA retains this strategy in its portfolio as an option for future implementation. Precipitation enhancement remains a good option for the region to provide additional water on a cost-effective basis.
- **Recycled Municipal Water:** Recycled water is water that results from a level of wastewater treatment stringent enough to produce water suitable for re-use. The quality of the reclaimed water determines how it can be used, for example for agricultural or landscape irrigation, or even in some cases for potable water. Since recycled water typically replaces water that would otherwise come from a “new” supply (such as groundwater), it is considered a valuable resource. Two water reclamation plants currently exist in the Greater Monterey County IRWM region. The Monterey Regional Water Pollution Control Agency (MRWPCA) owns and operates a regional wastewater treatment plant at the northern end of the City of Marina. Wastewater from the Monterey Peninsula, Salinas, Marina, Moss Landing and the Ord Community is conveyed to the

plant for processing. The plant has the capacity to generate approximately 21,600 AFY of recycled water. Of that amount, 13,300 AFY of tertiary treated recycled water is delivered by the MCWRA to farmers in the Castroville region for irrigation during the irrigation season, and plans are currently underway to construct seasonal storage facilities that would enable the remaining 8,300 AFY of available capacity to be generated during the non-irrigation season. In addition, the City of Soledad has recently constructed a 5.5 MGD water reclamation facility at the City's wastewater treatment plant. The plant will provide tertiary treated water for agricultural and urban and landscape irrigation.

- **Surface Storage – Regional/Local:** Surface storage uses reservoirs to collect water for later release and use. The Nacimiento and San Antonio reservoirs, built in 1957 and 1965 respectively, are examples of surface storage in the Greater Monterey County IRWM region. The reservoirs play a central role in the region's water system. The MCWRA owns and operates both of these reservoirs and uses them for seasonal storage, flood control, hydropower generation, conjunctive use (i.e., coordinating surface water with groundwater storage and use), recreation, and operates the dams to meet environmental water needs (mainly for steelhead) in coordination with other water supply uses. No other surface storage facilities exist in the region, though the potential exists for surface storage facilities in the Big Sur region. !
- **Drinking Water Treatment and Distribution:** Providing a reliable supply of safe drinking water is the primary goal of public water 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.
- **Groundwater Remediation/Aquifer Remediation:** Groundwater remediation removes contaminants that affect beneficial uses of groundwater. Passive groundwater remediation allows contaminants to biologically or chemically degrade or disperse in situ over time, while active groundwater remediation involves either treating contaminated groundwater in situ or extracting contaminated groundwater from the aquifer and treating it. Since groundwater is the primary water supply source for most of the region, and since the groundwater basin is stressed by both natural and human-caused contaminants, including nitrates, seawater, and arsenic, groundwater remediation is an important resource management strategy for the region.
- **Matching Water Quality to Use:** An example of matching water quality to use is a water supplier choosing to use a deeper, cleaner aquifer for municipal water, which requires less treatment before delivery, over a more shallow, more contaminated aquifer or over a surface supply. Benefits would include a reduced need for treatment and potentially fewer disinfection byproducts for the water user. Recycled water can also be treated to a wide range of purities that can be matched to different uses. In the Greater Monterey County IRWM region, water is currently reclaimed and treated for agricultural and landscape irrigation purposes. The potential exists to treat water to a drinking water standard if the need should arise in the future.



- **Pollution Prevention:** Pollution prevention protects water at its source and therefore reduces the need and cost for other water management and treatment options. An important pollution prevention strategy is implementation of proper land use management practices to prevent sediment and pollutants from entering the source water. Numerous pollution prevention programs exist in the Greater Monterey County IRWM region, including agricultural management measures, stormwater public education campaigns, construction best management practices, and vegetated treatment systems (including created wetlands). Pollution prevention is cost-effective and ultimately results in a cleaner, safer water supply and healthier environment. The potential always exists to improve and expand pollution prevention efforts in the region.
  
- **Salt and Salinity Management:** Salts are materials that originate from dissolution or weathering of the rocks and soil, including dissolution of lime, gypsum and other slowly dissolved soil minerals. “Salinity” describes a condition where dissolved minerals of either natural or anthropogenic origin and carrying an electrical charge (ions) are present. In February 2009, the State Water Resources Control Board (SWRCB) adopted a Recycled Water Policy which 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, to 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 working to manage excessive loading on a regional scale. Salt and salinity management has taken on greater prominence among the region’s resource management strategies by virtue of the fact that the Greater Monterey County IRWM region, like all regions in the state, will need to develop a salt and nutrient management plan as required by the SWRCB’s Recycled Water Policy.
  
- **Urban Runoff Management:** Urban runoff management, using a watershed approach, aims to emulate and preserve the natural hydrologic cycle that is altered by urbanization. The watershed approach consists of a series of best management practices (BMPs) designed to reduce the pollutant loading and reduce the volumes and velocities of urban runoff discharged to surface waters. These BMPs may include facilities to capture, treat, and recharge groundwater with urban runoff, conducting public education campaigns to inform the public about stormwater pollution and the proper use and disposal of household chemicals, and providing technical assistance and stormwater pollution prevention training. Urban runoff management is already common practice for most municipalities in the region, but there is great potential for improving and expanding urban runoff management strategies in the region.
  
- **Agricultural 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. Many farmers in the Greater Monterey County region actively pursue agricultural lands stewardship either on an individual basis or as part of collective groups. A group called the Agriculture Water Quality Alliance (AWQA) is a regional collaboration of agriculture industry groups, federal, state, and local agencies, technical experts, environmental

organizations and university researchers working together to help farmers and ranchers along the Central Coast attain technical assistance and funding, navigate the permitting process, and implement the management strategies outlined in the Monterey Bay National Marine Sanctuary's *Agriculture and Rural Lands Action Plan*. Since agriculture is such a dominant land use in Monterey County, agricultural lands stewardship is considered to be a vital resource management strategy for the region.

- **Economic Incentives (Loans, Grants, and Water Pricing):** 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 plumbing retrofits, washing machine rebates, and residential ultra low-flush toilet replacement programs, have been used and continue to be used at different times by water suppliers in the region. 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.
- **Ecosystem Restoration:** This strategy focuses on restoration of aquatic, riparian and floodplain ecosystems because they are the natural systems most directly affected by water and flood management actions, and are likely to be affected by climate change. Future water and flood management projects that fail to protect and restore their ecosystems will face reduced effectiveness, sustainability, and public support. Restoration usually emphasizes recovery of at-risk species and natural communities. Successful restoration of aquatic, riparian, and floodplain species and communities ordinarily depends upon at least partial restoration of physical processes that are driven by water. These processes include the flooding of floodplains, the natural patterns of erosion and deposition of sediment, the balance between infiltrated water and runoff, and substantial seasonal variation in stream flow. Many organizations throughout the region, including nonprofit environmental organizations and watershed groups as well as many individual farmers, ranchers, and private landowners, are actively working to restore ecosystems in rivers, streams, and other waterways, riparian areas, floodplains, and wetlands in order to achieve both habitat and water quality benefits.
- **Forest Management:** The Greater Monterey County region contains vast tracts of forestlands, much of which is under the jurisdiction of the U.S. Forest Service (including the magnificent Los Padres National Forest), California State Parks, and the U.S. Army (including Fort Hunter Liggett and Camp Roberts). The national forests in California were established under the Organic Act of 1897, which states that a primary purpose of these lands is to “secure favorable conditions of water flow.” Forest management as a resource management strategy focuses on forest management activities that are designed to improve the availability and quality of water. Strategies include, among others, meadow restoration (for increased groundwater storage), riparian forest restoration, fuels/fire management, and road management. Urban forestry is also discussed as an important management strategy. 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. Many streams that are now perennial are likely to become intermittent with the resulting loss of riparian zones, aquatic habitats, and other beneficial uses of water that depend on perennial flows. For these reasons it is imperative that U.S. Forest Service and other forest managers participate in the IRWM discussions for the Greater Monterey County region, and the RWMG has been making efforts to include them in IRWM planning.

- **Land Use Planning and Management:** The way in which we use land directly affects our water supply and water quality, and conversely, our water supply and water quality should inform, if not dictate, our 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—a watershed management approach using design techniques that emphasize on-site water infiltration, whereby natural processes filter, store, evaporate, and detain runoff close to the source of rainfall in order to mimic a site’s pre-development hydrology), and land use decision-making that aims to both reduce and mitigate the potential impacts of climate change (i.e., learning how to reduce GHG emissions through energy efficient and more sustainable development practices). Land use planning and water management planning are treated largely as separate functions in the Greater Monterey County region, though integration does occur to some extent on both a county and municipal level. The RWMG intends to use the IRWM Plan process as a vehicle for bringing together land use planners and water managers into a collective conversation so as to better coordinate and integrate these inextricably linked aspects of planning.
  
- **Recharge Area Protection:** The goals of recharge area protection are to 1) ensure that areas suitable for recharge continue to be capable of adequate recharge rather than covered by urban infrastructure, such as buildings and roads; and, 2) prevent pollutants from entering groundwater in order to avoid expensive treatment that may be needed prior to potable, agricultural, or industrial beneficial uses. There are currently no areas within the Greater Monterey County IRWM region that are specifically designated as “recharge protection areas,” though most of the Salinas Valley, which sits atop the Salinas Valley Groundwater Basin, could be considered areas of natural recharge. Certain sub-basins of the Salinas Valley Groundwater Basin are more permeable than others, and the land areas that overlie those basins may be considered candidates in the future for recharge protection. In the meantime, many agencies, organizations, farmers and ranchers in the region employ non-point source pollution management practices that, in effect, help protect groundwater recharge areas by preventing or reducing pollutants and nutrients in urban and agricultural runoff from seeping into the groundwater basin. This is an important resource management strategy for the region that holds significant potential for greater consideration and expansion.
  
- **Water-Dependent Recreation:** Providing for water-dependent recreation in water projects is part of California law and also part of the Public Trust Doctrine (California State Lands Commission). Demand for water-dependent recreation opportunities in California is so great that it exceeds the capacity of the current infrastructure. As a result, many of these facilities are overused, jeopardizing natural and cultural resources and degrading the recreational experience. This is evident in Big Sur, where, for example, visitor use in some of the State Parks has resulted in litter and trampling in sensitive wilderness or riparian areas. By incorporating planning for water-dependent recreation activities in water projects, water managers play a critical role in ensuring that residents and visitors are able to enjoy water-dependent activities today and into the future. Water managers in the region do encourage water-related recreation, for example at Nacimiento and San Antonio reservoirs where thousands of local residents and visitors each year enjoy boating, fishing, camping, swimming, picnicking, and hiking. However, the MCWRA staff must balance water supply and water quality needs with recreational opportunities (for example, allowing recreational boating in the reservoirs while protecting the water supply against the non-native, highly invasive zebra and Quagga mussels), just as the State Parks staff must balance recreation in the forests and on the beaches with maintaining good water quality, healthy habitat, and natural stream functioning. Through implementation of the IRWM Plan, the RWMG intends

to actively encourage opportunities for recreation while protecting water supply, water quality, healthy ecosystems, and the property rights of landowners.

- **Watershed Management/Planning:** Watershed management is the process of creating and implementing plans, programs, projects and activities to restore, sustain and enhance watershed functions. Ensuring healthy ecosystems and properly functioning watersheds is important not only for wildlife and sensitive plant species, but for maintaining good water quality, a safe water supply, and flood management. Enhancing watershed function will also help mitigate and increase resiliency to future impacts of climate change. The watershed assessment and management plan process typically involves multiple stakeholders, including scientists, local agencies, non-profit organizations, and local landowners. Several watershed management plans and restoration plans have been developed within the Greater Monterey County region: the San Antonio and Nacimiento Rivers Watershed Management Plan (October 2008), the Garrapata Creek Watershed Assessment and Restoration Plan (July 2006), the Reclamation Ditch Watershed Assessment and Management Strategy (2005, this includes the watersheds of Tembladero Slough, Merritt Lake, Santa Rita Creek, Espinosa Lake, Gabilan Creek, Natividad Creek, Alisal Slough, and Alisal Creek), Moro Cojo Slough Management and Enhancement Plan (February 1996), Northern Salinas Valley Watershed Restoration Plan (January 1997), Elkhorn Slough Watershed Conservation Plan (August 1999), and the Elkhorn Slough Wetland Management Plan (December 1989). A watershed assessment and management plan for the Big Sur River watershed is currently underway, and proposals exist for additional watershed planning in the region, including the Gabilan Creek sub-watershed.
  
- **Flood Risk Management:** Flood risk management aims to maximize the benefits of floodplains, minimize the loss of life and damage to property from flooding, and recognize the benefits to ecosystems from periodic flood events. The MCWRA is the primary flood management agency in Monterey County. Monterey County participates in the National Flood Insurance Program (NFIP) and has been a voluntary participant in the Community Rating System (CRS) since 1991. The CRS recognizes and encourages community floodplain management activities that exceed NFIP standards, and allows for reduced flood insurance premium rates based on the implementation of activities “over and above” that reduce flood risk. Approximately 21,600 communities participate in NFIP. Of those communities, only about 1,100 exceed the minimum requirements of the NFIP through their participation in the CRS program; and of those 1,100 CRS communities, only six have a higher rating than Monterey County (based on August 2009 CRS statistics). Flood risk management includes both structural approaches and land use management approaches. Structural approaches in the Greater Monterey County region include the San Antonio and Nacimiento dams and reservoirs (constructed in 1957 and 1967, respectively) and a well-coordinated Emergency Action Plan, including an automated alert system. Land use management approaches include floodplain function restoration, floodplain regulation, development and redevelopment policies, and housing and building codes. Monterey County is highly proactive in flood risk management, though significant potential still exists to enhance natural floodplain function within the region, as noted during recent discussions involving potential improvements to the Salinas Reclamation Ditch.
  
- **Dewvaporation or Atmospheric Pressure Desalination:** Dewvaporation is a specific process of humidification-dehumidification desalination. Brackish water is evaporated by heated air, which deposits fresh water as dew on the opposite side of a heat transfer wall. The energy needed for evaporation is supplied by the energy released from dew formation. Heat sources can be combustible fuel, solar or waste heat. The technology of dewvaporation is still being developed, and thus far the basic laboratory test unit is capable of producing up to 150 gallons per day. The technology for dewvaporation is still too new to be of significant value for the Greater Monterey

County region, but the RWMG remains open to its potential use as a resource management tool in the future.

- **Fog Collection:** There has been some interest in fog collection for domestic water supply in some of the dry areas of the world near the ocean where fog is frequent. Some experimental projects have been built in Chile, including the El Tofo project which yielded about 10,600 liters per day from about 3,500 square meters of collection net (i.e., about 3 liters per day per square meter of net). Because of its relatively small production, fog collection is limited to producing domestic water where little other viable water sources are available. 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.
- **Rainfed Agriculture:** Rainfed agriculture is when all crop consumptive water use is provided directly by rainfall on a real time basis. Rainfed agriculture has both water supply and water quality benefits. Land that is tilled and left fallow after harvest can cause the soil surface to seal with the first and second rainfall and increase runoff and erosion; planting more acreage for production of winter crops will reduce runoff flowing into the surface water systems and to ocean outflows. Improved tillage practices, no-till or minimum-till, may also improve water infiltration into soil root zone, thus increasing soil-water storage and could contribute to water supply by eliminating the first seasonal irrigation. Although the RWMG accepts this strategy as a viable, potential resource management tool, it is realistically of limited value to farmers and ranchers in the region, given rain patterns and the types of crops that are prevalent. However, the RWMG will continue to consider this strategy as a potential tool for the region.

The following additional resource management strategies, which were not included in the *California Water Plan Update 2009*, were also selected by the RWMG to help implement the objectives in the IRWM Plan:

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- **Environmental and Habitat Protection and Improvement:** The RWMG chose to add "environmental and habitat protection and improvement" as a complementary strategy to "ecosystem restoration," with the intention of not just restoring but also protecting and improving habitats and natural resources where possible. As noted earlier, this work is already being carried out by numerous organizations and agencies, as well as by many farmers, ranchers, and other private landowners in the region. The rationale for including it as a resource management strategy is to emphasize the RWMG's commitment to implementing projects through the IRWM Plan that not only improve water supply, water quality, and flood management, but that also protect, improve, and restore the region's environmental resources, as reflected in the region's goals and objectives.
- **Recreation and Public Access:** This strategy is a complement to the "water-dependent recreation" strategy noted above. It is included as a separate resource management strategy in order to emphasize the RWMG's commitment to providing opportunities for recreation and public access through the implementation of IRWM Plan projects, where appropriate and while respecting the rights of private property owners. This strategy is reflected in the region's goals and objectives as part of both the environmental and flood management objectives.
- **Stormwater Capture and Management:** Stormwater refers to all runoff produced by rainfall events. The vast amount of impermeable surfaces in urban areas not only prevents stormwater from seeping into the ground and replenishing the groundwater supply like it does in more natural landscapes, but it accelerates flow patterns, causing potential flooding downstream or overflows

at water treatment plants, and introduces harmful chemicals and pollutants that then get carried into the watershed environment and coastal waters. Keeping water “onsite” is one solution to urban runoff. Capturing that water for later reuse has the further advantage of providing water supply benefits. There is significant interest in stormwater capture and management by the Monterey Regional Water Pollution Control Agency and other water resource managers in the region, including the City of Salinas. Stormwater can be captured and allowed to filter into the ground or injected directly into the aquifers, either with or without treatment; or alternatively, it can be recycled along with wastewater and used for such purposes as agricultural or landscape irrigation. Stormwater is considered a largely untapped resource in the Greater Monterey County IRWM region. The major impediment to stormwater capture and reuse is lack of storage (storage and/or percolation ponds). Stormwater capture is an attractive resource management strategy for the region, and will be given further consideration for its potential use.

- **Wetlands Enhancement and Creation:** Wetlands enhancement refers to the rehabilitation or re-establishment of a degraded wetland, or modification of an existing wetland, including hydrologic enhancement (depth duration and season of inundation) and/or vegetative enhancement. Studies have reported loss rates of up to 90 percent of wetlands in California (Dahl and Johnson 1991), with some wetland types, including coastal wetlands, riparian areas, and vernal pools, experiencing a disproportionately higher rate of loss than others. In the Greater Monterey County IRWM region, the reclamation of wetlands for agricultural use over the past century has significantly reduced wetland cover. The Salinas Reclamation Ditch, completed in 1920, drained a series of seven shallow lakes in the northern Salinas River watershed, between Salinas and Castroville, in order to increase the acreage of productive agricultural lands. A proposal exists to convert one of those drained lakes, Carr Lake, into a regional multi-use flood control basin and park, which would include re-created wetland areas and enhanced riparian corridors. Benefits of the project would include water quality improvements, stormwater capture and detention, increased and enhanced wildlife habitat, flood control benefits for downstream agricultural and community lands, and open space and recreation. Another area with great potential for the creation of new wetlands in the Greater Monterey County region is in the lower Salinas River watershed, along the Monterey Bay from Elkhorn Slough to the Salinas River mouth, addressing the loss of coastal wetlands in the region.
- **Water and Wastewater Treatment:** Water and wastewater treatment as a resource management strategy potentially includes integration of agricultural and domestic wastewater into the water supply equation. Water/wastewater treatment has been a significant issue in the Monterey County region for several decades, and has ripened into a critical topic within the last several years. While this topic has received significant attention on the Monterey Peninsula, it also holds much promise for the Greater Monterey County IRWM planning area. For example, recent discussions are now focusing on integrating the Monterey Peninsula with the Salinas Valley wastewater treatment/recycling efforts. As Monterey Peninsula water supply planning has hit several snags, interest in integrating watersheds and infrastructure systems between watersheds has grown. Water/wastewater treatment as a supply option, through groundwater recharge and/or other means, is an important resource management strategy that holds much potential for the Greater Monterey County IRWM planning area.
- **Infrastructure Reliability:** The RWMG chose to include this as a resource management strategy in order to recognize the importance of maintaining and upgrading infrastructure for water supply, treatment, and distribution, wastewater collection, treatment, and disposal, and recycled water treatment and distribution. Infrastructure improvements are continually needed as facilities age, demands on their use increase (due to population growth, degraded water quality, or increased water quality standards), and new technologies are introduced.



- **Regional Cooperation:** Regional communication and cooperation is included as a goal category within the region’s goals and objectives, and is recognized as one of the “foundational” resource management strategies chosen for the region. Cooperation between water management entities and other stakeholders in the region is absolutely necessary if integrated regional water management is to be achieved. Cooperation forms the foundation for collaboration and allows for the possibility of true problem solving. The 18 entities that form the Greater Monterey County RWMG have developed a process and framework for IRWM planning that is meant to encourage cooperation, communication, and collaboration and to facilitate an open, region-wide conversation with all stakeholders about water resource management in the Greater Monterey County region as well as in the broader Central Coast region.
- **Education and Outreach:** Public education is considered such an important tool that it is included as an objective in six out of the seven goal categories in the region’s goals and objectives (“promoting public education” appears as an objective for water supply, water quality, flood protection and floodplain management, regional communication and cooperation, disadvantaged communities, and climate change). Many local agencies and organizations already 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. Numerous programs have also been implemented to promote best management practices within specific occupational fields, such as agriculture, construction, and restaurants. Despite the extensive educational efforts that have occurred to date, there is always a need for more education and outreach, both in terms of promoting positive behavior and in terms of promoting public support for water supply, water quality, flood management, and natural resource enhancement programs. The need for public education and outreach will become all the more critical as new data and information become available regarding climate change. It is for these reasons that supporting public education and outreach is considered one of the higher priorities for the region.
- **Monitoring and Research:** Monitoring and research are recognized by the RWMG as crucial to ensuring effective water resource management in the region. Monitoring is considered so important that it is included as a “Guiding Principle” in the IRWM Plan. Support for research and monitoring is also included as specific objectives in the water supply, water quality, flood protection and floodplain management, environment, and climate change goal categories. Research enables us to understand the causes of problems and to develop and implement management measures to address those problems. Monitoring helps us gauge the effectiveness of those management measures and other projects implemented through the IRWM Plan. Monitoring and research provide the scientific foundation needed for objective decision-making and help guide the implementation of effective management practices throughout the region, and as such, are considered primary tools for integrated regional water management in the Greater Monterey County region.

The strategies listed below from the *California Water Plan Update 2009* were considered but were not chosen for inclusion in the Greater Monterey County IRWM Plan. The reason for omitting each of these strategies is as follows:

- **Conveyance–Delta:** Not applicable in the Greater Monterey County IRWM region.
- **Surface Storage–CALFED:** Not applicable in the Greater Monterey County IRWM region.
- **Crop Idling for Water Transfers:** There is no financial incentive for growers to employ this strategy in Monterey County (like there might be in the Central Valley).

- **Irrigation Land Retirement:** Like the preceding strategy, there is no financial incentive for growers to employ this strategy in Monterey County (like there might be in the Central Valley). Also, this strategy would meet with great resistance from the agricultural community.
- **Waterbag Transport/Storage Technology:** The RWMG did not consider this to be an appropriate option. Also, this strategy would meet with great resistance from stakeholders in the region.

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## **E.2 HOW RESOURCE MANAGEMENT STRATEGIES ARE IMPLEMENTED IN THE PLAN**

Projects chosen for inclusion in the IRWM Plan represent a broad mix of the resource management strategies listed above. The RWMG encourages stakeholders to develop projects that employ a diverse mix of resource management strategies by offering additional points to projects that demonstrate such 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 resource management strategies for the region's water management portfolio. A strong diversification of resource management strategies will not only ensure robust solutions to current water management issues but will provide resiliency to help the region deal with uncertain future circumstances.

The table on the following pages demonstrates how projects included in the IRWM Plan (out of 38 projects total) will implement resource management strategies. The resource management strategies most widely used include:

- Watershed Management/Planning: 25 projects
- Environmental and Habitat Protection and Improvement: 25 projects
- Education and Outreach: 25 projects
- Regional Cooperation: 24 projects
- Monitoring and Research: 23 projects
- Pollution Prevention: 19 projects

The resource management strategies least often used by projects in the IRWM Plan include:

- Dewvaporation or Atmospheric Pressure Desalination: 0 projects
- Fog Collection: 0 projects
- Precipitation Enhancement: 0 projects
- Desalination: 1 project
- Rainfed Agriculture: 1 project
- Forest Management: 1 project
- Water Transfers: 3 projects
- Surface Storage – Regional/Local: 4 projects

For this region it makes sense that Dewvaporation, Fog Collection, Precipitation Enhancement, and Rainfed Agriculture are seldom-used strategies for water resource projects. However, Surface Storage and Forest Management are resource management strategies that the RWMG will actively seek for the resource management strategy “toolbox” in future project solicitations, and Desalination is in fact currently being considered for use in the region.



Resource Management Strategies / Projects	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance – Regional/Local	System Re-operation	Water Transfers	Conjunctive Management and Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage – Regional/Local	Drinking Water Treatment and Distribution	Groundwater Remediation/Aquifer Remediation	Matching Water Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Management	Recharge Area Protection	Water-Dependent Recreation	Watershed Management/Planning	Flood Risk Management	Dewaporation or Atmospheric Pressure Desalination	Fog Collection	Rainfed Agriculture	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Stormwater Capture and Management	Wetlands Enhancement and Creation	Water and Wastewater Treatment	Infrastructure Reliability	Regional Cooperation	Education and Outreach	Monitoring and Research		
Central Coast Wetlands Group: Implementation of the Moro Cojo Slough Management and Enhancement Plan – Restoration of the Upper Slough											x	x							x			x	x					x	x	x	x			x	x	x			
Central Coast Wetlands Group: Study of Environmental Services from Nutrient Reducing BMPs												x	x				x	x			x		x	x					x							x	x	x	
Central Coast Wetlands Group: Water Quality Enhancement of the Tembladero Slough Phase II												x				x	x				x		x	x					x	x	x	x				x	x	x	
Central Coast Wetlands Group: Tembladero Restoration and Castroville Community Public Access		x										x	x			x							x	x	x				x	x	x	x	x			x	x	x	
City of Salinas: Integrated Industrial Wastewater Conveyance and Treatment Facility Improvements									x							x																						x	
City of Salinas and MRWPCA: Dry Weather Runoff Diversion Program														x		x																	x					x	
City of Soledad: Soledad Recycled Water Project		x	x							x		x											x							x				x	x		x	x	x
Delicato Family Vineyards: San Bernabe Lining Project	x	x	x			x					x		x				x	x							x				x						x	x	x	x	
Ecology Action: Monterey Bay Green Gardener Training & Certification Program		x										x	x			x						x				x				x						x	x		

Resource Management Strategies / Projects	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance – Regional/Local	System Re-operation	Water Transfers	Conjunctive Management and Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage – Regional/Local	Drinking Water Treatment and Distribution	Groundwater Remediation/Aquifer Remediation	Matching Water Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Management	Recharge Area Protection	Water-Dependent Recreation	Watershed Management/Planning	Flood Risk Management	Dewaporation or Atmospheric Pressure Desalination	Fog Collection	Rainfed Agriculture	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Stormwater Capture and Management	Wetlands Enhancement and Creation	Water and Wastewater Treatment	Infrastructure Reliability	Regional Cooperation	Education and Outreach	Monitoring and Research				
Elkhorn Slough Foundation: Integrated Restoration – Beneficial Reuse of Sediment to Restore Tidal Marsh and Agricultural Stormwater Treatment by a Native Grassland Buffer														x		x		x					x	x	x										x	x	x				
Elkhorn Slough Foundation: Ridgeline to Tideline – Water Resource Conservation in Elkhorn Slough	x					x								x	x		x		x	x		x	x	x												x	x				
Marina Coast Water District: Recycled Water Element of the Regional Urban Water Augmentation Project (RUWAP)		x	x						x			x																													
Monterey Bay Sanctuary Foundation: Making Monitoring Count												x	x				x		x		x																				
Monterey Bay Sanctuary Foundation: Watershed Approach to Water Solutions	x													x			x		x																						
Monterey County Public Works: Las Lomas Drive Storm Drain Improvements Project																	x																								
Monterey County Redevelopment & Housing Office: Well Replacement and Pipeline – San Lucas Water District				x							x	x	x				x				x	x																			
Monterey County Water Resources Agency: Aquatic Invasive Species Inspection Project																							x	x																	
Monterey County Water Resources Agency: Coastal Dedicated Monitoring Well Drilling	x	x										x	x	x	x								x	x																	





Resource Management Strategies / Projects	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance – Regional/Local	System Re-operation	Water Transfers	Conjunctive Management and Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage – Regional/Local	Drinking Water Treatment and Distribution	Groundwater Remediation/Aquifer Remediation	Matching Water Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Management	Recharge Area Protection	Water-Dependent Recreation	Watershed Management/Planning	Flood Risk Management	Dewaporation or Atmospheric Pressure Desalination	Fog Collection	Rainfed Agriculture	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Stormwater Capture and Management	Wetlands Enhancement and Creation	Water and Wastewater Treatment	Infrastructure Reliability	Regional Cooperation	Education and Outreach	Monitoring and Research	
Resource Conservation District of Monterey County: Salinas River Watershed Invasive Non-native Plant Control and Restoration Program			x			x								x			x		x			x		x	x				x					x	x	x		
Rural Community Assistance Corporation: Greater Monterey Bay Disadvantaged Community Wastewater Management Pilot Program		x									x			x		x	x				x		x						x		x		x	x	x	x	x	
San Jerardo Cooperative: San Jerardo Wastewater Project	x								x		x			x																			x	x				
Save Our Shores: Watershed Protection Program – Annual Coastal Cleanup Day in Monterey County														x						x									x								x	
UC Davis Marine Pollution Studies Lab: Evaluation of Potential for Stormwater Toxicity Reduction by Low Impact Development (LID) Treatment Systems																																						
<b>Number of Projects that Implement Resource Management Strategies</b>	<b>6</b>	<b>11</b>	<b>12</b>	<b>5</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>9</b>	<b>13</b>	<b>19</b>	<b>10</b>	<b>11</b>	<b>16</b>	<b>7</b>	<b>15</b>	<b>1</b>	<b>13</b>	<b>10</b>	<b>9</b>	<b>25</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>25</b>	<b>9</b>	<b>14</b>	<b>10</b>	<b>8</b>	<b>11</b>	<b>24</b>	<b>25</b>	<b>23</b>	

Projects highlighted in green: These projects have been funded and are currently being implemented through Proposition 84 Implementation IRWM Grant funds (Round 1).

### **E.3 RESOURCE MANAGEMENT STRATEGIES AND CLIMATE CHANGE**

As noted above, the RWMG selected resource management strategies based primarily on IRWM Plan goals and objectives. Climate change adaptation and mitigation is one of the seven goals of the Plan, and as such, was explicitly factored in to the RWMG’s selection of resource management strategies.

The RWMG supports and 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, practicing integrated flood management, and enhancing natural ecosystems. Several of the resource management strategies chosen by the RWMG may be considered “no regret” strategies. These include strategies that:

*Increase water supply through water use efficiency:*

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency

*Increase water supply by developing “new” sources of water:*

- Recycled Municipal Water
- Desalination
- Dewvaporation or Atmospheric Pressure Desalination
- Fog Collection
- Rainfed Agriculture

*Increase (or maintain) water supply by protecting and replenishing groundwater:*

- Stormwater Capture and Management
- Pollution Prevention
- Salt and Salinity Management
- Recharge Area Protection
- Groundwater Remediation/Aquifer Remediation
- Agricultural Lands Stewardship

*Encourage integrated flood management:*

- Flood Risk Management

*Encourage the protection and enhancement of natural systems:*

- Ecosystem Restoration
- Forest Management
- Watershed Management/Planning
- Environmental and Habitat Protection and Improvement
- Wetlands Enhancement and Creation

*Encourage collaboration in order to understand and address the impacts of climate change:*

- Land Use Planning and Management
- Regional Cooperation
- Monitoring and Research
- Education and Outreach

Section R of this IRWM Plan presents an in-depth overview of climate change and its expected consequences for the Greater Monterey County region. The section includes a preliminary adaptation strategy based on the results of climate change risk assessments conducted by the RWMG and a Climate

Task Force, comprised of regional scientists, water resource managers, and policy experts (see Table R-10, “Adaptation and Response Strategies Based on Risk Assessment”). 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 a regional sea level rise adaptation strategy
- Manage watersheds, habitat, and vulnerable species
- Implement adaptation strategies to conserve California's biodiversity
- Habitat/ecosystem monitoring and adaptive management
- Implement water conservation and supply management efforts
- Integrate land use and climate adaptation planning
- Support essential data collection and information sharing
- State recommendations suggest no new critical facilities be built within the 200-year flood plain
- Provide guidance on protecting critical coastal ecosystems and development
- Promote community resilience to reduce vulnerabilities
- Educate, empower, and engage citizens regarding risks and adaptation

The resource management strategies selected by the RWMG for this Plan, in particular the “no regret” strategies listed above, 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 GHG emissions reduction and climate change mitigation activities, as reflected in the following IRWM Plan objectives:

- Support efforts to research alternative energy and to diversify energy sources appropriate for the region.
- Seek long-term solutions to reduce greenhouse gas producing energy use.
- Support research and/or implementation of land-based efforts such as carbon-sequestration on working lands and wildlands in the Greater Monterey County region.

The “Land Use Planning and Management” resource management strategy addresses these objectives. The strategy calls for more sustainable land use practices, including land use decision-making that aims to both reduce and mitigate the potential impacts of climate change, e.g., learning how to reduce GHG emissions through energy efficient and more sustainable development practices.

Section R in this IRWM Plan provides a more in-depth discussion regarding climate change mitigation and GHG emissions reduction. A full GHG emissions reduction strategy for the region is expected to be created by Monterey County in the near future to meet State mandates (AB 32, CEQA). However in the meantime, several key strategies and actions are recommended in Section R.6.1, “GHG Reduction Strategies,” 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, with substantial input from the Climate Task Force, to define possible next steps, responsible entities, and funding resources.

## Section F: Project Review Process

The projects included in this Integrated Regional Water Management (IRWM) Plan are meant to implement the Plan and achieve Plan objectives. All projects must undergo a thorough review process before they can be formally included in the IRWM Plan. The Proposition 84/1E IRWM Grant Program Guidelines require that certain factors be used in the review process. These factors include:

- ❑ How the project contributes to plan objectives
- ❑ How the project is related to resource management strategies
- ❑ Technical feasibility of the project
- ❑ Special benefits to critical disadvantaged community (DAC) water issues
- ❑ Special benefits to critical water issues for Native American tribal communities (Note: This factor is not applicable in the Greater Monterey County IRWM region. While Native American tribes inhabit the area, there are no designated tribal lands or “communities” within the region.)
- ❑ Environmental justice considerations
- ❑ Project costs and financing
- ❑ Economic feasibility
- ❑ Project status
- ❑ Strategic considerations for plan implementation
- ❑ Contribution of the project in adapting to the effects of climate change
- ❑ Contribution of the project in reducing greenhouse gas emissions as compared to project alternatives
- ❑ Whether the project proponent has adopted (or has committed to adopting) the IRWM Plan

With each new project solicitation for the IRWM Plan, a Project Review Committee, comprised of Regional Water Management Group (RWMG) members, is convened to review each of the projects. The committee: 1) ensures that projects meet “minimum standards” for inclusion in the Plan, 2) seeks opportunities for integration, and 3) prioritizes the projects according to how well they meet the IRWM Plan objectives, as well as how well they meet objectives and priorities of the IRWM Grant Program. The result of this process is a ranked project list, vetted and approved by the RWMG. All projects on the project list are eligible for IRWM grant funds.

The following sections describe the project review process, per the Proposition 84/1E IRWM Grant Program requirements outlined above.

### **F.1 PROCEDURES FOR SUBMITTING A PROJECT FOR INCLUSION IN THE IRWM PLAN**

Projects are solicited from stakeholders for inclusion in the IRWM Plan once every year or every other year, depending on IRWM Grant Program solicitations. Project solicitations for the IRWM Plan are planned to anticipate the IRWM Implementation Grant Program schedule, in order to ensure that the project list included in the Plan is as current as possible prior to an IRWM Implementation Grant solicitation.

Both implementation projects and concept proposals are accepted. Concept proposals are accepted for several reasons: to encourage stakeholders to come up with new projects that will address IRWM Plan objectives; to enable all water resource managers and planners in the region to see what ideas are “out there”; and to help project proponents bring their concept proposals to implementation by providing

information for alternative funding sources. The submission of concept proposals is also encouraged to enhance project integration, enabling certain concept proposals (or components thereof) to be “added on” to an existing implementation project. This may not only provide “multiple benefits” to the existing implementation project but may help that concept proposal get implemented. One example of this is a concept proposal submitted by The Return of the Natives at California State University Monterey Bay (CSUMB) to add native plant restoration to any implementation project, as appropriate. Note that concept proposals are not ranked along with the implementation projects, and are not eligible for submission to the State for IRWM grant funding.

An email notification is sent to all stakeholders announcing each new project solicitation for the IRWM Plan approximately two months prior to the application deadline. Application forms for implementation projects and concept proposals are forwarded with the email and are also available on the Greater Monterey County IRWM website (in both English and Spanish; see Appendix F for an example of the application forms). Public workshops to explain the project submission process and to answer any questions are also conducted around the time the project solicitation is announced. In 2010, for example, three public workshops were held at different times of day and in different locations (Salinas, Big Sur, and King City, with Spanish language translation available at the latter workshop). In 2011, two public workshops were held, in Salinas and King City.

## **F.2 PROCEDURES FOR REVIEW OF PROJECTS TO IMPLEMENT THE IRWM PLAN**

### **F.2.1 Project Review Process**

The first step in the project review process is ensuring that projects (including concept proposals) meet the minimum standards to be included in the IRWM Plan. Minimum standards consist of the following:

1. The project must be located within the boundaries of the Greater Monterey County IRWM region, or otherwise directly benefit the region.<sup>1</sup>
2. The project must include one or more of the following elements (as outlined in PRC §75026(a)):
  - Water supply reliability, water conservation and water use efficiency.
  - Stormwater capture, storage, clean-up, treatment, and management.
  - Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands.
  - Non-point source pollution reduction, management and monitoring.
  - Groundwater recharge and management projects.
  - Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users.
  - Water banking, exchange, reclamation and improvement of water quality.
  - Planning and implementation of multipurpose flood management programs.
  - Watershed protection and management.
  - Drinking water treatment and distribution.
  - Ecosystem and fisheries restoration and protection.

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<sup>1</sup> An example of eligible projects located outside of the Greater Monterey County IRWM regional boundaries is projects located at Lake Nacimiento and along the Nacimiento River from the reservoir to the Salinas River. The Nacimiento reservoir is located in San Luis Obispo County, but is owned and operated by MCWRA and is an important water supply and groundwater recharge source for the region.

3. The project has the support and approval of the landowner(s) for the property(ies) on which the project is located (i.e., the project proponent must be able to provide assurance of landowner support before a project can be submitted for IRWM grant funds).
4. The project must address IRWM Plan objectives.

After projects are reviewed for minimum standards, the Project Review Committee conducts a more thorough review to ensure consistency with laws, regulations, permit requirements, and local plans, to identify potential problems or conflicts (either with IRWM Plan objectives or with other projects), to identify possibilities for integration with other projects, and finally, to assess each project according to the project ranking criteria (see below). In addition, all projects (including concept proposals) are screened for potential environmental justice impacts or impacts to disadvantaged communities (DACs). The following section describes the process for prioritizing projects in the IRWM Plan.

### **F.2.2 Project Ranking Process**

The Proposition 84/1E IRWM Grant Program Guidelines stipulate that RWMGs must prioritize the projects included within their IRWM Plans. This is not an easy process, and different IRWM regions throughout the state have come up with different systems for prioritizing their projects. The idea is to develop a project ranking system that is objective and fair, and that can be systematically applied with the end result being an objectively ranked numerical listing of projects.

This section describes the project ranking process used to prioritize projects in the Greater Monterey County IRWM region. This process was approved by the RWMG by vote in September 2011 (with amendments added August 15, 2012). The project ranking criteria may be revised with subsequent project solicitations if needed, with the approval of the RWMG. Note that stakeholders were given an opportunity to provide input into the project ranking process via a 30-day public comment period.

The project ranking process includes two separate rankings:

- **Ranking #1:** Projects are ranked solely by how well they address the region's goals and objectives. The point of this ranking is to simply show how well projects address the IRWM Plan objectives relative to one another, within each goal category. The lists that result from this ranking are used for internal evaluation for regional priorities, and also to help the RWMG discern which projects may be most appropriate for certain resource-specific grant opportunities (e.g., water quality-related grant opportunities).
- **Ranking #2:** The second project ranking 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 point of this second ranking is to ensure that the IRWM Plan project list is competitive for the purposes of the IRWM Grant Program. *The project list that results from Ranking #2 is considered the "official" ranked project list for the IRWM Plan.*

The ranked project list resulting from Ranking #2 for 2012 projects are included in Section G of this Plan; updated project lists will be posted on the Greater Monterey County IRWM Region website (<http://www.greatermontereyirwmp.org/documents/>). Note that only implementation projects included in the IRWM Plan are ranked through this project ranking system; concept proposals are not ranked, and are not eligible for grant funding.

It is important to note that the final ranked project list *does not necessarily dictate which projects get submitted for IRWM grant funding* but is merely a tool to help the RWMG organize the many projects within the region for the purposes of the IRWM Grant Program. At the top of the list will be the projects



that: 1) best meet the region's goals and objectives, and that 2) best meet the objectives of the IRWM Grant Program. Those are presumably the projects that will be most competitive for State IRWM grant funds. The process of selecting projects for actual submission for IRWM grant funds begins with that information, but then weighs in other important factors as described below. Therefore it is quite possible for a project that ranks relatively low to be selected for submission for IRWM grant funds, and a project that ranks high to be passed over in any particular funding round.

The following describes the project ranking process in more detail.

### **PROJECT RANKING #1: REGIONAL OBJECTIVES**

Project Ranking #1 demonstrates how well a project addresses the objectives of the IRWM Plan overall, and how well a project addresses each goal category within the Plan. There are seven goals and 57 regional objectives. The goal categories in the IRWM Plan are: water supply, water quality, flood protection and floodplain management, environment, regional communication and cooperation, disadvantaged communities, and climate change. Projects receive points based on how many and how well objectives are addressed overall, and how many and how well objectives are addressed within each goal category. A project can receive between 0-5 points for each objective addressed, with 5 points = fully addressed and 1 point = somewhat addressed (scaled accordingly), and no points awarded if an objective is not addressed at all.

The result of this ranking process is eight separate lists: one that shows the projects that best address the Plan objectives overall, and then seven lists that show which projects best address each of the seven goal categories. The latter project lists are particularly useful for helping the RWMG determine which projects may be most appropriate for certain resource-specific grant sources, for instance, funding opportunities for water supply projects, or alternatively, for watershed restoration projects. These lists are used for internal evaluation only; they are not posted on the Greater Monterey County IRWM website but are available to the public upon request.

### **PROJECT RANKING #2: REGIONAL OBJECTIVES PLUS IRWM PROGRAM PRIORITIES**

The second project ranking process is used to help the RWMG evaluate projects in terms of the Proposition 84/1E IRWM Grant Program per se. The ranking process begins with the results of Ranking #1 (IRWM Plan objectives) and then factors in other criteria, as described below:

1. *Objectives*: How well a project addresses the IRWM region's goals/objectives
2. *IRWM Grant Program Criteria*: How well a project addresses the IRWM program preferences and other criteria listed in the Proposition 84/1E Guidelines
3. *Integration*: How well a project incorporates "integration"
4. *Project Need*: Recognition of special or urgent need
5. *Overall Strength of Project*: Strength of project in terms of its technical feasibility, work plan, and budget

Each of these categories is then weighted. The following table shows the relative weighting of each of the five categories, and the maximum number of points that a project can achieve for the various criteria within each category (with 100 being the total maximum number of points possible):

**Table F-1: Project Ranking #2: Summary of Points**

Category	Criteria	Maximum Potential Points
Objectives = 40%	Regional objectives (in the IRWM Plan)	40
IRWM Grant Program Criteria = 20%	Statewide priorities	12
	Land use planning	2
	Water-related conflicts	2
	Disadvantaged Communities (DACs)	2
	Climate change	2
Integration = 20%	Water supply, water quality, flood reduction, and other benefits	10
	Resource management strategies	2
	Partnerships	4
	Regionalism	4
Project Need = 10%	Special/urgent need	10
Overall Strength of Project = 10%	Technical feasibility	4
	Budget	3
	Work Plan	3
<b>TOTAL</b>		<b>100</b>

The table below describes the scoring methodology in more detail:

**Table F-2: Project Ranking #2: How Projects are Scored**

Category	Explanation of Scoring
Objectives	There are 7 goals and 57 regional objectives in the IRWM Plan. Projects are scored on a scale of 0-5 based on how many and how well the regional objectives are addressed, with 285 points being the maximum possible. Then, projects are ranked “on a curve”: projects are assigned points relative to each other, so that the project with the most objectives addressed gets the full amount of points possible (40), and a project with half those objectives gets half those points (20). <sup>2</sup> Points are awarded for the relative number of objectives addressed.

<sup>2</sup> Here’s the formula: Take the highest raw score for objectives and divide that number by 40 (e.g., for 2011 projects, the highest score for objectives for any one project was 127. That divided by 40 is 3.175. Then divide each project’s raw objectives score by 3.175).

<p><b>IRWM Grant Program Criteria</b></p>	<p>This category includes IRWM Program Preferences and criteria that will weigh in significantly to the California Department of Water Resources’ (DWR) scoring of IRWM grant proposals. A perfect score in this category is 20 points. Projects are scored on a sliding scale according to how well that category is addressed, with no points awarded if a project does not address the category at all. IRWM Program Preferences include:</p> <ol style="list-style-type: none"> <li>1. Addresses Statewide priorities (12 points maximum, with up to 2 points for each category) as follows: <ul style="list-style-type: none"> <li>- Drought Preparedness</li> <li>- Use and Reuse Water More Efficiently</li> <li>- Climate Change Response Actions</li> <li>- Expand Environmental Stewardship</li> <li>- Practice Integrated Flood Management</li> <li>- Protect Surface Water and Groundwater Quality</li> </ul> <p>(Note: No points will be given for the Statewide priority “Ensure Equitable Distribution of Benefits” because points are given for DACs in other categories)</p> </li> <li>2. Effectively integrates water management with land use planning (0-2 points)</li> <li>3. Resolves significant water-related conflicts (0-2 points)</li> <li>4. Addresses critical water supply or water quality needs of DACs (0-2 points)</li> <li>5. Effectively integrates water management programs and projects within a hydrologic region identified in the California Water Plan; the Central Coast Regional Water Quality Control Board region; or other region or sub-region specifically identified by DWR (0-2 points)</li> </ol>
<p><b>Integration</b></p>	<p>Integration includes the following categories:</p> <ul style="list-style-type: none"> <li>- Project Benefits (max 10 points)</li> <li>- Resource Management Strategies (max 2 points)</li> <li>- Partnerships (max 4 points)</li> <li>- Regionalism (max 4 points)</li> </ul> <p>Points are awarded (on a sliding scale) as follows:</p> <ul style="list-style-type: none"> <li>- <u>Project Benefits</u>: A project can receive up to 10 extra points to the extent that it demonstrates water supply, water quality, flood reduction, and/or other benefits. No points if only “minimal” benefits are demonstrated.</li> <li>- <u>Resource Management Strategies</u>: A project can receive up to 2 extra points for using a diverse mix of strategies, or for using a resource management strategy that most other projects do not (i.e., contributing to the diversification of the region’s water management portfolio). No points for using just one strategy.</li> <li>- <u>Partnerships</u>: A project can receive up to 4 extra points if it demonstrates multiple partnerships, based on diversity and number of partners. No points if there are no partners.</li> <li>- <u>Regionalism</u>: A project can receive up to 4 extra points if it demonstrates regional (vs. local) benefits: <ul style="list-style-type: none"> <li>- 1 point: Benefits 8-digit HUC or smaller area</li> <li>- 2 points: Benefits 3-digit hydrologic unit code (HUC) area</li> <li>- 3 points: Benefits entire IRWM Plan region</li> <li>- 4 points: Benefits extend beyond the IRWM Plan region</li> </ul> </li> </ul>
<p><b>Project Need</b></p>	<p>A project can receive up to 10 extra points (on a sliding scale) if there is a recognized special or urgent need. These are used as “bonus” points; i.e., projects with “average” need receive no points.</p>

Overall Strength of Project	<p>This category recognizes the overall strength of a project in terms of its technical feasibility, budget, and work plan. Maximum potential score in this category is 10, as follows:</p> <ul style="list-style-type: none"> <li>- Technical feasibility (0-4 points)</li> <li>- Budget (0-3 points)</li> <li>- Work plan (0-3 points)</li> </ul>
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A ranked project list is produced based on this scoring system. The ranked project list for 2012 IRWM Plan projects is provided in Section G. All DAC projects are “flagged” to ensure that they receive special consideration (and that they stand out for the purposes of special DAC funding opportunities). The final step in this process is “adaptive management”: If the RWMG finds that the project ranking system falls short in achieving its ultimate purpose (i.e., if the projects/programs that should clearly float to the top, don’t), then the RWMG will re-evaluate the project ranking system to address the discrepancy. Any revisions made to the project ranking system would have to be formally approved by vote of the RWMG.

**F.2.2.a A Note about the Climate Change Review Factors**

Two of the required review factors contained in the IRWM Program Guidelines concern climate change:

- Contribution of the project in adapting to the effects of climate change
- Contribution of the project in reducing greenhouse gas (GHG) emissions as compared to project alternatives

In the current review process, projects can receive points for climate change mitigation or adaptation both under the “objectives” category (there are seven objectives in the IRWM Plan that address climate change) and under the “IRWM Grant Program Criteria” category. Projects are therefore given higher prioritization to the extent that they adapt to the impacts of climate change or help reduce GHG emissions as compared to project alternatives.

In future project reviews, projects will be screened even more closely for their contributions in adapting to the effects of climate change and for their contributions in reducing GHG emissions. IRWM Planning Grant funds have recently been received (Round 1) to address the program standards for climate change as outlined in the Proposition 84 and 1E IRWM Program Guidelines, including three broad focuses: (1) analysis and assessment of regional vulnerabilities to climate change, (2) identification of adaptation strategies for the projected effects of climate change in the region, and (3) identifying mitigation strategies for GHG emissions at regional and project-specific scales as available. One key part of this effort will be directing and assisting project sponsors in assessing their own project’s effects on GHG emissions at the project level, and then tracking that information cumulatively at the planning region level. With better information about climate change vulnerabilities in the Greater Monterey County IRWM region and with additional information about project-level GHG emissions, the RWMG will be in a better position to evaluate projects in terms of climate change adaptation and GHG emissions.

**F.2.2.b A Note about the Economic Feasibility Review Factor**

The Proposition 84/1E IRWM Program Guidelines state: "A preliminary economic analysis must be included as part of the criteria in the project selection process." After much consideration and debate, the RWMG has voted *against* including an economic analysis as part of the project selection process for including and ranking projects in the IRWM Plan (though a full economic analysis *is* required for all projects selected to be submitted for IRWM Implementation Grant funds). The justification for not requiring an economic feasibility analysis as part of the criteria in the project review/ranking process is as follows:

1. Conducting an economic feasibility analysis is labor intensive, expensive, and requires a high level of technical expertise. The RWMG has concern that requiring stakeholders to conduct an economic feasibility analysis in order to simply get their projects included in the IRWM Plan will discourage many (if not most) project proponents from submitting their projects. Such a requirement would particularly discourage DACs and small communities or entities, which do not have the staff nor the financial resources to conduct this level of analysis. The RWMG aims to be "inclusive" in the IRWM Plan project solicitation process and to not discriminate against smaller entities or communities, particularly not against DACs. Requiring an economic feasibility analysis would prohibit many of these stakeholders—in particular, DACs—from submitting their projects.
2. The IRWM Plan is a long-term planning document. Some projects included in the Plan will not get put forward for IRWM funding for several years (from the time that the project proponent submits his/her project for inclusion in the Plan). Some projects may never get put forward for IRWM grant funds. Therefore, an economic feasibility analysis conducted at the time that the project is submitted for inclusion in the Plan may be quite outdated by the time that project actually gets put forward for funds—at which point, a new economic feasibility would be required. For those projects that are never put forward for funding, the RWMG considers it unfair to make those project proponents pay the considerable costs to produce the economic analysis. The cost of the "preliminary" economic analysis does not seem to justify the benefits.
3. The RWMG feels they have enough information *without* the preliminary economic analysis to adequately prioritize projects in the IRWM Plan. When an IRWM project solicitation is released, the RWMG will select a group of projects to put forward in an application package based on the project ranking and other factors. Each of the project proponents will be required to conduct an in-depth economic feasibility analysis at that time. If the results of an analysis fall short, then that project will be removed from the application package, and another project may be put forward in its place. The RWMG feels the appropriate time to conduct an economic analysis is during the selection process for projects to put forward for IRWM funding, not during the selection process for projects to include in the Plan.

For these reasons, the RWMG has voted against including this requirement as part of the IRWM Plan project selection/review process. However, note that the RWMG has recently received funding as part of the Round 1 Planning Grants to create an "economic feasibility tool" that would streamline the process and help project proponents conduct an economic analysis more easily and at lower cost. The RWMG may use this tool in future project solicitations as part of the project review and ranking process. However, until an adequate economic feasibility tool is developed, the RWMG does not feel it is fair or appropriate to require project proponents to prepare a labor-intensive and cost-intensive economic analysis as part of the project submittal process for the IRWM Plan.

### **F.3 PROCEDURES FOR COMMUNICATING THE IRWM PLAN PROJECT LIST**

The ranked project list for 2012 IRWM Plan projects, along with a brief summary of each project, is provided in Section G. As described earlier, the IRWM Plan project list will evolve with each new project solicitation (anticipated to occur on an annual to bi-annual basis, contingent on the Proposition 84 and 1E IRWM grant solicitation schedules). Section G of this IRWM Plan will be updated whenever a new project list is generated. Updating this section will not entail formal re-adoption of the Plan, but just the approval (i.e., simple majority vote) of the RWMG. The project lists (and updates) will be announced to stakeholders via email, and will also be available for download on the Greater Monterey County IRWM website at: <http://www.greatermontereyirwmp.org/projects/>.

#### **F.4 SELECTING PROJECTS FOR IRWM GRANT FUNDS**

The final step in the project review process involves selecting projects for application to the State for IRWM grant funds. Whenever an IRWM grant solicitation is announced, the RWMG must decide which projects to put forward in a grant application package on behalf of the Greater Monterey County region. Only a limited number of projects can be submitted in any one round. To make this decision, the RWMG will begin with the ranked project list and select:

- Only those projects that are ready to proceed.
- Only those projects whose project proponents have adopted, or have expressed a commitment to adopt, the IRWM Plan (the Proposition 84/1E IRWM Program Guidelines stipulate that each project proponent named in an IRWM Grant application must adopt the IRWM Plan).
- Only those projects for which project proponents are able to provide certainty of landowner support. Project proponents must either provide signed documentation of landowner support, or if the properties on which activities will occur are not precisely defined at the time of application for IRWM grant funds, then project proponents must provide a signed statement saying that they acknowledge that IRWM funds cannot be used for activities on properties without landowner consent, and that they agree to provide a signed letter of support and consent prior to receiving IRWM funds for any such activities.

Several additional factors are then taken into consideration to help determine which projects will make for the strongest and most competitive proposal package for State IRWM grant funds. Factors include: project costs and financing, economic feasibility, geographic impact (subarea and scope), whether the project addresses a critical water resource need of a DAC, and how well the projects complement each other in terms of providing the most benefits to the region.

The RWMG will also at this stage weigh strategic considerations for Plan implementation, i.e., leveraging any efficiencies that might be gained by combining or modifying local projects into regional programs, encouraging partnerships between project proponents, combining various elements of projects, or otherwise integrating projects to achieve greater benefits for the region. The desired outcome is a proposal package comprised of several projects that, together, will help implement the objectives of the Plan, will provide multiple and regional benefits for the Greater Monterey County IRWM region, and that will be most competitive on a State level for IRWM (and other) grant funds.



## Section G: Projects

The Project List included in this Integrated Regional Water Management (IRWM) Plan represents the implementing element of the Plan. The projects are intended to carry out the goals and objectives of the Plan, and reflect the collaborative spirit of the IRWM planning effort.

Note that the process for soliciting projects from stakeholders and for ranking the projects is described in the previous section (Section F, Project Review Process). The process for tracking the implementation of projects, along with associated monitoring data, is described in Section K, Data Management. The process for evaluating progress made toward achieving Plan objectives, via project implementation, is described in Section J, Plan Performance and Monitoring.

This section lists the projects included in the IRWM Plan through 2012. Three separate lists of projects are shown in Tables G-1, G-2, and G-3 on the following pages:

- *Proposed Implementation Projects:* Projects proposed by stakeholders in the region for grant funding. This is what we typically refer to as the “Project List” for the IRWM Plan. The Regional Water Management Group (RWMG) will choose from this list when applying for IRWM grant funds and other grant funds. This list is shown as Table G-1 below.
- *Funded IRWM Plan Projects:* Implementation projects that were previously included on the IRWM Plan Project List but have been funded either through the IRWM Grant Program or other source of funds (i.e., projects from previous IRWM Plan Project Lists that have “graduated” and are now implementing the Plan). This list is shown as Table G-2 below.
- *Concept Proposals:* Concept proposals are ideas submitted by stakeholders for projects that are not quite far enough along in their development to be submitted for grant funding. It is the intention that concept proposals will eventually grow into “full-fledged” implementation projects. This list is shown as Table G-3 below.

The projects listed in the tables below consist of three “cohorts” of projects: projects submitted in 2010 (i.e., the first project solicitation for the Greater Monterey County IRWM Plan), plus additional projects submitted in 2011 and 2012 (the second and third project solicitations). These project lists—including proposed implementation projects, funded implementation projects, and concept proposals—will change over time as projects get implemented and new projects are submitted for inclusion in the IRWM Plan. Hence, the projects shown in Tables G-1, G-2, and G-3 should be considered more of an example of water resource management projects in the Greater Monterey County IRWM region rather than a fixed list of IRWM Plan projects.

Note that the RWMG has found that some potential conflicts, in terms of project goals and objectives, do appear to exist between certain projects included in the IRWM Plan (including both the implementation projects and concept proposals). A process for resolving potential conflicts—as well as for identifying new opportunities for project integration—has been initiated with funding support from a Round 1 IRWM Planning Grant as a pilot project in one sub-watershed region of the Greater Monterey County IRWM region. This process, called the Water Resource Project Coordination (WRPC) process, is intended not only to remove potential barriers to Plan implementation that may be caused by internal conflicts, but equally important, to encourage project integration, collaboration, and partnerships within the region. For a detailed description of the WRPC process, please see Section I, Integration.

## **G.1 PROPOSED IMPLEMENTATION PROJECTS (“THE PROJECT LIST”)**

Table G-1 below constitutes the official ranked “Project List” for the IRWM Plan—the list from which the RWMG will choose when applying for IRWM grant funds. The Project List consists of 31 implementation projects from the combined 2010, 2011, and 2012 project solicitations for the IRWM Plan. These projects have undergone a full project review and have been prioritized according to an approved project ranking process. The projects are ranked according to how well they address both the IRWM Plan objectives and the priorities of the State IRWM Grant Program (according to “Project Ranking #2” as described in Section F, Project Review Process). Table G-1 includes a brief summary of each project, the water resource area(s) that the project addresses, and project costs (requested amounts).

It is important to note that the Project List is a continually evolving element of the IRWM Plan. Projects will be removed from the list as they get implemented, and new projects will be added to the list with every new IRWM Plan project solicitation (which is expected to occur approximately every two years or with each new IRWM grant solicitation). Thus, as noted earlier, the Project List printed in this section should be considered more of a “sample” Project List rather than a fixed list for the IRWM Plan. The RWMG will post the most current Project List on the Greater Monterey County IRWM Region website, at <http://www.greatermontereyirwmp.org/documents/>.

**Table G-1: Proposed Implementation Projects: Ranked Project List for 2012 IRWM Plan Implementation Projects**

Ranking	Project Proponent & Project Title	Score (out of 100)	Project Summary	Requested Amount	Primary Resource Area(s)
1	Central Coast Wetlands Group: Northern Gabilan Mountain Watershed Management Project	74	The project consists of three phases to restore a sub-watershed within the upper Gabilan watershed, and serve as a model for restoration of watersheds within the central coast. Phase I provides the foundational watershed characterization and process analysis necessary to develop meaningful and effective watershed management. It includes a review of previous relevant studies and preparation of original analysis along with a compilation of spatial data and key watershed processes. Analysis will be integrated with research and planning projects done by others. The synthesis of this information will be used to target planning and restoration for one sub-watershed. This will be accomplished by addressing the changes in the watershed functions and processes (physical, chemical and biological) that are caused by agriculture and urban activity that affect watershed health. Additionally, we will conduct a community-based engagement process to review Phase I information and watershed management options. Phase I will result in a management methodology and a master restoration plan for one of three sub-watersheds. Phase II will develop site design for prioritized restoration locations within the chosen sub-watershed and Phase III will implement those designs.	\$841,961	natural resource enhancement + water quality
1	Central Coast Wetlands Group: Water Quality Enhancement of the Tembladero Slough Phase II	74	This project is Phase II of Water quality enhancement of the Tembladero Slough and Coastal Access for the Community of Castroville, Phase I of which has been funded by the IRWMP Round 1. During Phase I, CCWG will work with County agencies, agricultural land owners and the community of Castroville for design and permitting of a select set of Water Quality/wetland management structures. These projects will utilize a variety of water quality management innovations including the treatment train approach (i.e. detention/sedimentation features, pollutant filtration/ biological degradation of pollutants and water polishing areas). During Phase II of this project, twenty acres in total (approximately six projects) will be constructed based on the plans from Phase I that support and integrate the multiple objectives of the GMCIRWMP, emphasizing urban and agricultural water quality enhancement, flood management, habitat restoration and support of various watershed planning and permit processes. Features are selected based on available space, hydrologic requirements, and adjacent land owner concerns, but preferentially support projects that enhance habitat and open space features as well as improving water quality.	\$609,525	water quality + natural resource enhancement
2	Elkhorn Slough Foundation: Ridgeline to Tideline: Water Resource Conservation in	69	Ridgeline to Tideline is a comprehensive approach to addressing water resource issues in an estuarine watershed. The project area encompasses 427 acres of Elkhorn Slough and uplands set in a 4,000-acre block of protected lands. The three phases of this work include: 1) increasing tidal range and circulation in part of the Slough with consistently poor water quality and greatly reduced estuarine function, coupled with restoration of an adjacent upland buffer, 2) acquiring two adjacent farmland properties that are chronic sources of Slough degradation, and 3) re-	\$6,178,438	natural resource enhancement + water quality

	Elkhorn Slough		contouring and stabilizing their steep eroding slopes and restoring native vegetation. Reduced groundwater extraction on these lands will improve water balance in the basin, resist sea water intrusion, prevent nitrate pollution and promote freshwater spring re emergence. Over the past three decades we have demonstrated these integrated actions can measurably improve ecological function, tidal, freshwater and groundwater quantity and quality, and provide habitat for a diverse array of plants and animals. We have demonstrated a statistically significant drop in nitrate in receiving waters subsequent to restoration of similar lands, which techniques we will apply to this work. That this work can accomplish these goals is of utmost importance to the local community, including Las Lomas.		
3	Nacimient Regional Water Management Advisory Committee: Interlake Tunnel between Lake Nacimient and Lake San Antonio	66	The project is to build an interlake tunnel between Lake Nacimient and Lake San Antonio. The project would explore various options for size, type, input and exit structures of the tunnel. Additionally numerous technologies for alternative energy generation will be evaluated, specifically in-line hydro-electric power generation and solar power for pumping and other systems. With the recent changes in allowed water storage derived from the modification of the Lake Nacimient dam spillway due to the completion of the Salinas Valley Water Project there has been a renewed interest in capturing all of the rain water run-off. This past year, despite the increased storage capacity of Lake Nacimient, tens of thousands of acre feet of water were released this past year for flood control, ultimately flowing to the ocean as wasted water. Over the same period Lake San Antonio had a minimum of 20% of its storage capacity available - twice what which was needed to store the extra runoff from Lake Nacimient. During the winter season, this tunnel would transfer extra rainwater that would be released which travels the Salinas River and ends up wasted in the Pacific Ocean. The water from these two lakes would then be used downstream for groundwater recharge, abatement of salt water intrusion, and the promotion of fish habitats. Increasing the total available supply of water will benefit all of these uses, industries and communities.	\$8,600,000	water supply
3	RCD of Monterey County: Monterey County Farm Water Quality Assistance Program	66	The RCD of Monterey County, in close partnership with University of California Cooperative Extension Crop Advisors and USDA Natural Resources Conservation Service, will provide a bilingual on-farm erosion, irrigation, and nutrient management evaluation program for Monterey County farmers. The service will 1) evaluate erosion potential, irrigation system and application efficiency, and nutrient budgeting; 2) develop recommendations as needed for field configuration, soil stabilization, and refined water and nutrient applications; and 3) assist growers' voluntary implementation of those recommendations to help reduce excess soil, water and nutrient movement off area farms while optimizing farm productivity. This work is already underway on a smaller scale, and incorporation into the GMCIRWMP and the requested funding would support development of a full program for the next three years.	\$583,000	water quality
4	Central Coast Wetlands Group: Implementation of the Moro	63	This project will continue to address the goals of the Moro Cojo Slough Management and Enhancement Plan, the Northern Salinas Valley Watershed Restoration Plan, and the Central Coast Regional Toxic Hot Spot Cleanup Plan for Moss Landing Harbor. This project will involve the restoration of 120-acres of the Moro Cojo Slough containing tidal and brackish water marsh (a state marine reserve) that receive fresh water inputs from agricultural lands	\$1,450,636	natural resource enhancement + water quality

	Cojo Slough Management and Enhancement Plan: Restoration of the Upper Slough		above. This project will restore the hydrologic connectivity of the upper, middle, and lower reaches of the Moro Cojo Slough by linking multiple marsh areas with new lands previously lost to agriculture. The project will reestablish an interconnected brackish water wetland ecosystem. This effort addresses a critical action defined within the Moro Cojo Management Plan that until now has been left incomplete. Because of new interest by farmers to provide access to restorable marsh lands we are able to move forward to implement this key action outlined in the Management Plan. The result of this project will be to reestablish hydrologic connectivity and ecosystem function, enhance wildlife habitat, reestablish wetland habitat that supports endangered species (brackish water snail and tidewater goby), and improve water quality flowing out of the watershed into several State marine reserves and the Monterey Bay National Marine Sanctuary. This will be a four year project with three major outcomes: 1) protection of wetland marsh and adjacent upland habitats through easement or acquisition, 2) filtration of agricultural runoff with sediment basins and treatment wetlands prior to water entering the main slough 3) restoration of the main slough to increase open water habitat and overall system complexity, and 4) regain wetland habitat continuity between the three main sections of the Moro Cojo Slough.		
5	Marina Coast Water District: Recycled Water Element of the Regional Urban Water Augmentation Project (RUWAP)	59	RUWAP is the urban water augmentation project developed by MCWD in cooperation with Fort Ord Reuse Authority (FORA). The Recycled Water element of RUWAP consists of the back-bone facilities needed for a recycled water distribution system that will provide up to 3,000 AFY of recycled water to urban users in the MCWD service areas, specifically including the former Fort Ord, and potentially the Monterey Peninsula. The Recycled Water element of RUWAP includes the following specific features: 1) A connection to the SVRP that includes a pump station referred to as the Water Augmentation Pumping Plant (WAPP). 2) A new distribution pipeline system consisting of approximately 40,000-LF of ductile iron and plastic pipe installed within existing roadway right-of-ways and easements. The pipeline will vary in diameter from 20-inches to 16-inches. Thousands of linear feet of Recycled Water conveyance pipelines have already been installed throughout the community, in particular a small section of back-bone facility within CSUMB and an approximately 3-mile extension of the back-bone facility southerly down General Jim Moore Boulevard. 3) One intermediate pump station referred to as the Fifth Avenue Pump Station (FAPS) located in the City of Marina near CSUMB. 4) One storage tank referred to as the Blackhorse Reservoir will provide more than 1.5-million-gallons of operational storage. The Blackhorse Reservoir will be located at an existing MCWD storage tank site just east of General Jim Moore Boulevard. 5)The installation of a variety of appurtenant features.	TBD	water supply
5	RCD of Monterey County: Livestock and Land: Rangeland and	59	The purpose of this program is to achieve immediate and lasting reductions in nutrient, sediment and pathogen pollution to surface and ground waters and enhance wildlife habitat through implementation of BMPs on livestock facilities and rangelands in the Greater Monterey County IRWM region. The proposed program utilizes an incentives-based approach to achieve the cultural change needed for livestock facilities to voluntarily adopt management measures that improve the healthy functioning of watersheds. Projects are implemented in high priority areas	\$899,852	water quality

	Livestock Facility Water Quality, Vegetation Management and Wildlife Enhancement Program		identified by the TMDLs and other regional and local plans. Water quality and wildlife goals will be achieved through implementation projects, project design, technical assistance, recruitment and training. We will employ a systematic evaluation process to measure program effectiveness through participant surveys, before and after site load reduction modeling and site-specific erosion and runoff assessments.		
6	Monterey County Redevelopment & Housing Office: Well Replacement and Pipeline - San Lucas Water District	57	The community of San Lucas is an impoverished, predominately Hispanic, farmworker village. The San Lucas Water District operates the community's drinking water and wastewater systems, and has approximately 90 service connections. The District's water supply is derived from a single groundwater well located in the center of an agricultural field about one mile south of the community. The District has very limited financial capacity and operational capacity. The County of Monterey Redevelopment and Housing Office has been providing on-going assistance with the goal of supporting the existing community. Since March 2011 all customers of the Water District have been on an indefinite "Do Not Drink" order from the Monterey County Division of Environmental Health due to excessive levels of nitrates in water being pumped from the District's single well. The Monterey County Division of Environmental Health has directed the Water District to implement a new source of water that meets all public water quality requirements as soon as possible. In addition, the RWQCB has been unable to certify approval of the District's recently upgraded wastewater treatment and disposal system due to high TDS in the treated effluent, which is a direct result of high TDS in the community's water source. As a result, the District cannot approve any new service connections to the sewer system until this issue is resolved. A "Hydrogeologic Characterization and Test Well Feasibility Analysis" was prepared in Sept 2010 regarding the Total Dissolved Solids issue. A supplemental Technical Memorandum regarding the Nitrate contamination issue was prepared in June 2011. Both reports recommend relocation of the well to a location about 1,800 feet west of the existing well, closer to the Salinas River. The first phase of implementation will be to acquire a temporary construction easement and drill a test well at the indicated location. A comprehensive sampling and testing regime must then be undertaken. If the testing program indicates the selected location is appropriate for a long-term reliable public water source, the next steps will be to prepare a Project Description, conduct CEQA environmental review, acquire permanent easements for the production well and pipeline, prepare final engineering plans and specifications, advertise for bids, and construct the improvements.	\$543,149	water supply
7	RCD of Monterey County: Salinas River Watershed Invasive Non-	56	Wildlife habitat, flood control and water availability on the Salinas River and its tributaries are compromised and threatened by invasive nonnative plants, including the second-largest invasion in California of the noxious weed, Arundo donax. Arundo is a nonnative aggressive perennial grass that has overtaken approximately 2,500 acres of the Salinas River, forming enormous monocultures with virtually no food or habitat value for native wildlife. Aerial GPS-linked photo reconnaissance of the Salinas River and several tributaries by the RCDMC in May 2011	\$1,215,500	natural resource enhancement + flood control + water quality



	native Plant Control and Restoration Program		identified Tamarisk ( <i>Tamarix ramosissima</i> ) as another major invasive plant that is displacing native vegetation and actively migrating into the Salinas River from several tributaries. The project proposal is for the first 3-year stage of treatment (of a 10+ year program) and will target <i>Arundo</i> and tamarisk and other invasive weeds in the channel, floodplain and terraces of the Salinas River between King City and Soledad. All non-native invasive weeds present in these areas will be treated using a combination of physical, chemical and biological techniques, and selected sites will be revegetated with native plants as appropriate to the site (considering flood risk, natural recruitment potential, and landowner interest). The methods and approach of this program are based on successful riparian noxious weed eradication efforts conducted throughout California, as well as at the headwaters of the Salinas River in northern San Luis Obispo County and at Camp Roberts in southern Monterey County.		
8	Monterey County Water Resources Agency: Salinas River Flood Risk Reduction Project	52	The project will fund the preparation of a combined National Environmental Policy Act/California Environmental Quality Act (NEPA/CEQA) document for the Salinas River Flood Risk Reduction Project, which allows channel maintenance activities on the mainstem of the Salinas River. MCWRA has partially funded this effort but additional funding is requested to complete the work, allowing the Salinas River Flood Risk Reduction Project to be implemented. Flooding of agricultural lands within the Salinas Valley, adjacent to the river, has occurred during conditions when in-channel sandbars and riparian vegetation including invasive plants impede high flows. Additionally, limited flood flow capacity in high rainfall years has caused damage or destruction to public infrastructure and private property. As such, MCWRA developed and administers the Salinas River Flood Risk Reduction Project to enhance flood protection, improve riparian habitat and reduce flood damage.	\$420,000	flood control
8	Pajaro/Sunny Mesa Community Services District: Springfield Water Project [DAC project]	52	Funds are requested for construction of a new well, storage tank, and associated distribution system in order to comply with the Nitrate Maximum Contamination Level (MCL) and saltwater intrusion regulations for the Springfield water system. The Springfield water system is made up of 35 connections supplying water to about 165 low-income farmworkers. The system has exceeded the nitrate MCL since at least 1986. The District took over the Springfield water system in 2004. Water containing nitrates in excess of 45 ppm present a risk to the health of humans when continually used for drinking or culinary purposes; the current level of nitrates is 293 ppm into Springfield. The project proposes that a new well be drilled on a site next to the Moss Landing Middle School on Springfield Road. The District obtained title to the site in 2006 and drilled a test well. The test well meets regulatory standards and can provide sufficient water for the Springfield water system and the Moss Landing Mobile Manor located within a mile of the water system. The Springfield water system could consolidate the Moss Landing Mobile Manor water system with this project. The project also consists of constructing a 210,000-gallon storage tank on the same site. The system is currently on a demand basis without water storage. The tank constructed at this site would be at a higher elevation than the distribution system, allowing the system to be gravity fed.	\$3,000,000	water supply + water quality

9	Ecology Action: Monterey Bay Green Gardener Training & Certification Program	49	The Monterey Bay Green Gardener Certification Program provides bilingual, hands-on training in ecological landscaping methods for landscaping industry professionals, public agency landscape maintenance staff, and home gardeners. Green Gardener graduates are trained to be watershed stewards who are actively reducing landscape water demand and preventing urban non-point source pollution in the watersheds of the Monterey Bay National Marine Sanctuary. Individual graduates with business and/or contractors licenses are promoted to the community on <a href="http://www.green-gardener.org">www.green-gardener.org</a> . To date, the Monterey Bay Green Gardener Program has matriculated 422 graduates, 225 of whom graduated from certification-level courses held at the Salinas Adult Education Center. In partnership with California Water Service Company, the Mission Trails Regional Occupation Program (ROP), and Hartnell College Center for Sustainable Construction, the project would: 1) Expand Green Gardener training beyond the Gabilan watershed and City of Salinas to the communities of Gonzales, Soledad, and King City. 2) Incorporate hands-on training experiences at water-wise demonstration sites on both public and private properties. Ecological landscape practices reinforced at demonstration sites include strategies for turf replacement with low-water use plants, irrigation system efficiency retrofits, graywater irrigation design, installation and maintenance, rainwater harvesting systems, and stormwater management with low-impact design methods.	\$38,975	natural resource enhancement + water quality
10	City of Salinas and Monterey Regional Water Pollution Control Agency: Dry Weather Runoff Diversion Program	48	In Phase 1 the City would divert dry weather urban surface water discharge from south Salinas into the City's Blanco Detention Basin. Water from the Detention Basin would then be sent to the MRWPCA regional wastewater treatment plant, or to another location. The City would install a shunt at the City's former wastewater treatment plant site to connect the two existing systems. Water in the basin will settle and filter through the soil as a pretreatment, then flow into a junction point for transfer to the MRWPCA-operated conveyance system. Shoulder-season wet weather events could be similarly diverted, provided flows do not exceed MRWPCA capacity benchmarks. All diversions would reduce the amount of pollutants entering the Salinas River. Once reclaimed, diverted water could be used for dry-season water supply (e.g., as agricultural irrigation water). In Phase 2, dry-weather surface water runoff from the City's northern neighborhoods would be similarly diverted for reuse. Surface water runoff that currently flows into the Rec Ditch would be diverted and reclaimed. This phase includes using existing water quality data for the City's stormwater outfalls and determining flow volumes from the largest sub-watershed within the City--the Rec Ditch. The City would develop site planning, design, and construction of Rec Ditch diversion facilities later as resources permit. This project also would reduce pollution to downstream receiving waters, and potentially add to recycled water supplies.	\$408,000	water supply + water quality
10	Monterey County Water Resources Agency: Aquatic Invasive	48	Monterey County Water Resources and/or its partners will monitor incoming vessels at the entry gates and the public launch ramps at Lake Nacimiento and Lake San Antonio. All vessels will be screened and/or inspected prior to launch to determine if the vessel, trailer, etc. poses high risk of carrying aquatic invasive species (AIS). Upon completing the screening or inspection process, it will be determined if the vessel is clean, drained and dry and therefore eligible to launch. The purpose of this project is to provide an inspection process at the Agency	\$471,000	natural resource enhancement + water supply

	Species Inspection Project		owned lakes that assesses and manages the risks of aquatic invasive species (AIS) without shutting the waters to all recreational boating. The transport of AIS vectors by trailered, recreational boaters is not the only way such vectors may enter a watershed, but as a controllable point of entry, vehicle inspection programs have proven useful in reducing the spread of AIS in other regions of the country.		
11	Central Coast Wetlands Group: Coastal Wetland Erosion Control and Dune Restoration	44	Our proposed project will enhance and restore wetland and sand dune ecosystems in central Monterey Bay, and control erosion in salt marshes directly behind the dunes around Moss Landing. These marshes are critical buffers to prevent salt water from entering surrounding farmland, especially the Salinas Valley, yet they are eroding away at accelerating rates. Sand dunes help retain fresh water at the coast, recharge groundwater, retard saltwater intrusion, and minimize storm damage from the sea. Currently much of the physical dune structure around Monterey Bay is fairly intact, but is also highly degraded with invasive non-native plants, which continue to spread. Monterey Bay is the largest indentation widely open to the sea on the Pacific Coast of the US, with correspondingly large and ecologically important dune systems, and is the core area of the Monterey Bay National Marine Sanctuary. The target area for this project, the central Monterey Bay, has the lowest and most degraded sand dunes in the region. They will be the first to fail as sea level rises from storms, El Nino cycles, and climate change. Should they fail, salt water will overflow into the Salinas Valley, compromising one of the nation's most productive agricultural centers.	\$1,070,164	natural resource enhancement + flood control
11	Monterey County Water Resources Agency: Granite Ridge Regional Water Supply Project	44	MCWRA is proposing to implement the Granite Ridge Regional Water Supply Project (Water Supply Project) to alleviate existing water supply and water quality deficiencies in the Granite Ridge area of northern Monterey County. Groundwater is the single source of water supply for the Granite Ridge area and is highly limited due to an underlying granitic formation. As a result, Monterey County and the MCWRA are proposing the Project to serve existing lots of record experiencing water supply problems in the Granite Ridge area. The Water Supply Project will enable MCWRA to provide potable water service in a way that complies with United States EPA and California Department of Public Health drinking water standards. The Water Supply Project will enable MCWRA to improve the reliability of water supply by interconnecting existing smaller systems into a consolidated water supply system with a new groundwater well to improve supply reliability.	\$6,625,000	water supply
12	Central Coast Wetlands Group: Study of Environmental Services from Nutrient Reducing BMPs	43	The SWRCB, CCC, and other State agencies have identified management measures (MMs) to address agricultural nonpoint sources of pollution that affect State waters. The agricultural MMs include practices and plans installed under various programs in California, called Best Management Practices (BMPs). These BMPs range in action from on-farm nutrient management to cover crops to constructed treatment wetlands. To be effective, BMPs should be targeted by location and type; however, we currently lack the information necessary for precise targeting. This project is intended to fill existing economic and ecological gaps in knowledge about select nutrient load reducing BMPs, supporting current conservation programs, and to explore innovative Payment for Environmental Services (PES) potential. Tasks include an ecosystem service assessment to identify the location and size of existing nutrient reducing	\$372,000	water quality

			BMPs; nutrient reduction research to address gaps in the understanding of the effectiveness of selected BMPs at load reduction; ecosystem service valuation to economically assess the multiple benefits of BMPs; and an ecosystem services analysis to determine if PES is feasible. The results of the project will be beneficial to many different users. In particular, the ecosystem service valuation will have widespread utility in cost benefit assessments of environmental projects, and the load reduction study will help farmers, conservation groups and regulators.		
13	Monterey County Water Resources Agency: Coastal Dedicated Monitoring Well Drilling	41	The twelve dedicated monitoring wells will be drilled under the oversight of a Professional Geologist (PG). The four inch diameter wells will be drilled using Sonic drilling method that allows discrete evaluation of geology to determine where well perforations will be placed. The wells will be strategically placed in Monterey County Right-of-Way locations with the goal to fill water quality and water level data gaps in front of and behind the 2009 500 mg/L chloride seawater intrusion fronts for the Pressure 180-Ft. and Pressure 400-Ft. aquifers.	\$691,200	water supply
14	Central Coast Wetlands Group: Development and Evaluation of Climate Change Response Strategies in the Elkhorn Slough, Gabilan and Salinas River Watersheds	40	This project implements key steps in climate change planning outlined by the DWR 2011 Climate Change Handbook for Regional Water Planning. This project will further and more accurately investigate regional climate change impacts and seeks to recommend adaptation response strategies (a priority action defined within the TAC driven climate adaptation chapter of the GMCIRWMP) to address the impacts of sea level rise, storm surge, coastal inundation and coastal erosion for the Elkhorn Slough, Gabilan, and Salinas River Watersheds. The first phase of the project focuses on collecting and compiling data to further evaluate coastal inundation threats and responses in these watersheds. This data includes an inventory of water control structures that manage current flood control conveyance and topographic data using Light Detection and Ranging technology (LiDAR). The second phase of this project focuses on creating a climate change adaptation and response strategy plan followed by an economic evaluation of these different strategies. The outcome of this project will be a comprehensive report recommending feasible and long-term adaptation and response strategies to climate change impacts, necessary to prepare for future threats rather than respond to emergencies. This project will help support the climate change planning efforts of multiple stakeholders in the GMC IRWMP region. We intend to seek separate grant funds suggested by DWR available for climate planning.	\$392,300	flood control + natural resource enhancement + water quality + water supply
14	Monterey County Water Resources Agency: Test Well for Regional Desalination Project – Slant Well	40	The Monterey area has had long-standing difficulties with its water supply. The area has no imported water sources and local supplies have sometimes been insufficient to provide the expected amount of water. Over the past several decades, local sources have been further constrained due to legal decisions and several proposed projects meant to increase the region’s water supply have been rejected by local voters. In response to the Seaside Basin overdraft and to address the 2006 State Board’s Division of Water Rights Cease-and Desist Order to Cal-Am to reduce its Carmel River well water withdrawals, an alternative “Regional Water Project, Phase I” was proposed. This alternative proposed using vertical and slant wells to produce and treat brine water by reverse osmosis, (RO), and then deliver the potable water for use on the	\$3,000,000	water supply

			Monterey Peninsula to remove the State Board Cease and Desist Order. This proposal would fund the slant test well drilling component of the abovementioned project to determine project feasibility. The proposed project includes four sets of monitoring wells to be located at the project site within about 200 feet of the surface of the slant well. The proposed wells would be constructed and tested over a period of about one year.		
15	Central Coast Wetlands Group: Ecosystem Condition Profile for the Lower Salinas River Watershed using the Level 1-2-3 Framework	36	The goal of this project is to provide cost-effective, scientifically-based, and integrated information on stream ecosystem condition in the Salinas watershed to inform management decisions and optimize ecological monitoring activities. To address this goal, the Environmental Protection Agency's 1-2-3 Framework will be selected and tailored to the region's interests. The 1-2-3 part of the Framework relates to three different levels of data collection that address different types of resource management questions. Landscape Assessments (Level 1) are inventories of streams in a watershed. They generate a base map of the extent and distribution of stream ecosystems in each watershed and help determine what role the organizations can take to maintain or improve stream conditions. Rapid Assessments (Level 2) evaluate the overall, or ambient, condition of riverine wetlands inexpensively and in a comparatively short time frame. Intensive Assessments (Level 3) provide finer resolution field data to evaluate the performance of mitigation sites, establish baseline conditions, and help to understand the cause of declines in habitat conditions. The information at the three levels will be synthesized into an integrated report of stream condition, referred to as Stream Ecosystem Condition Profile, within the main stem of the Salinas River and in two smaller sub-watersheds watershed. Profiles also identify the stressors affecting condition, risks and consequences of unmitigated stressors, and recommended actions to maintain or improve condition. Because the a majority of the land ownership or control over streams relative to the vast drainage network in each watershed is in private hands, the assessments help to clarify what role public agencies and regional organizations can take to protect stream condition and how to engage others through partnership or advocacy to help implement solutions.	\$517,875	natural resource enhancement
16	California State Parks: Big Sur River Steelhead Enhancement Project	35	The Big Sur River provides spawning and rearing habitat for the federally threatened South-Central California Steelhead ( <i>Onchorhynchus mykiss</i> ). Six and a half of the 8 ½ miles (75 %) of the river that are passable to steelhead are within Andrew Molera State Park (AMSP) and Pfeiffer Big Sur State Park (PBSSP). For this reason, California State Parks authorized development of the Big Sur River Steelhead Enhancement Plan (BSRSEP), which was completed in 2003. The project is made up of the following components: A) Constructing a clear-span bridge to replace an existing double squashed culvert crossing at Post Creek in PBSSP campground. Permitting and design has already been funded. B) Conducting riparian re-vegetation, exclusionary fencing and bank stabilization in degraded riverside campsites and the day use picnic area within PBSSP. C) Relocation of a portion of the Beach Trail in AMSP away from the river. D) Installation of steelhead lifecycle and regulation interpretive displays. E) Removal of invasive, non-native plant species and re-vegetation with natives along the riparian corridor in AMSP.	\$400,738	natural resource enhancement

16	Monterey Bay Sanctuary Foundation: Making Monitoring Count	35	This project is necessary to document the IRWMP efforts and their effectiveness throughout the Greater Monterey County region. This project will implement the tracking system developed to inventory projects designed to address the goals of improved water quality, water supply, flood control and environmental protection outlined in the IRWMP. The Monterey Bay National Marine Sanctuary's Synthesis, Analysis and Management (SAM) program initiated this effort in 2006 by conducting an initial compilation and assessment of water quality data collected on the Central Coast. This effort led to the development of the Strategic Plan for Central Coast Water Quality Monitoring Coordination and Data Synthesis. This project will further the tasks described in that plan by developing a framework for improving regional capacity to coordinate monitoring, synthesize information, communicate more effectively between key groups, understand environmental changes, and respond to changes and new knowledge with adaptive management. Water quality data have historically been stored in disparate formats at diffuse locations throughout the region, making them difficult to use collectively. Combining this with tools developed in the Tahoe Basin to measure effectiveness of practices and load reductions will be extremely valuable to the IRWM process	\$324,000	water quality
16	Monterey County Water Resources Agency: Salinas River Fisheries Enhancement Project	35	The SRFEP is a culmination of the fisheries-related work that is necessary for the implementation of the Salinas Valley Water Project (SVWP). There are three main purposes for the SRFEP: (1) population monitoring to quantify the presence of the Endangered Species Act listed <i>Oncorhynchus mykiss</i> (steelhead trout) in the lower Salinas River system (2) monitor river flows to ensure adequate water for fish passage (migration monitoring) (3) monitor water quality to determine habitat suitability. Tasks that identify the presence and/or enhance the population of <i>O. mykiss</i> will be performed within the Salinas River Watershed in the Salinas River, the Salinas River Lagoon, the Nacimiento River and the Arroyo Seco River.	\$867,000	natural resource enhancement + water supply
17	City of Salinas: Integrated Industrial Wastewater Conveyance and Treatment Facility Improvements	31	This project will include new gravity sewers with capacity to collect more of the City's industrial wastewater and convey it to the IWTF, upgrades to the IWTF to treat increased industrial flows (expanded electrical system and aeration treatment and related upgrades), and a system to filter the IWTF effluent through soil at the IWTF. After extraction the water would be available for reuse. New monitoring points around the soil bed filtration system will monitor system efficiency and assess its performance and success, such as producing high quality water with low suspended solids. The City has identified multiple potential beneficial uses for treated water including the following: 1) Encourages ground water re-charge. 2) Combats saltwater intrusion. 3) Transfer to the Monterey Regional Water Pollution Control Agency for high quality diluent in its groundwater recharge project. 4) Use as low-salt feed water for potential upgrade to potable water for the City of Salinas. 5) Use after some desalting for agricultural irrigation or without desalting for non-agricultural irrigation water (golf course, playing fields, etc.). 6) Discharge to the Salinas River for reuse by others when withdrawn at the inflatable dam. The potential quantity of water now exceeds about 2,500 acre feet annually and could increase to several times that amount as the IWS grows. The water quality would be substantially improved since the effluent had filtered through the soil column, removing algae and other suspended solids and some trace constituents. For the IWS, such withdrawal would	\$10,720,000	water supply



			enhance both disposal pond and the percolation bed percolation rate, effectively increase effluent disposal capacity, and hence, treatment capacity.		
18	Central Coast Wetlands Group: Expansion of a Coastal Confluence Water Monitoring System to support the Greater Monterey IRWMP	30	We anticipate that the cumulative results of regional water quality enhancement efforts will lead to improvements in water quality of receiving waters. We currently do not have the robust monitoring systems in place to successfully document these improvements. This project aims to expand the coverage of the continuous monitoring LOBO (Land/Ocean Biogeochemical Observatory) buoy monitoring array from the current location at the end of the Gabilan/Old Salinas River Channel (and several within the Elkhorn receiving waters) to the two additional priority coastal confluence locations that drain significant portions of the Salinas Valley (the Moro Cojo Slough and Salinas River mouth). Additional less costly nutrient monitoring equipment will be installed at the confluence of multiple sub-drainages in order to further document the cumulative effects of nutrient management strategies within the sub-drainages of each watershed. Funds will support the construction of a new LOBO bouy for the Salinas River and the refurbishment of a buoy currently being used within the Elkhorn Slough which will be redeployed within the Moro Cojo Slough. Funds will also support three years of half time staff and student support for the LOBO system including one station currently deployed within the Elkhorn Slough. This will document the enhancement of water quality within receiving waters due to watershed management practices.	\$600,557	water quality
19	Delicato Vineyards: San Bernabe Lining Project	27	The project is a continuation of initial linings which first occurred in 1998 in co-operation with PG&E and will continue, subject to available funds into the future until all water containment; both canals and reservoirs are lined. Currently we have 6 reservoirs lined along with approximately 6 miles of canals. The remaining canals and reservoirs are detailed on attached sheet. San Bernabe historically has done all the preliminary dirt work and has used outside contractors such as Sierra Geotechnical and D and S Construction for the actual install of the membrane. The lining or membrane is composed of extruded polypropylene in a 7-layer composite structure which is waterproof and impact proof. We have seen a 99% reduction in water loss due to the install which relates to reduced energy, both electrical and diesel, due to reduced pumping both at the wells and lift stations. The only containment/conveyance structures which will not be lined will be 2 reservoirs which fill naturally from springs and are left as natural habitat for mammals and waterfowl. Lining the structures not only prevents percolation and required pumping, but can provide habitat for waterfowl 365 days per year. All the structures are fenced to prevent accidental entry by hoofed animals such as deer and wild pigs, but permit the entry of waterfowl and small species. Lining reduces the use of aquacades due to no soil contact with water and yearly fuel use to clean and reshape the canals and reservoirs. Several of the structures border neighbors and will prevent the possible breakage and flood especially onto fields with leafy greens. Linings allow the pumping of water during non-peak hours reducing power demands to the grid and in most cases the water is gravity flowed into the system with no power demand. Lining will allow pumping only to water demand and not percolation.	\$1,710,750	water supply

20	Save Our Shores: Watershed Protection Program - Annual Coastal Cleanup Day in Monterey County	23	Save Our Shores (SOS) has been coordinating Annual Coastal Cleanup Day (ACC) in Santa Cruz since 2007 and has grown the event from 1,929 volunteers and 42 beach sites to 3,800 volunteers and 52 beach and river sites, in just two years. While SOS has been running ACC in Santa Cruz, California State Parks had been running ACC in Monterey since 2001 and no longer had the staff or resources to continue running this event after 2009. Because of the success that SOS has had in expanding the event in Santa Cruz, State Parks and the Coastal Commission asked SOS to take over this responsibility in Monterey in 2010. SOS ran the program in Monterey based on best practices from Santa Cruz and increased the number of volunteers from the previous 1,400 average to over 2,000 the first year and increased the number of sites by including river cleanups through our partnership with Return of the Natives, and involving businesses through sponsorship and employee participation. In the coming years, volunteers will continue to gain a valuable experience in understanding the problem of marine debris and learning ways that they can help solve the problem, and the thousands of visitors that Monterey beaches attract will benefit by experiencing cleaner beaches.	\$12,000	water quality
21	Rural Community Assistance Corporation: Greater Monterey Bay Disadvantaged Community Wastewater Management Pilot Program [DAC project]	22	Too often we read about septic effluent influencing our agricultural lands and creating public health and other environmental hazards. If these disadvantaged communities had the opportunity to create an Inspection and Monitoring Program for their community onsite wastewater systems, they would be successful in limiting public health hazards and environmental pollution. The Greater Monterey Bay Disadvantaged Community Wastewater Management Pilot Program will form a collaboration of experts, students, community leaders and local government to implement an Inspection and Monitoring program of community onsite wastewater systems. This program will include creating a local entity to manage multiple systems to ensure the systems are operating properly. The program will create an on-going operation and maintenance program, including ground water monitoring, for selected disadvantaged communities that are served by individual septic systems that may not afford traditional sewer systems.	\$677,000	water quality
22	Monterey County Public Works: Las Lomas Drive Storm Drain Improvements Project	19	Las Lomas Drive is a rural two-lane road with unimproved shoulders, no curbs, gutters and sidewalks, sub standard drainage ditches and culverts. Due to the substandard drainage ditches and culverts Las Lomas Drive is prone to flooding during the peak of the rainy season. The project proposes to improve 0.25 miles of Las Lomas Drive from Sill Road to Thomas Road. The project involves constructing new curb, gutter and sidewalks, Class II bicycle lanes, storm drains, a water treatment system, and rehabilitating the existing roadway. Las Lomas is a small low-income community located in the northern part of the Greater Monterey County IRWM region with a population of 2,677 as of 2009 with an 89% of Hispanic/Latino population, according to the 2010 U.S. Census, who are predominately low-income and Spanish speaking.	\$787,500	flood control

**G.2 FUNDED IRWM PLAN PROJECTS**

Seven of the “2010 cohort” implementation projects that had been included in the Greater Monterey County IRWM Plan were awarded grant funds from Round 1 of IRWM Implementation Grants (in 2011). Table G-2 below provides a brief summary of these seven projects, along with the award amounts and each project’s primary resource areas. The Greater Monterey County IRWM region received a total of \$4,139,009 in Implementation Grant funds from Round 1. The seven projects that received support from this round are currently being implemented.

**Table G-2: Funded Implementation Projects: IRWM Plan Projects funded through Round 1 IRWM Implementation Grant Program, 2011**

Project Proponent & Project Title	Project Summary	Awarded Amount	Primary Resource Area(s)
City of Soledad: Soledad Water Recycling/ Reclamation Project	The City of Soledad is designing and constructing, in fundable phases, the balance of the Soledad Water Reclamation Project. The 5.5 million-gallon/day (MGD) Water Reclamation Facility was substantially complete on February 24, 2010. This project includes completion of design of a recycle water delivery system to both agricultural and recreation areas in and near the City of Soledad. The project also includes research on the use of recycled water for agricultural uses. The entire project costs an estimated \$45M. The first phase, which is being implemented through this grant, is to construct the recycled water pump station and to design and construct the transmission mains needed to connect the recycled water transmission mains already constructed to the pump station. Completion of this phase will enable delivery of recycled water to multiple landscaped areas currently being irrigated with potable water. This first phase will also include a feasibility study and preliminary conceptual design for the neighboring communities of Gonzales and Greenfield for delivery of their cities' wastewater to the Soledad Water Reclamation Facility for processing.	\$904,480	water supply
Castroville Community Services District: Castroville CSD Well 2B Treatment Project [DAC project]	The project consists of construction of a well pump and arsenic removal treatment system for an existing well in Castroville, CA. This is a water supply enhancement project. Castroville's wells are in the 180/400-Foot Aquifer of the Salinas Valley Groundwater Basin, and were experiencing increased salinity due to seawater intrusion. The overall project is to construct a new well in the deeper 900-Foot Aquifer and reduce pumping from the shallower aquifers. In 2007, Castroville Water District (now the Castroville Community Services District) drilled a new well, No. 2B, into the 900-Foot Aquifer. Water quality testing indicated that arsenic levels in the new well (17 parts per billion [ppb]) exceeded the maximum contaminant level (MCL) for drinking water (10 ppb). The District has designed the well pump and treatment system for the new well, but has not initiated construction.	\$581,000	water supply + water quality
San Jerardo Cooperative, Inc.: San Jerardo Wastewater Project [DAC project]	This project consists of construction to upgrade the wastewater facility at San Jerardo Cooperative, a farm-worker housing collective. San Jerardo is a DAC that is confronted with serious drinking water, wastewater, and human health concerns. The community runs its own wastewater system in the form of four ponds, leach fields, and a machine room. The area's groundwater, and hence the community's drinking water, is threatened by nitrate contamination and other issues. The community urgently needs to upgrade the wastewater system to prevent further water quality deterioration. In addition, the current system is at capacity, and the proposed repairs and upgrade are necessary to ensure compliance with the Central Coast Regional Water Quality Control Board's (RWQCB) Waste Discharge Requirement Order No. R3-2003-0054 and to prevent further groundwater contamination in the Salinas Valley - East Side aquifer. The project is in close collaboration with a number of entities, including: Monterey County; the Central Coast RWQCB; Rural Community Assistance Corporation; Engineers Without Borders; and the Environmental Justice Coalition for Water.	\$924,455	water quality

<p>Elkhorn Slough Foundation: Integrated Ecosystem Restoration in Elkhorn Slough</p>	<p>In this project, the Elkhorn Slough Foundation, in partnership with the Elkhorn Slough National Estuarine Research Reserve, the Moss Landing Harbor District, the Monterey County Water Resources Agency and the County of Santa Cruz, will restore up to 90 acres of tidal salt marsh and a 30-acre native grassland buffer to provide habitat and reduce non-point source pollution in Elkhorn Slough. The marsh will be restored through the placement of sediment to be removed from Moss Landing Harbor and benches along the Pajaro River, making harbor maintenance and flood protection projects more effective and with fewer impacts on the environment. The project will address these specific problems through a collaborative approach and using a phased implementation approach. Prior phases included property acquisition and establishment of a buffer between farmland and the estuary. The next phase, the focus of this grant, includes: planning to finalize the project description and conduct California Environmental Quality Act (CEQA) compliance, engineering to a 30% design, establishment of native grassland in portions of the vegetated buffer, and site preparation for receiving sediment.</p>	<p>\$822,242</p>	<p>natural resource enhancement + flood management + water quality</p>
<p>Central Coast Wetlands Group at Moss Landing Marine Labs through San Jose State Research Foundation: Water Quality Enhancement of the Tembladero Slough and Coastal Access for the Community of Castroville</p>	<p>This project aims to enhance the thoroughly degraded Tembladero Slough, a water body that currently has 14 303(d) listed pollutants, which flows untreated into the Monterey Bay National Marine Sanctuary (MBNMS). Enhancement will be achieved through a collaborative effort between County planners, farmers, scientific researchers, and the community. In this first phase of the project, the Coordination Team will redesign the form and function of the lower drainage to include wetland enhancement projects, water quality treatment areas, and public access, while addressing agriculture discharge permits, the Castroville Redevelopment Plan, and the County Flood Control Program. In the second phase, the Coordination Team will improve water quality through the purchase of easements and creation of treatment wetlands in strategic locations along the slough, improve flood plain open space areas, create enhanced habitat, and construct public access trails where possible.</p>	<p>\$341,698</p>	<p>flood/watershed management + natural resource enhancement + water quality</p>
<p>Monterey Bay National Marine Sanctuary, Central Coast Wetlands Group, and the Resource Conservation District (RCD) of Monterey County: Watershed Approach to Water Quality Solutions</p>	<p>This project will take a watershed approach to improve water quality in Santa Rita Creek, an impaired water body located within the Lower Salinas River Watershed. This approach will address impacts from agriculture and urban areas and will incorporate creek restoration while engaging the community. Santa Rita Creek flows into the Salinas Reclamation Ditch, Tembladero Slough and ultimately to the MBNMS. These water bodies are considered the most polluted water bodies on the Central Coast with 37 Total Maximum Daily Load (TMDL) listings, 7 of them on Santa Rita Creek. Agricultural efforts will focus outreach and referrals to leverage existing programs and funding for implementation of irrigation and nutrient management practices and the Livestock and Lands program. In addition, management measures will control erosion from strawberry crops. Two restoration projects along Santa Rita Creek will promote environmental stewardship, reduce illegal dumping, stabilize banks and increase biofiltration of pollutants through revegetation of native plants. This holistic approach will inform resource managers on the geographic scale at which we can see improvements to water quality and habitat.</p>	<p>\$372,413</p>	<p>water quality + flood/watershed management</p>
<p>University of California, Davis (Granite Canyon Marine Pollution Studies</p>	<p>In order to protect the beneficial uses of aquatic habitats, many cities are now mandating LID treatment systems such as bioswales. Information on the ability of urban bioswales to reduce toxicity is an important component for evaluating impacts of regional urban stormwater runoff.</p>	<p>\$192,721</p>	<p>water quality</p>

Laboratory): Evaluation of Potential for Stormwater Toxicity Reduction by Low Impact Development (LID) Treatment Systems	This project will evaluate the efficacy of bioswales in reducing the concentrations of contaminants that contribute to stormwater toxicity in the City of Salinas. Looking at four sites in the City of Salinas, the project will: 1) assess toxic effects of stormwater runoff to aquatic organisms prior to treatment by bioswales; 2) evaluate efficacy of bioswales to reduce toxicity to aquatic organisms; 3) determine stormwater and pollutant load reduction through bioswales; and 4) provide data to stormwater agencies, water quality managers, LID engineers, and others to be incorporated into future land-use planning and management decisions.		
<b>TOTAL AWARD AMOUNT</b>		<b>\$4,139,009</b>	



### **G.3 CONCEPT PROPOSALS**

Table G-3 below presents the list of the proposed concept proposals currently included in the Greater Monterey County IRWM Plan. As noted previously, the concept proposals are not ranked, but have been reviewed and vetted for inclusion in the Plan. The Project Review Committee reviewed concept proposals according to the following criteria:

- Does the project meet the minimum IRWM Plan standards (as described in Section F.2.1, Project Review Process)?
- Are there potential environmental justice impacts or impacts to disadvantaged communities (DACs)?
- Do there appear to be potential problems or conflicts either with IRWM Plan objectives or with other projects?
- Are there possibilities for integration with other projects?

All of the concept proposals included in this IRWM Plan meet the minimum IRWM Plan standards. None of the projects appear to present potential environmental justice impacts or impacts to DACs (as of the writing of this Plan); and several of the projects show potential opportunity for integration with other IRWM Plan projects. The RWMG will encourage those project proponents to consider combining projects or project elements with other IRWM Plan projects, as appropriate. The RWMG will also consider opportunities to develop regional programs that would efficiently combine individual projects.

**Table G-3: Concept Proposals**

<b>Project Proponent &amp; Project Title</b>	<b>Project Summary</b>	<b>Primary Resource Area(s)</b>
Big Sur Land Trust, City of Salinas, CSUMB Watershed Institute and Return of the Natives: Carr Lake Property Acquisition	The goal of this project is the acquisition of the 450-acre Carr Lake basin, and its conversion into parkland for the multiple uses of recreation, restored wetlands and riparian wildlife habitat, stormwater detention, open space, and water quality enhancement for downstream areas including the Reclamation Ditch and the MBNMS. The restored Carr Lake Regional Park will connect via trails to Natividad Creek Park, which lies immediately upstream. Re-creation of wetlands and floodwater detention areas will provide reduction of flood impacts to the City of Salinas and to downstream agricultural and community lands. Water quality will also improve due to restored wetlands and natural vegetation, via sediment capture and the biological treatment of constituent chemicals.	natural resource enhancement + flood control + water quality
Central Coast Regional Water Quality Control Board: Healthy Functioning Watersheds: Green Infrastructure and the Preservation and Protection of Hydrologic Processes	The RWQCB's Vision of Healthy Watersheds calls for watershed protection in part through the use of green infrastructure. Green infrastructure is the set of practices that mimic natural processes to retain and use stormwater. Through infiltration, evapotranspiration, and harvesting stormwater throughout the landscape, green infrastructure preserves and restores the natural water balance of a watershed. Environmental benefits include reducing flooding, improving water quality, providing habitat, reducing the urban heat island effect, mitigating global warming and increasing groundwater recharge. Healthy sustainable watersheds supported by green infrastructure use less energy for imported water, have fewer greenhouse gas emissions, and a lesser carbon footprint than unhealthy watersheds. With this concept proposal the RWQCB is encouraging organizations to implement green infrastructure projects.	flood control + water quality + natural resource enhancement + water supply
Central Coast Regional Water Quality Control Board: Healthy Functioning Watersheds: Irrigation Efficiency and Nutrient Management on Agricultural Lands	With this concept proposal the RWQCB is encouraging organizations to work with farmers to implement irrigation and nutrient management projects. The RWQCB's Vision of Healthy Watersheds calls for watershed protection through the implementation of irrigation efficiency, and nutrient as well as pesticide and sediment management on agricultural lands. This includes conducting irrigation evaluations and corresponding actions designed to address pollutant loading from tailwater, creating un-farmed buffers that improve water quality (e.g., filter and infiltrate runoff), and protecting or improving habitat (e.g., stabilize streambanks and shade streams) between intensive agriculture and wetland/riparian areas. The Central Coast Water Board has prioritized implementation in the Salinas watershed and other impaired waterbodies included in the Greater Monterey County region. Irrigation and Nutrient Management, especially related to protection of shallow domestic drinking water wells, continues to be one of the RWQCB's highest priorities. Implementation would be carried out via various partnering organizations in collaboration with growers.	water quality
Central Coast Regional Water Quality Control Board: Safe and Affordable Drinking Water for Disadvantaged Communities	This concept proposal is focused on prioritizing projects that address the immediate drinking water needs of disadvantaged communities (DACs) and is in alignment with the RWQCB's highest priority of preventing and correcting threats to human health. Nitrate pollution of groundwater is one of the most significant threats to human health in our region. Domestic wells and small water system wells within or adjacent to intensive agricultural areas are the most at-risk of nitrate pollution in the Salinas Valley, and DACs generally shoulder a disproportionately higher share of the health and economic-related cost associated with nitrate pollution. In many cases DACs can't afford to address drinking water pollution, don't qualify for available funding, and have	water quality + water supply

	<p>difficulty navigating the myriad of drinking water related funding and regulatory programs. This concept proposal is focused on a three-pronged strategy to address the immediate needs of DACs who currently do not have a safe and affordable drinking water supply. The three-pronged strategy includes: 1) comprehensively and uniformly identify the drinking water problems and associated needs of DACs with the Greater Monterey County IRWM funding area; 2) the provision of interim safe water supplies (e.g. bottled water, etc.) to residents until more permanent solutions are implemented; 3) the evaluation and implementation of long-term safe and affordable drinking solutions (e.g. treatment, new water supply, consolidation, etc.). This concept proposal is focused on prioritizing projects that resolve drinking water contamination problems with an emphasis on, but not limited to, nitrate pollution and DACs.</p>	
<p>Central Coast Wetlands Group: Historic and Existing Drainage Network Mapping Project: Phase 1</p>	<p>This project proposes to utilize available public domain digital elevation models and orthophotography as a base for a GIS based mapping of drainage networks in the Salinas River, Elkhorn Slough, and Moro Cojo watersheds with two primary goals. The first, to recreate the pre-development drainage network of the subject area watersheds based on existing topography, historical records and field verification to determine historical surface drainage conditions. Secondly, to map the existing drainage network of the subject watersheds based on existing topography and drainage infrastructure.</p>	<p>flood control + natural resource enhancement + water quality</p>
<p>Central Coast Wetlands Group: Sustainable Agriculture and Sustainable Development - Field Station and Demonstration Area</p>	<p>This project proposes to establish a large acreage (100-640 acres) sustainable agriculture and sustainable development field research station to develop innovative sustainable land use practices for agriculture, residential, and commercial development on a landscape scale. The site will provide continuous monitoring of practices to ensure that the desired outcomes are achieved, establish long-term data sets and allow for new innovations and practices to be developed. The field station will also provide a demonstration area that can be reviewed and studied by other landowners and land managers to determine applicability to their individual projects or farms. The primary goal of this project is to improve water resources on and offsite in the context of modern land use.</p>	<p>water quality</p>
<p>City of Salinas: Replacement Raw Sewage Pipeline to Monterey Regional WWTP and City of Salinas Industrial Wastewater Treatment System Expansion</p>	<p>The City has identified two potential projects at a conceptual development level—expanding the City’s capacity to treat and reuse industrial wastewater and increasing conveyance capacity for transferring raw sewage from the City to the MRWPCA wastewater treatment plant (WWTP), for treatment, followed by reuse or disposal.</p>	<p>water quality + water supply</p>
<p>Coastal Watershed Council: Community-Based Water Research and Education</p>	<p>This project involves Community-Based Participatory Research (CBPR) with a goal of engaging diverse individuals and groups in future discussions of water supply, water quality, and other environmental issues. This approach lends greater legitimacy to future plans and actions by ensuring community involvement. Outcomes from this research will help elected officials and water agency boards to best serve their constituents and establish connections that will benefit all future planning and implementation efforts. This process further benefits the entire region, as it empowers and engages the public in crucial water issues where they might not otherwise be informed or active. The Coastal Watershed Council will lead the efforts to administer the CBPR on a specific watershed-by-watershed basis. Ultimately, this approach could foster the creation of specific watershed</p>	<p>flood control + water quality + natural resource enhancement + water supply</p>

	management and/or restoration plans, filling a noticeable void within the region. The holistic approach of this CBPR project would also address numerous objectives in all seven goals outlined in the region’s IRWM Plan.	
Coastlands Mutual Water Company & Big Sur Land Trust: Post Creek Water Supply and Watershed Restoration Project	The Post Creek Water Supply and Watershed Restoration Project includes two objectives: (1) securing a water supply system and (2) restoring watershed function to a degraded coastal stream and its receiving watershed. The water supply system portion of the project will include the rehabilitation of the Coastlands Mutual Water Supply Company spring box intake and 3000 feet of the company’s water supply distribution line servicing 60 customers in Big Sur. The water supply system is the only supply for the 60 water customers and was destroyed in the Basin Complex Fire of 2008. The project’s other objective is to work to restore geomorphic function back to the Post Creek drainage and to rehabilitate the watershed from the effects of the Basin Complex Fire. Currently the Post Creek watershed is drained through a 24-inch culvert located within the creek bed at Coast Ridge Road. Due to the presence of debris from the Basin Complex Fire and the continual source of sediment and materials coming from the burned watershed, the undersized culvert fills with sediment and debris and results in road failure and sediment deposition in Post Creek and ultimately to the Big Sur River. The project proposes the placement of a box culvert at the location of the existing culvert to provide proper drainage and for a more natural sediment flow through the drainage without road failures and debris flows as in the current conditions.	water supply + natural resource enhancement + water quality
CSUMB Return of the Natives: Return of the Natives Restoration Education Project—An IRWMP partner	The Return of the Natives Restoration Education Project (RON) is the education and outreach branch of Watershed Institute of the California State University Monterey Bay. For this concept proposal, RON would like to present their organization as a partner to other IRWM Plan projects. They offer to bring the marriage of native plant restoration and community engagement, which has become known as “community based habitat restoration” to IRWM Plan projects. RON’s social goal is to bring people and nature together on restoration and garden projects in the watersheds of the Monterey Bay. RON’s partnership has the capacity to bring tens of thousands of native grasses, forbs, shrubs, and trees to restoration projects. The plants grown by volunteers and RON staff and CSUMB students are eventually planted by these same volunteers on restoration sites. RON has the capacity to grow and out-plant from 25,000 to 50,000 native plants annually.	natural resource enhancement
CSUMB Watershed Institute: Monitoring Water Quality Improvements with BMPs	The Watershed Institute is offering to conduct monitoring for IRWM Plan projects, as requested and as needed, to test water quality as a result of urban, suburban, rural, and agricultural management practices.	water quality
Marina Coast Water District: Monterey Bay Regional Desalination Project	The Regional Desalination Project will provide approximately 10,500 AFY of potable water on an average annual basis to both the California American Water Company (CalAm) and MCWD service areas. The Regional Desalination Project generally consists of a reverse osmosis desalination plant to treat a mix of seawater and brackish groundwater water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce 10 million gallons per day of product water. Intake facilities include intake wells and an intake pipeline that will convey the extracted water to the desalination plant for treatment. The desalination facilities will include a pretreatment system, the RO system, a post-treatment system, clearwell tanks, and brine disposal. The brine from the desalination plant will be blended with treated effluent from the MRWPCA’s Regional Treatment Plant and disposed of via MRWPCA’s existing ocean outfall. Distribution	water supply

	<p>pumping and a transmission pipeline will convey the desalinated (product) water to MCWD’s and CalAm’s service area for potable use. The existing Aquifer Storage and Recovery system operated by Monterey Peninsula Water Management District (MPWMD) will be expanded as part of the project to provide additional storage capacity for the desalinated water produced by the Regional Desalination Project. A portion of the facilities will be powered by Monterey Regional Waste Management District’s cogeneration facility, reducing the carbon footprint of the Regional Desalination Project and GHG emissions.</p>	
<p>Monterey Coastkeeper/ The Otter Project: Maintenance and Flood Control Planning for the Old Salinas River Channel and Reclamation Ditch</p>	<p>A facilitated stakeholder process is proposed to bring people together to find common ground in regard to maintenance and flood control planning for the Old Salinas River Channel and Reclamation Ditch. Various visions for these highly modified waterways may require iterative review by consultants knowledgeable about the area and skilled in hydrology and geomorphology. Agencies such as the US EPA, RWQCB, MCWRA, NMFS, and California Department of Fish and Game (DFG) should be involved. Growers and landowners should be involved. And stakeholders such as Sierra Club, Surfrider Foundation, CA Native Plant Society, Audubon, and Monterey Coastkeeper should be involved. Such a process is the only way to bring people together, find common ground, maintain the waterways, and provide flood control. Deliverables from the process will be a 401 permit application and a Channel Maintenance Technical Memorandum.</p>	<p>flood control</p>
<p>Monterey Coastkeeper/ The Otter Project: Finding a Common Ground Approach to Salinas River Flood Management</p>	<p>A number of groups and agencies resisted grower and Monterey County Water Resource Agency plans to undertake bulldozing projects in the Salinas River channel without an environmental impact study. The US EPA designated the Salinas River an Aquatic Resource of National Importance (ARNI) essentially stopping the Army Corps of Engineers 401 permit process. The MCWRA has now funded environmental review. While the review may satisfy CEQA requirements, the study may do little to balance the value conflicts of growers, fish, water quality, and other users. Environmental review will certainly not address the ARNI designation. A facilitated stakeholder process is proposed to bring people together to find a common ground approach to flood management in the Salinas River.</p>	<p>flood control</p>
<p>Monterey County Public Works: Boronda County Sanitation District Guide Rail Upgrade Project</p>	<p>The goal of the Boronda County Sanitation District Guide Rail Upgrade Project is to replace the T-rail system and replace it with dual tube guide rail system. This project is through the beginning stage. Planning is underway between the Wastewater Collection crew and the Bridge crew to complete the project in a timely manner. This guide rail project will significantly improve performance. It is an effective way to ensure that the pump has a good seal and the flow is diverted with out seepage. Estimated project completion is within 90 days with proper funding. This project will minimize the pump seepage and reduce the amount of Sewer System Overflow occurrences.</p>	<p>water quality</p>
<p>Monterey County Public Works: Chualar Wastewater Collection and Treatment System Upgrade Project</p>	<p>Chualar Ponds operate as a percolation system which requires dredging, disking the ponds on an annual basis. This project requires the following repairs and items to be implemented: 1) <u>Valve replacement</u>: Each pond has a valve to allow ponds to divert flow from one pond to another. Without the pond rotation we cannot operate the ponds successfully. The Department of Public Works will also develop a way to tie in to a water supply in the area to obtain potable water. 2) <u>Monitoring</u>: Monitoring constituents in the ponds will require meters, including a dissolved oxygen meter and a pH meter. 3) <u>Back-up generators</u>: Back-up generators will be rented or purchased to ensure that the public is protected from Sanitary Sewer Overflows. 4) <u>Guide rail project for CSA-75</u>: The 30-year-old infrastructure which has the old T-rail system will be replaced. This includes replacing the base in some</p>	<p>water quality</p>

	of the lift stations and replacing the T-rail system with the guide rails. 5) <b>Plan of Action:</b> This includes the process of communicating with other districts and agencies to form a one-time fee for confined space training for additional County employees. 6) <b>CSA-75 SSMH:</b> The Public Works Department will elevate three manholes to reduce the amount of water intrusion in the Sanitary Sewer System.	
Monterey County Public Works: County Service Area 72 - Las Palmas Monitoring Wells	In order to operate the wastewater facilities and to discharge recycled water via irrigation systems, a Waste Discharge Requirement (WDR) is required. The RWQCB issued a WDR Order to meet this requirement for the Las Palmas Ranch Residential Development. On December 1, 2006, the RWQCB issued Master Reclamation Requirements (MRR) that required a Groundwater Monitoring Well Work Plan. That Monitoring Plan was prepared by Schaaf & Wheeler and submitted to the RWQCB on May 31, 2007. That plan called for the installation of additional monitoring wells at an estimated cost (in 2007 dollars) of \$130,000. There are insufficient funds within the CSA 72 accounts to pay for the full costs of the plan. Grant funding consideration is requested for the installation of groundwater monitoring wells to implement the submitted Work Plan.	water quality + water supply
Monterey County Public Works: Moss Landing County Sanitation District Wastewater System Upgrade Project	The goal of the Moss Landing County Sanitation District Guide Rail Upgrade project is to improve the T-rail system and replace it with the guide rail system. This project is already in process however it is at the beginning stage. Planning is underway between the Wastewater Collection crew and the Bridge crew to complete the project in a timely manner. This guide rail system will last as long as the T-rail system is properly maintained. This project will minimize the pump seepage and reduce the amount of Sewer System Overflow occurrences.	water quality
Monterey County Public Works: SCADA Project	This concept proposal is to implement a Supervisory Control And Data Acquisition (SCADA) program for all County Sanitation Systems, which will ensure accurate monitoring for the Sanitary Sewer System. Implementing this project will be an effective way to reduce the amount of man hours as well as to efficiently monitor system performance and avoid emergency events.	water quality
Monterey County Water Resources Agency: Granite Ridge Expansion Project (tentative name)	The project described in this concept proposal represents a sustainable solution to water supply in the Highlands South/Granite Ridge subareas of the northern portion of Monterey County. The project consists of a conveyance pipeline that starts near Castroville and runs along Castroville Boulevard and ties in to the Granite Ridge Distribution System (which for the purposes of this project is assumed to be built). Along the conveyance pipeline alignment, there are laterals/spurs that would provide water to smaller areas along the pipeline route. This project would build upon the success of the Granite Ridge Distribution Project (GRDP), which provides water to an area of Monterey County that is in great need of a sustainable water supply solution. The GRDP is listed as another project in this IRWM Plan. The GRDP utilizes water from two wells and distributes the water via pumps, storage tanks, and pipelines. Conversely, the GREP utilizes the existing infrastructure from the GRDP and augments the water supply of surrounding areas, with a different source of water.	water supply
Monterey County Water Resources Agency: Implement Reclamation Ditch Improvement Plan Advisory Committee	The Reclamation Ditch Improvement Plan was developed by the Reclamation Ditch Improvement Plan Advisory Committee (RDIPAC) to address the flooding, erosion, and sediment issues impacting the Reclamation Ditch system, a 157 square mile watershed. The desired project types submitted here will implement recommendations by the RDIPAC. Some of the recommendations include the following: replace Potrero Tide Gates, increase channel capacity and embankment stabilization (various locations), conduct bridge replacements (12), modify Main Street box culvert, increase pumping capacity at pump stations (2), conduct a comprehensive watershed	flood control + water quality



Recommendations	assessment and management plan, and conduct survey of existing right-of-ways.	
Monterey County Water Resources Agency: MCWRA Reservoir Roads Assessment and Upgrade Project	This project will assess the water quality impacts of approximately 40 miles of unpaved roads that are located on land owned by the MCWRA and will create a plan to address these impacts. These roads drain directly or indirectly into either the San Antonio Reservoir in Monterey County or the Nacimiento Reservoir located in San Luis Obispo County. The majority of the land owned by the MCWRA around the reservoirs has historically been used for cattle grazing leases; many of these roads have delivered a significant amount of sediment into the reservoirs. The excess sediment impairs water quality and may be a means of carrying other pollutants such as Mercury into these water bodies. The need for this project was first documented in the San Antonio and Nacimiento River Watershed Management Plan (known as the Nacitone Plan); it was listed as a high priority project.	water quality + water supply
Monterey County Water Resources Agency: Nacimiento Dam Hydroelectric Plant Upgrade	This proposal entails the upgrading of hydroelectric power generator unit No.2 at the Nacimiento Dam Hydroelectric Plant. The MCWRA recently completed the construction of the Salinas Valley Water Project (SVWP). This project has changed the way MCWRA schedules releases from Nacimiento Dam due to conditions dictated by state and federal regulatory agencies. In the past MCWRA typically released 25 cfs for conservation releases and/or fish passage flows. Unit No.2 was originally designed to generate power at this low-flow conservation release condition. As a result of the implementation of the SVWP, this low-flow conditional parameter has been increased from 25 to 60 cfs. Upgrading Unit No.2 to operate in and round this new conditional flow parameter shall allow for an increase in hydro-power generation efficiency.	water supply
Monterey County Water Resources Agency: Nacimiento Dam Low Level Outlet Works Rehabilitation	This proposal entails the rehabilitation of the downstream control system on the Low Level Outlet Works at Nacimiento Dam. The rehabilitation will include the following. Replacement of all six, 24” valves; five of which would be replaced with plug type valves and one would be upgraded to a new gate type valve. Replacing/upgrading existing valves will increase operational flexibility in that regulation of discharge flows could occur in five of the six valves (one valve will have to remain a gate type valve due to local space limitations). All new valves shall be electronically and/or hydraulically actuated to increase efficiency in implementing reservoir release changes. The concrete stilling basin shall be structurally reinforced to prevent further erosion. Protective steel covers/grating above the stilling basin have deteriorated and need to be replaced along with security fencing around the perimeter of the downstream control structure.	water supply
Monterey County Water Resources Agency: Potrero Road Tide Gates Construction Project	The Reclamation Ditch Improvement Plan by the RDIPAC addresses the flooding, erosion, and sediment issues impacting the Reclamation Ditch system. The Potrero Road Tide Gates Project submitted here will implement recommendations by the RDIPAC. The Potrero Road Tide Gates Project will reduce the risk of flooding in the City of Salinas and surrounding areas from current and future flow rates in the system, minimizing crop damage and reducing erosion and sedimentation from widened channel sections in the Reclamation Ditch watershed.	flood control
Monterey County Water Resources Agency: Salinas River Diversion Facility Expansion	The project described in this concept proposal asks the question, “Can the Salinas River Diversion Facility’s functionality be expanded?” The need comes from the desire to utilize the water in Monterey County with increasing effectiveness. Monterey County receives no water from sources outside of itself, therefore needs to be both effective and efficient with the resources it does have. The MCWRA proposes to develop this concept as a feasibility analysis that would evaluate possible alternatives that could increase Salinas River Diversion Facility functionality. Increased functionality could potentially be found with: 1) develop an urban water supply	water supply

	component, 2) expand the availability of water for agricultural use, and 3) other alternatives that may come from an alternatives identification analysis.	
Monterey County Water Resources Agency: Salinas River Diversion Facility Solar Energy Enhancement Project	The Salinas River Diversion Facility Solar Enhancement Project will consist of a solar energy field located on property owned by the MCWRA around Lake Nacimiento in relatively near proximity to the substation that currently serves the hydroelectric project. The Salinas River Diversion Facility consists of four 300 horsepower pumps that will extract water from the Salinas River that will, after treatment, be added into the recycled water storage pond for delivery to the 12,000 acres of agricultural fields in the project. Providing solar power into the grid to offset the power requirements of these large pumps will add to the combined benefits of all of these projects.	water supply
Monterey County Water Resources Agency: Salinas River Lagoon Fisheries Enhancement Project	During minimum flows in the Salinas River, the Old Salinas River Channel (OSRC) outlets through a slide gate into the Pacific Ocean, in Monterey Bay. This outlet is seasonally disconnected from the Pacific Ocean by a naturally forming sandbar at the mouth of the river forming the Salinas River Lagoon. The OSRC was constructed to provide flood protection for adjoining farmland and controlling water surface elevations in the lagoon when flows to the ocean are not possible. South-central California coast steelhead, a federally threatened species, uses the lower Salinas River as a migration corridor between the ocean and their upstream spawning grounds. When seasonally closed to the ocean, the Lagoon may serve as rearing habitat for juvenile steelhead. An existing slide gate is opened to allow Lagoon discharges to the OSRC. Steelhead may be entrained into the OSRC (drawn into the water diversion by hydraulic forces). To protect steelhead and other fish entrainment into the OSRC, MCWRA proposes to install fish screens at the slide gate. The proposed fish screen facility is also designed to prevent back flow from the OSRC to the Lagoon, which would eliminate influxes of agricultural runoff that currently contributes to the degradation of water quality in the Lagoon. The proposed project would enhance the Salinas River Lagoon as steelhead migration and rearing habitat, limit the ability of fish to leave the closed Salinas River Lagoon while allowing an outlet for flood management, and decrease debris loading in the channel approach.	natural resource enhancement + water quality
Monterey County Water Resources Agency: San Antonio Dam Butterfly Valve Operator System Rehabilitation	The associated butterfly valve is operated/exercised via its original hydraulic operator system. However, the butterfly valve's operator appears to be experiencing difficulty in effecting complete valve closure in a desired time period. From prior studies it has been determined that with some rehabilitation to the valve's operator system a complete valve closure can be obtained in a more effective and efficient manor. Rehabilitation to the existing butterfly valve system would include installation of a new hydraulic operator system, including hydraulic control panel, ram, latching system, and associated mechanical appurtenances. Current operation of the existing butterfly valve is conducted within the valve chamber. The new hydraulic operator system will have the capability to operate/exercise the butterfly valve locally (in the valve chamber) as well as remotely (in the control house). Video surveillance cameras will be installed to visually verify remote operations.	water supply
Monterey County Water Resources Agency: San Antonio Dam Hydro Electric Power Plant	In the last 20 years the concept of constructing a hydroelectric power plant at San Antonio Dam had been considered as a green source of electrical power to sell to PG&E at a premium kW/hr rate. The concept of a San Antonio Dam hydroelectric power plant would be structurally similar to that which exists at Nacimiento Dam. The power plant structure would be an all-weather type facility and would house turbines, generators, controls and electrical equipment. The San Antonio power plant would also work in concert with the controlled releases	water supply

	for groundwater recharge to the lower Salinas River Valley. It is anticipated that the controlled releases from San Antonio Dam will continue to be less than that of Nacimiento Dam and therefore the San Antonio power plant would potentially have a lower production rate of electricity than the Nacimiento power plant. Even though the San Antonio power plant may have less production capacity of electricity than the Nacimiento power plant, there would be an added source for green electrical energy.	
Monterey Regional Waste Management District: Monterey Regional Waste Management District Renewable Energy Facility	The Monterey Regional Waste Management District (MRWMD) is evaluating plans to construct an additional 6,000 kW cogeneration plant on the southern side of its landfill site, immediately adjacent to the proposed Regional Desalination Project facilities. The combined power from both the existing and new MRWMD cogeneration facilities would be sufficient to provide all of the power needed for operation of the Regional Desalination Project facilities, specifically the desalination water treatment plant and distribution pumping. The power would be delivered to the Regional Desalination Project through a new power transmission line running directly from the MRWMD cogeneration facilities to a substation at the desalination plant. Powering the Regional Desalination Project from the MRWMD Cogeneration Facility provides the following benefits: Reduced greenhouse gas emissions and carbon footprint for the Regional Desalination Project; power potentially provided at a cost lower than buying from PG&E; and power would not be required from PG&E on a regular basis.	water supply
Nacimiento Regional Water Management Advisory Committee: Interlake Tunnel between Lake Nacimiento and Lake San Antonio	The purpose of the project is to plan, engineer, permit, construct and operate of an interlake tunnel between Lake Nacimiento and Lake San Antonio. Lake Nacimiento and Lake San Antonio are manmade reservoirs within the Salinas River Basin that provide a number of vital functions to the area. These functions consist of flood control, water supply and recreation. Rainwater and runoff from the surrounding watershed is typically stored during winter months and then released in a controlled fashion during the dry summer months. The water supply is used for groundwater recharge in the Salinas Valley via releases from both lakes which combine in the upper Salinas River. Flood control is achieved by retaining water and limiting flow in the Nacimiento and San Antonio rivers during winter storm events. This captured water stored in the two lakes would be used later in the dryer seasons as release water which would flow downstream for groundwater recharge, abatement of salt water intrusion, and the promotion of fish habitats. Increasing the total available supply of water will benefit all of these uses, industries, and communities.	water supply
Resource Conservation District of Monterey County: Monterey County Integrated Watershed Restoration Program	The Integrated Watershed Restoration Program (IWRP) for Monterey County is modeled after the IWRP pioneered in Santa Cruz County. The flagship component of IWRP is the creation of an interagency process to identify, design, and permit high priority water quality, fish passage, and wetland restoration projects. The Santa Cruz County IWRP partner organizations and agencies recognized that implementing the recommendations of multiple assessments and plans is best accomplished by bringing together federal, state, and local resource and permitting agencies to identify the highest priority projects and assisting with locating funding sources, providing technical assistance, and facilitating permitting. While in many ways this sounds potentially redundant with the mission of the Greater Monterey County (GMC) IRWM Plan, the key distinctions with IWRP are: 1) the focus on restoration projects, 2) the closely involved role of regional Coastal Conservancy staff in supporting the IWRP process and projects, and 3) the participation of state and federal (along with local) agency representatives in the IWRP Technical Advisory Committee for a more vertically-integrated approach to facilitating, directing and	natural resource enhancement + water quality

	<p>supporting selected projects. As such, IWRP can be a critical asset for supporting GMC IRWM Plan restoration-focused projects, and it could facilitate coordination between neighboring IRWM regions. Typical IWRP restoration projects can include rural road erosion reduction, fish passage improvement, and wetland and lagoon restoration. The individual watershed projects will be identified by the IWRP Technical Advisory Committee based on recommendations in local watershed plans, including the Coho and steelhead recovery plans developed by DFG and the National Marine Fisheries Service (NMFS), or otherwise supported by state or federal resource agencies or local watershed groups. The IWRP will also support a number of potential projects recommended in other Monterey County IRWM Plans for the Pajaro River and the Carmel Valley and Monterey Peninsula.</p>	
<p>Resource Conservation District of Monterey County: Rural Roads Erosion Assistance Program for Monterey County</p>	<p>RCD of Monterey County will serve as the program lead with regular guidance from a Rural Roads Technical Advisory Committee (TAC), in providing education and training on rural roads drainage techniques, on-site technical assistance, and funding for road erosion assessments, project design and permitting, and road drainage project implementation. The outreach aspects of the program will include demonstration workshops and trainings, outreach material development and public communications. The TAC will help to develop and review criteria to select road association projects that will receive funding as well as assess program success. Road association projects that are selected will require 50% of the project costs to be contributed by the road association. This match share will be from in-kind services and/or cash contributions. In addition to the match share, a long-term maintenance agreement will be required as part of the project. Success will be measured by the amount of reduction in sedimentation coming from rural unsurfaced roads and from surfaced roads that are not maintained.</p>	<p>water quality</p>
<p>Ventana Wilderness Alliance: Arroyo Seco Wild and Scenic River Recreational and Habitat Enhancement</p>	<p>The Arroyo Seco River is the only major tributary of the Salinas River that remains undammed. The purpose of this concept proposal is to demonstrate the willingness of the nonprofit Ventana Wilderness Alliance (VWA) to collaborate with the US Forest Service and other agencies to enhance the outstanding recreational and habitat values of the Arroyo Seco River. With proper funding, VWA is prepared to initiate projects on the designated Wild and Scenic sections of the Arroyo Seco River either before or after H.R. 4040 is passed. Potential projects to be initiated in conjunction with the Forest Service include: <u>Implementation Monitoring</u>: Ensure visitor information/education material is available; provide Wilderness Ranger personnel to assist in public education and help maintain the outstanding values of the river). <u>Effectiveness Monitoring</u>: Annual review of patrol logbooks for overall river corridor condition, including but not limited to amount of trash, development of fire rings, cutting of live vegetation, invasive weeds, overcrowding of campgrounds, number of dogs off-leash. <u>Adaptive Management</u>: If annual review of monitoring indicates repetitive documentation of excessive trash, development of fire rings, cutting of live vegetation, spread of invasive weeds, overcrowding of campgrounds, and dogs off-leash, then site specific environmental analysis will be conducted as appropriate and an approved process will be used to determine the appropriate corrective action.</p>	<p>natural resource enhancement + water quality</p>
<p>Ventana Wilderness Alliance: Big Sur Wild and Scenic River Monitoring and Adaptive Management</p>	<p>The purpose of this concept proposal is to secure funding for a collaborative approach to Monitoring and Adaptive Management along the Wild and Scenic Big Sur River. The VWA is prepared to work with the US Forest Service to conduct implementation monitoring and effectiveness monitoring as outlined in the Comprehensive River Management Plan (CRMP). Due to budget constraints, little if any of these activities have taken place since the adoption of the CRMP in 2003. The project includes Implementation Monitoring, Effectiveness Monitoring, and Adaptive Management as described above.</p>	<p>natural resource enhancement + water quality</p>

<p>Ventana Wilderness Alliance: Los Burros Abandoned Mine Survey and Remediation</p>	<p>Literally hundreds of abandoned gold mines and at least one mercury mine litter the southern Big Sur coast. These relics of the former Los Burros Mining District discharge liquid runoff into watersheds known to harbor spawning populations of Federally Endangered southern steelhead. Further downstream, this effluent enters the Monterey Bay National Marine Sanctuary. Prior to the VWA's Los Burros Abandoned Mine Survey project, the chemical composition of such runoff was completely unknown. Initial testing at one of the sites revealed effluent with highly elevated levels of mercury, flowing out of an abandoned adit (i.e., horizontal mine shaft) and directly into a tributary of San Carpoforo Creek. Agency officials at Los Padres National Forest have been aware of this situation for decades, but have yet to allocate funding for testing or remediation. The VWA's solution has been to address these conditions so that remediation efforts can be undertaken. Phase I of the Silver Peak/Los Burros Abandoned Mine Project has begun with testing of the most suspect sites for the presence of heavy metals, and the scheduling of biological surveys for sensitive species habitat. Future phases will pursue remediation of any toxics found and the installation of bat gates at mine openings as needed to protect sensitive species and forest users, and to deter vandalism.</p>	<p>natural resource enhancement + water quality</p>
<p>Ventana Wilderness Alliance: Milpitas Special Interest Area and San Antonio River - Grazing Allotment Monitoring</p>	<p>The Milpitas Special Interest Area (SIA) contains approximately 9500 acres, located in the upper watershed of the San Antonio River, much of which is within the Ventana Wilderness. Within the Milpitas SIA is the Milpitas Grazing Allotment. Together these two entities cover virtually the entire headwaters region of the San Antonio River watershed, which is the major contributor to San Antonio Reservoir. In the Los Padres National Forest Management Plan of 2005, the US Forest Service recognized the unique aspects of the area and designated the Milpitas SIA. Due to decreases in funding and personnel, the Forest Service has been unable to develop a management plan for the SIA to achieve the desired condition. The VWA has facilitated and funded an agreement between Los Padres National Forest and Mountain Heritage Associates to create a comprehensive management plan for the area with input from the Salinan tribes, recreational users, and the local community. A key Management Objective of the management plan is to "provide forage for cattle in a way that complements ethnobotanical management objectives." One objective is the development of a "new allotment management plan with grazing prescriptions that complement ethnobotanical resources, maintains functional riparian areas, and uses infrastructure as needed to reduce cattle grazing impacts on heritage sites." To achieve this objective, funding is necessary to monitor grazing, study its impacts and test and assess the water quality of the San Antonio River and its tributaries. It is the VWA's hope that this concept proposal will lead to a cooperative and collaborative Implementation Project to develop a new grazing allotment management plan on the Milpitas Special Interest Area.</p>	<p>water quality</p>

## Section H: Impacts and Benefits

Implementation of projects in this Integrated Regional Water Management (IRWM) Plan will result in significant water resource and environmental benefits for the Greater Monterey County planning region. The Greater Monterey County IRWM Plan includes the following types of projects:

- *Water supply projects*, including construction of an interlake tunnel between Lake San Antonio and Lake Nacimiento; an urgently needed water supply system for the Granite Ridge area; a test well for a proposed desalination project for the Monterey Bay area; and an aquatic invasive species inspection project for Lake San Antonio and Lake Nacimiento.
- *Water recycling projects*, including facilities needed for recycled water distribution in the City of Soledad and for recycled water distribution in the Marina Coast Water District (MCWD) service areas.
- *Water supply infrastructure improvement projects*, including arsenic removal for the drinking water supply in Castroville (a disadvantaged community [DAC]); construction of a new well, storage tank, and distribution system to provide a potable water supply for the communities of Springfield and Moss Landing Mobile Manor (DACs) to comply with Nitrate Maximum Contamination Level and saltwater intrusion regulations; a new well and pipeline to replace the single existing well for San Lucas; and the lining of reservoirs and canals at San Bernabe Vineyards.
- *Groundwater improvement and protection projects*, including coastal dedicated monitoring wells to help monitor seawater intrusion, and urban and agricultural runoff water quality improvement projects, such as the UC Davis low impact development (LID) research project, the Monterey Bay Sanctuary Foundation's best management practice (BMP) implementation project in Santa Rita Creek Watershed, and the Resource Conservation District (RCD) of Monterey County's farm water quality assistance programs.
- *Wastewater facility improvements*, including upgrade of the wastewater facility in San Jerardo (a DAC); industrial wastewater conveyance and treatment facility improvements in the City of Salinas; an Inspection and Monitoring pilot program for DAC onsite wastewater systems; and storm drain improvements in Las Lomas.
- *Water quality improvement programs*, including farm water quality assistance, on-farm erosion control, irrigation and nutrient management evaluation, and implementation of BMPs on livestock facilities and rangelands (led by the RCD of Monterey County); BMP implementation in Santa Rita Creek (led by the Monterey Bay Sanctuary Foundation, RCD of Monterey County, and Central Coast Wetlands Group); implementation of a Green Gardener Program (led by Ecology Action and the RCD of Monterey County); and a regional project tracking program to monitor progress in addressing the goals of improved water quality, water supply, flood control and environmental protection outlined in the IRWM Plan (led by the Monterey Bay National Marine Sanctuary).
- *Major wetland and dune restoration projects* in Tembladero Slough, Moro Cojo Slough, and the dunes near Moss Landing (all led by the Central Coast Wetlands Group), and in Elkhorn Slough (led by the Elkhorn Slough Foundation).
- *Watershed management programs*, including watershed restoration activities in Santa Rita Creek Watershed; watershed planning and management in the Northern Gabilan Watershed (led by the Central Coast Wetlands Group); invasive non-native plant removal in the Salinas River Watershed (led by the RCD of Monterey County); and an annual coastal river and beach litter



removal program (led by Save Our Shores).

- *Steelhead enhancement projects*, including the Salinas River Fisheries Enhancement Project (led by the Monterey County Water Resources Agency [MCWRA]), and implementation of the Big Sur River Steelhead Enhancement Plan (led by California State Parks).
- *Flood protection projects*, including flood risk reduction for the Salinas River (consisting of National Environmental Policy Act/California Environmental Quality Act [NEPA/CEQA]) preparation and led by MCWRA), and several wetland/watershed restoration projects that will produce significant flood protection benefits.

Together these projects are anticipated to achieve the following regional goals, as outlined in this IRWM Plan:

- Improve water supply reliability and protect groundwater and surface water supplies
- Protect and improve surface, groundwater, estuarine, and coastal water quality, and ensure the provision of high-quality, potable, affordable drinking water for all communities in the region
- Develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes
- Protect, enhance, and restore the region's ecological resources while respecting the rights of private property owners
- Promote regional communication, cooperation, and education regarding water resource management
- Ensure the provision of high-quality, potable, affordable water and healthy conditions for disadvantaged communities
- Adapt the region's water management approach to deal with impacts of climate change using science-based approaches, and minimize the regional causal effects

Some adverse environmental impacts may also be expected from implementation of the IRWM Plan, though 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:<sup>1</sup>

- *Water Resources*. Construction of proposed projects may result in increased erosion and sediment delivery to 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 PM10 (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 and/or excavation.
- *Noise*. Construction noise and vibration impacts may result from construction equipment, vehicles, and 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

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<sup>1</sup> Thanks to the San Francisco Bay Area IRWM Plan for outlining these potential construction-related impacts.

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.

This chapter describes the anticipated benefits and potential impacts that will result from the implementation of this IRWM Plan, both on a project-specific level and in terms of how the projects will help achieve regional goals. Potential impacts and benefits to DACs specifically are also discussed.

### **H.1 HOW PROJECTS ACHIEVE IRWM PLAN OBJECTIVES**

There is inherent value in the IRWM planning process in providing a systematic method for defining, and then achieving, regional water resource management goals.

Table H-1 on the following pages illustrates how projects in the IRWM Plan, including those currently being implemented, will contribute toward addressing regional objectives. The table shows both the number of projects (out of 38 total) that will address each objective, and then the extent, on average, to which those projects are expected to address the objectives (on a scale from 0-5).<sup>2</sup>

Of the resource-specific goals, the table indicates that the goal category “best addressed” by projects currently in the IRWM Plan is Water Quality, followed by Environment, then Water Supply, then Flood Protection/Management. Most of the projects in the Plan address the Regional Communication and Cooperation goal. More than half of the projects address DAC objectives, either directly or indirectly.

Note that every objective is addressed at least to some extent by projects in the IRWM Plan. With every Plan review and update, the objectives will be reviewed to assess the extent to which they are being achieved (see Section J, Plan Performance and Monitoring). As the IRWM planning process continues, new projects will be developed, either as concept proposals or as full implementation projects, to address the gaps in achieving the goals and objectives of this IRWM Plan.

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<sup>2</sup> Methodology: Each project was reviewed for how likely it was to achieve IRWM Plan objectives. For each project, a score of 0-5 was given for each IRWM Plan objective (these scores were first provided by the project proponents themselves, and then adjusted if deemed necessary by the Project Review Committee). Then for each objective, an average score was determined based on the projects that scored between 1-5 for that objective.

**Table H-1: Number of Projects that will Implement the Plan Objectives**

OBJECTIVES	# of projects that address each objective (total = 38 projects)	Extent to which those projects address objective (avg. 0-5)
<b>Water Supply</b>		
Increase groundwater recharge and protect groundwater recharge areas.	18	3.2
Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.	8	3.3
Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.	11	3.6
Diversify water supply sources, including but not limited to the use of recycled water.	10	3.3
Maximize water conservation programs.	12	3.8
Capture and manage storm water runoff.	13	3.2
Optimize conjunctive use where appropriate.	6	3.7
Support research and monitoring to better understand water supply needs.	7	3.9
Support the creation of water supply certainties for local production of agricultural products.	6	2.8
Promote public education about water supply issues and needs.	7	2.6
Promote planning efforts to provide emergency drinking water to communities in the region in the event of a disaster.	4	4.0
<b>Water Quality</b>		
Promote practices necessary to meet, or where practicable, exceed all applicable water quality regulatory standards (for drinking water, surface and groundwater quality).	28	3.9
Promote projects to prevent seawater intrusion.	13	3.6
Incorporate or promote principles of low impact development where feasible, appropriate, and cost effective.	9	2.8
Protect surface waters and groundwater basins from contamination and the threat of contamination.	25	3.9
Support research and pilot projects for the co-management of food safety and water quality protection.	9	3.3
Improve septic systems, sewer system infrastructure, wastewater treatment systems, and manure management programs to prevent water quality contamination.	8	3.6
Support research and other efforts on salinity management.	4	3.8
Support monitoring to better understand major sources of erosion, and implement a comprehensive erosion control program.	11	3.4
Promote programs and projects to reduce the quantity and improve the quality of urban and agricultural runoff and/or mitigate their effects in surface waters, groundwater, and the marine environment.	17	4.3
Promote regional monitoring and analysis to better understand water quality conditions.	16	3.9
Support research and utilization of emerging technologies (enzymes, etc.) to develop effective water pollution prevention and mitigation measures, and source tracking.	8	3.3
Promote public education about water quality issues and needs.	24	3.7
<b>Flood Protection/ Management</b>		
Promote projects and practices to protect infrastructure and property from flood damage.	12	3.4
Improve flood management infrastructure and operational techniques/strategies.	9	2.8

Implement flood management projects that provide multiple benefits such as public safety, habitat protection, recreation, agriculture, and economic development.	13	3.1
Develop and implement projects to protect, restore, and enhance the natural ecological and hydrological functions of rivers, creeks, streams, and their floodplains.	16	3.7
Support research and monitoring efforts to understand the effects of flooding on transport and persistence of pathogens in food crop production areas.	5	1.8
Support management of flood waters so that they do not contaminate fresh produce in the field.	10	2.9
Promote public education about local flood management issues and needs.	11	2.7
<b>Environment</b>		
Support science-based projects to protect, improve, enhance, and/or restore the region's ecological resources, while providing opportunities for public access and recreation where appropriate.	21	3.6
Protect and enhance state and federally listed species and their habitats.	21	3.4
Minimize adverse environmental impacts of water resource management projects.	16	3.1
Support applied research and monitoring to better understand environmental conditions, environmental water needs, and the impacts of water-related projects on environmental resources.	17	4.0
Implement fish-friendly stream and river corridor restoration projects.	10	3.9
Reduce adverse impacts of sedimentation into streams, particularly from roads and non-point sources.	17	3.6
Promote efforts to prevent, control, reduce, and/or eradicate high priority invasive species.	15	4.2
Promote native drought-tolerant plantings in municipal and residential landscaping.	4	3.5
Consider opportunities to purchase fee title or conservation easements on lands from willing sellers that provide integrated water resource management benefits. Ensure adequate funding and infrastructure to manage properties and/or monitor easements.	7	4.3
Support research and monitoring efforts to understand the effects of wildfire events on water resources.	2	2.0
<b>Regional Communication and Cooperation</b>		
Facilitate dialogue and reduce inconsistencies in water management strategies/regulations between local, regional, state, and federal entities.	26	3.4
Promote dialogue between federal and state regulators and small water system managers to facilitate water quality regulation compliance.	11	2.2
Foster collaboration between regional entities to minimize and resolve potential conflicts and to obtain support for responsible water supply solutions and improved water quality.	29	3.3
Build relationships with federal, state, and local regulatory agencies and other water agencies to facilitate the permitting, planning, and implementation of water-related projects.	22	3.2
Increase stakeholder input and public education about the need, complexity, and cost of strategies, programs, plans, and projects to improve water supply, water quality, flood management, coastal conservation, and environmental protection.	26	3.3
<b>DAC</b>		
Seek funding opportunities to ensure all communities have a water system with adequate, safe, high-quality drinking water.	4	4.3
Seek funding opportunities to ensure all communities have adequate wastewater treatment.	4	4.0
Ensure that disadvantaged communities are adequately protected from flooding and the impacts of poor surface and groundwater quality.	18	3.1

Provide support for the participation of disadvantaged communities in the development, implementation, monitoring, and long-term maintenance of water resource management projects.	14	3.6
Promote public education in disadvantaged communities about water resource protection, pollution prevention, conservation, water quality, and watershed health.	20	3.3
<b>Climate Change</b>		
Plan for potential impacts of future climate change.	16	2.9
Support increased monitoring and research to obtain greater understanding of long-term impacts of climate change in the Greater Monterey County region.	6	3.3
Support efforts to research alternative energy and to diversify energy sources appropriate for the region.	3	3.0
Seek long-term solutions to reduce greenhouse gas producing energy use.	10	2.3
Seek long-term solutions to maintain and protect existing pristine natural resources from the impacts of climate change.	8	2.9
Support research and/or implementation of land-based efforts such as carbon-sequestration on working lands and wildlands in the Greater Monterey County region.	5	2.2
Promote public education about impacts of climate change, particularly as it relates to water resource management in the Greater Monterey County region.	9	2.3

## **H.2 IMPACTS AND BENEFITS TO DACS AND ENVIRONMENTAL JUSTICE CONCERNS**

All projects included in the IRWM Plan are reviewed for potential impacts to DACs 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. Thus far, no potential impacts to DACs or environmental justice concerns have been found in any of the projects submitted for inclusion in the IRWM Plan.

On the other hand, numerous benefits to DACs are expected to result from implementation of the IRWM Plan. Several projects included in the Plan promise DAC benefits, including (an asterisk means the project is currently being implemented through Round 1 of the IRWM Implementation Grant Program):

- San Jerardo Cooperative: San Jerardo Wastewater Project\*
- Castroville Community Services District: Well 2B Treatment Project\*
- Rural Community Assistance Corporation: Greater Monterey Bay Disadvantaged Community Wastewater Management Pilot Program
- Pajaro/Sunny Mesa Community Services District: Springfield Water System
- Monterey Bay Sanctuary Foundation: Watershed Approach to Water Quality Solutions\*
- Elkhorn Slough Foundation: Integrated Ecosystem Restoration in Elkhorn Slough\*
- Central Coast Wetlands Group: Tembladero Restoration and Castroville Community Public Access, Phase I\*
- Central Coast Wetlands Group: Northern Gabilan Mountain Watershed Management Project
- Central Coast Wetlands Group: Implementation of the Moro Cojo Slough Management and Enhancement Plan: Restoration of the Upper Slough
- Central Coast Wetlands Group: Study of Environmental Services from Nutrient Reducing BMPs
- Central Coast Wetlands Group: Water Quality Enhancement of the Tembladero Slough, Phase II
- RCD of Monterey County: Monterey County Farm Water Quality Assistance Program
- Central Coast Wetlands Group: Coastal Wetland Erosion Control and Dune Restoration
- Monterey County Water Resources Agency: Salinas River Flood Risk Reduction Project
- Ecology Action: Monterey Bay Green Gardener Training & Certification Program
- RCD of Monterey County: Livestock and Land: Rangeland and Livestock Facility Water Quality, Vegetation Management and Wildlife Enhancement Program
- RCD of Monterey County: Salinas River Watershed Invasive Non-native Plant Control and Restoration Program
- Elkhorn Slough Foundation: Ridgeline to Tideline: Water Resource Conservation in Elkhorn Slough
- Save Our Shores: Watershed Protection Program - Annual Coastal Cleanup Day in Monterey County

The first four projects listed above directly address critical water resource needs in DACs, specifically: construction of a new wastewater facility at the San Jerardo farm worker community; water treatment to remove arsenic from the drinking water supply for the community of Castroville; an innovative pilot program to involve DAC community members throughout the region in creating inspection and monitoring programs for their onsite wastewater systems; and a water supply project for the communities of Springfield and Moss Landing Mobile Manor, which has not had potable water since 1986. Each of the other projects listed above provides water resource management assistance to a broader geographic area that also includes DACs (such as farm water quality assistance, rangeland and livestock facility water quality assistance, or Green Gardener training), or alternatively, provides important water resource improvements or environmental enhancements to broader geographic regions that will also benefit DACs



(for example, watershed restoration, wetlands restoration, or elimination of invasive non-native species in waterways).

### **H.3 PROJECT-SPECIFIC IMPACTS AND BENEFITS**

The anticipated impacts and benefits of individual projects in the Greater Monterey County IRWM Plan differ greatly. Some projects will provide local benefits (perhaps critical to a local population), others regional benefits. 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, together and over time, the projects implemented through the IRWM Plan will provide multiple benefits across the entire Greater Monterey County planning region—including water supply, water quality, flood management, environmental enhancement, regional coordination, recreational benefits, and special benefits for disadvantaged communities—while achieving the overarching goals and objectives of the Plan.

The tables below describe the impacts and benefits anticipated from each of the projects included in the Greater Monterey County IRWM Plan. Table H-2 includes the projects that were awarded grant funds through Round 1 of the IRWM Implementation Grant Program, and that are currently in the early stages of implementation. Table H-3 includes the projects proposed for implementation in the IRWM Plan. Note that the impacts and benefits listed in the tables are generally descriptive rather than quantitative, and are intended to give the reader a general understanding of the types of impacts and benefits to be expected. An in-depth impact and benefit analysis will be required for every project that is included in an IRWM grant application package, prior to submitting an IRWM grant proposal to the State.

Since this IRWM Plan is still in the early stages of development and project implementation has only just begun, these lists serve as a general benchmark. Over time, as more and more projects are implemented, the impacts and benefits will be reviewed and this section of the IRWM Plan will be updated as part of the normal plan management activities. These updates will reflect changes to the Impacts and Benefits section from any data gathered, and any additions or changes to the implementation projects listed in the IRWM Plan.

The following tables summarize the impacts and benefits anticipated from each of the 2010-2012 projects included in the Greater Monterey County IRWM Plan.

**Table H-2: Impacts and Benefits: Projects Currently being Implemented through Round 1 IRWM Implementation Grant Funds**

<b>Project Proponent &amp; Project Title</b>	<b>Anticipated Benefits</b>	<b>Anticipated Impacts</b>
City of Soledad: Soledad Water Recycling/Reclamation Project	This project includes completion of design of a recycled water delivery system to both agricultural and recreation areas in and near the City of Soledad. The benefits of this project entail taking the wastewater generated and produced by three DACs and re-routing them to the already built wastewater treatment plant in Soledad, allowing for their treatment and recycling for re-use within the city and surrounding agricultural areas that will benefit from this resource. The project also includes research on the use of recycled water for agricultural uses. Completion of project will enable delivery of recycled water to multiple landscaped areas currently being irrigated with potable water. The project will have the benefit of taking wastewater currently being treated in secondary pond systems to Title 22 recycle water, thus improving the groundwater quality in the Salinas River aquifer.	Possible impacts of this project include dust, noise, and other impacts related to the use of heavy equipment for installation of the conveyance pipes, as well as an increase in greenhouse gas (GHG) emissions.
Castroville Community Services District: Castroville CSD Well 2B Treatment Project	Construction of a new well pump and treatment facility will increase the overall water system capacity for Castroville, achieving the primary benefit of a new water supply facility. Pumping water from the Deep (900-Foot) Aquifer instead of the 180/400-Foot Aquifer will reduce the migration rate of seawater-intruded groundwater in the shallow aquifer. The use of the Well 2B will alleviate the need for a pipeline from the Salinas Valley River Diversion facility. Water quality benefits include: improvements related to protecting, restoring, or enhancing beneficial uses; avoided water treatment costs; avoided wastewater treatment costs; and water quality improvements related to providing water supplies and avoided public safety and health impacts.	Possible impacts may occur from construction activities, including dust, noise, erosion, sedimentation, and increased GHG emissions.
San Jerardo Cooperative, Inc.: San Jerardo Wastewater Project	The proposed project will provide critical public health benefits to the San Jerardo community by both ensuring adequate wastewater treatment systems and by reducing nitrate and 1,2,3-trichloropropane discharge into the underlying aquifer system. It will provide additional air quality benefits as expansion of the system's capacity will reduce noxious odors from the overtaxed ponds. By upgrading the wastewater system, it will help prevent the cycle of contamination and recontamination between the ponds and the underlying aquifer. This is expected to provide water quality benefits, which will extend to the surrounding area, including nearby residential uses. It also includes a potential reduction in the amount of treatment needed for the community's drinking water supply from the nearby well. Water supply benefits include the provision of an alternate source of water for grounds upkeep and year-round soccer field irrigation through the reuse or recycling of treated wastewater, thus reducing water supply demand. Future economic benefits are expected to result from the planning component of the grant, which include the substitute of recycled water for water from the new well site for secondary uses, reducing operating costs to pump, store and maintain the water system. The project will have energy savings by using solar-powered aerators and other solar technology where feasible. Implemented water conservation efforts also potentially have large energy saving implications.	Construction during the project could impact the habitat of two endangered species, the California tiger salamander and the California red-legged frog. Careful biological monitoring during the project will ensure that no endangered species are harmed. To date, the potentially impacted species have not been discovered in the construction zone for the drinking water project, indicating the likelihood that they will not be in the construction zone for the wastewater project.
Elkhorn Slough Foundation: Integrated Ecosystem Restoration in	This project will result in the direct restoration of up to 90 acres of salt marsh in Elkhorn Slough. Over the last 150 years approximately 50% of Elkhorn's marshes have been lost due to human modifications, and their restoration is critical for the long-term health of the estuary. Raising the marsh elevation in lower Elkhorn Slough will reduce the volume of water moving in and out of the estuary each day, decreasing the system's overall tidal prism and helping to reduce erosion of the slough's benthic	Possible impacts from this project include temporary disturbance of habitat from the restoration effort and other construction-related impacts, including increased GHG emissions.

<p>Elkhorn Slough</p>	<p>habitats and tidal creeks. Salt marsh degradation in Elkhorn Slough is associated with the local extirpation of the federally endangered California clapper rail in the 1980s; this project is a first step to recovering critical habitat for this species. Raising the marsh elevation with sediment addition will protect them from drowning due to future sea level rise. The permanent establishment of a native perennial vegetated buffer will reduce agricultural pollution of tidal marshes, increase native grassland habitat, and reduce invasion by non-native upland weeds. The native grass buffer will complete a comprehensive erosion control program for the farm. The establishment of a kayak landing and educational signs will increase public access and enhance recreational use of Elkhorn Slough's waters. As part of a research reserve, the project will enable an ideal laboratory for the study of food safety issues and carbon sequestration in restored tidal marshes.</p>	
<p>Central Coast Wetlands Group at Moss Landing Marine Labs through San Jose State Research Foundation: Water Quality Enhancement of the Tembladero Slough Phase I</p>	<p>During Phase I, CCWG will work with County agencies, agricultural landowners and the community of Castroville for design and permitting of a select set of water quality/wetland management structures. These projects will utilize a variety of water quality management innovations including the treatment train approach (i.e., detention/ sedimentation features, pollutant filtration/biological degradation of pollutants and water polishing areas). This project will provide numerous environmental and social benefits. Vegetating the banks will reduce erosion in the channel and prevent upland sediment from being washed into the Slough. Flooding is a serious risk in this area. The majority of the farms adjacent to the Slough are partially or entirely in the Federal Emergency Management Agency (FEMA) 100-year floodplain, and flooded during the strong storms of 1995 and 1998. This flooding poses a serious food safety risk along with the financial burden to landowners. The project is designed to allow for some flood waters to spread in defined areas (i.e., Floodplain Improvement and Open Space areas), increasing flood management of adjacent areas. These areas will provide an important buffer to farms from flooding and bank erosion. This project will further reduce nutrients and reduce sediment loads to Moss Landing Harbor and Elkhorn Slough. In addition, Castroville will benefit from improved tourist visitation once the slough systems are restored and visitors have greater access to wetland and beach areas.</p>	<p>No negative impacts are expected to occur as a result of this project.</p>
<p>Monterey Bay National Marine Sanctuary, Central Coast Wetlands Group, and the Resource Conservation District (RCD) of Monterey County: Watershed Approach to Water Quality Solutions</p>	<p>This project will take a watershed approach to improve water quality in Santa Rita Creek, an impaired water body located within the Lower Salinas River Watershed. This approach will address impacts from agriculture and urban areas and will incorporate creek restoration while engaging the community. Three Total Maximum Daily Loads (TMDLs) are under development for the area: nutrients, pesticides, and fecal coliform. Though reductions are clearly imminent, it is not yet possible to estimate how the load reductions from this project will compare to the yet to be developed TMDL goals. Manure and associated nutrients and pathogen movement into Santa Rita Creek can be reduced by over 80% through pasture and manure management practices supported by this project. In terms of load reduction, on a poorly managed 2 acre parcel holding 2 horses, pasture and manure management coupled with a vegetated swale could keep nearly 200 lbs of nitrogen and 75 lbs of phosphorous from entering the creek. There are approximately 300 acres of rural residential and ranchette acreage draining to the creek that could host such improvements. Sediment load reductions of as much as 20 tons/acre/year from hillside strawberry farms into an adjacent waterway can be achieved with a combination of furrow alignment, road seeding and furrow cover crops. Based on aerial map and review, there are over 600</p>	<p>No significant negative impacts are expected to occur as a result of this project.</p>

	<p>acres in strawberry production along Santa Rita Creek, approximately half of which are on sloped ground draining directly to the creek with potential for significant soil stabilization opportunities. In addition to improvements in water quality, the restoration projects along Santa Rita Creek will create new and enhance existing community green space by converting what is now an unattractive waterway, bare dirt in some places and overgrown with weeds in others, into a thriving creek and riparian environment that will improve habitat that people can easily access and enjoy.</p>	
<p>University of California, Davis (Granite Canyon Marine Pollution Studies Laboratory): Evaluation of Potential for Stormwater Toxicity Reduction by Low Impact Development (LID) Treatment Systems</p>	<p>This project will evaluate the efficacy of bioswales in reducing the concentrations of contaminants that contribute to stormwater toxicity in the City of Salinas. Looking at four sites in the City of Salinas, the project will: 1) assess toxic effects of stormwater runoff to aquatic organisms prior to treatment by bioswales; 2) evaluate efficacy of bioswales to reduce toxicity to aquatic organisms; 3) determine stormwater and pollutant load reduction through bioswales; and 4) provide data to stormwater agencies, water quality managers, LID engineers, and others to be incorporated into future land-use planning and management decisions. The primary benefit of this project is information leading to aquatic life protection in freshwater streams and the downstream estuary, which provide critical habitat for many commercially important fish species, migratory birds, threatened and endangered species, and other wildlife. Improved water quality is key to maintaining and restoring habitat for area wildlife.</p>	<p>No environmental impacts are anticipated from this project.</p>

**Table H-3: Impacts and Benefits: Proposed Projects Included in the IRWM Plan**

Project Proponent & Project Title	Anticipated Benefits	Anticipated Impacts
California State Parks: Big Sur River Steelhead Enhancement Project	This project will implement the most important recommendations of the Big Sur River Steelhead Enhancement Plan by improving in-stream steelhead habitat and overall water quality in the lower portion of the watershed. The project, although specifically intended to address degraded steelhead habitat, will result in protecting all of the beneficial uses listed by the Central Coast Regional Water Quality Control Board (RWQCB) in the Central Coast Basin Plan. Wildlife and aquatic habitat is protected by moving activities that impact the stream corridor farther away from the river, and by removing invasive species and conducting revegetation activities. Some of the federally or state listed threatened, endangered or special status animal species benefiting from this project are California red-legged frog, south-western pond turtle, yellow-breasted chat, yellow warbler, and white-tailed Kite. The Big Sur River riparian zone in which the project is located is composed of the following three special vegetation community types (California Natural Diversity Database designation): Central Coast Arroyo Willow Riparian Forest, Central Coast Cottonwood-Sycamore Riparian Forest, and Central Coast Riparian Scrub. Migration and spawning beneficial uses are addressed by removing the primary migration barrier on Post Creek and replacing it with a crossing which will allow significantly higher flows on one of two tributaries that support steelhead. Overall water quality improvement will also be obtained by significantly reducing fine sediment input to the channel by upgrading stream crossings and relocating trails, and through bank stabilization. The Big Sur River is specifically called out in the draft South-Central California Coast DPS Recovery Plan as a critical watershed to protect steelhead; this project will be important to the goal of species recovery.	Potential impacts will be minimal but include temporary disturbance of in-stream and/or riparian habitat during the construction and restoration work.
Central Coast Wetlands Group: Coastal Wetland Erosion Control and Dune Restoration	The proposed project will enhance and restore wetland and sand dune ecosystems in central Monterey Bay, and control erosion in salt marshes directly behind the dunes around Moss Landing. The project will benefit water quality and flood control by controlling erosion in wetlands and dunes that buffer the coastline from storm impacts and flooding. Once erosion is minimized the natural wetland ecosystem will flourish and provide a filter for impaired water quality. This project will indirectly benefit water supply by preventing saltwater intrusion into the Salinas Valley Groundwater Basin, which is a major source of water for agricultural and municipal uses. Special status species that will benefit from this project include: California legless lizard, black subspecies ( <i>Anniella pulchra nigra</i> ); sand gilia ( <i>Gilia tenuiflora ssp. arenaria</i> ); Monterey spineflower ( <i>Chorizanthe pungens var. pungens</i> ); tidewater goby ( <i>Eucyclogobius newberryi</i> ); brackish water snail ( <i>Tryonia imitator</i> ); Smith's blue butterfly ( <i>Euphilotes enoptes smithi</i> ); Globose dune beetle ( <i>Coelus globosus</i> ); and the snowy plover ( <i>Charadrius alexandrinus</i> )	Potential impacts will be minimal but include temporary impacts from weed control activities. Impacts will be minimized by installing sediment fencing to prevent erosion while native dune communities are established.
Central Coast Wetlands Group: Development and Evaluation of Climate Change	This project has components of Watershed Enhancement, Water Quality, Habitat Improvement, and Flood Management projects. The following are identified project benefits: Flood management: natural resources preservation and restoration, reduced risk to life and property including agricultural land, and decreased flood insurance costs. Watershed enhancement: enhanced public safety. Habitat improvement: reduced flood risks. Water quality: decreased chance of sea water intrusion.	There are no anticipated impacts with this project as its focus is on data collection and forming a strategy for responding to climate change.

Response Strategies in the Elkhorn Slough, Gabilan and Salinas River Watersheds		
Central Coast Wetlands Group: Ecosystem Condition Profile for the Lower Salinas River Watershed using Level 1-2-3 Framework	This project will use the US EPA’s 1-2-3 Framework to provide cost-effective, scientifically-based, and integrated information on stream ecosystem condition in the Salinas watershed in order to inform management decisions and optimize ecological monitoring activities. The development of a master stream ecosystem condition profile integrates all of the separate efforts to address water quality, supply, and environmental management into one comprehensive plan. Therefore, one of the project’s chief benefits is its comprehensive approach and the integration of information into one overarching, easily accessible, management document. The framework includes recommendations for how to establish Levels of Service (LOS, numeric performance targets) for stream ecosystems. These numeric performance targets will allow our regional partners to periodically assess progress towards meeting environmental/habitat objectives and the appropriateness of associated strategies and measurable objectives. These LOS can be established in each watershed by analyzing results of ambient surveys of stream ecosystem conditions.	There will be no negative impacts because the project consists of primarily research and watershed planning.
Central Coast Wetlands Group, MBNMS, Monterey Bay Aquarium Research Institute, Elkhorn Slough Reserve: Expansion of a Coastal Confluence Water Monitoring System to support the Greater Monterey IRWMP	<i>Water Quality Projects:</i> The region will have the level of water quality data prescribed in the SAM document to effectively quantify small changes in load reduction and help attribute those changes to water quality program implementation. These data will provide the stakeholders with the data necessary to document the long-term capacity of the region to improve water quality impacts of the past century. <i>Watershed Enhancement Projects:</i> We will provide the necessary data to report on the cumulative effects of watershed management efforts necessary to fully adopt a watershed approach to water quality management and load reduction attainment. <i>Habitat Improvement Projects:</i> We will be able to help document the water quality value of habitat restoration projects including erosion control of drainage banks, treatment wetland installation and reestablishment of drainage floodplains. <i>Flood Management Projects:</i> This monitoring will include flow metering that will quantify real time flow measurements that can be made available on line for multiple users. Real time flow at coastal confluence and the resulting loading data will help IRWMP partners to improve their understanding of watershed processes and better model rainfall driven flow patterns of these drainages.	<i>Water Quality Projects:</i> Some regional groups may have concerns regarding the generation of more accurate pollutant loading estimates for these drainages. There have been no negative results of the LOBO data from the Old Salinas River Channel, so we anticipate that these concerns can be addressed through proper interpretation of the generated data. <i>Watershed Enhancement Projects:</i> Will document when programs are not being implemented at a scale to produce significant water quality enhancements to the greater watershed. <i>Habitat Improvement Projects:</i> None. <i>Flood Management Projects:</i> None.
Central Coast Wetlands Group: Northern Gabilan Mountain Watershed Management	The project consists of three phases to restore a sub-watershed within the upper Gabilan watershed, and serve as a model for restoration of watersheds within the Central Coast. One of the project’s chief benefits is its comprehensive approach and the integration of information into one overarching, easily accessible, management document. The project will provide a benefit by synthesizing historically separate management approaches and responsibilities into one cohesive approach. In addition, where data gaps are found, the project will fill them, and as a result, improve decision-making. The intent is to	There will be no negative impacts of Phases I or II because they consist of primarily background research, watershed planning, engineering plans and permitting. The potential for impacts exists in Phase III during the



Project	provide an “early warning system” to reduce surface water pollution, protect natural ecosystems, and to direct activities to areas that will enable natural systems, such as percolation. Not only will the project result in standards, policies and criteria, and a master site plan, it is a step towards load reductions (helping reach TMDL goals), enhancements to the ecosystem, and the public’s greater knowledge and appreciation of their watershed. Phase II and III will result in multiple watershed benefits. One main outcome of this project is to improve water quality. Additionally this project seeks to create a public access trail that will provide recreational opportunities throughout the sub-watershed and may aid in reducing greenhouse gas emissions by providing bike access for commuters to downtown Salinas.	construction work; however, those impacts cannot be quantified without knowing the types and locations planned.
Central Coast Wetlands Group: Implementation of the Moro Cojo Slough Management and Enhancement Plan – Restoration of the Upper Slough	The project will involve the restoration of 120 acres of the Moro Cojo Slough containing tidal and brackish water marsh (a State marine reserve) that receive fresh water inputs from agricultural lands above. Many of the problems that are now associated with most of California’s waterways stem from the fact that natural watershed functions which once served to maintain high water quality and wildlife – by filtering pollutants, recharging aquifers, providing flood storage capacity, and providing habitat – have been disrupted. By impounding water that is now allowed to flow off the land into the ocean, we will allow it to percolate into the substrate and eventually into the aquifers, reversing a 50-year trend of seawater intrusion into the coastal aquifers. Even the most persistent pesticides break down more rapidly in shallow marsh habitats through anaerobic bacterial degradation and photo-degradation from sunlight. Ponds will allow for the finest sedimentary particles (which transport pesticides, metals, and other pollutants) to settle out of the water column, preventing the concentration of these materials at single locations such as the Moss Landing Harbor. Restored wetland vegetation will clean water by removing nutrients. Microbial processes in wetland substrates will break down nitrates into harmless forms of nitrogen through denitrification. Threatened or endangered species that should benefit from the completion of this project include: Bells vireo ( <i>Vireo bellii</i> ), red-legged frog ( <i>Rana aurora draytonii</i> ), Santa Cruz long-toed salamander ( <i>Ambystoma macrodactylum croceum</i> ), California tiger salamander ( <i>Ambystoma californiense</i> ), tidewater goby ( <i>Eucyclogobius newberryi</i> ), and the brackish water snail ( <i>Tryonia imitator</i> ).	Possible impacts could include short-term, site-specific impacts related to site grading and construction, loss of some agricultural land production, and the associated revenue.
Central Coast Wetlands Group: Study of Environmental Services from Nutrient Reducing BMPs	This project is intended to fill existing economic and ecological gaps in knowledge about select nutrient load reducing BMPs, supporting current conservation programs, and to explore innovative Payment for Environmental Services (PES) potential. Tasks include an ecosystem service assessment to identify the location and size of existing nutrient reducing BMPs; nutrient reduction research to address gaps in the understanding of the effectiveness of selected BMPs at load reduction; ecosystem service valuation to economically assess the multiple benefits of BMPs; and an ecosystem services analysis to determine if PES is feasible. In many cases, growers can only receive funding assistance for BMPs that have been proven effective. This project will explore the effectiveness of two BMPs that growers may be interested in installing. Efforts that lead to the better understanding and more widespread implementation of the most effective BMPs will result in water quality benefits. In addition to the benefit of BMP implementation, gaining an understanding of the economic value of the environmental services that many different BMPs provide can help with grant and project budget justifications to make implementation projects more competitive. Finally, PES is an innovative mechanism for improving water quality, which if feasible can have incalculable benefits for this region and others.	There may be some impact from the installation of BMPs, depending on the type of BMP. Any BMP that involves dirt-moving has the potential to release small amounts of sediment into the air or water. These impacts are expected to be minimal, temporary, and far outweighed by the project benefits.

Central Coast Wetlands Group: Water Quality Enhancement of the Tembladero Slough Phase II	During Phase II of this project, 20 acres in total (approximately six projects) will be constructed based on the plans from Phase I that support and integrate the multiple objectives of the IRWM Plan, emphasizing urban and agricultural water quality enhancement, flood management, habitat restoration and support of various watershed planning and permit processes. This project will support numerous IRWM Plan objectives including watershed enhancement, improved water quality, flood protection, and habitat improvement, as well as an enhancement of public open space and urban/agricultural boundaries. The construction of these systems will integrate numerous efforts that have occurred with local landowners together to address water quality, supply, and environmental management into one comprehensive project. The project will provide a benefit by synthesizing historically separate management approaches and responsibilities into one cohesive approach. Main outcomes of this project are to improve water quality, help to meet various regulatory objectives, create wetland habitat, and reintegrate the community of Castroville with its coastal wetland resources. The project proponents anticipate that Castroville residents will embrace the multiple values made evident through this Phase II project and will direct county leaders to adopt wetland restoration objectives as primary criteria for the redevelopment of the community of Castroville.	Impacts include the following: resources directed to this project will not be available for other regional needs; there may be some loss of low-quality agricultural lands for construction of these systems; construction phase GHG emissions will occur, and will be mitigated (through biofuels, carpooling, sequestration).
City of Salinas: Integrated Industrial Wastewater Conveyance and Treatment Facility Improvements	This project will include new gravity sewers with capacity to collect more of the City’s industrial wastewater and convey it to the Industrial Wastewater Treatment Facility (IWTF), upgrades to the IWTF to treat increased industrial flows (expanded electrical system and aeration treatment and related upgrades), and a system to filter the IWTF effluent through soil at the IWTF. Project benefits include improved water resources management, job creation through opening of new industries, improved markets for local farmers, and enhanced energy efficiency (and hence lower GHG emissions) at the Industrial Wastewater Treatment Facility. Depending on the final selected water reuse scheme, groundwater over-drafting and /or seawater intrusion would be reduced.	Potential impacts would be transitory ones such as dust, noise, stormwater runoff, and traffic congestion associated with construction. The City would mitigate those impacts through normal City requirements such as enforcement of noise restrictions, traffic control measures, and a project stormwater pollution prevention plan.
City of Salinas and Monterey Regional Water Pollution Control Agency: Dry Weather Runoff Diversion Program	For Phase 1, the benefits include both water supply and water quality. The diverted water will assist MRWPCA in responding to water demands from its agricultural customers. Routing less urban runoff to the Salinas River will decrease release of potentially deleterious constituents—oil and grease, nutrients, trace metals and synthetic organics, and pathogenic organism. For Phase 2, the chief benefit will be to determine if more stormwater diversion is feasible and quantify potential diversions.	For Phase 1, the only impact on water supply would be slightly decreased flow to the Salinas River in the dry season. The project will have minor construction impacts but work will take place in an area where surface disturbances have occurred for over 70 years. The City will require that all work be performed in conformance with appropriate environmental controls such as stormwater pollution prevention and emissions controls on construction equipment. The Phase 2 study will have de minimis impacts on the environment.
Delicato Family Vineyards: San	The project consists of lining canals and reservoirs at the San Bernabe Vineyard. Significant water loss due to percolation results in increased water pumped from the well field, and significant increase in	Impacts could include temporary, short-term, and site-specific impacts

<p>Bernabe Lining Project</p>	<p>energy usage. Completion of lining would result in immediate benefits of reduced water usage and reduced energy consumption. With past lining installations, the vineyard managers have seen a 99% reduction in water loss which results in reduced energy use, both electrical and diesel, due to reduced pumping both at the wells and lift stations. Lining the structures not only prevents percolation and required pumping, but can provide habitat for waterfowl 365 days per year. All the structures are fenced to prevent accidental entry by hooved animals such as deer and wild pigs, but permit the entry of waterfowl and small species. In addition, linings allow the pumping of water during non-peak hours, reducing power demands to the grid; and in most cases, the water is gravity flowed into the system with no power demand.</p>	<p>associated with installation of the linings.</p>
<p>Ecology Action: Monterey Bay Green Gardener Training &amp; Certification Program</p>	<p>The Monterey Bay Green Gardener Certification Program provides bilingual, hands-on training in ecological landscaping methods for landscaping industry professionals, public agency landscape maintenance staff, and home gardeners. Benefits of the Green Gardener Certification Program are an increased technical capacity within the local landscape industry to realize the goals of the Greater Monterey County IRWM Plan relating to enhancing water supply, protecting water quality, improving stormwater retention and flood control, and fostering stewardship of watersheds and natural resources. The Green Gardener Program also serves as a conduit for government agencies to communicate new ordinances, regulations, and conservation incentives to an audience that may be hard to reach due to language and cultural barriers. Ecological landscaping practices also reduce the use of fossil fuels and improve air quality through reduced mowing, blowing, and hauling of green waste. Public health is improved via reduced exposure to potential carcinogens in the urban landscapes where people live, work, and play.</p>	<p>There are no negative impacts associated with this project.</p>
<p>Elkhorn Slough Foundation: Ridgeline to Tideline – Water Resource Conservation in Elkhorn Slough</p>	<p>“Ridgeline to Tideline” is a comprehensive approach to addressing water resource issues in an estuarine watershed. The project area encompasses 427 acres of Elkhorn Slough and uplands set in a 4,000-acre block of protected lands. The three phases of this work include: 1) increasing tidal range and circulation in part of the Slough with consistently poor water quality and greatly reduced estuarine function, coupled with restoration of an adjacent upland buffer, 2) acquiring two adjacent farmland properties that are chronic sources of Slough degradation, and 3) re-contouring and stabilizing their steep eroding slopes and restoring native vegetation. Benefits include improved estuarine water quality, improved flood protection of a railroad and roads, reduced offensive odors, decreased sediment, nutrient, salt and chemical pollution of surface and groundwater, decreased groundwater pumping, increased groundwater recharge, increased estuarine, freshwater wetland and upland wildlife habitat, increased listed species habitat, increased carbon sequestration, and reduced need for mosquito control.</p>	<p>Possible impacts include temporary construction-related effects, reduced farmland acreage and associated tax revenue.</p>
<p>Marina Coast Water District: Recycled Water Element of the Regional Urban Water Augmentation Project</p>	<p>The Recycled Water element of RUWAP is a local water supply source for the MCWD service area and potentially the Monterey Peninsula that will provide a non-potable offset to potable water currently used for irrigation. The Recycled Water element of RUWAP will contribute to the following regional benefits and beneficiaries:</p> <ul style="list-style-type: none"> <li>• Development of a reliable, high quality water supply for a large Monterey County region;</li> <li>• Optimization of the use of current water supply resources within Monterey County at a relatively low cost;</li> <li>• Improved water supply reliability through diversification of the developed water supply</li> </ul>	<p>All of the environmental impacts that would result from implementation of the Recycled Water element of RUWAP are considered less than significant, or will be reduced to less than significant with mitigation. The following was noted in the environmental documentation: Construction and operation of the project</p>

(RUWAP)	<p>portfolio;</p> <ul style="list-style-type: none"> <li>• Delivery of water to the Ord Community, allowing implementation of the Fort Ord Base Reuse redevelopment plan;</li> <li>• Creation of new jobs for construction, implementation, and operation and maintenance of the facility and associated appurtenances, contributing to economic sustainability of the region;</li> <li>• Reduced nutrient discharge to Monterey Bay National Marine Sanctuary;</li> <li>• Reduced groundwater pumping in support of Seaside Groundwater Basin Adjudication requirements; and</li> <li>• Sustainment of local water resources by putting this resource to its highest and best use.</li> </ul>	<p>would require grading, excavation, and other activities that could result in loss or disturbance to special-status species and their habitats. The potential exposure of employees and public to hazards due to discovery of unknown unexploded ordnance during pipeline trenching is a potentially significant impact. Construction activities and operation have the potential to affect air quality, which will be mitigated by efforts to reduce fugitive dust. The project proponent anticipates no significant impacts related to hydrology and water quality, and no significant negative impacts related to water supply.</p>
Monterey Bay Sanctuary Foundation: Making Monitoring Count	<p>This project will implement the tracking system developed to inventory projects designed to address the goals of improved water quality, water supply, flood control and environmental protection outlined in the IRWM Plan. The project will ultimately benefit the IRWM Plan process because the RWMG will have better knowledge of where practices are being implemented and how effective they are at their intended purpose. An inventory of the projects mapped on a Google interface for easy access and contact information will be created. Tools will be developed that will determine pollutant load reductions and potential for meeting beneficial uses. There will be multiple benefits associated with these tracking and assessment tools that may improve habitat and increase efficiencies. This project will also help to direct future efforts of the MBNMS Water Quality Protection Program by implementing the strategies outlined in the MBNMS Regional Monitoring, Data Access, and Interagency Coordination Action Plan. It addresses the need for a continuous and coordinated strategy for regional monitoring of water quality, compilation of data and effectiveness of practices. It is a goal of the MBNMS to make this information more accessible to the public, resource managers and especially researchers with the scientific and technical expertise to tackle unanswered questions related to effects of runoff into fresh water systems and the marine environment. In addition, further data analysis will help to determine where the IRWM process can focus environmental protection efforts.</p>	<p>No negative impacts are expected.</p>
Monterey County Public Works: Las Lomas Drive Storm Drain Improvements Project	<p>The project proposes to improve 0.25 miles of Las Lomas Drive. The project involves constructing new curb, gutter and sidewalks, Class II bicycle lanes, storm drains, a water treatment system, and rehabilitating the existing roadway. The project will provide water quality benefits by incorporating design features that will result in a reduction of pollutants and sedimentation prior to discharge into the Elkhorn Slough. Additionally, these improvements will capture and manage stormwater runoff, and improve and implement flood management thus adequately protecting and reducing risk to life and property to flooding.</p>	<p>The project will be constructed during the dry season and may have a short-term impact of traffic delays during the construction phase that will mostly affect the residents of Las Lomas Drive. The project may have potential environmental impacts in terms of air quality, biological resources, hydrology</p>

		and water quality, and noise. However, mitigation measures have been identified to reduce these impacts, including: dust control measures; a spill abatement plan; preparation of a Stormwater Pollution Prevention Plan that includes BMPs to control runoff, erosion and sedimentation from the site during grading activities; and noise reduction measures.
Monterey County Redevelopment & Housing Office: Well Replacement and Pipeline – San Lucas Water District	Since March 2011 all customers of the Water District have been on an indefinite “Do Not Drink” order from the Monterey County Division of Environmental Health due to excessive levels of nitrates in water being pumped from the District’s single well. The project will replace the existing well with a new production well. Project benefits include: the lifting of the “Do Not Drink” order issued by the Monterey County Health Department in March 2011; enhancement of the security of the public water supply by providing a newly constructed well to serve as the District’s primary water source, while retaining the existing well as an emergency backup source (the District presently does not have an emergency back-up water source for fire protection in the event the existing well has a mechanical failure); ability to approve new water service connections for planned affordable housing projects, something that is much needed in this overcrowded farmworker community; and bringing the Water District’s wastewater treatment facility into compliance with its Discharge Permit, which will further allow the District to approve new sewer service connections for the above reasons.	Potential impacts include possible temporary, short-term, site specific inconvenience to portions of the existing agricultural operation on the property from dust, erosion, sedimentation, or construction equipment during construction of the test well, test pumping and sampling of the test well, construction of the production well and pipeline, and development pumping of the production well.
Monterey County Water Resources Agency: Aquatic Invasive Species Inspection Project	This project benefits water supply by protecting the drinking water infrastructure that is present in Lake Nacimiento from infestation by quagga and zebra mussels, and protecting the Salinas River system from invasion of aquatic invasive species (AIS). Once introduced into a waterway, the mussels reproduce prolifically. If just a few zebra or quagga mussels get into a fresh water system, they could multiply into hundreds of thousands, within months, and eventually decimate native aquatic populations, change water clarity, increase toxic algal blooms and undesirable vegetation, cripple water system infrastructure, including critical agricultural water delivery systems, disrupt recreational boating, and can potentially cost state and local water and recreation agencies and the agricultural industry millions of dollars annually in monitoring, maintenance, containment, infrastructure restoration, and eradication efforts. In addition, it is likely that the recreational value of the lakes would be greatly reduced if AIS were found in either Lake.	There are no expected negative impacts.
Monterey County Water Resources Agency: Coastal Dedicated Monitoring Well Drilling	Twelve dedicated monitoring wells will be drilled under the oversight of a Professional Geologist. The four-inch diameter wells will be drilled using sonic drilling method that allows discrete evaluation of geology to determine where well perforations will be placed. The wells will be strategically placed in Monterey County right-of-way locations with the goal to fill water quality and water level data gaps in front of and behind the 2009 500 mg/L chloride seawater intrusion fronts for the Pressure 180-Foot and Pressure 400-Foot Aquifers. An important benefit of this project is that it will fill data gaps for continued comprehensive seawater intrusion monitoring. The project will also enable coastal water	Possible impacts associated with the drilling of the wells may occur.

	users, urban and agricultural, to understand potential impacts to their source water. In addition, the project will facilitate strategic planning for alternative water solutions by providing information about the health of the groundwater aquifers.	
Monterey County Water Resources Agency: Granite Ridge Regional Water Supply Project	MCWRA is proposing to implement the Granite Ridge Regional Water Supply Project to alleviate existing water supply and water quality deficiencies in the Granite Ridge area of northern Monterey County. The project will provide significant benefits in water supply reliability, increased water quality, and enhanced local fire protection. All parcels within the zone of benefit are susceptible to water shortages or loss, and will receive an increased level of water supply reliability including: greater supply reliability in the alluvial aquifer material of the greater East Side subarea; and greater reliability provided through the utilization of two wells, one for normal service, and one as a backup in the event the primary well is out of operation. There are two water quality issues in the Granite Ridge region: nitrate and arsenic concentrations that exceed Federal drinking water standards. Water quality where the supply wells will be located is generally good; all identified customers within the zone of benefit will obtain a uniform level of access to an improved water quality benefit. In addition, the project will improve the fire protection of the region and may result in reduced fire insurance rates for some parcels.	Impacts could include temporary, short-term, and site-specific impacts from dust, erosion, sedimentation, or construction equipment during construction of the water supply system. Possible impacts could also include impacts to air quality related to site grading and operation of heavy equipment, and increase in GHG emissions.
Monterey County Water Resources Agency: Salinas River Fisheries Enhancement Project	The implementation of the migration monitoring component of this project will provide a flow regime for steelhead trout in the Salinas River. This flow prescription calls for flows to be released from Nacimiento and San Antonio Reservoirs that are aimed at providing suitable habitat in the lower Nacimiento River for steelhead rearing, suitable conditions in the Salinas River for upstream migration of the adult steelhead, outmigration of steelhead smolt, and juvenile steelhead passage to the Salinas River Lagoon. It will also provide a procedure to improve water quality and fish habitat conditions in the Salinas River Lagoon by maintaining a fresh water flow into the Lagoon. The implementation of the habitat monitoring component means that water quality parameters that are critical for fish survival will be monitored with a new level of consistency. While not a direct goal of this project, the increased releases from the reservoirs and resultant river flows will force greater groundwater recharge, improving groundwater quality. The facilities and water quantity will be monitored to ensure that conditions exist for safe steelhead migration. The implementation of the population monitoring will evaluate steelhead response to management actions through behavioral parameters or abundance parameters.	There are no expected negative impacts.
Monterey County Water Resources Agency: Salinas River Flood Risk Reduction Project	The project will fund the preparation of a combined NEPA/CEQA document for the Salinas River Flood Risk Reduction Project, which allows channel maintenance activities on the mainstem of the Salinas River. Benefits may include reduced flood risk to public infrastructure and land adjacent to the Salinas River and select tributaries including highly productive agricultural land, homes, utilities and infrastructure such as bridges and wastewater treatment plants. This would have a direct benefit on the local economy as agriculture plays a key role in the local economy. Benefits also may include long-term sediment reduction and decreased in-stream erosion, increased aquifer recharge, improved fish and wildlife habitat and passage, decreased quantities of non-native invasive species, natural resources preservation and restoration of the floodplain. Additionally the program could offer enhanced public safety by reducing the risk to life and property.	Possible impacts could include short-term, site-specific impacts to air quality related to site grading and operation of heavy equipment, increase in greenhouse gas emissions, and could result in a loss of riparian and/or wetland acreage.

<p>Monterey County Water Resources Agency: Test Well for Regional Desalination Project – Slant Well</p>	<p>In response to the Seaside Basin overdraft and to address the 2006 State Board’s Division of Water Rights Cease and Desist Order to Cal-Am to reduce its Carmel River well water withdrawals, an alternative “Regional Water Project, Phase I” was proposed. This alternative proposed using vertical and slant wells to produce and treat brine water by reverse osmosis, and then deliver the potable water for use on the Monterey Peninsula to remove the State Board Cease and Desist Order. This proposal would fund the slant test well drilling component of the abovementioned project to determine project feasibility. The proposed project includes four sets of monitoring wells to be located at the project site within about 200 feet of the surface of the slant well. The Monterey Bay Regional Desalination Project will supply water to meet the immediate regulatory needs of the Monterey Peninsula and the demands of the Ord Community. Specifically, the project will: meet the requirements of the State Water Resources Control Board (SWRCB) Order 95-10 and offset the reduced diversion from the Carmel River; respond to the adjudication of the Seaside Groundwater Basin and provide additional supply necessary to offset reductions in allowable pumping from the Seaside Groundwater Basin; and meet the approved redevelopment needs of the Ord Community as documented in the Fort Ord Reuse Plan. In addition to meeting regulatory requirements for water supply, the desalination project will help reduce and remediate seawater intrusion, which is an ongoing water quality issue in the region.</p>	<p>Possible impacts may include construction-related issues including short-term specific impacts related to site grading and construction. Construction-related impacts may include increased traffic and noise, and increased GHG emissions.</p>
<p>Nacimientto Regional Water Management Advisory Committee: Interlake Tunnel between Lake Nacimientto and Lake San Antonio</p>	<p>The project is to build an interlake tunnel between Lake Nacimientto and Lake San Antonio. The Nacimientto–San Antonio Interlake Tunnel Project will ensure the reliability of the water supply, conserve additional water, and assist with flood control. Tens to nearly a hundred thousand AF of water could be captured (the 2011 rain year was estimated at 33,000 acre-ft) and stored for use in dryer months or years. This additional water supply would benefit all downstream users throughout the Salinas River Basin for agricultural, industrial, commercial, recreational and drinking water purposes. The water is conveyed via the Salinas River, whose flow is directly over the groundwater basin and is the primary source of recharge, thereby benefiting those downstream needs such as groundwater recharge and the resistance of seawater intrusion. The water from the reservoir will be used to naturally replenish the 180 and 400-Foot Aquifers below the Salinas Valley. Thus the water would increase the water supply by capturing tremendous amounts of rainwater, improve the overall water quality (less reliance on recycled water), and increase the recreational opportunities at both reservoirs with higher water levels. Water released from the Nacimientto and San Antonio Dams provides a consistent habitat for endangered fish such the steelhead trout, which are alleged to have once inhabited the area. An increase in stored water at both Lake Nacimientto and San Antonio will ensure more stable habitat. In addition, the Nacimientto–San Antonio Interlake Tunnel Project will facilitate the transfer of water from Lake Nacimientto to Lake San Antonio. It will allow for more varied operational dynamics and flood control options as the tunnel provides another outlet in which to store water during a storm event.</p>	<p>Possible impacts may include construction-related issues within the lakebeds including short-term specific impacts related to site grading and construction. Construction-related impacts may include increased traffic and noise. Additionally, a temporary increased turbidity with the reservoir bodies may affect water quality. Longer term aesthetics of the intake structures may degrade the natural beauty of the manmade reservoirs.</p>
<p>Pajaro/Sunny Mesa Community Services District: Springfield Water Project</p>	<p>The proposed project will benefit the disadvantaged community of Springfield and the Moss Landing Mobile Manor by providing them with an increase in potable water supply. The Springfield system is currently on a demand basis without storage. The project includes providing the system with sufficient storage for both Struve Road and the Moss Landing Mobile Manor. Also the proposed project will benefit the water system by reducing the pump cost. The well will no longer be on a demand basis and will have time to shut off and turn on when the tanks call for water, not every time the user opens the</p>	<p>The Springfield water system will be impacted by short-term construction. The community will be facing the inconvenience that construction crews bring: noise, traffic, and momentary water shut off.</p>



	<p>water faucet. In addition, the only access to the Springfield water system is through dirt roads. During the rainy season it is impossible to drive on the muddy roads, and the well site must be checked by foot. The well operator must walk to the well site daily until the roads have dried. The proposed well site is accessible all year long. This will benefit the system by reducing operation costs. The project will benefit all the Struve Road community by providing potable water and reducing the travel time and expense of purchasing bottled water for drinking and cooking. The community will have potable water in their homes, something this community has not had since at least 1986.</p>	
RCD of Monterey County: Livestock and Land	<p>The purpose of this program is to achieve immediate and lasting reductions in nutrient, sediment and pathogen pollution to surface and ground waters and enhance wildlife habitat through implementation of BMPs on livestock facilities and rangelands in the Greater Monterey County IRWM region. The proposed program utilizes an incentives-based approach to achieve the cultural change needed for livestock facilities to voluntarily adopt management measures that improve the healthy functioning of watersheds. This project has water quality, watershed enhancement, habitat improvement, and water conservation benefits. Benefits include strengthening of public/private partnerships to address environmental challenges, reduced surface water nutrient and bacteria concentrations (improved water supply quality), improved fish and wildlife habitat with emphasis on stockpond-associated amphibians (such as the California red-legged frog and tiger salamanders), animal health and public safety, site-specific improved flood protection, and educational opportunities.</p>	<p>Possible impacts are extremely localized temporary soil disturbance and noise associated with site preparation or grading.</p>
RCD of Monterey County: Monterey County Farm Water Quality Assistance Program	<p>The RCD of Monterey County, in close partnership with University of California Cooperative Extension Crop Advisors and USDA Natural Resources Conservation Service, will provide a bilingual on-farm erosion, irrigation, and nutrient management evaluation program for Monterey County farmers. The main intended benefits of this project are more efficient use of agricultural irrigation water and nutrients, improved water quality and availability downstream for other beneficial uses in the subject watersheds, and reduced grower input costs relative to crop productivity and quality. Additional potential benefits include: decreased sedimentation of downstream waterways, wetlands, and structures; decreased reliance on imported water; reduced pumping costs; decreased groundwater overdraft; reduced surface water nutrient and bacteria concentrations; and improved fish and wildlife habitat.</p>	<p>Potential project impacts include: short-term, site-specific impacts related to site grading and construction, loss of summer drainage flow to downstream water users, and summer in-stream flow loss due to reduced irrigation runoff.</p>
RCD of Monterey County: Salinas River Watershed Invasive Non-native Plant Control and Restoration	<p>The project proposal is for the first 3-year stage of treatment (of a 10+ year program) and will target <i>Arundo spp.</i> and <i>Tamarix spp.</i> and other invasive weeds in the channel, floodplain and terraces of the Salinas River between King City and Soledad. All non-native invasive weeds present in these areas will be treated using a combination of physical, chemical and biological techniques, and selected sites will be revegetated with native plants as appropriate to the site (considering flood risk, natural recruitment potential, and landowner interest). Anticipated benefits include: enhancement of riparian habitat, increased aquifer recharge due to reduced evapo-transpirative demand from removed non-native plants, erosion prevention, improved surface water quality and reduced flood risk from sediment reduction, stream shading and temperature improvements for steelhead, enhanced navigability and fish passage, public safety and food safety from reduced flood risk, decreased flood insurance costs, and education opportunities for youth and land managers.</p>	<p>Possible impacts are primarily short-term, site-specific impacts related to mechanical and chemical weed treatment, namely: noise, possible spray drift on adjacent non-target vegetation, and soil disturbance from heavy equipment. All of these are considered in the Programmatic Mitigated Negative Declaration for CEQA currently under public review.</p>
Rural Community Assistance	<p>The Greater Monterey Bay Disadvantaged Community Wastewater Management Pilot Program will form a collaboration of experts, students, community leaders and local government to implement an</p>	<p>Possible impacts may include the discovery of failed systems in need of</p>

<p>Corporation: Greater Monterey Bay Disadvantaged Community Wastewater Management Pilot Program</p>	<p>Inspection and Monitoring program of community onsite wastewater systems. The program will create an on-going operation and maintenance program, including ground water monitoring, for selected disadvantaged communities that are served by individual septic tanks that may not afford traditional sewer systems. Possible benefits include decreases in contaminated groundwater, more sanitary living conditions for community residents, decreases in environmental health hazards, and overall improvement to water quality and conservation. An additional benefit is the local job creation of two certified Service Providers. Economic benefit will also occur for local plumbers and excavators. Lastly, partnerships with the two universities will increase the community presence for both schools, provide the students with hands-on projects and decrease the cost to the DACs in implementing the project.</p>	<p>replacement or immediate repair. This may pose an increased financial hardship for community residents.</p>
<p>Save Our Shores: Watershed Protection Program – Annual Coastal Cleanup Day in Monterey County</p>	<p>At a minimum of 30 sites annually, 2,000 volunteers will remove and prevent 10,000 pounds of trash from entering the MBNMS. River cleanups will result in improved fish passages due to the removal of debris. Beaches will be cleaner, which will be more inviting for tourists and safer due to less glass and other sharp objects in the sand. The annual cleanup will protect endangered species by preventing dangerous trash from entering coastal waters. In particular, the MBNMS is home to four species of endangered turtles as well as the endangered California sea otter, which can easily mistake plastic bags for jellyfish. Save Our Shores has prevented 27,000 plastic bags from entering the ocean in the past four years through the annual coastal cleanup days. In addition, recreational activities that take place daily in the Sanctuary such as kayaking, surfing and swimming will be more enjoyable due to less trash in the water.</p>	<p>No negative impacts are expected.</p>

#### **H.4 THE INTANGIBLE BENEFITS OF IRWM PLAN IMPLEMENTATION**

The benefits of this IRWM planning effort go well beyond the on-the-ground water resource and environmental benefits that will accrue through the implementation of projects. One of the great 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.

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.

## Section I: Integration

The intent of the Integration standard in the Proposition 84/IE Integrated Regional Water Management (IRWM) Program Guidelines is to ensure that Regional Water Management Groups (RWMGs) intentionally create a system where integration can occur. 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. This section discusses three types of integration: 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 sections of this IRWM Plan (including the Governance, Stakeholder Outreach, Data Management, and Project Review sections).

### I.1 STAKEHOLDER/INSTITUTIONAL INTEGRATION

IRWM Plans are required to contain governance structures and processes that enable diverse groups of stakeholders to participate in all levels of the IRWM planning effort. The California Water Code (CWC) §10541(h)(2) refers to ensuring that IRWM plans are developed collaboratively in a manner that balances interests and engages a variety of stakeholders regardless of their ability to contribute financially. This type of integration has been ensured in the Greater Monterey County IRWM planning region through the governance structure, including composition of the RWMG and the process for stakeholder participation.

#### I.1.1 Governance

Eighteen organizations have come together to form the Greater Monterey County RWMG for the purposes of IRWM planning and project implementation within the Greater Monterey County IRWM region. These entities include government agencies, nonprofit organizations, educational organizations, water service districts, private water companies, and organizations representing agricultural, environmental, and community interests, as follows:

- Big Sur Land Trust
- California State University Monterey Bay
- California Water Service Company
- Castroville Community Services District
- City of Salinas
- City of Soledad
- Elkhorn Slough National Estuarine Research Reserve
- Environmental Justice Coalition for Water
- Garrapata Creek Watershed Council
- Marina Coast Water District
- Monterey Bay National Marine Sanctuary
- Monterey County Agricultural Commissioner's Office
- Monterey County Water Resources Agency
- Monterey Regional Water Pollution Control Agency
- Moss Landing Marine Laboratories
- Resource Conservation District of Monterey County
- Rural Community Assistance Corporation
- San Jerardo Cooperative, Inc.

The Greater Monterey County RWMG is made up of diverse organizations with differing expertise, perspectives, and authorities of various aspects of water management, representing all major geographic

areas within the region. There is no one leadership position on the RWMG, and no hierarchy of decision-making. All major IRWM planning decisions are decided by vote at the regularly scheduled RWMG meetings. Each RWMG member organization is allowed one vote regardless of whether or not they have contributed financially 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 in the Greater Monterey County region.

### **I.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 the RWMG by brainstorming every known organization that might be affected by and/or interested in the IRWM Plan process. The current list includes about 250 individuals representing over 150 agencies, organizations, and interest groups. The list continues to expand and evolve as new stakeholders are introduced to the process.

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 water resource management authorities and stakeholders from 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 governments
- Environmental non-profit organizations
- Agricultural organizations
- Business organizations
- Disadvantaged communities
- Other community organizations
- Universities and research institutions
- 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. Please see Appendix D for the full list of stakeholder organizations in the Greater Monterey County region (also posted on the website, <http://www.greatermontereyirwmp.org/documents/>).

The RWMG ensures public involvement in its decision-making processes through various means, including regular email updates to stakeholders on the IRWM planning process, a regularly updated website, public comment periods on all major IRWM Plan “milestones,” and occasional public workshops. In addition, stakeholders are always invited to participate in the monthly RWMG meetings, with locations and meeting times announced on the website each month. Meeting minutes are posted on the IRWM website following each RWMG meeting.

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

## **I.2 RESOURCE INTEGRATION**

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

### **I.2.1 Sharing of Information and Expertise**

Between the RWMG members and stakeholders, the combined knowledge, expertise, and technical capacity within the Greater Monterey County IRWM planning region is truly immense. The RWMG members lend their expertise and unique perspectives through the ongoing 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 Greater Monterey County IRWM planning region were asked to provide their knowledge and opinions about the water resource “issues and conflicts” that existed in the region. Outside experts are also asked to provide input on technical aspects of project applications during the project review process, as needed. The RWMG expects to involve outside experts and specialists to an even greater extent in the IRWM planning process as part of a Climate Change Task Force, with the intent of forming a sort of “hub” for climate change planning in the broader Monterey County and Monterey Bay region.

Another way in which the RWMG promotes integration in the IRWM planning process is through the sharing of data. Section K of this IRWM Plan describes the data management system for the Greater Monterey County region. Because the Greater Monterey County IRWM Plan does not have an ongoing secure funding source for data management, the RWMG has opted to utilize existing State database frameworks including, for surface water quality, those developed by the California Surface Water Ambient Monitoring Program (SWAMP) and by the California Environmental Data Exchange Network (CEDEN). 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 Groundwater Ambient Monitoring and Assessment (GAMA) database. The intent and design of the Greater Monterey County IRWM Plan data management system thus focuses on a localized approach to data collection and management with uploading of data into statewide databases. The statewide databases include web tools for dissemination, which will easily allow for the sharing of data between stakeholders and project proponents in the planning region.

The RWMG is also making use of a new online data tool to track IRWM Plan implementation projects. The Conservation Action Tracker database, described in the Plan Performance and Monitoring Section of this Plan, is 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 collective impacts and effectiveness. The Conservation Action Tracker is being implemented by the Central Coast Resource Conservation Districts and project partners of the Greater Monterey County IRWM Plan.

## **I.2.2 Integration of Resource Strategies**

Implementing projects that utilize a diverse mix of resource management strategies and that promote the full capacity of the water management system in the IRWM planning region, including both natural and man-made water resource infrastructure, is yet another way in which the RWMG promotes integration in the IRWM planning process. Section E of this IRWM Plan lists and describes the resource management strategies chosen by the Greater Monterey County RWMG for inclusion in the Plan. The resource management strategies include both natural watershed systems and drinking water distribution systems as components of the water system being managed in the IRWM planning effort, and as such, reflect a recognition on the part of the RWMG that the proper and “healthy” functioning of both systems are equally important.

The projects included in the IRWM Plan utilize a broad and diverse mix of resource management strategies (see Table E-1 in Section E, which demonstrates how the various projects utilize resource management strategies). The RWMG encourages stakeholders to develop projects that employ a diverse mix of resource management strategies 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 to mitigate for, uncertain future circumstances, including the impacts of climate change.

## **I.3 PROJECT INTEGRATION**

One advantage of regional planning lies in the ability to address similar objectives of local organizations with regional programs. IRWM planning decisions can lead to existing projects being combined or replaced by new projects. The resources to implement multiple smaller efforts (e.g., personnel, finance, equipment) may benefit from economy of scale when similar local interests can be met with a regional project.

### **I.3.1 How the RWMG Promotes Project Integration**

The RWMG encourages stakeholders in the Greater Monterey County IRWM planning 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) for potential integration opportunities, with an aim of combining discrete project elements or combining entire projects to create regional programs. 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.

Note that for future IRWM Plan project solicitations, the RWMG has considered the idea of hosting informal “mixers” for project proponents and other stakeholders where they can discuss current projects and brainstorm new project ideas. The concept behind the mixers is to bring individuals together in a casual setting that is conducive to “mingling” and to an easy exchange of ideas. The intent is to increase integration of projects and to enhance opportunities for coordination of activities, collaboration, and partnerships throughout the region.



### **I.3.2 Water Resource Project Coordination Process**

One important effort that has resulted from the project integration process described above is the Water Resource Project Coordination (WRPC) process. The WRPC process represents a new approach to addressing and resolving water-related conflicts in the region, while at the same time promoting stakeholder collaboration and project integration. Through the WRPC process, the RWMG will bring together project proponents and other stakeholders in a particular sub-watershed of the region—the lower Gabilan/Reclamation Ditch watershed—to discuss and reconcile conflicts between IRWM Plan projects or project objectives, to coordinate and integrate the projects where possible, and to find new potential areas of collaboration. Through this process the RWMG also hopes to find additional opportunities for integrated flood management.

The idea for WRPC came out of a recent project review process. As RWMG members were reviewing projects for opportunities to integrate them into multi-benefit projects and programs, it became apparent that many projects within certain sub-watershed areas could and should be integrated, except that underlying conflicts between project objectives and/or project proponents put the projects at odds with one another. A process was needed—beyond the normal integration process—to reconcile these projects in order for integration to occur and for project implementation to proceed. But while many attempts at traditional conflict resolution have been made in the past, most of these attempts have failed, resulting in even more mistrust on the part of stakeholders. The RWMG concluded that a new approach was needed.

The WRPC process uses a basic joint fact-finding approach, whereby parties discuss what factual questions they believe to be relevant to a decision, exchange information, identify where they agree and where they disagree, and negotiate an approach to seeking additional information, either to fill gaps or to resolve areas of disagreement. The WRPC brings stakeholders into the process from the start, beginning with the question, “What information do we need to make our decisions?” The goal is to alleviate areas of mistrust so that mutual solutions can be achieved. The process is intended to work towards solutions that are reached by a sharing of data, experiences, stakeholder concerns, and viewpoints. Beginning from a solutions-based platform, all stakeholders interact and in the end develop, ideally, a result that all involved can get behind. The RWMG anticipates that bringing the public together with scientists and local-elected leadership to work with each other and share their knowledge in an open consensus-seeking process will prove a better way to ensure the use of good science in water resource decision-making than through the more typical adversarial process.

With the WRPC process, the Greater Monterey County RWMG seeks to proactively move from a conflict resolution paradigm to one of cooperation and reconciliation. And through cooperation, the RWMG hopes to encourage the development of new collaborations and new integrated projects for the IRWM Plan. All projects developed through the WRPC process will be forwarded to the RWMG for review and consideration for possible inclusion in the Plan.

The WRPC process has been fully funded through the Proposition 84 IRWM Round 1 Planning Grant, and is currently underway. If successful, the WRPC process will enable the Greater Monterey County RWMG and stakeholders to move past certain (sometimes contentious) issues that have held project proponents back in the past from conducting important water resource-related work in the watershed. The significance of this cannot be overestimated, and if successful, the template for the WRPC process will be shared with other IRWM regions throughout the state.

Thus, it is through processes such as the WRPC along with multiple other aspects of the ongoing IRWM planning process—including governance, stakeholder participation, data management, utilization of resources and resource management strategies, and project integration—that the RWMG ensures a cohesive, collaborative, and integrated planning process for the Greater Monterey County IRWM region.

## Section J: Plan Performance and Monitoring

The intent of the Plan Performance and Monitoring standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to ensure that:

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

This section addresses the first two requirements listed above. The third requirement of the standard is addressed as part of the regular project review process (described in Section F); each project submitted for inclusion in the IRWM Plan is carefully reviewed by the RWMG to ensure that it complies with all applicable rules, laws, and permit requirements before it can be approved for inclusion in the Plan. As projects get implemented, they will continue to be monitored to ensure compliance with all applicable rules, laws, and permit requirements.

This section outlines the general process that is used for IRWM Plan performance and project monitoring. Project-specific details are not included in this section, but will be made available on the Greater Monterey County website (<http://www.greatermontereyirwmp.org/>) following each Plan Performance Review.

### J.1 PLAN PERFORMANCE

A Plan Performance Review will be conducted every two years or as appropriate to evaluate progress made toward achieving Plan objectives. The Plan Performance Review will be prepared by the IRWM Plan Coordinator, or in the absence of a Coordinator, by a subcommittee of the RWMG. Progress toward meeting Plan objectives is directly tied to the implementation of projects. The implementation of projects, along with associated monitoring data, will be tracked using a Data Management System (DMS) that takes advantage of database systems developed by statewide efforts. Because the Greater Monterey County IRWM Plan does not have an ongoing secure funding source for data management, the RWMG has opted to utilize existing State database frameworks including, for surface water quality, those developed by the California Surface Water Ambient Monitoring Program (SWAMP) and by the California Environmental Data Exchange Network (CEDEN). 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 Groundwater Ambient Monitoring and Assessment (GAMA) database (see the Data Management section for a detailed description). The IRWM Plan Coordinator will work closely with the Data Management Coordinator (or in absence of a Data Management Coordinator then a subcommittee of the RWMG) to track project implementation.

Two tables will be generated with each Plan Performance Review that address the first two requirements of the standard, i.e., that the RWMG is implementing projects listed in the IRWM Plan, and that the RWMG is efficiently making progress towards meeting the objectives of the IRWM Plan. The first table will simply list all of the projects in the IRWM Plan, their implementation status, and funding source. Projects that have been fully implemented will be highlighted, as follows:

**Table J-1: Status of Project Implementation**

Project Proponent & Project Title	Funding Source		Date of Implementation/Status
	IRWM funds \$	Other funds \$ (cite source)	
1. xxx			Not yet implemented
2. xxx	\$xxx	\$xxx EPA 319(h) grant; \$xxx	Phase I completed August 2012, in initial stages of Phase II
3. xxx			Not yet implemented
4. xxx		\$xxx (USDA Farm Bill grant)	Project fully implemented, completed April 2012
5. xxx	\$xxx	\$xxx (EPA CWSRF funds)	Project near completion, September 2012
6. xxx			Not yet implemented
Etc.			

The second table will help chart the progress of the projects that have been implemented, or are in the process of being implemented, toward achieving IRWM Plan objectives. The table will be populated by a Conservation Action Tracker database, which is a data system for tracking land-use management improvements in the Central Coast region. It is an online tool (currently under construction) 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 collective impacts and effectiveness. The Conservation Action Tracker will be implemented by the Central Coast Resource Conservation Districts (RCDs) and project partners of the Greater Monterey County IRWM Plan.

Table J-2 below provides a template of the table that will be completed during each Plan Performance Review using the Conservation Action Tracker online tool. The measurability criteria for objectives (defined in Section D of this IRWM Plan) 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 J-2: Progress toward Achieving IRWM Plan Objectives**

Objectives	Qualitative Measurement	Quantitative Measurement
<b>WATER SUPPLY OBJECTIVES</b>		
<i>Objective 1: Increase groundwater recharge and protect groundwater recharge areas.</i>		
Project X	List how project is meeting obj	List how project is meeting obj
Project Y	List how project is meeting obj	List how project is meeting obj
Project Z	List how project is meeting obj	List how project is meeting obj
<i>Objective 2: Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
<i>Objective 3: Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		
<b>WATER QUALITY OBJECTIVES</b>		
<i>Objective 1: Promote practices necessary to meet, or where practicable, exceed all applicable water quality regulatory standards (for drinking water, surface and groundwater quality).</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		

<b>FLOOD PROTECTION OBJECTIVES</b>		
<i>Objective 1: Promote projects and practices to protect infrastructure and property from flood damage.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		
<b>ENVIRONMENT OBJECTIVES</b>		
<i>Objective 1: Support science-based projects to protect, improve, enhance, and/or restore the region's ecological resources, while providing opportunities for public access and recreation where appropriate.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		
<b>REGIONAL COMMUNICATION OBJECTIVES</b>		
<i>Objective 1: Facilitate dialogue and reduce inconsistencies in water management strategies/regulations between local, regional, state, and federal entities.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		
<b>DISADVANTAGED COMMUNITIES OBJECTIVES</b>		
<i>Objective 1: Seek funding opportunities to ensure all communities have a water system with adequate, safe, high-quality drinking water.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		
<b>CLIMATE CHANGE OBJECTIVES</b>		
<i>Objective 1: Plan for potential impacts of future climate change.</i>		
Project title(s) here	List how project is meeting obj	List how project is meeting obj
ETC.		

During each Plan Performance Review, the information in the above table will get updated and new projects will be added. The table will be accompanied by a narrative, which will summarize 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 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.

**J.2 PROJECT-SPECIFIC MONITORING PLANS**

If the project requires monitoring, the project proponent is responsible for both development of the project-specific monitoring plans and for all monitoring activities. There may be cases where project-specific monitoring will not apply, such as land acquisition or installation of purple pipe for reclaimed water.

There are two levels of development for the project monitoring plan. First, a general outline of monitoring requirements and design will be included in a project proposal for inclusion in the IRWM Plan; second, the monitoring plan and quality assurance project plan will be included in the scope of work in a funding proposal, and must be approved by the appropriate State agency prior to monitoring taking place for a given project.

The DMS for the Greater Monterey County IRWM region will include data validation and quality assurance for the set of standardized key metadata fields. The data system will provide a portal to data sets (measurements) hosted by the data generating organizations or those that have been integrated to regional, statewide, or national databases, including Wetland Tracker, CalDUCs, and CEDEN. For further details on this system please refer to Section K, the Data Management section of this IRWM Plan. The Data Management Coordinator, or in absence of a Coordinator then a subcommittee of the RWMG, will be responsible for ensuring that data gets uploaded to the appropriate State database.

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

- Projects that involve surface water quality must meet the criteria for and be compatible with SWAMP, [http://www.waterboards.ca.gov/water\\_issues/programs/swamp/tools.shtml](http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml)).
- All projects that involve groundwater quality must meet the criteria for and be compatible with GAMA, <http://www.waterboards.ca.gov/gama/>).
- All projects that involve wetland restoration must meet the criteria for and be compatible with the State Wetland and Riparian Area Monitoring Plan (WRAMP, [http://www.waterboards.ca.gov/mywaterquality/monitoring\\_council/wetland\\_workgroup/docs/2010/tenetsprogram.pdf](http://www.waterboards.ca.gov/mywaterquality/monitoring_council/wetland_workgroup/docs/2010/tenetsprogram.pdf))

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

1. Clearly and concisely (in a table format) describe what is being monitored for each project. Examples include photo monitoring, water depth, flood frequency, and effects the project may have on habitat or particular species (before and after construction), etc.
2. Measures to remedy or react to problems encountered during monitoring. An example would be to coordinate with the Department of Fish and Game if a species or its habitat is adversely impacted during construction or after implementation of a project.
3. Location of monitoring (with a map).
4. Monitoring frequency.
5. Monitoring protocols/methodologies, including who will perform the monitoring.
6. Procedures to ensure the monitoring schedule is maintained and that 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 Greater Monterey County IRWM Plan is meeting its goals and objectives. Note that 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 data regarding climate change impacts and vulnerabilities for the Greater Monterey County region become available. With this information, the RWMG may choose to modify IRWM Plan objectives, the measurability of those objectives, the use of resource management strategies, or the project review process; and these decisions will, in turn, dictate the types of projects that will be prioritized and implemented in the future.

## Section K: Data Management

The intent of the Data Management standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to ensure efficient use of available data, stakeholder access to data, and to ensure that the data generated by IRWM implementation activities can be integrated into existing State databases. The Regional Water Management Group (RWMG) has intentionally adopted existing statewide protocols for the regions' data management needs in order to ensure sustainable long-term support and standardization. This section describes how data from IRWM-funded projects is stored, validated, and shared in the Greater Monterey County IRWM planning region.

### K.1 DATA MANAGEMENT: INTRODUCTION

Throughout Monterey County, a great deal of valuable water quality data is collected, but not in an organized or collaborative way that is meaningful for all stakeholders in the region. Most data that is collected is program specific with outcomes intended for a particular question or purpose. The IRWM planning process can help to facilitate better information sharing and identify data needs that will help the RWMG, agencies and organizations, project proponents, and stakeholders in the region better understand water quality and habitat conditions.

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

A less costly alternative with a greater chance for success is the adoption of similar data management documentation practices for IRWM Plan projects along with the rigorous standardization of the most critical information across projects and data types. Given resources currently available, it is not possible to centralize the management of the diverse data types that may include physical implementation, monitoring, restoration, design, inspection, education and outreach. Further, tasking an entity with managing data they did not collect is risky since they have a less intimate knowledge of that data and may be more prone to introducing errors during data management operations, such as quality assurance or duplicate detection and removal.

Ultimately, a more seamless integration of data sets that can be used to assess watershed health and address regional knowledge needs is desirable. Adopting common data documentation standards and standardizing key metadata fields is a sensible and useful step towards this goal at this time. The proposed structure will facilitate data discovery and sharing, lowering the costs associated with satisfying regional knowledge needs.

Because the Greater Monterey County IRWM Plan does not have an ongoing secure funding source for data management, the RWMG has opted to utilize existing State database frameworks including, for surface water quality, those developed by the California Surface Water Ambient Monitoring Program (SWAMP) and by the California Environmental Data Exchange Network (CEDEN). 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 Groundwater Ambient Monitoring and Assessment (GAMA) database.



## **K.2 OVERVIEW OF DATA NEEDS**

In 2006, the Monterey Bay National Marine Sanctuary (MBNMS) began an effort to coordinate disparate monitoring programs and to determine if the data was comparable enough to answer specific State non-point source (NPS) questions. This effort was called the “Central Coast Water Quality Data Synthesis, Assessment, and Management (SAM) Project.” The SAM Project facilitates region-wide water quality monitoring coordination, data management, and data analysis for addressing the sources, status, and trends of NPS pollution on the Central Coast via technical, scientific, and programmatic activities. Key goals of the project include enhancement of the regional water quality monitoring network and improving access to knowledge used for managing coastal watershed and nearshore marine systems. Findings of the SAM Assessment include the following recommendations to address key information gaps. These gaps apply to all of the watersheds draining to the MBNMS but are highly representative of information gaps and data needs for the Greater Monterey County IRWM Plan (MBNMS and SIMoN 2008).

- The absence of a region-wide standardized water quality data format for the Central Coast is an important barrier to regional water quality data analysis, information exchange, and coordination between monitoring organizations. A system should be created for automatic, seamless data integration that is based on the SWAMP formats and facilitates upward data flow toward a central location in CEDEN.
- The lack of coordination between monitoring organizations results in wasted resources and important data gaps that reduce our ability to understand the status and trends of water quality conditions. Two things that would help to identify opportunities to optimize resources are: 1) a regularly updated clearinghouse of information on all the Central Coast Water Quality Data Assessment existing programs; and 2) an annual water quality conference in the region to disseminate information and highlight the value of monitoring coordination efforts.
- Adequate detection of changes over time in water quality conditions requires that we: 1) maintain commitments to sustain long-term monitoring stations such as the Central Coast Ambient Monitoring Program (CCAMP) Coastal Confluences stations; 2) encourage standardized flow measurement as a regular part of water quality monitoring; and 3) allocate sufficient resources to data analysis.
- Encourage cooperation of watershed stakeholders to collect and share information about changes in land management practices in a standardized way that will be useful for comparison with water quality data.
- Develop a monitoring design with the express purpose of evaluating relationships between changes in land use management activities and water quality conditions at multiple watershed scales.
- Institutionalize a regional data node for ongoing data collection, analysis and multi-tiered reporting to facilitate the NPS pollution management objectives of regional stakeholders.

### **K.2.1 Monitoring Programs**

#### ***Surface Water Quality***

There is quite a bit of water quality data collected in the Salinas Valley watershed, including two long-term regional programs: the Central Coast Regional Water Quality Control Board’s (RWQCB) CCAMP and the Central Coast Agriculture Preservation, Inc.’s Cooperative Monitoring Program. Other programs that measure water quality and have large spatial or temporal scale are described below. Very little water quality monitoring takes place along the Big Sur coast. One data set is from the MBNMS Citizen



Watershed Monitoring Network's Annual Snapshot Day, a single-day event that has been taking place since 2000, in which volunteers measure water quality at over 150 rivers and streams along the entire Central Coast, including the Big Sur region. Programs that are ongoing, have good potential to produce high quality data, and are known to have collected substantial data sets at fixed locations over a period of greater than three years are listed below:

- **Central Coast Ambient Monitoring Program (CCAMP)**  
Central Coast RWQCB  
<http://www.ccamp.org/>
- **Central Coast Long Term Environmental Assessment Network (CCLEAN)**  
Applied Marine Sciences  
<http://www.cclean.org/>
- **Ag Waiver Cooperative Monitoring Program**  
Central Coast Water Quality Preservation Inc. (CCWQP)  
<http://www.ccwqp.org/>
- **Elkhorn Slough Volunteer Monitoring Program**  
Elkhorn Slough National Estuarine Research Reserve (ESNERR)  
<http://www.elkhornslough.org/esnerr.htm>
- **Snapshot Day**  
MBNMS Citizen Watershed Monitoring Network/Coastal Watershed Council (CWC)  
<http://montereybay.noaa.gov/monitoringnetwork/events.html>  
<http://www.coastal-watershed.org/>
- **Marc Los Huertos Ambient Monitoring (MaLoHAM)**  
University of California Santa Cruz / California State University Monterey Bay  
<http://envs.ucsc.edu/shennan/Directory/Mark.html>  
<http://home.csUMB.edu/1/loshuertosmarc/world/>
- **Central Coastal Watershed Studies (CCoWS)**  
California State University Monterey Bay  
<http://ccows.csUMB.edu/index.htm>
- **National Water Information System**  
US Geological Survey (USGS)  
<http://waterdata.usgs.gov/nwis>
- **The Marine Pollution Studies Laboratory at Granite Canyon**  
University of California Davis  
<http://www.envtox.ucdavis.edu/GraniteCanyon/GraniteCanyon.htm>

### ***Habitat Condition***

If habitat condition monitoring is required by funding guidelines, CRAM will be used to document the habitat condition for Greater Monterey County IRWM Plan projects. CRAM is an approach that provides consistent, scientifically defensible, affordable information about the conditions of wetlands and riparian habitats throughout California. Large amounts of public and private funds are being invested in policies, programs, and projects to protect, restore, create, enhance, and manage wetlands and riparian habitats in California. Most of these investments have not been evaluated, because the ambient conditions of the habitats have not been monitored, or the monitoring methods have been inconsistent, and there is little

assurance of data quality. CRAM provides a means to measure and document habitat conditions and makes the results of the monitoring readily available to analysts and decision makers.

CRAM is designed to cost-effectively assess the performance of wetland and riparian restoration projects, mitigation projects, and the status and trends of ambient conditions within watersheds, regions of the state, and for the state as a whole. The use of CRAM for ambient monitoring will, over time, help wetland managers and scientists quantify the relative influence of anthropogenic stress, management actions, and natural disturbance on the spatial and temporal variability in reference conditions. This information can then be used in the design, management, and assessment of projects.

Specific applications of CRAM could include:

- Assessments of impacted wetlands to help determine appropriate mitigation measures;
- Preliminary assessments of wetland conditions and stressors to determine the need for intensive monitoring;
- Evaluation of wetland project performance under the Coastal Zone Management Act, Section 1600 of the California State Fish and Game Code, Sections 401 and 404 of the Clean Water Act, and local government wetland regulations; and
- Assessment of restoration or mitigation progress relative to ambient conditions, reference conditions, and expected ecological trajectories.

The Central Coast Wetlands Group (CCWG) is the Central Coast lead for the development and implementation of CRAM. Since 2002 they have assisted in the development of the riverine, estuarine, depression and bar-built estuarine wetland modules. CCWG is the Central Coast monitoring coordinator, trainer and quality assurance (QA) manager of CRAM and eCRAM, the online repository for all CRAM data. Additionally, CCWG is an active member of the State Level 2 (Rapid Assessment) Committee of the California Wetlands Monitoring Workgroup. This Committee is tasked with overseeing the development and implementation of CRAM.

### ***Groundwater Quality***

The State Water Resources Control Board's (SWRCB) GAMA Program is California's comprehensive groundwater quality monitoring program. The GAMA Program was created by the SWRCB in 2000. It was later expanded by Assembly Bill 599 – the Groundwater Quality Monitoring Act of 2001. The main goals of GAMA are:

- To improve statewide groundwater monitoring; and
- To increase the availability of groundwater quality information to the public.

Most of the Greater Monterey County IRWM planning region with the exception of the Big Sur coast falls within the Monterey-Salinas Study Unit. Recharge to the groundwater system is primarily from stream-channel infiltration from the major rivers and their tributaries, and from infiltration of water from precipitation and irrigation. The primary sources of discharge are water pumped for irrigation and municipal supply, evaporation, and discharge to streams. Results of the GAMA study for this region can be found at: <http://pubs.usgs.gov/fs/2011/3089/>.

The most extensive source for ambient groundwater quality data in the region is the Monterey County Water Resource Agency's (MCWRA) monitoring program. The purpose of the ambient monitoring program is to provide long-term data to document and analyze water quality trends and conditions over time. Water quality samples are collected annually for the ambient monitoring program, primarily from agricultural production wells throughout the Salinas Valley Basin and from MCWRA-owned dedicated monitoring wells. Over 350 agricultural monitoring wells and 44 dedicated monitoring wells are

monitored. The same wells are sampled from year to year, unless abandoned, destroyed, or not operating. The data are stored locally in a Geographic Information System (GIS) relational database.

The Central Coast RWQCB is currently in the process of developing the Groundwater Assessment and Protection (GAP) component of CCAMP, referred to as CCAMP-GAP. The RWQCB's groundwater regulatory programs have, until now, dealt with groundwater pollution problems on an ad hoc basis; there has been no systematic, region-wide approach to assess and track the quality of Central Coast groundwater basins. CCAMP-GAP is intended to enable the RWQCB to develop a comprehensive monitoring program within the Central Coast Region. There are a number of organizations that currently implement groundwater monitoring programs with dedicated monitoring well networks within the Central Coast Region. CCAMP-GAP will leverage these existing individual programs into a coordinated regional monitoring program. Coordinating the groundwater data from local agencies into a regional database will significantly improve the ability to assess the data, streamline sharing of these data with the RWQCB and other agencies, and allow public access to the data (while keeping well location and ownership confidential). The data generated from CCAMP-GAP will be publicly available on the GeoTracker GAMA website.

Other sources of groundwater data can be found at <http://www.waterboards.ca.gov/gama/grid.shtml> or at <http://www.water.ca.gov/waterdatalibrary/>.

### **K.3 TYPICAL DATA COLLECTION TECHNIQUES**

When considering data collection, we first must determine what questions we are trying to answer. Many different types of data collection exist, be it water quality, habitat condition, biological, or groundwater quantity and quality. For surface water quality monitoring and biological monitoring, the RWMG has opted to use guidance developed by the SWRCB's SWAMP.<sup>1</sup> Monitoring techniques for habitat condition will follow CRAM. Groundwater monitoring will follow the GAMA Program. Chemical measurements typically include sediments, nutrients, bacteria, pesticides and herbicides, persistent organic pollutants, and trace metals. Additionally, a number of programs collect measurements that reflect ecosystem level health including toxicity, periphyton assays, bioassessments, and rapid condition assessments. Through cooperative agreements with local agencies, the United States Geological Survey (USGS) maintains, collects, processes and publishes stream flow data at specific sites throughout Monterey County and provides access to real-time or historical data sets via the web, accessible from USGS websites.

Below are data collection techniques for the previously mentioned programs and methods.

**SWAMP:** Typical data collection techniques for surface waters include both field measurements and laboratory analysis. Field measurements are either collected using meters or field kits for a common list of constituents including but not limited to water temperature, pH, conductivity, dissolved oxygen and turbidity. For an example of a field data sheet and complete list of SWAMP required fields go to: [http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp\\_sop\\_field\\_measures\\_water\\_sediment\\_collection\\_v1\\_0.pdf](http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_field_measures_water_sediment_collection_v1_0.pdf). There is a large list of possible analytes that are measured in surface waters that require laboratory analysis. Typical laboratory analysis includes fecal indicator bacteria, metals, nutrients, persistent organic pollutants, and turbidity. SWAMP provides guidance on methods and quality assurance; the guidance can be found at: [http://www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/qapp/qaprp082209.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/qaprp082209.pdf).

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<sup>1</sup> See: [http://www.waterboards.ca.gov/water\\_issues/programs/swamp/tools.shtml#methods](http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#methods).

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

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

**CRAM:** The CRAM model is a standardized tool for assessing the ambient condition of wetlands and riparian habitats. CRAM software guides users through assessments that take less than half of a field day to complete. The CRAM user's manual can be downloaded at:

[http://www.cramwetlands.org/documents/2008-09-30\\_CRAM%205.0.2.pdf](http://www.cramwetlands.org/documents/2008-09-30_CRAM%205.0.2.pdf).

**GAMA:** The GAMA Priority Basin Project is grouped into 35 groundwater basin groups called "study units." Each study unit is sampled for common contaminants regulated by the California Department of Public Health (CDPH), and also for unregulated chemicals. Testing for these chemicals—usually at detection levels well below those achieved by most laboratories—will help public and private groundwater users to manage this resource. Results from the Monterey/Salinas study unit can be found at <http://pubs.usgs.gov/fs/2011/3089/>. Some of the chemical constituents that are sampled by the GAMA Priority Basin Project include:

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

#### **K.4 HOW STAKEHOLDERS CONTRIBUTE DATA TO THE DATA MANAGEMENT SYSTEM**

This section describes how project proponents in the Greater Monterey County IRWM planning region will contribute data to the Greater Monterey County IRWM Plan data management system.

##### **K.4.1 Surface Water Quality and Biological Monitoring Data**

CEDEN will be the data management system used by all organizations collecting surface water quality and biological measurements in the Greater Monterey County IRWM planning region. CEDEN is a system designed to facilitate integration and sharing of data collected by many different participants. It is a growing statewide cooperative effort of various groups involved in the water and environmental resources of the state of California. This network is open to federal, state, county, and private organizations interested in sharing data throughout the state. The purpose of the CEDEN network is to allow the exchange and integration of water and environmental data between groups and to make it accessible to the public.

Integrating data from many different programs and data generators is one of CEDEN's main goals. To assist with this task, the Regional Data Centers (RDCs) have developed applications to support agencies, organizations, and groups who want to submit their data. These applications help improve data comparability within the CEDEN system by checking data prior to submittal. Standard templates have also been developed for use with the data checkers and to increase data comparability. These templates and associated documentation can be downloaded at:

[http://www.ceden.org/ceden\\_submitdata.shtml#templates](http://www.ceden.org/ceden_submitdata.shtml#templates).

For the Central Coast region, the Central Coast RWQCB developed a tool called the California Data Upload and Checking System (CalDUCs) which facilitates upload of the data templates and checks the data for erroneous information, thus ensuring the data is of known and sufficient quality. More information on these tools can be found at: <http://www.ccamp.info/CalDucs/index.html>. The RDC for projects in the Greater Monterey County region is located at Moss Landing Marine Laboratories. The first time an organization in this region submits data to CEDEN, or if the data is for a new project, the RDC at Moss Landing Marine Laboratories must be contacted to register the project (<http://www.ceden.org/mlml.shtml>).

CEDEN has established a list of “valid values” that are used for submitting, reporting, and exchanging data within the CEDEN system. Valid values are acceptable names and codes for analytes, projects, organism names, etc. The link to the accepted values lists can be found at: <http://www.ceden.us/Metadata/ControlledVocab.php>. These values will be updated periodically as new values are created. To submit values for inclusion into the CEDEN system, project proponents should contact their local RDC.

The Central Coast RDC at Moss Landing has been funded to provide the CCAMP (Central Coast RWQCB) tools for graphing and sorting data using CEDEN data until the end of 2012.

#### **K.4.2 Habitat Conditions**

Five CRAM field books have been produced for: estuarine, riverine, depressional, individual vernal pools, and vernal pool systems. Each field book has its own guidance and instructions for collecting data, completing field data sheets, definitions, and scoring. These field books can be downloaded at: <http://www.cramwetlands.org/documents/>.

eCRAM is an online data entry tool used to upload CRAM results. CRAM documentation is generally performed in the field with the eCRAM software installed on a tablet computer or laptop. An online version of the eCRAM software is also available. Project proponents must register before using online data entry (at <http://www.cramwetlands.org/register/>).

#### **K.4.3 Groundwater**

For those entities measuring groundwater, the RWMG has opted to use the GeoTracker GAMA database. 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. GeoTracker GAMA is an online groundwater information system that provides access to water quality data and connects a user to groundwater basics and protection information. This online database integrates groundwater quality data from multiple sources, which are searchable by chemical or by location with results displayed on an interactive Google maps interface, found at <http://geotracker.waterboards.ca.gov/gama/>. GeoTracker GAMA currently integrates data from State and Regional Water Boards, California Department of Public Health, Department of Pesticide Regulation, Department of Water Resources, USGS, and Lawrence Livermore National Laboratory.

If a project work plan contains a groundwater ambient monitoring element, the project proponent will contact the SWRCB’s GAMA program for guidance on the submittal of ambient groundwater data. Prior to the project proponent implementing any sampling or monitoring activities, the State must be notified in writing as to the planned procedure for submittal of groundwater data to GAMA.

## **K.5 ENTITY RESPONSIBLE FOR MAINTAINING DATA IN THE DATA MANAGEMENT SYSTEM**

Each organization or project proponent that collects data related to habitat condition, biological monitoring, or water quality will be responsible for maintaining their own data management system and quality control. Primary data management responsibilities for surface water quality data lies with the data collecting organization. After appropriate quality assurance checks, the data will be uploaded into the CEDEN database through the Regional Data Center (which for this region is located at Moss Landing Marine Labs). Primary data management responsibilities for data related to habitat conditions and groundwater also lies with the data collecting organization. If this type of monitoring is required by funding source guidelines, the entity collecting the data will maintain their own data storage system for their organization in advance of uploading the data into the CRAM or GeoTracker GAMA statewide databases.

## **K.6 DESCRIPTION OF DATA VALIDATION OR QUALITY ASSURANCE/QUALITY CONTROL MEASURES**

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

- SWAMP: [http://www.swrcb.ca.gov/water\\_issues/programs/swamp/qapp.shtml](http://www.swrcb.ca.gov/water_issues/programs/swamp/qapp.shtml)
- CRAM: [http://www.wrmp.org/docs/cram/CRAM\\_calibration\\_QAPP\\_final.pdf](http://www.wrmp.org/docs/cram/CRAM_calibration_QAPP_final.pdf)

## **K.7 DATA TRANSFER AND SHARING**

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

The CEDEN database will be updated every week with new data from the four RDCs around the state. The advanced query tool that exists on the CEDEN website currently allows the user to query multiple data types by project, site, analyte type together in different formats. Other tools such as a bioassessment reporting module and the ability to query the data by geographical area, watershed, county, etc. will be available in late 2012. Currently there is no planned date to release a graphing package or summary data on CEDEN. However, CEDEN is the data repository for many different portal applications built by the SWRCB on the “My Water Quality” website (<http://www.waterboards.ca.gov/mywaterquality/>). Data that is uploaded to CEDEN will be available in these and other applications that use CEDEN data.

The same situation is true for CRAM data. The California Wetlands Portal is an interactive tool that displays information about modern and historical wetland habitat in California (go to: <http://www.californiawetlands.net/tracker/>). Wetlands Portal catalogues planned, in progress, and completed wetland restoration, preservation, creation, and enhancement projects. CRAM data that is uploaded to the statewide database automatically populates this website to enable data sharing and dissemination.

GeoTracker GAMA is an online groundwater information system that gives the user access to water quality data and connects the user to groundwater basics and protection information. This online database integrates groundwater quality data from multiple sources, which are searchable by chemical or location with results displayed on an interactive Google maps interface:

[http://www.waterboards.ca.gov/gama/geotracker\\_gama.shtml](http://www.waterboards.ca.gov/gama/geotracker_gama.shtml)

#### **K.8 HOW THE DATA MANAGEMENT SYSTEM SUPPORTS THE RWMG EFFORTS TO SHARE COLLECTED DATA**

The intent and design of the Greater Monterey County IRWM Plan data management system focuses on a localized approach to data collection and management with the primary goal of uploading data of known quality into a statewide database with web tools for dissemination. It is not reasonable to expect every organization that has implementation projects to change the way they store and manage their data. In addition, the Greater Monterey County RWMG does not have the resources to develop and fund a centralized data storage system. The most logical system is to fully leverage and support the efforts and resources the SWRCB has put into the RDC that support the CEDEN and CRAM databases and the My Water Quality Portal. A significant amount of time and funding has developed SWAMP and CRAM protocols and quality assurance with the intent of being the recipient of many different sources of environmental data. These systems make data collection much more informative and valuable when it is easily accessible and available to the RWMG for resource management and decision-making.

#### **K.9 HOW DATA WILL GO TO LARGER DATA SETS**

As previously stated in section K.4 above, the data collected for IRWM Plan projects will be managed by each respective organization and then uploaded into a statewide data system, e.g., CEDEN, Wetlands Tracker or GeoTracker GAMA. See section K.4 for more details.



## Section L: Finance

The intent of the Finance standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to ensure that financing of the IRWM Plan has been considered at a programmatic level by the Regional Water Management Group (RWMG), and that a strategy for financing the IRWM Plan is documented for stakeholders.

From the Proposition 50 IRWM Grant Program, it has become clear that the need for funding substantially exceeds the grant funding available through recent bond measures. Most of the cost of developing, maintaining, and implementing an IRWM Plan must be borne by local entities with State grant funding providing a necessary, but relatively small, supplement in funds. With potentially multiple sources of funding being accessed to formulate, maintain, and implement an IRWM Plan, documentation of how the funding pieces fit together is necessary for the RWMG and stakeholders to understand how the Plan will be implemented. This section provides that information.

### L.1 ONGOING FUNDING OF THE IRWM PLAN

To date, the Greater Monterey County IRWM planning effort has been funded through a combination of private foundation grant funds, State IRWM Planning Grant funds, monetary contributions from RWMG entities, and in-kind staff time contributed by members of the RWMG. As noted in the Governance section, the Greater Monterey County RWMG has been developed to be a “working group,” with its members expected to actively participate in all aspects of the IRWM planning process. During the development of this IRWM Plan, RWMG members have attended monthly RWMG meetings, helped lead public workshops, reviewed drafts of the IRWM Plan, and participated on various committees to develop elements of the Plan, including the following:

- *Issues and Conflicts Committee:* To identify water resource issues in the region, as a first step in identifying goals and objectives for the IRWM Plan.
- *Goals and Objectives Committee:* To identify regional goals and objectives for the IRWM Plan. This committee was convened twice, first to develop goals and objectives, and later to review those goals and objectives in light of the new Proposition 84 IRWM Program Guidelines and to make the objectives “measurable.”
- *Project Ranking Committee:* To develop a system for ranking projects. This committee was convened in 2010, prior to the first IRWM Plan project solicitation.
- *Project Review Committee:* This committee was convened twice, in 2010 and in 2011, to review and rank projects from both IRWM Plan project solicitations.
- *Project Review—DAC/Environmental Justice Committee:* This committee, convened for both the 2010 and 2011 project solicitations, worked alongside the Project Review Committee to review all project proposals for potential environmental justice impacts or impacts to disadvantaged communities (DACs).
- *Integration Committee:* A special committee convened in 2010, as part of the Project Review process.
- *Water Resource Project Coordination Committee:* To coordinate the Water Resource Project Coordination (WRPC) process – a “fact-finding” process – for project proponents and other stakeholders in the lower Gabilan Creek Watershed region.
- *Data Management Committee:* To develop a data management system for IRWM Plan projects.
- *Draft IRWM Plan Review Committee:* A core group of dedicated reviewers.

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- *Funding Committee:* A “permanent” committee convened to identify sources of funding for IRWM Plan projects and programs, and to develop a strategy for funding the ongoing IRWM planning process.

All of this work has been accomplished by means of donated staff time, or in some cases volunteered time, on the part of all of the RWMG members. It is also important to recognize the many hours contributed by stakeholders and community members who have volunteered their time to review IRWM Plan milestones and the draft IRWM Plan, to provide comments, and to offer technical advice and expertise. Leading this effort—and responsible for drafting this IRWM Plan—is the IRWM Plan Coordinator, a consultant and non-voting member of the RWMG whose time has been funded thus far through a combination of private foundation grant funds, State grant funds from the Proposition 84 IRWM Planning Grant Program, and RWMG monetary contributions.

With the completion and final approval of this IRWM Plan, the time and resources required to support the Greater Monterey County IRWM planning effort are expected to diminish. While the RWMG has met on a monthly basis during the initial development of this Plan, it is anticipated that the continuing IRWM planning process will require fewer (e.g., quarterly) meetings and considerably less time spent on subcommittees. A Funding Committee has been convened to estimate the level of support that will be required to continue the IRWM planning process at a sustainable pace, and to develop a strategy for obtaining those funds.

The Funding Committee estimates that after the initial IRWM Plan development, ongoing IRWM planning and “maintenance” for the Plan will most likely entail:

- Approximately 4-8 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, the Water Resource Project Coordination process, ongoing outreach and assistance to DACs, and opportunities for collaboration between RWMG members.
- Project solicitations for the IRWM Plan, which will occur about every 18 months.
- 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.

It is expected that RWMG members will continue to donate their staff time toward the ongoing planning effort, and that stakeholders will continue to participate actively in the process. Additional funds will be needed, however, to continue to support the IRWM Plan Coordinator position. With such positive momentum created during development of the new Greater Monterey County IRWM Plan, the IRWM Plan Coordinator need to keep the process driving 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. Since the private foundation grant funds that had supported the IRWM Plan Coordinator position have been expended and State Planning Grant funds are limited, the Funding Committee is exploring various means for securing long-term funding for this position (which is expected to cost on the order of \$40K - \$50K annually).

The Funding Committee is sensitive to the fact that the Greater Monterey County RWMG includes non-profit organizations with limited discretionary funds, disadvantaged communities, and public agencies that are over-burdened and under-funded. The founding of the RWMG has been based on the principle and understanding that each RWMG organization would have an equal vote regardless of the organization’s ability to contribute financially to the Plan or to other RWMG activities. Therefore, while financial contributions are not required of RWMG members, the Funding Committee is requesting each

RWMG entity to contribute annually, on a sliding scale, toward the ongoing IRWM planning process, primarily to support the IRWM Plan Coordinator but also for other planning activities as needed. The Funding Committee is also investigating other potential means of long-term support, including:

- Collaboration with other agencies and organizations, external to the RWMG, that share similar goals and that might benefit from IRWM Plan implementation, for donation of financial contributions or other resources toward the IRWM planning effort.
- Potentially, grant funds from America’s Great Outdoors (AGO) Initiative. The IRWM Plan goals and objectives support most of the priority themes for the AGO.

## **L.2 POTENTIAL FUNDING SOURCES FOR IRWM PLAN PROJECTS AND PROGRAMS**

In addition to seeking financial support for the ongoing IRWM planning process, the Funding Committee is also tasked with identifying 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*, e.g., 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, American Recovery and Reinvestment Act of 2009 (ARRA) funds, US Department of Agriculture 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 programs*, e.g., Department of Fish and Game 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).
- *Local funds*, e.g., Transportation Agency for Monterey County (TAMC) grants.
- *Private grants*, including grants from foundations associated with federal/state programs (such as California State Parks Foundation, Elkhorn Slough Foundation, Monterey Bay Sanctuary Foundation), other private foundations (such as the Monterey County Agricultural and Historical Land Trust), corporate gifts.
- *Ratepayer fees*, e.g., water use fees.
- *Special taxes, assessments, and fees*, e.g., Monterey County and municipal taxes, Fort Ord Reuse Authority Community Facilities District (CFD) fees, assessment district fees, water district or community services district fees.
- *Loans*, e.g., Clean Water State Revolving Fund loan.

Table L-1 below summarizes the anticipated and potential sources of funding that will support the projects and programs included in this IRWM Plan, including financing for operations and maintenance (O&M), which is not eligible for grant reimbursement by State grant programs. The table lists, in alphabetical order according to project proponent, both the implementation projects proposed in this Plan and projects that are currently being implemented through Round 1 IRWM Implementation Grant funds. 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 L-1: Financing Projects and Programs in the IRWM Plan**

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
California State Parks: Big Sur River Steelhead Enhancement Project		\$400,800	California State Parks Foundation and Cal State Parks: 10%	Secure – part of current and ongoing Natural Resources funding source	California State Parks Natural Resources Program	Secure – part of current and ongoing Natural Resources Program funding
			Prop 84 Grant: 90%	Application submitted	NA	NA
Castroville Community Services District: Well 2B Treatment Project		\$610,000	Castroville CSD: 30%	Secure – Castroville CSD capital improvement budget	Castroville CSD budget	Secure – 2011 O&M budget
			Prop 84 Grant: 70%	Awarded, grant secure	NA	NA
Central Coast Wetlands Group: Coastal Wetland Erosion Control and Dune Restoration		\$1,400,000	Prop 84 Grant: 75%	Application will be submitted FY 11/12	State Parks operational budget, CCWG ongoing program	Secure – O& M costs minimal
			Matching Funds: 25%	Potential sources include project partners, USFWS, Coastal Conservancy, NOAA, private foundations, etc.	State Parks operational budget, CCWG ongoing program	Secure – O& M costs minimal
Central Coast Wetlands Group: Development and Evaluation of Climate Change Response Strategies in the Elkhorn Slough, Gabilan and Salinas River Watersheds		\$498,750	Prop 84 Grant: 73%	Application will be submitted FY 12/13	CCWG operational budget	Secure, rates covered through line item O&M for current grant programs
			Ocean Protection Council LiDAR Project: 25%	Certain, part of current funding		
			CCWG Program Resources: 2%	Certain, part of current funding		
Central Coast Wetlands Group: Ecosystem Condition Profile for the Lower Salinas River Watershed using Level 1-2-3 Framework		\$690,500	Prop 84 Grant: 75%	Application will be submitted FY 11/12	NA	NA
			Federal Grant: 25%	Tentative award, contingent on State funding	NA	NA

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
Central Coast Wetlands Group, MBNMS, Monterey Bay Aquarium Research Institute, Elkhorn Slough Reserve: Expansion of a Coastal Confluence Water Monitoring System to support the Greater Monterey IRWMP	\$600,557		Prop 84 Grant: 75%	Application will be submitted FY 12/13	CCR and San Jose State University Foundation operational budget	Secure, rates covered through line item O&M for current grants
			Current LOBO budget: 23%	Certain, part of current funding		
			CCWG / CCR program resources: 4%	Certain, part of current funding		
Central Coast Wetlands Group: Northern Gabilan Mountain Watershed Management Project		\$557,025	Prop 84 Grant: 75% TBD: 25%	Application will be submitted FY 12/13	City and County agencies, operational budget; CCWG, program funds	Secure – depends on project type
Central Coast Wetlands Group: Implementation of the Moro Cojo Slough Management and Enhancement Plan – Restoration of the Upper Slough		\$1,934,181	Prop 84 Grant: 75%	Application will be submitted FY 11/12	NA	NA
			Federal Grant, USFWS, Coastal Conservancy, Private funds: 25%	Tentative award, contingent on State funding	NA	NA
Central Coast Wetlands Group: Study of Environmental Services from Nutrient Reducing BMPs		\$496,000	Prop 84 Grant: 75% TBD: 25%	Application will be submitted FY 12/13	No O&M for Tasks 1,2,4,5; CCWG program funds, CSUMB grant funds Task 3	Secure
Central Coast Wetlands Group: Tembladero Restoration and Castroville Community Public Access (Phase I)		\$455,479	Prop 84 Grant: 75%	Awarded, grant secure	NA	NA
			Federal Grant: 14.2%	secure	NA	NA
			SJSU Research Foundation: 10.8%	secure	NA	NA
Central Coast Wetlands Group: Water Quality Enhancement of the Tembladero Slough Phase II		\$812,700	Prop 84 Grant: 100%	Some long-term maintenance will be provided as match and integrated with County maintenance	City and County agencies, operational budget; CCWG program funds	Secure – depends on project type, landowner and county maintenance agreements

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
				agreements		
City of Salinas: Integrated Industrial Wastewater Conveyance and Treatment Facility Improvements	Segments 1 and 2	\$8,250,000	Non-State match funding: 58% Prop 84 Grant: 42%	City has received an EDA grant for partial funding (\$3.48 M) and will use rates for other matching funds	City operational budget	Secured through existing rates and planned rate increases
	Industrial Wastewater Treatment Facility	\$9,660,000	Non-State match funding: 25% Prop 84 Grant: 75%	City will use rates for matching funds	City operational budget	Secured through existing rates and planned rate increases
City of Salinas and Monterey Regional Water Pollution Control Agency: Dry Weather Runoff Diversion Program		\$590,000	Non-state-match funding: 31% Prop 84 Grant: 69%	City and MRWPCA funding planned from existing resources	City operational budget	Secured through existing rates and planned rate increases
City of Soledad: Soledad Recycled Water Project		\$1,155,000	Non-State match funding: 25% Prop 84 Grant: 75%	Match: City Water Capital Fund. Grant awarded – secure	City operating Capital (currently unfunded)	Proposed rate increase could cover O & M costs
Delicato Family Vineyards: San Bernabe Lining Project		\$2,281,000	Prop 84 Grant: 75% San Bernabe Vineyard: 25%	Secure – part of SBV capital improvement budget	SBV operational budget	Secure – SBV operational budget
Ecology Action: Monterey Bay Green Gardener Training & Certification Program	10-week Bilingual Green Gardener Certification-Level Training	\$17,685	California Water Service Company: 31%	Pending approval	California Water Service Agency Conservation Budget	Pending approval
			Mission Trails ROP: 35%	Secure – funded by student attendance fees, ADA funds	Mission Trails ROP operating budget	Secure
			Prop 84 Grant: 34%	Application will be submitted	NA	NA
	Green Gardener Advanced Series (open to the public)	\$19,475	Mission Trails ROP: 5%	Secure, funded by student attendance fees, ADA funds	Mission Trails ROP operating budget	Secure
			Prop 84 Grant: 95%	Application will be submitted	NA	NA
Elkhorn Slough Foundation: Integrated Ecosystem Restoration in Elkhorn Slough		\$3,071,383	Prop 84 Grant: 31%	Funded, secure	Department of Fish and Game	Secure - land lease
			Federal Grant: 40%	Funded, secure	NA	NA
			State Grant, Coastal	Application will be	NA	NA

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
			Conservancy: 29%	submitted FY 11/12		
Elkhorn Slough Foundation: Ridgeline to Tideline – Water Resource Conservation in Elkhorn Slough	Phase I – North Marsh Restoration	\$2,028,216	Prop 84 Grant: 75%	Modified FY10/11 application an resubmitted in FY11/12	NA	NA
			ARRA: 24%	Funded 2009-2012	Annual Allocation from Department of Fish and Game and NOAA/NERR	Secure
			NO24: 0.7%	Funded 2011-2012	NA	NA
			MBA: less than 0.5%	Funded 2011-2012	NA	NA
			NFWF: 0.7%	Funded in 2011-2012	NA	NA
	Phase II – Land Acquisition	\$5,414,816	Prop 84 Grant: 75%	Modified FY10/11 application and resubmitted in FY11/12	NA	NA
			Private: 1.1%	Funded in 2009 and 2010	NA	NA
			Federal: 23.7%	Funded in 2009	NA	NA
	Phase III – Uplands Restoration	\$786,100	Prop 84 Grant: 75%	Modified FY10/11 application an resubmitted in FY11/12	NA	NA
			Private: 23.1%	Funded through individual and corporate gifts and private foundation grants	ESF Stewardship Budget (including major donors and endowments)	Secure
			NFWF: 1.9%	Funded in 2011-2012	NA	NA



Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
Marina Coast Water District: Recycled Water Element of the Regional Urban Water Augmentation Project (RUWAP)		\$40,800,000	Title XVI funds (Bureau of Reclamation); Clean Water State Revolving Fund loan (State Water Resources Control Board); FORA CFD reimbursements; MCWD reserves; Prop 84 IRWM grant	Applications submitted, in review	MCWD Operational Budget	MCWD & FORA commitments secure; Title XVI funds and SRF loan in process
Monterey Bay Sanctuary Foundation: Making Monitoring Count		\$404,000	Prop 84 Grant: 75% NOAA: 0.6% EPA: 24.4%	Proposal submitted	NA	NA
Monterey Bay Sanctuary Foundation: Watershed Approach to Water Solutions		\$512,134	Prop 84 Grant: 73%	Awarded August 2011, secure	Landowner	Secure – only requires manual labor of community
			Federal, In-kind: 9% (\$46,750)	Secure, NOAA and USDA already committed	NA	NA
			Local, In-kind: 10.5% (\$55,000)	Secure, Monterey County Agriculture Trust	NA	NA
			Federal grant, In-kind: 7.4% (\$38,000)	Secure, AWEP, USDA funds already committed	NA	NA
Monterey County Public Works: Las Lomas Drive Storm Drain Improvements Project		\$1,054,421	Local Grant: 25%	Secure, local grant through TAMC and Road Fund	Local agency budget	Secure, O&M budget
			State Grant, DAC assistance, DWR: 75%	Tentative award contingent on project approval by IRWM and State funding	NA	NA
Monterey County Redevelopment & Housing Office: Well Replacement and Pipeline – San Lucas Water		\$543,149	Prop 84 Grant: 100%	Application submitted	San Lucas Water District operational budget	Secure, current rates cover O&M costs

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
District						
Monterey County Water Resources Agency: Aquatic Invasive Species Inspection Project		\$631,000	Prop 84 Grant: 75% Monterey County: 25%	Funded for FY 2011/2012	NA	NA
Monterey County Water Resources Agency: Coastal Dedicated Monitoring Well Drilling		\$921,600	Prop 84 Grant: 75% MCWRA: 25%	Application submitted	MCWRA Monitoring Budget	Secure, costs will be incorporated in the 2011-2012 Budget
Monterey County Water Resources Agency: Granite Ridge Regional Water Supply Project		\$26,500,000	Prop 84 Grant: 75% MCWRA: 25%	Application submitted	Monterey County	Secure 2012-2015 County Budget
Monterey County Water Resources Agency: Salinas River Fisheries Enhancement Project		\$1,157,000	Prop 84 Grant: 75% MCWRA: 25%	MCWRA 2010/11 Budget	NA	NA
Monterey County Water Resources Agency: Salinas River Flood Risk Reduction Project		\$560,000	MCWRA: 25%	Secure, part of MCWRA approved budget for FY 11-12	NA	NA
			Prop 84 Grant: 75%	Application will be submitted for FY 11-12	NA	NA
Monterey County Water Resources Agency: Test Well for Regional Desalination Project – Slant Well		\$4,000,000	Prop 84 Grant: 75% MCWRA: 25%	Application submitted	Monterey County Water Resources Agency	Secure 2012-2013 MCWRA Water Resources Planning & Management Operations Budget
Nacimiento Regional Water Management Advisory Committee: Interlake Tunnel between Lake Nacimiento and Lake San Antonio		\$11,000,000	Lake Nacimiento Community Service District: 40%	In development stage	NA	Part of project
			Prop 84 Grant: 20%	Application will be submitted FY 11/12	NA	NA
			MCWRA: 20%	Proposal phase	NA	NA
			San Luis Obispo County: 10%	Pending application	NA	NA
Pajaro/Sunny Mesa		\$3,000,000	Prop 84 Grant: 100%	Application will be	Water billing	Secure. Rate increase

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
Community Services District: Springfield Water Project			(DAC Project)	submitted FY 12/13		covers O&M costs
RCD of Monterey County: Livestock and Land		\$1,192,852	Prop 84 Grant: 75% Landowner match: 10%	Secured with landowner agreements. Application submitted.	Landowner agreements secure O&M for life of BMP	Secure
			- NRCS technical assistance: 4% - USFWS technical assistance: 2% - USFWS Partners for Fish and Wildlife grants: 6% - NRCS/RCD equipment and vehicles: 3%	- Committed project partner - Committed project partner - Grant currently secured  - Secured, available now from agencies	NA	NA
RCD of Monterey County: Monterey County Farm Water Quality Assistance Program		\$759,000	UCCE: 7% for staff time & equipment	Secure, part of shared efforts	NA	NA
			RCDMC: 1% for equipment			
			Prop 84 Grant: 75%	Application will be submitted FY 11/12	NA	NA
			USDA NRCS: 7% staff and vehicles	Secure	NA	NA
			USDA NRCS: 10% EQIP program grants and cooperative agreement w RCDMC	Pending annual renewal of agreements	NA	NA
RCD of Monterey County: Salinas River Watershed Invasive Non-native Plant Control and Restoration		\$1,634,500	RCDMC personnel & equipment: 5%	Secure	NA	NA
			Prop 84 Grant: 75%	Application will be submitted FY 11/12	NA	NA
			NRCS personnel & vehicles: 5%	Secure part of RCD-NRCS relationship	NA	NA
			Monterey County Ag	Mostly secure. Some	NA	NA

Project Proponent & Project Title	Project Phases (if applicable)	Approximate Total Cost	Funding Source & % of Total Cost	Funding: Certainty/ Longevity	O&M Finance Source	O&M Finance Certainty
			Dept.: 5%	pending approval of future county budgets		
			RON student volunteers: 0.5%	Secure	NA	NA
			Participating growers: 10%	Pending landowner agreements	NA	NA
Rural Community Assistance Corporation: Greater Monterey Bay DAC Wastewater Management Pilot Program		\$689,000	Prop 84 Grant: 98% In-Kind Match: 2%	2012 and 2013	Community. A fee-based O&M program will be established with rate payers from each household.	Moderate. Each resident will be required to cover their repairs/ replacement.
San Jerardo Cooperative: San Jerardo Wastewater Project		\$3,023,945	State Grant, Cleanup and Abatement Account, State Water Board: 65%	Awarded. Grant secure through 2014.	Cooperative, Operating budget	Secure
			State Grant, Prop 84, DAC assistance, DWR: 35%	Awarded	Cooperative, Operating budget	Secure
Save Our Shores: Watershed Protection Program – Annual Coastal Cleanup Day in Monterey County		\$24,000	Prop 84 Grant: 50%	Application will be submitted	NA	NA
			California Coastal Commission: 4%	Secure, will receive Fall 2012	NA	NA
			REI: 21%	Secure, will receive June 2012	50% Operations, 50% Programs	Secure- 2012 O&M budget
			Community Support: 25%	Secure, will receive May 2012	All Operations	Secure- 2012 O&M budget
UC Davis Marine Pollution Studies Lab: Evaluation of Potential for Stormwater Toxicity Reduction by LID Treatment Systems		\$246,100	Prop 84 Grant: 78% In-kind: 22%	Awarded. Grant secure.	NA	NA

## Section M: Technical Analysis

The purpose of the Technical Analysis standard as stated in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to explain the technical information, methods, and analyses used by the Regional Water Management Group (RWMG) to understand the water management needs over the planning horizon.

### M.1 TECHNICAL INFORMATION USED IN THE IRWM PLAN

The RWMG relies almost entirely on existing plans, reports, and studies as a basis for understanding current water resource conditions in the Greater Monterey County IRWM planning region and for developing 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 types of plans and reports (among others):

- Urban Water Management Plans
- Water Master Plans
- Stormwater Management Plans
- Wastewater Management Plans
- Local Agency Formation Commission (LAFCO) Municipal Services Review Reports
- Department of Water Resources (DWR) Land Use Surveys
- Watershed Assessment and Management Plans
- Monterey County Water Resources Agency (MCWRA) Groundwater Extraction Summary Reports
- MCWRA Monterey County Floodplain Management Plan
- Monterey County General Plan and Specific Area Plans
- Regional Water Quality Control Board (RWQCB) plans, including 303(d) List
- Monterey Bay National Marine Sanctuary (MBNMS) Management Plan
- MBNMS Condition Report
- US Census decennial population data
- US Census/American Community Survey (ACS) five-year economic survey data
- Association of Monterey Bay Area Governments (AMBAG) economic reports
- Monterey County Agricultural Commissioner Crop Reports
- Research and technical studies conducted by local academic institutions and environmental consultants

Regional objectives have been informed by these and other planning documents, including MBNMS Water Quality Protection Program Action Plans, RWQCB Central Coast Basin Plan objectives, and the RWQCB Watershed Management Initiative.

The sources listed above have been used to describe historic and existing conditions in the Greater Monterey County IRWM region as well as to estimate future conditions—most importantly, future water demand—for the purposes of IRWM planning. The table below 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.

**Table M-1: Technical Information Used in the IRWM Plan**

Type of Study or Data	Source (Author/Title)	Technical Analysis or Method Used	Information Derived from Technical Analysis	Use in IRWM Plan
Economic data	US Census Bureau, American Community Survey, 2006-2010	Five-year economic surveys	Median household income data (2010) for communities and census tracts in region.	Used to identify disadvantaged communities (DACs).
Historic population trends	US Census Bureau, population data from 1960 to 2010 (US Census website)	Decennial population surveys	Population for urban areas in region from 1960 to 2010.	Used as basis for estimating population growth, and for calculating future urban water demand in the Salinas Valley Groundwater Basin (using Method 1).
Population growth	AMBAG: 2008 Regional Forecast	Statistical analysis	Estimated population growth for urban areas in region, from 2020 to 2035. Population projections for Chualar 2030-2035 and for San Ardo, San Lucas, and “Other Areas” 2020-2035 were based on AMBAG projected growth rate for Unincorporated Monterey County.	Used as basis for determining future urban water demand in the Salinas Valley Groundwater Basin (using Method 1).
Population growth	Marina Coast Water District (MCWD): 2010 Urban Water Management Plan	Statistical analysis	Future population estimates for the MCWD service area.	Used as basis for determining future urban water demand in the Salinas Valley Groundwater Basin (using Method 1).
Ground and surface water modeling	MCWRA: Salinas Valley Integrated Ground and Surface Water Model (SVIGSM) Update, May 1997, Montgomery Watson	SVIGSM	Historic water use from the Salinas Valley Groundwater Basin: 1970-1994.	Used to establish historic water use trends in the Salinas Valley Groundwater Basin.
Groundwater use	MCWRA: Ground Water Extraction Summary Reports (GWESR) 1995-2010	Review of existing records: data reported from well operators for agricultural and urban water uses	Historic water use from the Salinas Valley Groundwater Basin: 1995-2010.	Used to establish historic water use trends, to document current water use, and as a basis for estimating future water demand in the Salinas Valley Groundwater Basin (using Method 1).

Type of Study or Data	Source (Author/Title)	Technical Analysis or Method Used	Information Derived from Technical Analysis	Use in IRWM Plan
Urban water use	Urban Water Management Plans for: City of Greenfield (2008), King City (2010), Marina Coast (2010), California Water Service Company-Salinas District (2010), City of Soledad (2010)	Statistical analysis	Projected water use for urban areas in region, according to water purveyors as reflected in their Urban Water Management Plans.	Used as basis for estimating future urban water demand from the Salinas Valley Groundwater Basin (using Method 2).
Urban water use	RMC Water and Environment Survey, October 2005; and personal communications with water purveyors	Survey of water purveyors (statistical analysis and deductive reasoning)	Projected water use for urban areas in region (specifically, City of Gonzales, Castroville Community Services District, and Alcoserved portion of the City of Salinas), according to direct communication with individual water purveyors.	Used as basis for estimating future urban water demand from the Salinas Valley Groundwater Basin (using Method 2).
Land use trends: Monterey County	DWR Land Use Surveys: 1968-2005	Aerial surveys and field verification	Land use trends in the region, specifically agricultural vs. urban vs. native land acreages, including irrigated and non-irrigated lands.	Used to establish land use trends, and as a basis for estimating future water demand in the region.
Land use trends: Crops	Monterey County Agricultural Commissioner's Office: Annual Crop Reports 1930 - 2010	Review of existing records	Current crop acreages and historic crop trends in Monterey County.	Used to establish crop trends, and as a basis for estimating future agricultural water demand in the Salinas Valley Groundwater Basin.
Land use trends: Big Sur	Monterey County Planning Department: Big Sur Coast Local Coastal Plan (1986); and direct communication with Big Sur water suppliers	Statistical analysis and deductive reasoning	Land use trends together with population trends were used to conclude that water demand will most likely remain constant in the Big Sur region over the planning horizon.	Used to estimate future water demand in the Big Sur coastal region.
Groundwater and surface water modeling	MCWRA: Salinas Valley Integrated Ground and Surface Water Model Update, May 1997, Montgomery Watson	SVIGSM	Land use, water use, population trends, and other factors (including crop patterns, conversion of ag land to urban land, water efficiency increases, etc.) were used to conclude that agricultural water demand will most likely decline slightly and that urban water demand will increase considerably in the Salinas Valley over the planning horizon.	Used to estimate future agricultural and urban water demand in the year 2030 from the Salinas Valley Groundwater Basin (Method 3).



Type of Study or Data	Source (Author/Title)	Technical Analysis or Method Used	Information Derived from Technical Analysis	Use in IRWM Plan
Seawater intrusion	MCWRA: Memorandum from MCWRA to EPA Region IX, dated July 30, 2010, Subject: Technical Memorandum – SEAWATER INTRUSION, 2010	Groundwater sampling from coastal wells	Mineral content of groundwater at various well locations and depths, resulting in seawater intrusion maps (using isochloride contours).	Used to document the extent of seawater intrusion in the Salinas Valley Groundwater Basin, as well as the projected intrusion rate, to understand future groundwater supply conditions.
Local projections of changes in climate variables	Cal-adapt Web Tool - <a href="http://cal-adapt.org/">http://cal-adapt.org/</a>	Cal-Adapt allows the user to identify potential climate change risks in specific geographic areas throughout the state	Local projections of changes in rainfall, average temperature, evapotranspiration, surface flows.	Used to define how various climate variables are projected to change within the Greater Monterey County IRWM region and their effect on water resources.
Climate vulnerabilities	Climate Change Handbook, 2011, <a href="http://www.water.ca.gov/climatechange/cchandbook.cfm">www.water.ca.gov/climatechange/cchandbook.cfm</a>	Assessing regional vulnerability to climate change	Prioritization of potential environmental vulnerabilities.	Used to define most critical environmental variables from which to focus Climate Risk Assessment and future studies.
Climate risk assessment	International Council for Local Environmental Initiatives (ICLEI) Climate Adaptation Planning Workbook	ICLEI Risk Assessment protocol	Identify high risk infrastructure and water resources	Used to help prioritize future adaptation strategies for high-risk resources.
Developing climate adaptation strategies	California Natural Resources Agency's 2009 California Climate Adaptation Strategy	Evaluating appropriate adaptation strategies for the region, based on the risk assessment	Recommended adaptation actions and response scenarios	Used to help prioritize future adaptation strategies for high-risk resources.

## M.2 DESCRIPTION OF TECHNICAL INFORMATION SOURCES

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

### M.2.1 Population Data

**U.S. Census Bureau Data:** The U.S. Census decennial population data have been derived from the U.S. Census Bureau website.<sup>1</sup> Economic data—in particular, median household income (MHI) and poverty status—have been derived from the American Community Survey (ACS) five-year survey, for 2006-2010. 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 2010 inflation-adjusted dollars. DACs are defined as communities that had a MHI in 2010 of less than 80 percent the statewide MHI. “Severely DACs” are defined as communities that had a MHI in 2010 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 2008 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 2008 Regional Forecast provides detailed population, housing and employment projections for every jurisdiction in the Monterey Bay region through 2035. 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.

### M.2.2 Water Supply, Water Use, and Projected Water Demand

**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. The memorandum and isochloride contour maps used in this IRWM Plan represent the most current information available on seawater intrusion.

**MCWRA Ground Water Extraction Summary Reports:** The purpose of the GWESR is to summarize data submitted to the MCWRA by well operators on an annual basis from Ground Water Extraction Reports (agricultural and urban), Water Conservation Plans (agricultural and urban), and Water and Land

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<sup>1</sup> U.S. Census Bureau website: <http://factfinder2.census.gov/>.

Use Forms (agricultural). The report is intended to present a synopsis of current water extraction within the Salinas Valley, including agricultural and urban water conservation improvements that are being implemented to reduce the total amount of water pumped. While the MCWRA makes every effort to ensure the accuracy of the data presented in the report, it should be noted that the data is submitted by individual reporting parties and is not verified by Agency staff. The MCWRA maintains strict quality assurance in the compilation, standardization, and entry of the data received. In the 2010 reporting year, the MCWRA received GWESR from 97 percent of the 1846 wells in the Salinas Valley for the 2010 reporting year. Agricultural and Urban Water Conservation Plan submittals for 2011 were 94 percent and 95 percent, respectively. In this IRWM Plan, GWESR are used to establish historic water use trends, document current water use, and as a basis for projecting future water demand in the Salinas Valley Groundwater Basin. The GWESR represents the only reliable source of groundwater extraction information in the region. Therefore these data are considered representative and adequate for developing the IRWM Plan.

**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 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: City of Greenfield (2008), King City (2010), Marina Coast (2010), California Water Service Company-Salinas District (2010), City of Soledad (2010). Information from these UWMPs has been used to describe water systems and to establish future water demand for urban areas in the Greater Monterey County IRWM region.

**Salinas Valley Integrated Ground and Surface Water Model Update (1997):** The MCWRA initiated development of the Salinas River Basin Management Plan in 1996 with the specific goals to: stop seawater intrusion; create a long-term balance between recharge and withdrawal in the Salinas Valley Groundwater Basin; and provide a sufficient water supply in the Salinas Valley to the year 2030. The SVIGSM is a hydrologic/operational model that simulates the groundwater and surface water flows and their interaction in the Salinas Valley. The SVIGSM was developed to be the primary analytical tool to analyze the hydrologic and operational impacts of various alternatives presented in the Salinas River Basin Management Plan. The SVIGSM was used to provide a better understanding of the nature of the physical and hydrological processes that govern the groundwater flow system in the Salinas Valley Groundwater Basin, and to analyze the hydrologic impacts of the Salinas Valley Basin Management Plan. Although the SVIGSM was last updated in 1997, it is still considered by MCWRA staff to be the best and most valuable water resource planning tool for managing the Salinas Valley Groundwater Basin, and is therefore considered adequate for use in this IRWM Plan.

### **M.2.3 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 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. For this

IRWM Plan, land use surveys from 1968-2005 were used to provide an understanding of agricultural vs. urban lands in the region and as a basis for projecting future land use trends (and therefore, projected water use). The 2005 land use surveys are the latest data available for this region.

**Monterey County Agricultural Commissioner Crop Reports:** Annual Crop Reports published by the Monterey County Agricultural Commissioner’s Office from 1930-2010 have been used in this IRWM Plan to document crop acreage trends and to establish the importance of agriculture for Monterey County’s economy. The Crop Reports include acreages, production, and revenues for: vegetable crops, fruit and nut crops, seed production, apiary production, livestock and poultry, cut flowers and cut foliage, nursery products, and field crops. The Crop Reports also include Monterey County export information and a summary of gross production values. The Crop Reports are considered the most reliable source of summary information for crop acreages and crop values in the county, and are therefore considered representative and adequate for use in this IRWM Plan.

### **M.2.4 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 scenarios A2 and B1 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.<sup>2</sup>

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 RWMG used the California Natural Resources Agency’s 2009 *California Climate Adaptation Strategy* to develop an adaptation strategy for the Greater Monterey County 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 R-10, “Adaptation and Response Strategies Based on Risk Assessment.”

### **M.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

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<sup>2</sup> These emissions scenarios are described in the 2009 California Climate Adaptation Strategy (California Natural Resources Agency) as follows: “One scenario depicts a higher-emissions scenario (A2), the other a lower-emissions scenario (B1). The A2 scenario represents a more competitive world that lacks cooperation in development and portrays a future in which economic growth is uneven, leading to a growing income gap between developed and developing parts of the world. The B1 scenario denotes a future that reflects a high level of environmental and social consciousness combined with global cooperation for sustainable development.”

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:

- *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 the Region Description, Section B.5.4.c, environmental water needs are not well quantified for the Greater Monterey County IRWM region. The lack of numerical data suggests that environmental water needs may be getting overlooked in water resource planning. Addressing environmental 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.
- *SVIGSM:* The SVIGSM is a sophisticated modeling tool developed for analysis of hydrologic conditions in the Salinas Valley. Although the SVIGSM was last updated in 1997, it is a powerful model and is still considered the best and most valuable tool for Salinas Valley Groundwater Basin management. Nonetheless, if recalibrated to current conditions, the SVIGSM would be that much more valuable a tool for water resource management planning in the region. The RWMG would like to see this model updated, should funding become available.
- *Future urban water demand:* As described in Section B.5.4.a of the Region Description chapter, future urban water demand in the Salinas Valley has been estimated for the purposes of this IRWM Plan according to three different methods: 1) using GWESRs and AMBAG population data, 2) using projections reported by water purveyors, primarily in their UWMPs, and 3) using SVIGSM. While the timeframe for this IRWM Plan is a minimum 20-year planning horizon (to the year 2035), two of the three methods (projections by water purveyors and SVIGSM) only allow for projections to the year 2030. For future updates of this IRWM Plan, the RWMG will work more closely with water purveyors to obtain water use projections that extend over the minimum 20-year planning horizon, and hopes to see the SVIGSM updated.
- *Climate change impact assessment, adaptation and mitigation:* There are significant data resources that are needed 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.

Note that all of the data and information contained in this IRWM Plan will be reviewed and updated approximately every five years, depending on available funds, as part of the formal IRWM Plan update. Some data will be reviewed on a more frequent basis; for example, MHI data will be reviewed prior to every Proposition 84 Implementation Grant solicitation, using the ACS five-year survey estimates, in order to determine the status of DACs in the region.

## Section N: Relation to Local Water Planning

The intent of the Relation to Local Water Planning standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to ensure that the IRWM Plan is congruent with local plans and that the IRWM Plan 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 section describes how the Greater Monterey County Regional Water Management Group (RWMG) has coordinated its water management planning activities to address or incorporate all or part of the following actions of its members:

- Local water supply management planning including:
  - Groundwater management
  - Water supply assessments
  - Urban water management
  - Agricultural water management
- Other water resource management planning including:
  - Flood management
  - Watershed management
  - Stormwater management
  - Low impact development (LID)
  - Salt and salinity management
- Other planning efforts including:
  - City and County general planning
  - Emergency response and disaster plans
  - Monterey Bay National Marine Sanctuary Management Plan

### **N.1 HOW THE IRWM PLAN IS CONSISTENT WITH LOCAL WATER RESOURCE MANAGEMENT PLANS**

The goals and objectives for this IRWM Plan have been developed in response to the perceived water resource issues in the Greater Monterey County region. The water resource goals for this Plan include the following:

- *Water Supply*: Improve water supply reliability and protect groundwater and surface water supplies.
- *Water Quality*: Protect and improve surface, groundwater, estuarine, and coastal water quality, and ensure the provision of high-quality, potable, affordable drinking water for all communities in the region.
- *Flood Protection and Floodplain Management*: Develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes.
- *Environment*: Protect, enhance, and restore the region's ecological resources while respecting the rights of private property owners.

In order to achieve those goals, the RWMG must first have a clear understanding of the region's water

system, including current conditions and future water needs. The water system includes not only water supply sources (groundwater, surface water, recycled water, desalinated water, etc.) but also ecological systems (watersheds, floodplains, wetlands, and coastal waters), as these systems are integrally connected. The information used to describe the region's water system for the purposes of this IRWM Plan has been derived almost entirely from existing local and regional water resource management plans. This IRWM Plan has incorporated the information and data from those existing plans and is therefore consistent with those plans. The following sections describe the local plans that have been used to inform the regional IRWM planning effort.

### **N.1.1 Local Water Supply Management Planning**

***Monterey County Groundwater Management Plan:*** The Monterey County Groundwater Management Plan (GWMP) was prepared by the Monterey County Water Resources Agency (MCWRA) in 2006 in accordance with California Water Code (CWC) Part 2.7, §10753, Groundwater Management Act. The document provides the framework for the management of groundwater resources in the Salinas Valley Groundwater Basin (exclusive of the Seaside and Paso Robles subareas) and acts as a guidance document for future groundwater projects. While the 2006 GWMP focuses on the Salinas Valley Groundwater Basin, MCWRA is responsible for the management of the water resources for all of Monterey County, and future GWMP editions will incorporate the additional groundwater basins in the County. The overall basin management objectives of the GWMP are:

- Development of integrated water supplies to meet existing and project water requirements
- Determination of sustainable yield and avoidance of overdraft
- Preservation of groundwater quality for beneficial use

To accomplish these objectives, the GWMP incorporates a number of components, which are divided into a set of 14 elements. The elements formally recognize the effectiveness of a number of ongoing water resource management activities and further recognize the need for additional activity, such as expanded conjunctive use of supplemental surface water and recycled water, with groundwater. They also reflect the wider focus on groundwater management, such as continuing cooperation with the municipal water purveyors and other groundwater users in the basin to address the impacts of regional resource opportunities and/or challenges. The plan elements are as follows:

- Plan Element 1: Monitoring of Groundwater Levels, Quality, Production, and Subsidence
- Plan Element 2: Monitoring of Surface Water Storage, Flow, and Quality
- Plan Element 3: Determination of Basin Yield and Avoidance of Overdraft
- Plan Element 4: Development of Regular and Dry Year Water Supply
- Plan Element 5: Continuation of Conjunctive Use Operations
- Plan Element 6: Short-Term and Long-Term Water Quality Management
- Plan Element 7: Continued Integration of Recycled Water
- Plan Element 8: Identification and Mitigation of Groundwater Contamination
- Plan Element 9: Identification and Management of Recharge Areas and Wellhead Protection Areas
- Plan Element 10: Identification of Well Construction, Abandonment, and Destruction Policies
- Plan Element 11: Continuation of Local, State and Federal Agency Relationships
- Plan Element 12: Continuation of Public Education and Water Conservation Programs
- Plan Element 13: Groundwater Management Reports
- Plan Element 14: Provisions to Update the Groundwater Management Plan

The goals and objectives of this IRWM Plan are fully consistent with the basin management objectives of



the GWMP. Numerous projects included in this Plan have been developed specifically to carry out the GWMP objectives.

**Ground Water Extraction Summary Reports:** MCWRA began collecting groundwater extraction data from well operators for agricultural and urban water uses in 1992. The groundwater extraction data, provided by over 300 well operators, is compiled in the Ground Water Extraction Management System portion of MCWRA Information Management System, a relational database maintained by the MCWRA, and published in the annual Ground Water Extraction Summary Reports (GWESR). Since 1991, MCWRA has also required the annual submittal of Agricultural Water Conservation Plans, which outline the best management practices (BMPs) that are adopted each year by growers in the Salinas Valley. In 1996, an ordinance was passed that required the filing of Urban Water Conservation Plans. These plans provide an overview of per capita water use and BMPs being implemented by urban water users as conservation measures. The GWESR summarizes the data submitted to the MCWRA for both Agricultural and Urban Water Conservation Plans, as well as agricultural Water and Land Use Forms. Data from the GWESR has been used in this IRWM Plan to establish historic water use trends, to document current water use, and as a basis for estimating future water demand in the Salinas Valley Groundwater Basin.

**Urban Water Management Plans:** All urban water suppliers as defined in CWC §10617, 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 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:

- City of Greenfield (2008)
- King City (2010)
- Marina Coast Water District (2010)
- California Water Service Company-Salinas District (2010)
- City of Soledad (2010)

Information from these UWMPs has been used to describe water systems and to establish future urban water demand in the Salinas Valley Groundwater Basin. Note that the City of Gonzales and the Castroville Community Services District (CCSD) are both under 3,000 connections and therefore are not required to produce an UWMP; however CCSD has developed a modified UWMP to address California Department of Environmental Health (CDEH) requirements for individual hydrologic studies in unincorporated Monterey County, though this document is not available in electronic format.

**LAFCO Municipal Services Reviews:** The Local Agency Formation Commission of Monterey County (LAFCO) produces Municipal Service and Sphere and Influence Reviews (MSR) for urban areas and other planning districts within the County. State law requires that the Commission 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 the Commission to update information about municipal services before adopting Sphere updates (Government Code §56430). The MSRs contain information pertinent to

understanding the water management and water management needs in the Greater Monterey County IRWM planning region, including: 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 Gonzales (2010)
- City of Greenfield (2010)
- King City LAFCO (2010)
- City of Marina (2011)
- City of Salinas (2010)
- City of Soledad (2010)
- North County (2006)
- South/Central County (2006)

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 Greater Monterey County IRWM planning region.

## **N.1.2 Other Water Resource Management Planning**

### **N.1.2.a Flood Protection and Floodplain Management**

***Monterey County Floodplain Management Plan:*** The MCWRA 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, the Plan describes the County's flood control system (infrastructure), identifies flood zones defined by the Federal Emergency Management Agency (FEMA), including maps depicting Repetitive Loss Properties (RLPs) 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 this IRWM Plan to provide the RWMG and stakeholders with an understanding of flooding, flood protection, and floodplain management in the Greater Monterey County IRWM 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*. In addition, several projects in the IRWM Plan will help carry out these objectives through flood risk reduction and restoring ecological functioning to floodplains.

### **N.1.2.b Watershed Management**

Information from current and recent watershed assessments and management plans has been used in this IRWM Plan primarily to provide background for the RWMG and stakeholders about local watershed management planning efforts. This information is presented in Section B.6.2.c, Water Quality Goals and Objectives for Watersheds in the Region. The goals and objectives of this IRWM Plan are fully congruent with the various watershed management planning efforts in the Greater Monterey County region. In fact,

many of the objectives in this Plan were derived from these and previous watershed assessment and planning efforts.

The following watershed management plans have been considered and incorporated into this IRWM Plan (for details about the watershed management plans, see Section B.6.2.c):

- ***San Antonio and Nacimiento Rivers Watershed Management Plan (2008)***: This watershed management plan was developed by the Nacitone Watersheds Steering Committee and Central Coast Salmon Enhancement, Inc. for the MCWRA and the State Water Resources Control Board (SWRCB) in October 2008.
- ***Garrapata Creek Watershed Assessment and Restoration Plan (2006)***: This plan was developed by the Garrapata Creek Watershed Council for the Garrapata Creek Watershed Community and the California Department of Fish and Game (CDFG) in July 2006.
- ***Northern Salinas Valley Watershed Restoration Plan (1997)***: This plan was the Final Report of a study entitled, “Nonpoint Pollution in Coastal Harbors and Sloughs of the Monterey Bay Region” prepared for the Association of Monterey Bay Area Governments (AMBAG) by Moss Landing Marine Laboratories and the Watershed Institute of California State University Monterey Bay (CSUMB) in January 1997, and funded under Section 205(j) of the federal Clean Water Act. The plan focuses on the northern Salinas Valley, encompassing all of the water courses that flow from the Gabilan Mountains east of Salinas into Moss Landing Harbor.
- ***Reclamation Ditch Watershed Assessment and Management Strategy (2005)***: This study, completed for MCWRA by the Central Coast Watershed Studies (CCoWS) team of the Watershed Institute at CSUMB, focuses on the same geographic area as the Northern Salinas Valley Watershed Restoration Plan, a 157 square-mile watershed with its headwaters in the Gabilan Range and its terminus at a set of tide gates at the entrance to Moss Landing Harbor (see Casagrande and Watson 2005).
- ***Moro Cojo Slough Management and Enhancement Plan (1996)***: The Moro Cojo Slough Management Plan was developed for the Monterey County Planning and Building Inspection Department and the State Coastal Conservancy by The Habitat Restoration Group in October 1996. The plan describes the environmental resources of the Moro Cojo Slough watershed and recommends actions to enhance, restore, and manage the significant resources in the slough system.
- ***Elkhorn Slough Watershed Conservation Plan (1999)***: This plan was produced for the Elkhorn Slough Foundation and The Nature Conservancy in 1999. The Conservation Plan was developed to identify critical resources within the Elkhorn Slough watershed, to identify and address threats, and to maintain the long-term viability of Elkhorn Slough and its related upland communities as a significant coastal system. In 2002, a second report was produced based on the Elkhorn Slough Watershed Conservation Plan. *Elkhorn Slough at the Crossroads: Natural Resources and Conservation Strategies for the Elkhorn Slough Watershed* identifies key natural resources of the slough and suggests strategies for conserving them.

Proposals exist for additional watershed planning in the region, including the Gabilan Creek sub-watershed. A watershed assessment and management plan for the Big Sur River watershed has recently been funded by the CDFG, and is expected to be completed in 2014. Other plans related to steelhead and watershed management in the Big Sur River watershed that have been considered in the development of this IRWM Plan include the following:

- ***Federal Recovery Outline for the Distinct Population Segment of South-Central California Coast Steelhead (National Marine Fisheries Service, Southwest Regional Office, 2007)***: The federal Endangered Species Act of 1973 requires that the National Oceanic and Atmospheric

Administration, National Marine Fisheries Service (NMFS) develop and implement recovery plans for the conservation and survival of NMFS-listed species. In the interim between listing and recovery plan approval, NMFS Interim Recovery Planning Guidance requires the development of a Recovery Outline for the listed species. The Recovery Outline presents a preliminary strategy for recovery of the species, with recommended high priority actions to stabilize and recover the species. The Recovery Outline for South-Central Steelhead was reviewed as part of the development of this IRWM Plan. A draft Recovery Plan has been completed for the South-Central California Steelhead and will be undergoing review by NMFS.

Recovery planning for South-Central California Coast Steelhead is fully supported in this IRWM Plan. Several objectives in the IRWM Plan promote the protection and enhancement of steelhead and steelhead habitat, including:

- Protect and enhance state and federally listed species and their habitats.
- Implement fish-friendly stream and river corridor restoration projects.
- Reduce adverse impacts of sedimentation into streams, particularly from roads and non-point sources.
- Develop and implement projects to protect, restore, and enhance the natural ecological and hydrological functions of rivers, creeks, streams, and their floodplains.

The RWMG will continue to stay abreast of federal recovery plans for steelhead and to promote fish-friendly projects through this IRWM Plan.

- ***Big Sur River Protected Waterway Management Plan (1983):*** The *Big Sur River Protected Waterway Management Plan* was developed in response to the California Protected Waterways Act and also as a management program intended to assist in implementing the Big Sur Coast Local Coastal Program Land Use Plan. The plan was adopted by the Monterey County Planning Commission in 1983; certification was acknowledged by the California Coastal Commission in 1986. The California Protected Waterways Plan, prepared in 1971 pursuant to the Protected Waterways Act of 1968, recognized the Big Sur River as an important steelhead and trout stream. In 1973, the State Legislature, with the support of the Monterey County Board of Supervisors, designated the Big Sur River a protected waterway. The resolution that incorporated the Big Sur River into the Protected Waterways Program requested the Resources Agency and affected local agencies to prepare a detailed waterway management plan for the Big Sur River. This protected waterway plan addresses pertinent issues and concerns in the Lower Big Sur River Basin. The plan serves as a guide for the RWMG in promoting IRWM Plan projects along the Big Sur River.
- ***Little Sur River Protected Waterway Management Plan (1983):*** The Little Sur River Protected Waterway Management Plan was also developed in response to the California Protected Waterways Act and also as a management program intended to assist in implementing the Big Sur Coast Local Coastal Program Land Use Plan. The plan was adopted by the Monterey County Planning Commission in 1983; certification was acknowledged by the California Coastal Commission in 1986. The resolution that incorporated the Little Sur River into the Protected Waterways Program requested the Resources Agency and affected local agencies to prepare a detailed waterway management plan for the Little Sur River. This protected waterway plan addresses pertinent issues and concerns in the Little Sur River Basin. The plan serves as a guide for the RWMG in promoting IRWM Plan projects along the Little Sur River.
- ***Big Sur Enhancement Plan for Steelhead Habitat (2003):*** The *Big Sur Enhancement Plan for Steelhead Habitat* was developed for the California Department of Parks and Recreation (DPR) in

2003. The plan focuses its geographic scope to the two State Park properties within the Big Sur River watershed: Andrew Molera State Park and Pfeiffer-Big Sur State Park. The primary purpose of the Enhancement Plan is to characterize the status of the existing steelhead within the project area and provide recommendations for habitat enhancement and resource management measures that benefit the species. One of the projects in this IRWM Plan, “Big Sur River Steelhead Enhancement Project” proposed by California State Parks, will implement several of the recommendations included in the Enhancement Plan.

### **N.1.2.c Stormwater Management**

Stormwater management programs and plans are discussed in this IRWM Plan in Section B.6.3.a, Regulatory Water Quality Programs, under “Federal and State Stormwater/Urban Runoff Programs.” The section describes each of the following stormwater programs and plans:

- City of Salinas Stormwater Management Plan (2007)
- King City National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Management Plan (2009)
- City of Soledad Stormwater Management Plan (2004)
- Monterey Regional Stormwater Management Program (2006)

The City of Salinas is the only Phase I Municipal Separate Storm Sewer System (MS4) in the Central Coast Region, and is covered by an individual NPDES Phase I permit. Cities within the Greater Monterey County IRWM planning region enrolled under the Phase II General Permit for Stormwater Discharges include King City, Soledad, and Marina. While King City and the City of Soledad have individual stormwater programs, the City of Marina joined with Monterey County and several Monterey Peninsula cities to apply as co-permittees under a single General Plan, called the Monterey Regional Storm Water Management Program (MRSWMP). 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: “capture and manage stormwater runoff”).

### **N.1.2.d Low Impact Development**

One of the Water Quality objectives of this IRWM Plan is to “incorporate or promote principles of low impact development where feasible, appropriate, and cost effective.” To help address that objective, a project by the UC Davis Marine Pollution Studies Laboratory was put forward and awarded funds in Round 1 of the Proposition 84 IRWM Implementation Grants to evaluate the efficacy of LID treatment components in reducing the concentrations of contaminants that contribute to stormwater toxicity. Objectives of the study include evaluating efficacy of bioswales or other treatment systems in reducing stormwater runoff toxicity to aquatic organisms; determining stormwater load reduction and stormwater pollutant load reduction through infiltration in LID design components; and providing data to stormwater agencies, water quality managers, LID engineers, and others to be incorporated into future planning and management decisions to protect the Salinas River Watershed.

RWMG entities are also working with the Central Coast Regional Water Quality Control Board (RWQCB) on the Central Coast Joint Effort for LID and Hydromodification Control (described in Section B.6.3.b, Voluntary Water Quality Programs). The Municipal NPDES Stormwater Permit requires municipalities to develop performance measures and, in some cases, numeric criteria to manage stormwater. Development of these measures and criteria requires substantial knowledge of urban

hydrologic processes; appropriate use of LID techniques; and an understanding of technical, policy and regulatory issues related to implementing municipal stormwater control requirements. The Central Coast RWQCB is providing municipalities the option of participating in a Joint Effort, led by a consultant team, to develop hydromodification control criteria to meet the RWQCB's stormwater regulations for new and redevelopment. The RWMG is interested in promoting LID practices in the Greater Monterey County IRWM region, and will continue to work with the RWQCB on the Central Coast Joint Effort and with local agencies to encourage the implementation of LID practices, where appropriate.

#### **N.1.2.e Salt and Salinity Management**

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.

No entity has as of yet initiated the salt and nutrient management planning process within the Greater Monterey County IRWM planning region. However, the Central Coast RWQCB has included the following in the City of Salinas Stormwater Permit (RWQCB 2012d, pp. 86-87):

##### b) Salt and Nutrient Management

- i) Within 2 years of adoption of this Order, the Permittee shall coordinate with local water and wastewater entities, together with local salt/nutrient contributing stakeholders, to fund locally driven and controlled, collaborative processes open to all stakeholders that will prepare salt and nutrient management plans for groundwater basins underlying the Permit coverage area, per State Water Board Recycled Water Policy (State Water Board Resolution No. 2009-0011).
- ii) Within 4 years of adoption of this Order, the Permittee shall evaluate opportunities to include a significant stormwater use and recharge component within the salt/nutrient management plan(s). At a minimum, the Permittee shall coordinate with other stakeholders to include stormwater recharge/use goals and objectives in salt and nutrient management plan(s).

Whenever the salt and nutrient management planning effort for the Salinas Valley Groundwater Basin is initiated, either by the City of Salinas or some other entity, the RWMG will be sure to coordinate that planning effort with the IRWM Plan.

#### **N.1.3 Other Planning Efforts**

##### **N.1.3.a City and County General Planning**

Every county and city in California is required by State law to have a General Plan, and the plan is required to be up to date. The General Plan identifies the county or city's goals, policies, and implementation actions regarding future development within that region. State law provides that a General Plan must address, at minimum, seven elements: Land Use, Circulation, Housing, Natural Resource Conservation, Open Space, Noise, and Safety.

The Monterey County 2010 General Plan and General Plans of the cities in the region have been carefully reviewed during the development of this IRWM Plan to identify common goals, to highlight areas of

inconsistency or potential barriers to implementing objectives of the IRWM Plan, and to seek opportunities for increasing coordination between water use and land use planning. The following General Plans have been reviewed:

- City of Gonzales Draft General Plan 2010 (Public Review Draft)
- City of Greenfield General Plan 2005-2025
- City of Marina General Plan 2000, Updated 2006
- City of Salinas General Plan 2002
- City of Soledad General Plan 2005
- King City General Plan 1998
- Monterey County General Plan 2010, including Specific Plans for:
  - Big Sur Coast Land Use Plan (Local Coastal Program) 2008
  - Ford Ord Master Plan
  - Central Salinas Valley Area Plan
  - Greater Salinas Area Plan
  - North County Area Plan
  - South County Area Plan
  - Toro Area Plan

In addition, the *Implementation Plan for the Boronda and Castroville/Pajaro Redevelopment Areas 2010*, produced by Monterey County Redevelopment Agency, has also reviewed in the development of this IRWM Plan.

The policies of the General Plans are generally consistent with the goals and objectives of the IRWM Plan. As an example—and as a good representation of other General Plans in the region—the following list provides goals and policies from the Monterey County 2010 General Plan that support the IRWM Plan objectives (this list is not exhaustive):

#### **Land Use Element**

- *Goal LU-8:* Encourage the provision of open space lands as part of all types of development including residential, commercial, industrial and public.

#### **Conservation and Open Space Element**

- *Goal OS-1:* Retain the character and natural beauty of Monterey County by preserving, conserving, and maintaining unique physical features, natural resources, and agricultural operations.
- *Goal OS-3:* Prevent soil erosion to conserve soils and enhance water quality.
  - *Policy OS-3.1:* Best Management Practices (BMPs) to prevent and repair erosion damage shall be established and enforced.
  - *Policy OS-3.2:* Existing special district, state, and federal soil conservation and restoration programs shall be supported. Voluntary restoration projects initiated by landholders, or stakeholder groups including all affected landowners, shall be encouraged.
  - *Policy OS-3.3:* Criteria for studies to evaluate and address, through appropriate designs and BMPs, geologic and hydrologic constraints and hazards conditions, such as slope and soil instability, moderate and high erosion hazards, and drainage, water quality, and stream stability problems created by increased stormwater runoff, shall be established for new development and changes in land use designations.
  - *Policy OS-3.7:* Voluntary preparation and implementation of a coordinated resource management plan shall be encouraged in watersheds of State designated impaired waterways.



- *Policy OS-3.8:* The County shall cooperate with appropriate regional, state and federal agencies to provide public education/outreach and technical assistance programs on erosion and sediment control, efficient water use, water conservation and re-use, and groundwater management. This cooperative effort shall be centered through the Monterey County Water Resources Agency.
- *Policy OS-3.9:* The County will develop a Program that will address the potential cumulative hydrologic impacts of the conversion of hillside rangeland areas to cultivated croplands.
- *Goal OS-4:* Protect and conserve the quality of coastal, marine, and river environments, as applied in areas not in the Coastal Zone.
  - *Policy OS-4.1:* Federal and State listed native marine and fresh water species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant shall be protected. Species designated in Area Plans shall also be protected.
  - *Policy OS-4.2:* Direct and indirect discharges of harmful substances into marine waters, rivers or streams shall not exceed state or federal standards.
  - *Policy OS-4.3:* Estuaries, salt and fresh water marshes, tide pools, wetlands, sloughs, river and stream mouth areas, plus all waterways that drain and have impact on State designated Areas of Special Biological Significance (ASBS) shall be protected, maintained, and preserved in accordance with state and federal water quality regulations.
- *Goal OS-5:* Conserve listed species, critical habitats, habitat and species protected in Area Plans; avoid, minimize and mitigate significant impacts to biological resources.
  - *Policy OS-5.3:* Development shall be carefully planned to provide for the conservation and maintenance of critical habitat.
  - *Policy OS-5.4:* Development shall avoid, minimize, and mitigate impacts to listed species and critical habitat to the extent feasible.
  - *Policy OS-5.6:* Native and native compatible species, especially drought resistant species, shall be utilized in fulfilling landscaping requirements.
  - *Policy OS-5.14:* Policies and procedures that encourage exclusion and control or eradication of invasive exotic plants and pests shall be established. Sale of such items within Monterey County shall be discouraged.
  - *Policy OS-5.15:* A fee waiver program for environmental restoration projects shall be established.
  - *Policy OS-5.21:* At five year intervals, the County shall examine the degree to which thresholds for increased population, residential construction, and commercial growth predicted in the General Plan Environmental Impact Report (EIR) for the timeframe 2006-2030 have been attained. If the examination indicates that actual growth is within 10 percent of the growth projected in the General Plan EIR (10,015 new housing units; 500 acres new commercial development; 3,111 acres new industrial development and 10,253 acres of land converted to agriculture), the County shall assess the vulnerability of currently non-listed species becoming rare, threatened, or endangered due to projected development. The County shall complete the preparation of a conservation strategy for those areas containing substantial suitable habitat for plant and wildlife species with the potential to become listed species due to development. ...
  - *Policy OS-5.22:* In order to preserve riparian habitat, conserve the value of streams and rivers as wildlife corridors and reduce sediment and other water quality impacts of new development, the county shall develop and adopt a Stream Setback Ordinance. ... The ordinance shall identify specific setbacks relative to the following rivers and creeks so they can be implemented in the Area Plans: Salinas, Carmel River, Arroyo Seco, Pajaro River,

Nacimiento, San Antonio, Gabilan Creek, and Toro Creek.

- *Goal OS-9:* Promote efficient energy use.
- *Goal OS-10:* Provide for the protection and enhancement of Monterey County’s air quality without constraining routine and ongoing agricultural activities.
  - *Policy OS-10.7:* Use of the best available technology for reducing air pollution emissions shall be encouraged.
  - *Policy OS-10.11:* 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. At a minimum, the Plan shall:
    - a. Establish an inventory of current (2006) GHG emissions in the County of Monterey including but not limited to residential, commercial, industrial, and agricultural emissions; and
    - b. Include an inventory of emissions as of 1990 Forecast GHG emissions for 2020 for County operations;
    - c. Forecast GHG emissions for areas within the jurisdictional control of the County for “business as usual” conditions;
    - d. Identify methods to reduce GHG emissions;
    - e. Quantify the reductions in GHG emissions from the identified methods;
    - f. Establish requirements for monitoring and reporting of GHG emissions;
    - g. Establish a schedule of actions for implementation;
    - h. Identify funding sources for implementation; and
    - i. Identify a reduction goal for the 2030 Planning Horizon.

During preparation of the Greenhouse Gas Reduction Plan, the County shall also evaluate potential options for changes in County policies regarding land use and circulation, as necessary, to further achieve the 2020 and 2030 reduction goals and measures to promote urban forestry and public awareness concerning climate change.

### **Public Services Element**

- *Goal PS-2:* Assure an adequate and safe water supply to meet the County’s current and long-term needs.
  - *Policy PS-2.1:* Coordination among, and consolidation with, those public water service providers drawing from a common water table to prevent overdrawing the water table is encouraged.
  - *Policy PS-2.6:* A Hydrologic Resources Constraints and Hazards Database shall be developed and maintained in the County Geographic Information System (GIS). The GIS shall be used to identify areas containing hazards and constraints (see Policy S- 1.2) that could potentially impact the type or level of development allowed in these areas (Policy OS-3.5). Maps maintained as part of the GIS will include:
    - a. Impaired water bodies on the State Water Resources Control Board 303d (Clean Water Act) list.
    - b. Important Groundwater Recharge Areas
    - c. 100-year Flood Hazards
    - d. Hard rock areas with constrained groundwater

- e. Areas of septic tank leachfield unsuitability
- f. Contaminated groundwater plumes and impacted soil and groundwater sites.
- *Policy PS-2.7:* As part of an overall conservation strategy and to improve water quality, Area Plans may include incentive programs that encourage owners to voluntarily take cultivated lands on slopes with highly erosive soils out of production.
- *Policy PS-2.8:* The County shall require that all projects be designed to maintain or increase the site's pre-development absorption of rainfall (minimize runoff), and to recharge groundwater where appropriate. Implementation would include standards that could regulate impervious surfaces, vary by project type, land use, soils and area characteristics, and provide for water impoundments (retention/detention structures), protecting and planting vegetation, use of permeable paving materials, bioswales, water gardens, and cisterns, and other measures to increase runoff retention, protect water quality, and enhance groundwater recharge.
- *Policy PS-2.9:* Protect and manage groundwater as a valuable and limited shared resource. The County shall use discretionary permits to manage construction of impervious surfaces in important groundwater recharge areas. Potential recharge area protection measures at sites in important groundwater recharge areas include, but are not limited to, the following:
  - a. Restrict coverage by impervious materials.
  - b. Limit building or parking footprints.
  - c. Require construction of detention/retention facilities on large-scale development project sites overlying important groundwater recharge areas as identified by Monterey County Water Resources Agency.
  - d. Recognize that detention/retention facilities on small sites may not be practical, or feasible, and may be difficult to maintain and manage.
- *Goal PS-3:* Ensure that new development is assured a long-term sustainable water supply.
  - *Policy PS-3.4:* Specific criteria shall be developed for use in the evaluation and approval of adequacy of all new wells. Criteria shall assess both water quality and quantity including, but not limited to:
    - a. Water quality. ...
    - g. Effects on in-stream flows necessary to support riparian vegetation, wetlands, fish, and other aquatic life including migration potential for steelhead, for the purpose of minimizing impacts to those resources and species.
  - *Policy PS-3.6:* The Monterey County Health Department shall not allow construction of any new wells in known areas of saltwater intrusion as identified by Monterey County Water Resources Agency or other applicable water management agencies until such time as a program has been approved and funded that will minimize or avoid expansion of salt water intrusion into useable groundwater supplies in that area. This policy shall not apply to deepening or replacement of existing wells.
  - *Policy PS-3.8:* The County shall coordinate and collaborate with all agencies responsible for the management of existing and new water resources.
  - *Policy PS-3.9:* A program to eliminate overdraft of water basins shall be developed as part of the Capital Implementation and Financing Plan (CIFP) for this Plan using a variety of strategies, which may include but are not limited to:
    - a. Water banking;
    - b. Groundwater and aquifer recharge and recovery;

- c. Desalination;
- d. Pipelines to new supplies; and/or
- e. A variety of conjunctive use techniques.

The CIFP shall be reviewed every five (5) years in order to evaluate the effectiveness of meeting the strategies noted in this policy. Areas identified to be at or near overdraft shall be a high priority for funding.

- *Policy PS-3.10:* Developments that use gray water and cisterns for multi-family residential and commercial landscaping shall be encouraged, subject to a discretionary permit.
- *Policy PS-3.12:* Maximize agricultural water conservation measures to improve water use efficiency and reduce overall water demand. The County shall establish an ordinance identifying conservation measures that reduce agricultural water demand.
- *Policy PS-3.13:* Maximize urban water conservation measures to improve water use efficiency and reduce overall water demand. The County shall establish an ordinance identifying conservation measures that reduce potable water demand.
- *Policy PS-3.14:* Maximize the use of recycled water as a potable water offset to manage water demands and meet regulatory requirements for wastewater discharge, by employing strategies including, but not limited to, the following:
  - a. Increase the use of treated water where the quality of recycled water is maintained, meets all applicable regulatory standards, is appropriate for the intended use, and re-use will not significantly impact beneficial uses of other water resources.
  - b. Work with the agricultural community to develop new uses for tertiary recycled water and increase the use of tertiary recycled water for irrigation of lands currently being irrigated by groundwater pumping.
  - c. Work with urban water providers to emphasize use of tertiary recycled water for irrigation of parks, playfields, schools, golf courses, and other landscape areas to reduce potable water demand.
  - d. Work with urban water providers to convert existing potable water customers to tertiary recycled water as infrastructure and water supply become available.
- *Policy PS-3.17:* The County will pursue expansion of the Salinas Valley Water Project (SVWP) by investigating expansion of the capacity for the Salinas River water storage and distribution system. This shall also include, but not be limited to, investigations of expanded conjunctive use, use of recycled water for groundwater recharge and seawater intrusion barrier, and changes in operations of the reservoirs. ...
- *Policy PS-3.18:* As required by PS-3.17, County will convene and coordinate a working group made up of the Salinas Valley cities, the MCWRA, and other affected entities. The purpose will be to identify new water supply projects, water management programs, and multiple agency agreements that will provide additional domestic water supplies for the Salinas Valley. These may include, but not be limited to, expanded conjunctive use programs, further improvements to the upriver reservoirs, additional pipelines to provide more efficient distribution, and expanded use of recycled water to reinforce the hydraulic barrier against seawater intrusion. ...
- *Goal PS-4:* Ensure adequate treatment and disposal of wastewater.
  - *Policy PS-4.4:* Groundwater recharge through the use of reclaimed wastewater, not including primary treated wastewater, in accordance with federal, state, and local laws, regulations and ordinances, shall be encouraged.
- *Goal PS-11:* Maintain and enhance the County's parks and trails system in order to provide

recreational opportunities, preserve natural scenic resources and significant wildlife habitats, and provide good stewardship of open space resources.

### **Agriculture Element**

- *Goal AG-1:* Promote the long-term protection, conservation, and enhancement of productive and potentially productive agricultural land.
- *Goal AG-5:* Ensure compatibility between the County's agricultural uses and environmental resources.
  - *Policy AG-5.1:* Programs that reduce soil erosion and increase soil productivity shall be supported.
  - *Policy AG-5.2:* Policies and programs to protect and enhance surface water and groundwater resources shall be promoted, but shall not be inconsistent with State and federal regulations.

### **Greater Salinas Area Plan: Public Services Element**

- *Goal GS-5.1:* Portions of Gabilan Creek shall be evaluated for a linear park as defined by the County's Parkland Classification System at such time when the County can support another regional park. Until such time, Gabilan Creek shall be:
  - a. Maintained in a natural riparian state;
  - b. Kept in a free-flow state devoid of dams;
  - c. Allowed its natural flood capacity through required setbacks conforming to the 100 year flood plain; and
  - d. Kept free from urban encroachment by residential development through required dedication of land in the floodplain corridor.

Note that the RWMG intends to conduct an in-depth investigation of potential barriers to IRWM Plan implementation in the city and county General Plan policies, ordinances, and other state, regional, and local rules and regulations, for future updates of this IRWM Plan.

### **N.1.3.b Emergency Response and Disaster Plans**

***Monterey County Multi-Jurisdictional Hazard Mitigation Plan (2007):*** 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 human-caused 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 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 naturally 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: Prevent disaster-resistant development)
- Helping coastal residents minimize erosion and stabilize slopes (Goal 3: Reduce the possibility of

damage and losses due to coastal erosion)

- Participating in California Division of Safety of Dams (DSOD) mapping updates and reviewing and updating County inundation maps regularly (Goal 4: Reduce the possibility of damage and losses due to dam failure)
- Identifying and implementing minor flood and stormwater management projects to reduce damage to infrastructure and damage 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: Reduce the possibility of damage and losses due to floods)

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.

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. Note that 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 outlines a plan for flood mitigation in the *Monterey County Floodplain Management Plan*, which has been incorporated into this Plan in Section C, Flood Management.

### **N.1.3.c Monterey Bay National Marine Sanctuary Management Plan**

The *Monterey Bay National Marine Sanctuary (MBNMS) Final Management Plan* was developed in 2008, and includes 23 Action Plans to guide the Sanctuary in protecting resources over a five-year planning period. Most of the Action Plans are grouped into four main themes: coastal development, ecosystem protection, water quality, and wildlife disturbance. This IRWM Plan discusses and/or incorporates the strategies of several of the Sanctuary's Action Plans, including most notably: Desalination; Big Sur Coastal Ecosystem Plan; Introduced Species; and implementation of the Water Quality Protection Program Action Plans, in particular: *Implementing Solutions to Urban Runoff*; *Regional Monitoring, Data Access, and Interagency Coordination*; and *Agriculture and Rural Lands*. Section B.6.3.b of this IRWM Plan describes two voluntary water quality programs that have been specifically developed out of MBNMS's Water Quality Protection Program Action Plans. Several members of the RWMG, most notably the MBNMS itself, along with other stakeholders in the Greater Monterey County region are working to implement strategies in the MBNMS Action Plans through the IRWM planning process.

## **N.2 DYNAMICS BETWEEN LOCAL PLANNING AND IRWM PLANNING**

### **N.2.1 How and When Updates are Considered in the IRWM Plan**

Most of the planning documents described above are updated on a regular basis, 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 approximately every five years, depending on available funds, as part of the formal Plan update. Accordingly, the IRWM Plan updates will reflect the latest planning efforts and most recent editions of the local planning documents.

### **N.2.2 How Regional Planning Efforts Feed Back to Local Planning Efforts**

The information exchange between IRWM planning and local water planning is not a one-way exchange.

The IRWM regional planning efforts feed 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 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 Greater Monterey County IRWM planning process. One example is the following:

The City of Salinas's NPDES Phase I Stormwater Permit was renewed in May 2012. Changes in the new order include provisions for the City to pursue IRWM objectives. Specifically:

3) Aligning Stormwater Management with Related Planning Goals and Requirements

a) Integrated Regional Water Management –

i) Within 12 months of adoption of this Order, the Permittee shall coordinate with other stakeholders to pursue the Environmental Enhancement Objectives of the May 2006 Integrated Regional Water Management Functionally Equivalent Plan Update, or comparable water supply, water quality, and flood protection and flood management goals and objectives of the Integrated Regional Water Management Plan in use, through the Permittee's stormwater management program.

ii) Within 2 years of adoption of the Order, the Permittee shall identify opportunities to protect, enhance, and/or restore natural resources including streams, groundwater, watersheds, and other resources consistent with the Integrated Regional Water Management Plan. At a minimum, the Permittee shall examine opportunities for stormwater capture and reuse, and stormwater infiltration for aquifer recharge. (RWQCB 2012d, p. 86)

Ideally the relationship between regional IRWM planning and local water resource management planning will remain dynamic, with the information exchange continuing to occur in both directions.

### **N.2.3 How Inconsistencies are Resolved**

Since the IRWM Plan is essentially built upon local plans and planning efforts, few inconsistencies between the IRWM Plan and local plans exist. If inconsistencies are found they will be resolved through direct communication and coordination with the planning entities where the inconsistencies occur. As noted above, the RWMG intends to conduct an in-depth investigation of potential barriers to IRWM Plan implementation in city and county General Plan policies, ordinances, and other state, regional, and local rules and regulations, for future updates of this IRWM Plan. The RWMG will seek to eliminate any barriers to IRWM Plan implementation by working closely with the regulating agencies to resolve those issues on a case-by-case basis.

### **N.2.4 Climate Change Adaptation and Mitigation Strategies in Local Plans**

Local water planning agencies are only in the beginning stages of adopting climate change adaptation and mitigation strategies in their local plans. As climate change adaptation and mitigation strategies become more developed in local water management planning efforts, those strategies will become incorporated into the Greater Monterey County IRWM Plan with future Plan updates. Please see Section R, Climate Change, for a full discussion of the RWMG's current climate change recommendations and strategies for the Greater Monterey County region.

The RWMG has been in communication with water managers and land use managers in the broader Central Coast region regarding climate change mitigation/GHG reduction efforts along the Central Coast. The Climate Change section for this IRWM Plan was developed with significant contributions from a 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 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 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.

## Section O: Relation to Local Land Use Planning

The purpose of the Relation to Local Land Use Planning standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to require an exchange of knowledge and expertise between land use and water resource managers through the IRWM planning process; to examine how Regional Water Management Groups (RWMGs) and land use planning agencies currently communicate; and to identify how to improve planning efforts between the RWMGs and land use planning agencies. One of the goals of the *California Water Plan Update 2009* is to ensure that water managers and land use planners make informed, collaborative water management decisions on a statewide basis. The purpose of including the Relation to Local Land Use Planning standard in the Proposition 84/1E IRWM Program Guidelines is to help meet that goal.<sup>1</sup>

Every city and county in California must adopt a comprehensive long-term General Plan in accordance with §65300 of the California Government Code. There are seven required elements of a General Plan including Land Use, Circulation, Housing, Conservation, Open Space, Noise, and Safety, which provide a broad overview of the issues within a jurisdiction. Water-related supply and treatment issues are 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 (UWMPs) if groundwater is identified as a source available to the supplier. A key provision in Senate Bill (SB) 610 requires that any project subject to the California Environmental Quality Act (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 [OPR] 2003) recommends facilitating SB 610 by having strong water elements in local general plans that incorporate coordination between the land use agency and the water supply agency.

Even with such advances in policy, efforts to link land use decisions and water management decisions remains an area of challenge. Land use decisions and water management decisions are often 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 early water management input into, and coordination with those responsible for making, land use decisions. This relationship can significantly influence how both water management

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<sup>1</sup> This introduction has been excerpted from the Proposition 84/1E IRWM Program Guidelines, p. 62.

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 Greater Monterey County IRWM region, and provides suggestions for how that relationship may be improved.

## **O.1 CURRENT RELATIONSHIP BETWEEN LOCAL LAND USE PLANNING ENTITIES AND WATER MANAGEMENT ENTITIES**

The effort to link land use decisions and water management decisions remains an area of challenge in the Greater Monterey County IRWM region as it does in many other regions of the state. The level of communication and coordination between land use planners and water resource managers varies quite significantly amongst entities. A higher level of communication and coordination seems to exist between entities that operate on a regional scale than between those that operate more locally. Opinions also vary as to the level of exchange desired, with some water resource managers (typically those in rural areas where development pressures are minimal) preferring to manage their water supplies without “input” (perceived constraints) from outside agencies, and other water managers expressing a strong desire and need for increased coordination with land use planning agencies.

This section provides some examples of how water resource managers currently communicate with land use planners in the Greater Monterey County IRWM region. Since communication patterns seem to be similar amongst entities with similar jurisdictions, this section has been organized, solely 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
- Smaller, more rural communities
- Agencies with regional jurisdiction

*A note on terminology:* The term “water manager” is used in a general sense in this section to refer both to regulatory water management entities—including those that manage water supply (such as the Monterey County Water Resources Agency [MCWRA], which is responsible for long-term management of the Salinas Valley Groundwater Basin) and those that regulate water quality (e.g., the Regional Water Quality Control Board [RWQCB] and Monterey County Department of Environmental Health)—as well as to those that “manage” water delivery (i.e., the water purveyors, such as California Water Service Company (Cal Water), Alco Water Company, Marina Coast Water District, Castroville Community Services District, and several municipalities that supply water within their city boundaries).

### **O.1.1 Municipalities that Supply Their Own Water**

Several of the municipalities in the region—specifically, Gonzales, Greenfield, King City, and Soledad—supply their own water and provide their own wastewater treatment services. The water source for all of these cities is the Salinas Valley Groundwater Basin, which as noted above, is managed by the MCWRA. The water purveyor function is managed and implemented by the public works department in each of these municipalities.

Where water resource management and land use planning occur “in house,” coordination tends to occur naturally through ongoing interdepartmental communications. Discussions are initiated, for example, whenever a developer inquires about a land use project or files an application. Development projects over a certain threshold must prepare a SB 610 Water Supply Assessment (WSA); during the preparation of an assessment an exchange of information will occur between the planning and public works departments.

Additionally, when a City updates its General Plan, the City planners will consider water sources and the expansion of the urban area. Interagency coordination (e.g., between a City and the MCWRA) typically occurs in conjunction with major subdivisions, or annexation proposals. Environmental Impact Reports (EIRs) and, more recently, WSAs, typically provide the instrument for disclosure of information and potential impacts to concerned members of the public and other agencies.<sup>2</sup>

### **O.1.2 Municipalities and Large Communities that Do Not Supply Their Own Water**

Other municipalities and large communities in the region receive their water supply from water districts, such as the Marina Coast Water District or Castroville Community Services District, or from water companies, including privately owned water companies such as Coastlands Mutual Water Company in Big Sur, or investor-owned water companies such as Cal Water, which serves the cities of Salinas and King City. 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.”

For example, according to a water resource planner at Cal Water, the only type of “formal” coordination that exists between the water purveyor and land use jurisdictions is limited to efforts such as developing Urban Water Management Plans, or developing WSAs. Some examples of Cal Water’s typical interactions with land use planners include:

- Cal Water staff work with City staff to develop growth projections (population, service counts, water demand) for Urban Water Management Plans.
- To develop Cal Water’s Water Supply and Facilities Master Plan, Cal Water staff used General Plan data and interviewed City planning personnel to project future growth and water use.
- Cal Water District Management attends City Council meetings.

In addition, for large development projects that require a WSA, Cal Water will conduct the WSA and submit it to the City prior to development approval. Coordination between Cal Water and a City or the County is more limited for smaller projects. In those cases Cal Water deals directly with the developers after their plans have already been approved by the City or County. Cal Water 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. The Cal Water District Manager notes that oftentimes developers spend significant time and energy creating water system plans that do not meet Cal Water’s specifications. This could be avoided if more coordination existed between the utility and the City, specifically, if a sign-off from the water company were required as a part of the development approval process.<sup>3</sup>

From the City of Salinas’s perspective (i.e., from the land use planning perspective), communication and coordination with water managers is generally adequate though there is “much room for improvement.”<sup>4</sup> Examples of communication “working” include distribution of the City’s General Plan to all water managers for early review and discussion.<sup>5</sup> The City’s General Plan stipulates that the City must consult

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<sup>2</sup> Sources for information in this paragraph are from email communications with: City of Gonzales Community Development Director, January 30, 2012; City of Greenfield Community Development Director, February 6, 2012; Senior Planner, City of Soledad Community Development Department, February 6, 2012; Assistant Planner, King City Community Development Department, February 7, 2012.

<sup>3</sup> Email communication with Cal Water Project Engineer, January 30, 2012.

<sup>4</sup> Email communication with the City’s Community and Economic Development Department Assistant Director February 6, 2012.

<sup>5</sup> Telephone conversation with City of Salinas Principal Planner, February 8, 2012.

with local and regional water agencies to assess whether the water demand associated with a development project is included in the agency's most recent Urban Water Management Plan and whether existing supplies can meet the project's demand for water (City of Salinas 2002, p. COS-5). In addition, Goal COS-1, "Create a safe and adequate supply of water for community uses," includes the following policies:

- *Policy COS-1.1:* Work with regional and local water providers to ensure that adequate supplies of water are available to meet existing and future demand.
- *Policy COS-1.3:* Work with local and regional water providers to increase the production, distribution, and use of recycled water.
- *Policy COS-1.4:* Maintain and restore natural watersheds to recharge the aquifers and ensure the viability of ground water resources.
- *Policy COS-1.5:* Cooperate with the Monterey County Water Resources Agency, the State Water Resources Control Board, and the Regional Quality Control Board to implement programs that address two primary causes of poor water quality in the planning area: salt water intrusion and nitrate contamination.
- *Policy COS-1.6:* Enforce national (NPDES) requirements and participate in regional efforts to protect and enhance water quality.

Coordination between the City of Salinas and the MCWRA exists on a project-by-project basis, usually through a CEQA process or project review for projects adjoining the County's drainage ditch (the Salinas Reclamation Ditch). Another way in which information is exchanged between the City and water managers—in this case, water regulators—is in regards to the National Pollutant Discharge Elimination System (NPDES) Permit issued by the RWQCB.

Formalized City-County meetings do take place on a monthly basis between the City (usually Planning staff and sometimes a Public Works representative) and the County's Resources Agency (usually County Planning and Public Works staff); however, Water Resources Agency staff do not tend to participate in these meetings, nor do the water purveyors such as Cal Water and Alco. The conclusion offered by the City's Community and Economic Development Department Assistant Director is that there is "much room for improvement, particularly for long-term water resources planning and coordination of all water-related development issues."<sup>6</sup>

A similar situation exists—and similar conclusions might be drawn—for the relationship between the Marina Coast Water District (MCWD, water purveyor) and the land use planning entities for the areas it serves, including the City of Marina. For large development projects, MCWD will prepare the WSA, and the WSA will invariably be included in the EIR. 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 (i.e., when MCWD estimates a project will use more water than the City does). If the City approves the 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. One water manager at MCWD is concerned that precisely this situation may occur as the economy picks up and those "last units," which received prior approval by the City but have not yet been built because of the economic downturn, finally get built. Upfront coordination between water managers and land use jurisdictions would help prevent this situation.<sup>7</sup>

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<sup>6</sup> Email communication February 6, 2012.

<sup>7</sup> Information regarding MCWD was obtained via telephone conversations with the MCWD Capital Projects Manager, February 8 and February 16, 2012.

From MCWD’s perspective, increased coordination and communication needs to 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., a hotel, a 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 a region, allocating water to each parcel in some sort of flexible—but quantifiable—manner. Specific allocations of water for small as well as large projects will remove some of the ambiguity and uncertainty regarding future water use and will help improve long-term water supply security.

A regular forum does exist between the MCWD and the City of Marina to discuss upcoming projects and potential conflicts: the Joint City/District meeting, attended by MCWD Board and Marina City Council members, takes place once/month (providing there is a quorum). The Joint City/District meeting provides a good example of similar forums that could be set up between water management districts/companies and land use jurisdictions in the region.

### **O.1.3 Rural Communities**

Other water district and water company managers in the region have reported even less coordination with land use planners than that described thus far—and many of them would prefer it to remain that way.

The General Manager at the Castroville Community Services District (CCSD) explains that CCSD makes decisions based on a five-member Board in the community of Castroville. Three of the five board members sit on the Castroville Advisory Committee, which advises the County Board of Supervisors through the office of Housing and Redevelopment. Through this connection, some collaboration exists with land use planners but there is no direct oversight of how CCSD allots their water and sewer capacity. For permitting, CCSD determines the water and wastewater connections without any input at all from land use planners. The General Manager noted, “My goal is to simplify. Anytime I can reduce the number of layers on a project, I do.” It is not that the District is averse to accepting input from other entities. The CCSD does not have much direct interaction with land use planners at the County of Monterey, but the General Manager is also quick to point out that the District has not yet had the kind of growth that would require a WSA.<sup>8</sup>

Similar sentiments have been expressed by other water managers, particularly those in rural areas. For example, Butch Kronlund, the President of Coastlands Mutual Water Company, a small, private water company in Big Sur, reports that “communication and coordination” between small water company managers and Monterey County land use planners in that region tends to be limited only to water quality testing and permitting requirements (e.g., avoiding fines and taking advantage of state and federal grants to reach compliance). Like the water managers at the CCSD, he prefers to keep the “coordination” effort to a minimum in favor of having more autonomy in managing the water resources (“less is more”).<sup>9</sup>

### **O.1.4 Regional Agencies**

While communication and coordination between land use planners and water resource managers appears to be lower—and least desired by water managers—on the local level in the more rural areas of the region, at the regional level, communication and coordination appear to be actively pursued and desired.

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<sup>8</sup> Email communications with CCSD General Manager, February 7 - 13, 2012.

<sup>9</sup> Email communications with Coastlands Mutual Water Company President, January 30 and 31, 2012.

For example, the MCWRA—which is responsible for managing, protecting, and enhancing water supply and water quality as well as providing flood protection in the County of Monterey—appears to be thoroughly involved in all levels of land use planning throughout the county. The following provides some examples of MCWRA’s interactions with land use planners.<sup>10</sup>

The MCWRA works in close coordination with the Monterey County Planning Department, Building Department, 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 departmental 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 include:

*Regularly scheduled meetings:*

- Inter-Agency Review Meeting
- Inter-Departmental Review Meeting
- Inter-Departmental Coordination Meeting
- General Plan Implementation

*Regularly scheduled public hearings:*

- 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 IRWMP Technical Advisory Committee
- Monterey Peninsula Water Management Technical Advisory Committee
- Floodplain Management Plan Working Group
- Multi-jurisdictional Hazard Mitigation Plan Working Group
- County Service Area 50 Citizens Advisory Committee – Technical Support

Note, the MCWRA is not fully funded to participate in some land use activities (e.g., general plan implementation), which limits communication and coordination in those areas. Essentially there is more demand for services than there is funding.

On the “land use planner” side, the Monterey County Resource Management Agency (MCRMA)

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<sup>10</sup> The examples of MCWRA’s involvement with land use planning are from an email communication with the Senior Water Resources Hydrologist at MCWRA, February 17, 2012.



participates in several water resource planning activities throughout the county, including<sup>11</sup>:

- MCRMA participates as Technical Advisory Committee (TAC) member in the Integrated Watershed Restoration Program with the Resource Conservation District (RCD) of Monterey County and other partners;
- MCRMA provides input to Central Coast Wetlands Group regarding wetland planning efforts in the region;
- MCRMA provides input to the Monterey Bay National Marine Sanctuary (MBNMS) regarding climate change adaptation planning efforts (including the potential impacts of climate change on the Monterey Bay area coastline).

MCRMA consults with MCWRA on water supply and flood/drainage matters in all parts of Monterey County; part of the permit application goes to the MCWRA for that service. MCRMA consults with the Monterey County Environmental Health Bureau regarding water quality issues. In addition, the 2010 Monterey County General Plan is set up such that MCWRA provides advice on water supply, which the MCRMA Board has the discretion to accept or not.

In Elkhorn Slough, the Elkhorn Slough National Estuarine Research Reserve (ESNERR) staff (i.e., land managers) collaborate with RWQCB staff on data sharing, and with the Moss Landing Harbor District (a water manager) on navigation and access. ESNERR is itself a collaborative partnership between the California Department of Fish and Game and the National Oceanic and Atmospheric Administration. The Elkhorn Slough Foundation, a community non-profit, is also highly engaged in that partnership. Less frequent and less formal communication, consisting of the sharing of reports and occasional meetings, occurs between local land management staff and the MCWRA and the Pajaro Valley Water Management Agency, which oversee surface and groundwater management and groundwater management respectively in portions of the Elkhorn Slough Watershed.<sup>12</sup>

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, for example, forums related to the Salinas Reclamation Ditch, the Salinas River Lagoon, and the Salinas River Channel. These forums do not exist in any formal way, but are initiated on an as-needed basis by various agencies and organizations; and while the forums may serve an important function in relaying information and promoting communication, they do not tend to lead to interagency coordination per se. Regional planning entities such as the Association of Monterey Bay Area Governments (AMBAG) conduct workshops from time to time where interdisciplinary professionals, including land use planners and water managers, come together.

One current forum that brings together land use planners, water managers, and natural resource managers along with other stakeholders is provided by the Ford Ord Reuse Authority (FORA). FORA 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 serving facilities, and related institutional activities to replace the contribution to the local economy of the 15,000 soldiers and thousands of civilian employees when Fort Ord was active. Nearly two-thirds of the former base will be preserved and maintained as habitat for endangered species and recreational open space.<sup>13</sup> Working groups have been formed to focus on particular issues

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<sup>11</sup> Email communication with Acting Deputy Director, MCRMA, June 9, 2011 and March 12, 2012.

<sup>12</sup> Email communication with the Tidal Wetland Project Director, ESNERR, January 30, 2012.

<sup>13</sup> Source: FORA website: <http://www.fora.org/index.htm>.

related to the Base Reuse Plan, including the Habitat Conservation Plan and Coordinated Resources Management and Planning. A Water and Wastewater Oversight Committee also meets on a regular basis to implement the delivery of water and wastewater services on the former Fort Ord, and by meeting regularly it provides a forum for the discussion of water and land use jurisdiction interactions.

It is clear that while the level of coordination between land use planners and water managers varies considerably in the Greater Monterey County IRWM region from entity to entity, and from the local level to the regional level, there is much room for improvement.

## **O.2 FUTURE EFFORTS: ESTABLISHING A PROACTIVE RELATIONSHIP BETWEEN LAND USE PLANNING AND WATER MANAGEMENT**

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 input into, 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.

However, as evident in the section above, opinions vary among water managers as to how much coordination between land use planners and water managers is desirable. Most individuals interviewed for this chapter seemed to think that much more coordination is needed. Others, however, prefer to work more autonomously, without input or obligation from other agencies or organizations. The concern underlying the latter perspective is that increased communication and coordination equates with increased regulatory requirements, or increased red tape and paperwork, or simply a slower, more cumbersome decision-making process. Particularly in rural regions which are not faced with development pressures (and its impacts, including diminished water supply and potential water shortages, diminished water quality, and concern about meeting future water needs in light of increasing population), it is understandable if the need to coordinate with land use planners seems unnecessary and undesirable.

Yet as one water resource planner points out, rural regions can sometimes become “development hotspots.” She cautions that land use and water use managers need to be prepared for that eventuality. Many “smaller” (<500 units) developments produce their own water supply (via wells) rather than use a purveyor, and the cumulative effect of several of these smaller developments could have significant impacts to a watershed. Thus, coordination and planning among the responsible agencies even in these rural areas is important.

Regardless of perspective, the purpose of the Relation to Local Land Use Planning standard in the Proposition 84/1E IRWM Program Guidelines is to promote an exchange of knowledge and expertise between land use and water resource managers through the IRWM planning process. This section will focus on how to achieve that goal.

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.
- Similarly, ensuring that the water supplier and the land use decision-maker are in agreement about anticipated water use by any project prior to approval (“the optimal time to ‘get into alignment’ is during the WSA and EIR process”).

- 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 some sort of flexible—but quantifiable—manner, and thereby ensuring greater certainty in regards to future water use.

While it is not the role or the intention of the RWMG to “force” entities to communicate and coordinate better, 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:

**Monthly or Quarterly Joint Planning Meetings:** The RWMG can encourage local land use jurisdictions and local water managers to hold joint planning meetings at regular intervals to improve communication and 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. A good model is the Joint City/District meeting that is held by the MCWD Board of Directors and the Marina City Council, described above.

**Annual Water Resource Planning Forum:** One land use planner interviewed for this chapter suggested that part of the “disconnect” between land use and water resource planning entities might be that individuals in those organizations do not fully understand the mission, priorities, and issues of the other organizations and agencies.<sup>14</sup> To help resolve that problem, he suggests the RWMG could host an annual forum of land use and water resource planning agency/organization directors, where staff present their agency or organization’s mission and programmatic priorities and then heads of staff discuss, in a workshop-type forum, overlapping areas of interest, potential conflicts in priorities or objectives, and potential areas for coordination. This type of forum could potentially be conducted as a “retreat,” and led by a professional facilitator.

**Collaboration Workshop:** Similarly, a one-time collaboration session could be offered to land use planners and water managers in the region. ESNERR recently hosted a workshop entitled “How to Plan and Run a Collaborative Process,” which laid out an approach to help individuals and organizations with some overlapping interests identify those overlaps and focus in on a meaningful step they could take to move the collaborative process forward. ESNERR, a member of the RWMG, has offered to conduct a “needs assessment” for land use managers and water managers in the region, if desired, to evaluate the needs for increased collaboration. The assessment would determine whether a collaborative process is called for, what topics it would cover, and what entity would be the best host to ensure a successful process. If that assessment demonstrates a need for the collaborative process, and that ESNERR would be a good host, then ESNERR is willing to host such a process for land use managers and water managers in the region.

**“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 (“what they do”), and jurisdictions, including a map that clearly shows watersheds 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

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<sup>14</sup> Email communications with Bryan Largay, Tidal Wetland Project Director, ESNERR, January 30-31, 2012.

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 and 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 in this way.

**Addressing Policy and Regulatory Barriers to IRWM Plan Implementation:** If funding becomes available, the RWMG intends to investigate potential policy and regulatory barriers to IRWM Plan implementation. This includes any laws, regulations, or practices that may conflict with the objectives of the IRWM Plan or that may inhibit implementation of any project proposed through the IRWM Plan. The RWMG will work with local land use planners to resolve conflicts and implement changes as appropriate. Increased communication will lead to increased understanding on the part of both the land use planners and the water managers 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 Greater Monterey County 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 within all aspects of water management—connecting water supply, surface and ground water quality, floodplain issues, stormwater issues, water conservation, municipal and agricultural usage, ecological conservation, etc.—to more comprehensively coordinate all of the efforts of all the agencies and stakeholders involved.

### **O.3 CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGIES IN LOCAL PLANS**

As noted in the Relation to Local Water Planning section, local planning agencies are only in the beginning stages of adopting climate change adaptation and mitigation strategies in their local plans. Most local land use plans do not address climate change at all. Some local plans call for *plans* to address climate change. 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 only in the early stages of addressing climate change as part of the IRWM planning effort. Nonetheless, the Greater Monterey County IRWM planning effort is on the forefront of assessing vulnerabilities and potential impacts of climate change in the Monterey County region and formulating a mitigation response. Please see Section R, Climate Change, for a full discussion of current climate change efforts in the region.

Note that the Climate Change section for this IRWM Plan was developed with significant input from 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: 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 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.

## Section P: Stakeholder Involvement

The intent of the Stakeholder Involvement standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to ensure that Regional Water Management Groups (RWMGs) give the opportunity to all stakeholders to actively participate in the IRWM decision-making process on an ongoing basis. California Water Code (CWC) §10539 defines a RWMG as: “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 development and implementation of a [IRWM] Plan...” This definition recognizes the collaborative nature of IRWM planning. The IRWM planning process relies on stakeholder involvement to gather regional information and make regional decisions. This section describes the protocols used for stakeholder involvement in the Greater Monterey County IRWM region.

### P.1 STAKEHOLDER OUTREACH

#### P.1.1 Process Used to Identify Stakeholders

Outreach efforts to include stakeholders in the development of the IRWM Plan have targeted specific audiences and constituencies as well as the general public. An initial stakeholder email list, with about 175 names, was developed by the RWMG through brainstorming every known organization that might be affected by and/or interested in the IRWM Plan process. An invitation to participate in the IRWM planning process was sent to each of those stakeholders. The current list includes about 250 individuals representing over 150 agencies, organizations, and interest groups. The list includes all of those stakeholders who were initially invited (except those who specifically requested to be removed from the list), plus many others who have asked to join or who have been invited to join since.

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 water resource management authorities and stakeholders from 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 governments
- Environmental non-profit organizations
- Agricultural organizations
- Business organizations
- Disadvantaged communities
- Other community organizations
- Universities and research institutions
- 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. The list continues to expand and evolve as new stakeholders are introduced to the process. New stakeholders are introduced through sign-in sheets at public workshops, recommendations from those already involved, and targeted outreach to underrepresented groups (see process for including disadvantaged communities [DACs] below). At the end of every email communication sent to stakeholders, the IRWM Plan Coordinator provides an opportunity for stakeholders to either remove themselves from the email list or to make recommendations for additional stakeholders. Please see Appendix D for the full list of stakeholder organizations in the Greater Monterey County IRWM region (this list is occasionally updated on the IRWM website at: <http://www.greatermontereyirwmp.org/>).

### **P.1.2 Process Used to Communicate with Stakeholders**

A website has been developed to facilitate communication with stakeholders about the Greater Monterey County IRWM Plan process (see website address above). The website is a good source of information, containing documents produced during the course of Plan development, news and events (such as public workshops), maps of the region, current project lists, contact information, other resources related to IRWM planning, and a downloadable version of the IRWM Plan. The website will also contain a portal for data related to IRWM Plan projects.

Stakeholders are informed of IRWM Plan developments through website postings, email notices, and where email capability is lacking, personal communication. All email communications to stakeholders, as well as the website, include clear contact information for the IRWM Plan Coordinator (email and phone number). Stakeholders are encouraged to contact the Coordinator at any time (not just during the public comment periods) with questions or comments on the process.

Public workshops are held on occasion to encourage broad and diverse stakeholder participation in the IRWM planning process. The workshops are widely advertised through brochures, newspapers, email, website announcements, and word of mouth. Special efforts are made to ensure broad participation at the public workshops. For example, workshops are held in different locations throughout the region, at different times of day (during the workday and in the evening); workshops are held in locations that have handicap access, near public transportation; and Spanish language translation is made available at (at least) one of the locations. In the course of IRWM Plan development thus far, four public workshops have been conducted:

- *Workshop #1:* A public workshop was held in September 2009 in two different locations (Big Sur and Soledad) to introduce stakeholders to the Greater Monterey County IRWM planning process. The regional boundaries, RWMG composition, and strategy for developing the IRWM Plan were explained. A summary of regional issues and conflicts (as identified by the RWMG, with substantial input from local experts) was then presented, and small breakout sessions were held to encourage discussion. The facilitator documented the participants' comments and input regarding issues and conflicts.
- *Workshop #2:* A second public workshop was held in March 2010. The purpose of this workshop was to solicit projects for inclusion in the IRWM Plan, describe the project submission process, answer questions about the IRWM Grant Program, and explain exactly what the RWMG was looking for in a project. The workshops were held in three different locations (Big Sur, Salinas, and King City) on different days and different times of day in order to encourage participation by as many stakeholders as possible.
- *Workshop #3:* A public workshop was held in August 2011 to coincide with the second annual project solicitation. The project submission process was described and questions about both the project solicitation and the IRWM planning process were answered. The workshop was held in two different locations, King City and Salinas.



- *Workshop #4:* A public workshop was held in July 2012 to present the Draft IRWM Plan to stakeholders and to explain the process for public comment. The Draft IRWM Plan was presented in sections, the process for submitting comments was explained, and stakeholders' questions were answered by the facilitator (a RWMG member). This workshop was conducted in two different locations, Salinas and King City.

## **P.2 OUTREACH TO DISADVANTAGED COMMUNITIES**

### **P.2.1 Disadvantaged Communities in the Greater Monterey County Region**

Special effort has been made to encourage the participation of DACs in the Greater Monterey County IRWM planning process and to ensure that their water resource needs are considered and addressed. DACs are defined as communities with annual median household incomes (MHI) that are less than 80 percent of the statewide MHI (the California MHI was \$60,883 in 2010, according to the 2006-2010 American Community Survey [ACS] conducted by the US Census Bureau<sup>1</sup>).

According to US Census data, four DACs have been identified in the Greater Monterey County IRWM region: Boronda, Castroville, Chualar, and San Ardo. A tract-level search using 2006-2010 ACS data identified additional DAC areas outside of these communities. These include 20 census tract areas, primarily in or near the cities of Salinas, King City, Gonzales, and Marina, and in the McClosky Slough area north of Moss Landing. Five of those census tract areas qualify as "severely DACs," with MHIs that are less than 60 percent of the statewide MHI. It is also interesting to note that 11 of the incorporated cities and Census-designated Places (CDPs) in the region had a higher poverty percentage than the state's poverty percentage (defined as percentage of families whose income during the past 12 months was below the poverty line).

In addition to these identified DAC tracts, there may be "hidden" DACs within larger census groupings. Monterey County Health Department Environmental Division, the Central Coast Regional Water Quality Control Board (RWQCB) and a number of Community Service or Water Districts have been contacted by the RWMG for information regarding areas that might be known to experience water quality problems. Several farm worker housing developments in the Salinas Valley and residential areas near Struve Road and Hudson Landing in North Monterey County and in the community of San Lucas were noted as being of particular concern until such time as treatment systems or new water supplies are brought on-line. Smaller communities in this area may also qualify as disadvantaged and are planned to be included in outreach efforts.

Table P-1 shows the MHI (with DACs highlighted), poverty status, and Hispanic/Latino populations for communities in the Greater Monterey County IRWM region. Figure P-1 illustrates DACs within the Greater Monterey County IRWM region (including census tracts).

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<sup>1</sup> 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.

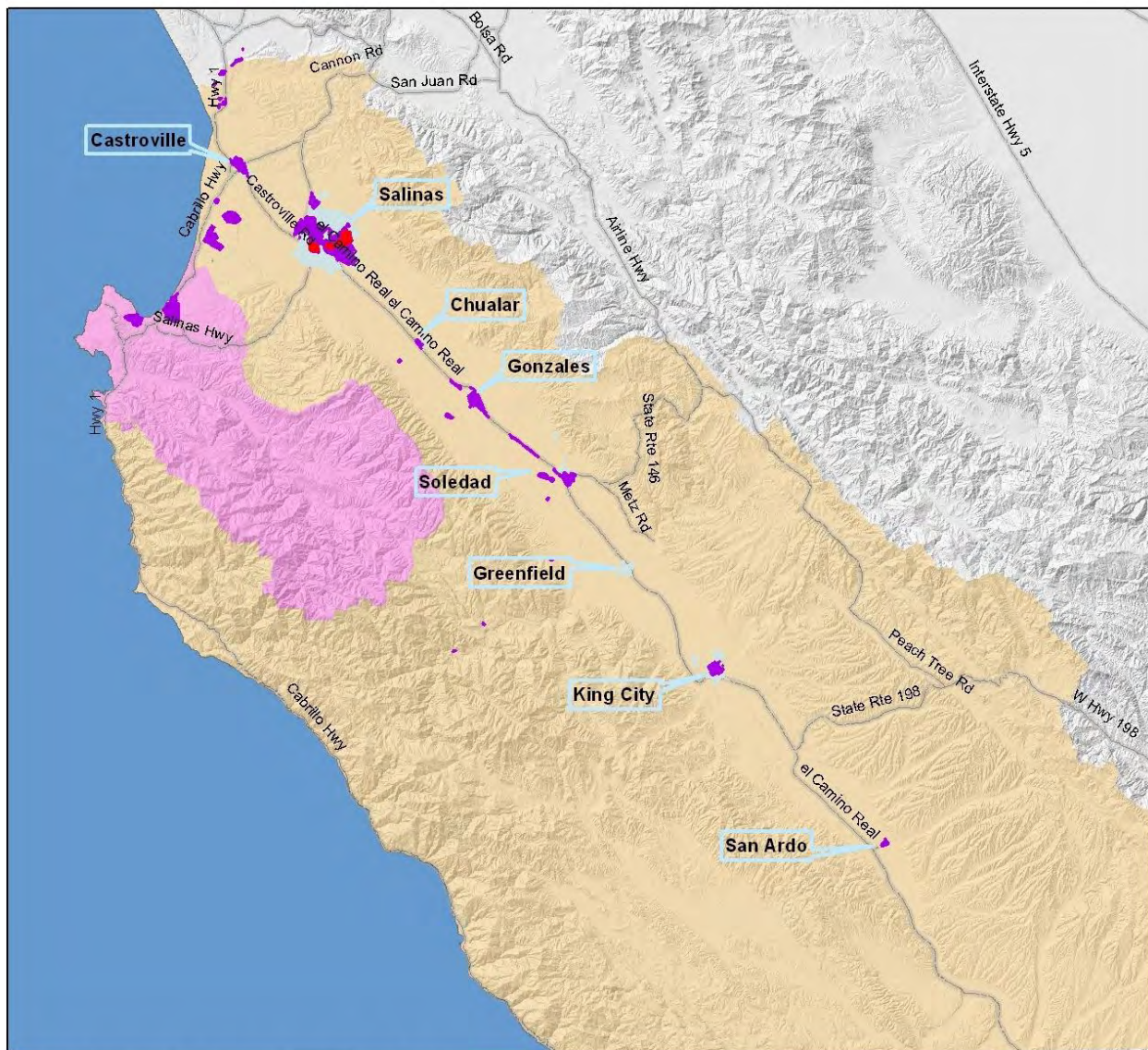
**Table P-1: Median Household Income, Poverty Status, and Hispanic/Latino Population for Communities in the Greater Monterey County IRWM Region**

<b>Community</b>	<b>Population</b>	<b>MHI (in 2010 inflation-adjusted dollars)</b>	<b>% of Families whose Income in Past 12 Months was Below Poverty Line</b>	<b>% Hispanic/Latino Population</b>
<i>California</i>		60,883	10.2	37.6
<i>Monterey County</i>	415,057	59,271	10.6	55.4
Boronda CDP	1,710	37,295	10.4	85.2
Bradley CDP	93	55,625	0	11.8
Castroville CDP	6,481	44,286	12.7	90.1
Chualar CDP	1,190	48,516	16.2	96.7
Elkhorn CDP	1,565	77,604	12.9	37.6
Gonzales city	8,187	53,463	13.2	88.9
Greenfield city	16,330	52,321	13.3	91.3
King City city	12,874	49,722	13.7	87.5
Las Lomas CDP	3,024	52,803	18.4	89.2
Lockwood CDP	379	82,917	0	26.4
Marina city	19,718	51,547	11.5	27.2
Moss Landing CDP	204	87,740	0	22.5
Pine Canyon CDP	1,822	59,715	4.3	54
Prunedale CDP	17,560	77,422	6.9	41.7
Salinas city	150,441	50,808	15.6	75
San Ardo CDP	517	48,000	9.7	70.2
San Lucas CDP	269	51,250	9.1	83.3
Soledad city	25,738	50,912	14.7	71.1
Spreckels CDP	673	69,063	0	28.7

Source: Population: 2010 US Census; MHI, Hispanic/Latino population: 2006-2010 ACS.

Green = DAC

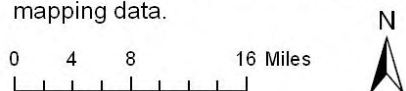
**Figure P-1: Disadvantaged Communities in the Greater Monterey County Region**



A Disadvantaged Community is defined as a community with an annual median household income (MHI) that is less than 80% of the statewide MHI—and Severely Disadvantaged Community as a community with less than 60% of the statewide MHI.

Source: Disadvantaged status based on the years 2006-2010 ACS data and 2010 US Census tabblocks. Non-populated areas eliminated based on 2010 FMMP mapping data.

- Disadvantaged Community
- Severely Disadvantaged Communities
- Greater Monterey County IRWM Region
- Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Region
- City/Town/CDP
- Major Roads



Projection: UTM Zone 10N  
Datum: NAD 1983  
May 21st, 2012

**P.2.2 Environmental Justice Communities**

In addition to ensuring that critical water needs of DACs are met through the IRWM Plan process, the RWMG remains vigilant to environmental justice concerns. Environmental justice concerns exist where water resource problems disproportionately impact communities that lack the capacity to address those problems themselves, due to financial, language, or other constraints. Environmental justice is also relevant where water resource projects meant to convey “general” public benefit do not in fact benefit poor or otherwise disadvantaged communities proportionately (e.g., conservation programs that feature rebates for high efficiency washing machines may benefit middle and upper class communities more than poorer communities, which cannot afford the initial purchase).

Environmental justice communities are often low-income or non-English-speaking communities. According to ACS 2006-2010 data the population of Monterey County is 55.4 percent Hispanic/Latino. Several communities within the Greater Monterey County IRWM region have very high Hispanic/Latino populations. Many people in these communities are first-generation and are monolingual in Spanish. Other languages may be represented within specific DAC communities as well. For example, the City of Greenfield has a large number of households from the Oaxaca region of Mexico, where the primary language is an indigenous dialect unrelated to Spanish. Table P-2 below shows the Hispanic/Latino populations for selected communities within the Greater Monterey County IRWM region, as well as the percentage of people within those communities that speak a language other than English at home.

**Table P-2: Hispanic/Latino Populations and Non-English Language Spoken at Home**

Community	% Hispanic/Latino Population	% of Population that Speaks Language Other than English at Home
Boronda CDP	85.2	76.2
Castroville CDP	90.1	81.9
Chualar CDP	96.7	90.7
Gonzales city	88.9	77.9
Greenfield city	91.3	85.3
King City city	87.5	84.5
Las Lomas CDP	89.2	79.3
Salinas city	75	67.6
San Ardo CDP	70.2	71.4
San Lucas CDP	83.3	93.4
Soledad city	71.1	64.2

Source: 2006-2010 ACS data, US Census Bureau

In the Salinas Valley, many environmental justice communities are also farmworker communities. Approximately 24 percent of jobs in Monterey County are related to the agricultural industry, and agriculture-related jobs are some of the lowest paying jobs of all industry sectors in the county.

**P.2.3 Water-Related Challenges for DACs and Environmental Justice Communities**

DACs and environmental justice communities in Monterey County face a variety of water-related challenges, including water supply, wastewater treatment, and flooding problems. Many drinking water systems are experiencing rising rates of contamination. Common contaminants in Monterey County include nitrates, dissolved solids, and arsenic. A recent study completed by the University of California, Davis, “Addressing Nitrate in California’s Drinking Water,” reports that one third of wells in the northern, eastern and central areas of the Salinas Valley tested for nitrates are in excess of the State standard of 45 milligrams per liter that is considered acceptable for safe drinking water (Harter et al.

2012). One in ten public supply wells are estimated by the UC study to exceed the nitrate levels before treatment. Further, the study concluded that nitrate problems are likely to worsen for several decades.

DACs are affected disproportionately throughout Monterey County due to high treatment costs for water in relation to household income. The lowest income households may be unable to afford bottled water or filtration systems if tap water or well water is undrinkable. Affordability of water and wastewater expenses is often expressed as a maximum of 2 percent of MHI or \$81 per month. Using current MHI data, lower income households are likely to experience financial hardship even at that rate per month. An example of the “affordability” problem for DACs is what recently occurred at the San Jerardo Farm Cooperative, a low-income community in the Salinas Valley. The community members at San Jerardo had been getting sick from contaminants in their drinking water, and after several years and persistent effort, the community was successful in obtaining grant funds to install a new water filtration system. An unexpected result of the new water system, however, has been a sharp rise in cost to members—e.g., from \$25-30/month to \$100-150/month. Many members of the community are simply unable to afford these rates.

In addition to other water resource problems faced by DACs and environmental justice communities, many of these communities in Monterey County lack water-based recreational and open space opportunities. While Monterey has a wealth of beautiful coastline, many DACs and environmental justice communities are located in the Salinas Valley or North County areas, where rivers and streams have been diverted and/or covered up to accommodate agricultural and urban growth. One result is a lack of healthy, thriving watersheds in low-income areas such as Salinas and Castroville. There is a great need for watershed restoration projects in these areas.

#### **P.2.4 DAC Representatives on the RWMG**

The Greater Monterey County RWMG has made a concerted effort to ensure that the water resource management needs and interests of DACs are fully addressed in the IRWM Plan. Two organizations, the Environmental Justice Coalition for Water (EJCW) and the San Jerardo Cooperative, were asked to participate in the RWMG specifically to represent DAC interests. They were joined in this effort by the Rural Community Assistance Corporation (RCAC) in late 2011.

EJCW is a statewide coalition comprised of over 70 community-based and non-profit member organizations working on water justice issues that impact low income communities and communities of color. EJCW has identified a chronic lack of access to safe and affordable water resources as a critical disparity facing many of California’s communities, and aims to build the capacity of organizations and groups to engage in local, regional and statewide water policy and planning (see [www.ejcw.org](http://www.ejcw.org)).

The San Jerardo Cooperative is a unique rural housing complex for low-income farmworker families in rural Monterey County. The Cooperative is the first such development in California, where there are 60 units that are owned by Cooperative members as a mutual benefit organization, four rental units, a community room, child care center, and soccer fields. The Cooperative has experienced severe drinking water contamination and wastewater issues, and was recently awarded an IRWM Implementation Grant in Round 1 to install wastewater system improvements. San Jerardo has also been involved in the statewide movement for water justice.

RCAC provides training and technical assistance to rural communities in the western states and has been a partner with EJCW and the San Jerardo Cooperative in developing solutions to San Jerardo’s water quality problems. RCAC is currently in discussions with one potential DAC in the Greater Monterey County IRWM region and two in the adjacent Monterey Peninsula IRWM region to provide technical assistance on water quality issues (see [www.RCAC.org](http://www.RCAC.org)).



The RWMG is committed to achieving a fair and equitable distribution of benefits to all communities in the Greater Monterey County IRWM region. Including three organizations on the RWMG that proactively represent the interests of DACs and environmental justice communities helps ensure that the IRWM planning process remains sensitive to the unique needs of these communities.

In addition, the Castroville Community Services District (CCSD) is a member of the RWMG and represents the community of Castroville, which is a DAC in the Greater Monterey County IRWM region. The CCSD was successful in obtaining Round 1 IRWM Implementation Grant funding. The grant will replace an arsenic-contaminated water supply with a new well to serve the community.

### **P.2.5 DAC Outreach Plan**

In 2012, the RWMG received Round 1 IRWM Planning Grant funds to expand outreach to DACs and to enable other assistance to be provided to DACs in order to increase their participation in the IRWM planning effort. EJCW has been contracted through the Planning Grant to implement the DAC Outreach Plan, and will be assisted in its efforts by staff from California Rural Legal Assistance and the San Jerardo and RCAC representatives. Outreach activities will take place over a two-year period, and will begin in areas that have been previously identified as DACs in the Salinas Valley and in North Monterey County. Other areas may be added upon further analysis of the IRWM DAC map data, information made available from public agencies and organizations for smaller areas, and published studies such as the UC Davis nitrate assessment report.

There is also a need to investigate potential DAC issues in areas that are undergoing a severe water shortage and in areas with high levels of arsenic or other contaminants. EJCW has already made contact with several stakeholders in these areas and will continue outreach to communities in the region. A special effort will be made to mobilize communities in the Salinas Valley to participate strategically in RWMG meetings. EJCW will advocate for the development of water projects that can be included in the IRWM Plan, particularly water and wastewater projects, but also including other projects based on identified needs of DACs.

Strong partnerships with local agencies and non-profit organizations are critically important to a successful outreach strategy targeting DACs. These institutions have knowledge of communities, have existing relationships with the communities that can be leveraged and built upon, and may already be aware of key issues and concerns within the communities. Some may be familiar with the IRWM Plan but others may not. Recognizing the importance of strong local partnerships, the outreach work will include a significant focus on identifying and developing relationships with key local agencies, non-profit organizations, and other community institutions that have existing relationships with DACs. EJCW will coordinate with identified local agencies and organizations in advance of outreach to DACs to gain awareness and sensitivity to community-specific issues.

Throughout the conversations with these local partners, particular focus will be placed on gathering insights and ideas regarding the best way to reach their constituents, identifying communities where needs are greatest, determining where opportunities for collaboration may exist, and exploring suggestions of potential DAC projects where prior projects failed. These discussions will also help EJCW gather information about the languages that are spoken and read in the DACs. EJCW will also seek to identify existing efforts or plans to address water quality, water supply, affordability and/or open space issues in the targeted DACs and facilitate introductions to the proponents of those efforts.

While people who live and work in DACs will be invited to participate in ongoing IRWM meetings and workshops, interaction with DACs is expected to mainly take place within the targeted communities or in

centralized locations nearby. As described above, outreach in the communities will build off of existing relationships that partner organizations have in communities and will attempt to, where possible, be incorporated into ongoing forums for information exchange. This could include, for example, conducting presentations where adults are already coming together to receive services, take classes, or learn about other issues impacting their communities. Language appropriate educational materials will be developed in advance of an outreach program for the targeted DAC and written records of meetings and other communications will be maintained for public access.

In addition, EJCW will advise and provide support to DACs in project planning and application strategies and possible collaborative partnerships that would enhance the project's successful through the process. Capacity building support and advocacy will be offered where communities are engaged and committed to take an active role in developing projects through the IRWM process to address critical water needs. Technical support will be provided to develop projects that will address critical water needs, with the support of Round 1 IRWM Planning Grant funds.

A collaborative, comprehensive approach to community outreach, resulting in full participation of DAC communities in evaluating their water problems and how they can be addressed, has the best potential for successful outcomes leading to improvements in water supply and affordability over time.

### **P.3 OUTREACH TO NATIVE AMERICAN TRIBES**

Archeological evidence indicates that humans have been occupying coastal California for at least 10,000 years. When the first Spanish settlers arrived in the early 1600s, the Monterey area was inhabited by American Indians of the Ohlone (formerly Costanoan), Esselen, and Salinan groups. According to the 2010 US Census, Monterey County had a Native American population of 5,396 persons or 1.3 percent of the County population.

While there are no dedicated tribal lands within the Greater Monterey County region, there are a number of historic, cultural, and Native American sacred sites throughout the region that are of great importance to the descendants of these tribes. The RWMG has consulted with the California Native American Heritage Commission and is working to include representatives of the Ohlone/Costanoan, Esselen, and Salinan Nation tribe in the project review process to ensure that projects implemented as part of the IRWM Plan do not impact Native American archeological or cultural resources. The RWMG will continue to encourage the participation of Native Americans in the IRWM planning process.

### **P.4 STAKEHOLDER PARTICIPATION**

Participation in the IRWM planning process is entirely voluntary. Access to IRWM Plan participation and involvement is never based on an individual's or group's ability to contribute financially to IRWM Plan development or to the planning process.

Stakeholders can participate directly in the IRWM planning process through attendance at regularly scheduled RWMG meetings, which are open to the public and announced on the website. At RWMG meetings, stakeholders are welcome to voice their opinions and participate in the discussions along with RWMG members, though stakeholders are unable to vote. The meeting minutes from all RWMG meetings are posted on the website within a week following the RWMG meeting.

In addition, stakeholders can participate in the Greater Monterey County IRWM decision-making process by attending public workshops as described above, and by providing input through written comments both generally and during specific public comment periods. Minimum 30-day public comment periods are held for every IRWM Plan "milestone," including: goals and objectives; project ranking system; ranked



project lists; and the Draft IRWM Plan. Stakeholders are occasionally asked directly to assist the RWMG in its decision-making process; for example, regional “experts” were asked to provide input during information gathering for “issues and conflicts,” and several non-RWMG water resource managers and other experts were asked to help review project proposals during the first (2010) project solicitation.

## Section Q: Coordination

The intent of the Coordination standard in the Proposition 84/1E Integrated Regional Water Management (IRWM) Program Guidelines is to ensure that Regional Water Management Groups (RWMGs):

- Coordinate their activities with local agencies and stakeholders to avoid conflict within the region and to best utilize resources;
- Are aware of adjacent planning efforts and are coordinating with adjacent RWMGs; and
- Are aware of state, federal, and local agency resources and roles in the implementation of their plans and projects.

This section describes how the IRWM planning effort in the Greater Monterey County IRWM region addresses this Coordination standard.

### Q.1 COORDINATION OF ACTIVITIES WITHIN THE IRWM REGION

The coordination of IRWM-related activities and efforts between the RWMG and project proponents and stakeholders in the Greater Monterey County IRWM planning region occurs in several ways. The Greater Monterey County IRWM website (<http://www.greatermontereyirwmp.org/>) is the “go to” place for project proponents and stakeholders to learn about the IRWM planning effort, read the latest news, review projects that are included in the IRWM Plan, and find resources about related efforts in the region, including other Central Coast area IRWM Plans. 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).

Secondly, the RWMG has been working with the Central Coast Resource Conservation Districts (RCDs) to develop and utilize a new database as a way to track water resource projects within the Greater Monterey County region. The Conservation Action Tracker database, described in the Plan Performance and Monitoring Section of this IRWM Plan, is 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 collective impacts and effectiveness. The Conservation Action Tracker is being implemented by the Central Coast RCDs and project partners of the Greater Monterey County IRWM Plan.

Finally, a type of “project coordination” occurs during each new IRWM Plan project solicitation. The Project Review Committee reviews each and every project (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, and to create projects with multiple benefits. For future IRWM Plan project solicitations, the RWMG is considering the idea of hosting informal “mixers” for project proponents and other stakeholders where they can discuss current projects and brainstorm new project ideas. The concept behind the mixers is to bring individuals together in a casual setting that is conducive to “mingling” and an easy exchange of ideas. The intent is to increase integration of projects and to enhance opportunities for coordination of activities, collaboration, and partnerships throughout the region.

## Q.2 COORDINATION WITH NEIGHBORING IRWM REGIONS

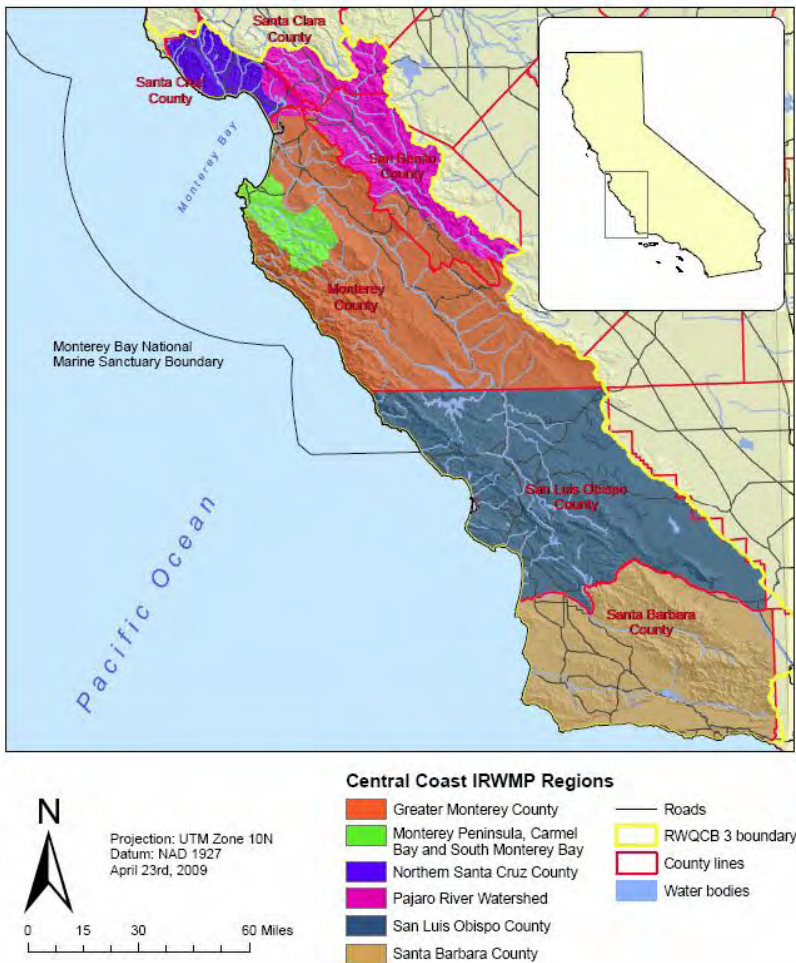
### Q.2.1 IRWM Regions on the Central Coast

Six IRWM Plans have been developed in the Central Coast IRWM Funding Area:

- Northern Santa Cruz County IRWM Plan
- Pajaro River Watershed IRWM Plan
- Greater Monterey County IRWM Plan
- Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Plan
- San Luis Obispo County IRWM Plan
- Santa Barbara Countywide IRWM Plan

Each of the six Central Coast IRWM regions was determined and deemed appropriate for IRWM planning based on various factors—including watersheds, groundwater basins, jurisdictional boundaries, existing partnerships, historical planning efforts, and other factors—that made each regional alignment the most logical for IRWM planning and coordination. These regional boundaries were developed in consultation with the water resource agencies and organizations in each of the six counties to coordinate and avoid conflicts between the IRWM regions. Figure Q-1 below illustrates the boundaries of the Greater Monterey County IRWM region in relation to the other Central Coast IRWM regions.

**Figure Q-1: Greater Monterey County IRWM Region in Context with Other Central Coast IRWM Regions**



## **Q.2.2 Why There are Three Separate IRWM Plans in Monterey County**

The Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region (or “Monterey Peninsula” IRWM region) and a portion of the Pajaro River Watershed IRWM region both lie within Monterey County, as does the Greater Monterey County IRWM region. This section explains why there are three separate IRWM Plans within Monterey County.

When contemplating the formation of a new IRWM region that would address coverage voids in the Salinas River watershed and the Big Sur coastal watersheds (resulting in the expansion of the former Salinas Valley IRWM region into the current Greater Monterey County IRWM region), the Planning Committee considered several potential boundary alignments. These included potential re-alignments of existing IRWM regions, such as incorporating the Big Sur coastal watersheds into the Monterey Peninsula IRWM region, or creating one large IRWM region to cover all of Monterey County. However, those alignments did not make sense given the distinct characteristics and unique circumstances of each of the existing IRWM regions, as explained below.

The regional boundaries that define the three current IRWM Plans within Monterey County—i.e., Greater Monterey County, Pajaro River Watershed, and Monterey Peninsula IRWM Plans—reflect the way in which water resource issues are managed locally and regionally. In Monterey County, this structure is institutionalized through the charters of three water management districts as well as through several subsequent MOUs between those agencies. As the first of those agencies created in the Water Code, the Monterey County Water Resources Agency (MCWRA, known originally as the Monterey County Flood Control and Water Conservation District) was organized with broad, countywide water resources planning and management authorities. Subsequently, through creation of the Monterey Peninsula Water Management District (MPWMD) and the Pajaro Valley Water Management Agency (PVWMA), as well as through follow-on MOUs, most water resources planning and management authorities except flood protection were allocated from MCWRA to those agencies within their jurisdictional areas. The three IRWM Plans developed within Monterey County reflect both the jurisdictional boundaries and the cooperative relationships of these three water management agencies.

These regional alignments not only recognize the historical management of water resources in the area but recognize the unique issues and conflicts that distinguish these three IRWM regions. The Pajaro River Watershed IRWM Plan is a collaborative effort by the PVWMA, San Benito County Water District, and Santa Clara Valley Water District. The IRWM planning area encompasses the boundaries of the Pajaro River watershed, which is approximately 1,300 square miles and includes portions of Santa Cruz, Santa Clara, San Benito, and Monterey Counties. The Pajaro River Watershed IRWM Plan partners are all entitled to Central Valley Project (CVP) deliveries and share an interest in improving the system reliability, efficiencies, and operational flexibility of the San Felipe Division of the CVP. The Greater Monterey County and Monterey Peninsula IRWM regions do not receive CVP water and instead depend entirely on local groundwater and surface water sources for their water supply. In addition, flooding is a major source of conflict within the Pajaro River watershed; cooperative efforts to manage flooding have led to the formation of the Pajaro River Flood Prevention Authority, a joint powers authority with representatives from all four counties (the MCWRA is a participating member). These factors distinguish the Pajaro River watershed from the Greater Monterey County and Monterey Peninsula IRWM regions and justify them being separate and distinct IRWM regions.

Development of the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Plan has been led by the MPWMD, the Big Sur Land Trust, City of Monterey, the MCWRA, and the Monterey Regional Water Pollution Control Agency (MRWPCA); the Marina Coast Water District has recently joined this RWMG. The Monterey Peninsula IRWM region boundary is based on groundwater basins within the MPWMD boundary (specifically, the Carmel Valley aquifer and the Seaside Groundwater Basin) and

surface watersheds flowing into or through the MPWMD boundaries, including all of the Carmel River and San Jose Creek watersheds. The planning region is approximately 347 square miles and consists of coastal watershed areas in Carmel Bay and south Monterey Bay between (and including) Pt. Lobos in the south and Sand City in the north—a 38-mile stretch of the Pacific coast.

As noted above, the Monterey Peninsula IRWM region is dependent on local rainfall and runoff for its potable water supply, with no connections to water sources outside of the region. Nearly all of the region's water supply comes from the Carmel River, the Carmel Valley aquifer, and from the coastal subareas of the Seaside Groundwater Basin. This common reliance on a shared water supply distinguishes the Monterey Peninsula IRWM region from the larger Monterey County region, which depends primarily on Salinas Valley groundwater (and secondarily on surface water in the Big Sur region) for its water supply sources. In addition, freshwater from the Seaside and Carmel River basins is integrally linked through infrastructure and is used to supply the Monterey Peninsula cities, whereas no similar infrastructure exists between the Seaside and Salinas basins; water exportation from the Salinas Basin is distinctly prohibited by Monterey County ordinance, and no water from the Seaside Basin is exported to the Salinas Basin. For these reasons, the Monterey Peninsula IRWM region is considered a discrete sub-region within Monterey County and has been determined to be an appropriate geographical region for integrated planning, separate from the Greater Monterey County and Pajaro River Watershed IRWM regions.

### **Q.2.3 How the Greater Monterey County Region Coordinates with Adjacent Regions**

The Greater Monterey County IRWM region shares borders with three other IRWM planning regions: the Pajaro River Watershed region to the north, the Monterey Peninsula region, and the San Luis Obispo County region to the south. The boundary divisions are as follows:

- *Border with Pajaro River Watershed IRWM region:* The boundary division between the two regions is marked by the Pajaro River watershed line in Monterey County. The Greater Monterey County region does not include any portion of the Pajaro River watershed, but does overlie a small portion of the Pajaro Valley Groundwater Basin.
- *Border with Monterey Peninsula IRWM region:* The Greater Monterey County region surrounds the Monterey Peninsula IRWM region on all sides, except where the Monterey Peninsula region meets the coast. In relation to the Monterey Peninsula region, the Greater Monterey County region runs north from the MPWMD boundary and includes the City of Marina; runs north of the Seaside Groundwater Basin, and includes the areas outside of the Carmel River watershed boundary; runs south from the MPWMD boundary just south of Pt. Lobos; and runs south from the southernmost limit of the San Jose Creek and Carmel River watersheds to the San Luis Obispo County line. The Greater Monterey County IRWM region does not include any portion of the Carmel River or San Jose Creek watersheds.
- *Border with San Luis Obispo County IRWM region:* The boundary division between the Greater Monterey County and the San Luis Obispo County IRWM regions is demarcated by the Monterey/San Luis Obispo county line.

Collaborative efforts have been undertaken to ensure that projects for each of the regions are well understood and coordinated where overlapping interests may exist now and in the future. This section describes how the Greater Monterey County RWMG coordinates IRWM planning efforts with each of these adjacent regions.

#### ***Shared Border with San Luis Obispo County IRWM Region***

The region for the San Luis Obispo County IRWM Plan is defined as the County of San Luis Obispo. While the Greater Monterey County and San Luis Obispo County IRWM regions do not overlap, there

are overlapping interests. The Salinas River watershed spans both counties, as do the Nacimiento River and the San Antonio River sub-watersheds. The *San Antonio and Nacimiento Rivers Watershed Management Plan* (October 2008) covers both IRWM regions, and therefore both regions have a shared interest in carrying out the recommended actions of that plan.

Also, while the Nacimiento Reservoir is located within San Luis Obispo County, it is owned and operated by the MCWRA (a RWMG member for the Greater Monterey County region). The MCWRA and the San Luis Obispo County Flood Control and Water Conservation District (District) have coordinated efforts for implementation of both the Nacimiento Water Project and the Salinas Valley Water Project, both of which utilize water from the Nacimiento Reservoir. The Nacimiento Water Project includes the construction of a pipeline and appurtenant facilities from the existing Nacimiento Reservoir south to the communities of Paso Robles, Templeton, Atascadero, and San Luis Obispo to convey the District's existing water entitlement from the reservoir to areas of use.

Because of this shared use of resources of the Nacimiento Reservoir and the fact that the Salinas River watershed spans both counties, the MCWRA and the District discussed the possibility of shared regional planning. The decision was made, however, to contain the respective IRWM planning regions to within each county. This regional alignment made sense given that the Salinas River watershed is divided near the county boundary into major groundwater basins (the Salinas Valley and the Paso Robles basins), and that the county boundary has historically differentiated management responsibilities for land, watershed, and infrastructure within the two counties. The RWMG for the Greater Monterey County IRWM Plan will continue to coordinate with the San Luis Obispo County RWMG on watershed management and water supply issues, and will continue to discuss joint regional planning efforts for the future. Some potential interregional projects between the two regions include:

- *Invasive Aquatic Species Control and Monitoring:* Monterey and San Luis Obispo counties have worked closely over the past several years to monitor for invasive mussels. The goal is to create a sustainable program to inspect all vessels launching at reservoirs in the region to prevent quagga/zebra mussels from becoming established in these critical water supplies. This project is included in the Greater Monterey County IRWM Plan.
- *Interlake Tunnel between Lake Nacimiento and Lake San Antonio:* Lake Nacimiento and Lake San Antonio are manmade reservoirs within the Salinas River Basin. Lake Nacimiento is located in northern San Luis Obispo County and Lake San Antonio is located in Monterey County, but as noted above, both reservoirs are owned and operated by the MCWRA. The watershed feeding Lake Nacimiento is more responsive to rain events, with nearly three times more inflow than Lake San Antonio. At times water releases are made from Lake Nacimiento during the winter months because the lake is at capacity while Lake San Antonio has excess storage available. A project has been proposed to provide a pathway between the lakes in order to redirect water and use it to fill the excess capacity typically available in Lake San Antonio. This would provide additional water storage as well as increased recreational opportunities. This project is included in the Greater Monterey County IRWM Plan.
- *South-Central California Coast Steelhead:* Several small coastal streams in San Luis Obispo County share the same steelhead Distinct Population Segment (DPS) as the Greater Monterey County IRWM region. Issues in the area south of the Carmel River watershed extending across the county line would be better addressed by having the two IRWM regions working closely together.
- *Paso Robles Groundwater Basin:* More than 33 percent of the Paso Robles Groundwater Basin lies within Monterey County, with the remaining portion located within San Luis Obispo County. The MCWRA participates on the Paso Robles Groundwater Management Plan Steering Committee. There are numerous issues that face and will face the Paso Robles Groundwater

Basin, including increasing agricultural demands, water quality issues, water supply issues (overdrafted basin), and urbanization pressure. The committee is currently discussing possible options for the basin. Opportunities to share experiences, resources, and strategies would provide a win-win situation for both regions.

### ***Shared Border with Pajaro River Watershed IRWM Region***

As noted above, the Pajaro River Watershed IRWM Plan is a collaborative effort by the PVWMA, San Benito County Water District, and Santa Clara Valley Water District. The water resource issues that exist in the Pajaro River Watershed region are quite distinct to that region, including flooding within the Pajaro River watershed. However, there are certain issues that are common to both regions and that would be suitable for potential interregional projects or programs. These include:

- ***Agricultural Water Quality:*** Agriculture is the predominant land use in both IRWM regions, and consequently agricultural water quality is a major concern on both sides of the border. The Central Coast Regional Water Quality Control Board renewed the Agricultural Order (No. R3-2012-0011, Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands) in March 2012. The Order requires compliance with water quality standards, and requires those who are subject to the Order to address impacts to water quality by evaluating the effectiveness of management practices (e.g., waste discharge treatment and control measures), and taking action to improve management practices to reduce discharges. The RWMGs for both the Greater Monterey County and the Pajaro River Watershed IRWM regions can coordinate on projects and programs to help growers comply with the Agricultural Order and to help ensure consistent implementation of the Order.
- ***Co-Management of Food Safety and Water Quality:*** With Monterey County's \$4 billion agricultural industry, this is an issue of critical importance for both IRWM regions. The fresh produce of Monterey County is among the healthiest food in the world. Rare outbreaks of illness have been linked to the contamination of leafy greens by pathogens where wildlife was the likely vector. In response, many large buyers have adopted stringent standards for the management of the fields where they source their produce. Some interpretations of these standards conflict with agricultural management practices developed for water quality protection and erosion control, which often include the retention of surface runoff or establishment of non-crop vegetation on field edges (such as filter strips or buffers). Growers report that they are increasingly caught in an untenable position, forced to choose between meeting mandates to improve water quality, or meeting food safety guidelines and contractual requirements. For example, 32 percent of leafy greens growers who responded to a local survey reported removing non-crop vegetation in response to pressure from buyers or auditors (RCD 2007).

Addressing these conflicts is critical to the success and advancement of both regions' IRWM Plans. Many growers and regional experts believe that "co-management" for food safety and environmental protection represents the optimal path forward. Co-management is defined as an approach to minimize microbiological hazards associated with food production while simultaneously conserving soil, water, air, wildlife, and other natural resources. The Greater Monterey County and Pajaro River Watershed RWMGs are considering possible opportunities to coordinate on projects and programs to help resolve barriers that food safety concerns present to implementing water quality, ecological restoration, and flood management projects in both regions' IRWM Plans.

### ***Shared Border with Monterey Peninsula IRWM Region***

The primary area where water resource management is shared between the Greater Monterey County and the Monterey Peninsula 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. The former Fort Ord area is almost equally divided geographically between the Greater Monterey County and Monterey Peninsula IRWM regions. The Ord Community is under the jurisdiction of several agencies. Water supply is managed by both the MCWRA and the MPWMD, is extracted from both the Seaside Groundwater Basin and the Salinas Valley Groundwater Basin, and is delivered by the Marina Coast Water District (MCWD), California American Water Company, and several dozen other water distribution systems.

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. Of particular note is a major water supply and recycled water distribution project that has been proposed for funding under the IRWM Grant Program, with potential long-term benefits for 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 the need for over 25,000 acre-feet/year (AFY) in new water supplies for northern Monterey County (RMC 2010). A portfolio of possible water supply projects, called the Monterey Regional Water Supply Program, has been formulated as part of a regional collaborative process to address pending regional water supply shortages and to develop a regionally supported solution.

The Regional Water Supply Program—with projects spanning the Greater Monterey County and Monterey Peninsula IRWM regions—would link water supplies in the Salinas Valley with supplies to the Monterey Peninsula. The program would be implemented in phases and includes two projects that impact both the Greater Monterey County and the Monterey Peninsula IRWM regions: a proposed regional desalination project for the Monterey Bay area, and a project called the “Regional Urban Water Augmentation Project” (RUWAP). These projects are described more fully in the Region Description section of this IRWM Plan (in sub-section B.5.5.a, Locally Proposed Solutions to Local Water Supply Issues).

Funds were requested in September 2010 through the Round 1 Planning Grant program, collaboratively from the Greater Monterey County IRWM region and the Monterey Peninsula IRWM region, 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 such as those proposed in the Regional Water Supply Program. The requested funds were granted and awarded to the Monterey Peninsula RWMG, which is now responsible for conducting the task and producing a section that will be incorporated into both regions’ IRWM Plans (the section will appear as a subsection of this Coordination chapter when completed). The section will describe existing and anticipated water supply needs and the various jurisdictions in this boundary region.

It is important to note that 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 National Pollutant Discharge Elimination System (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 planned, however, existing funds do not appear sufficient to implement any project that might come out of this study. The Greater Monterey County RWMG will continue to coordinate with the Monterey Peninsula RWMG on common issues such as this.

#### **Q.2.4 Participation of Greater Monterey County RWMG Members in Other IRWM Efforts**

Four members of the Greater Monterey County RWMG—the Big Sur Land Trust, MCWRA, the MRWPCA, and the MCWD—are also participating members of the RWMG for the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region. The involvement of these entities in both IRWM Plan efforts makes sense since both IRWM regions fall squarely within the jurisdictional boundaries and/or geographic areas of interest of all four entities, and projects included in both plans concern all of these organizations. Note, however, that the MPWMD is the lead agency in the Monterey Peninsula IRWM Plan effort, and as such the Big Sur Land Trust, MCWRA, MRWPCA, and the MCWD have played supporting roles in that planning effort. Since there is no one lead agency for the Greater Monterey County IRWM Plan effort, all members of the RWMG are expected to play a “leading” role.

#### **Q.2.5 Coordination between the Six Central Coast IRWM Regions**

The Central Coast IRWM Funding Area is diverse, with geographically distinct regions. Some of the established 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 (see Appendix E, Statement of Principles).

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 2008a). 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 CVP, 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 land use in all of the six Central Coast IRWM regions. Water quality issues are similar across all of the regions, though to varying degrees. The most significant and serious water quality problems tend to be seawater intrusion, nitrates, sediment, nutrients, pesticides, and other contaminants (with the exception of the Monterey Peninsula region, which seems to experience fewer water quality problems than the other regions).

Not surprisingly, all six IRWM planning regions have quite similar goals and objectives in terms of water supply, water quality, flood management, and environmental protection and enhancement, with minor differences reflecting regional needs and priorities. All regions aim to improve water supply reliability and protect against drought; 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. Regarding environmental protection, 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 that exist between regions reflect region-specific needs and issues. At the risk of being simplistic: 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 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 Q-1 below provides a summary of shared interests that exist 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.

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

Objective	Key Issues	Strategies	Potential Project Examples
<b>Water Quality</b>	<b>Agriculture Water Quality:</b> High concentrations of nutrients, pesticides and sediment are known pollutants in certain watersheds with agricultural development.	<ul style="list-style-type: none"> <li>• Nutrient management</li> <li>• Irrigation management</li> <li>• Education</li> <li>• Integrated pest mgmt</li> <li>• Food safety efforts</li> </ul>	<ul style="list-style-type: none"> <li>• Permit Coordination</li> <li>• Watershed Working Groups</li> <li>• Ranchette Series Model</li> <li>• Expand Regional Mobile Lab</li> </ul>
	<b>Urban Water Quality:</b> High concentrations of nutrients, indicator bacteria and metals are known pollutants in watersheds with urban development.	<ul style="list-style-type: none"> <li>• Reduce runoff</li> <li>• Education</li> <li>• Integrated pest mgmt</li> <li>• Best management practices</li> </ul>	<ul style="list-style-type: none"> <li>• Permit Coordination</li> <li>• Low Impact Development (LID)</li> <li>• First Flush monitoring</li> <li>• Green Business Program</li> </ul>
	<b>Special Protected Areas:</b> All planning regions along the coast have areas either designated as Marine Protected Areas, Critical Coastal Areas or Areas of Special Biological Significance.	<ul style="list-style-type: none"> <li>• Education</li> <li>• Watershed assessments</li> <li>• Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Coast and Oceans Regional Round Table</li> <li>• California Coastal Commission (CCC) Critical Coastal Areas Program</li> <li>• Historical Ecology</li> </ul>
	<b>Sediment and Erosion:</b> Erosion from roads, agriculture and unstable stream banks carry pollutants and are detrimental to aquatic habitat and organisms.	<ul style="list-style-type: none"> <li>• Irrigation management</li> <li>• Stream bank stabilization</li> <li>• Redesign of rural roads</li> <li>• Education</li> </ul>	<ul style="list-style-type: none"> <li>• RCD Rural Roads program</li> <li>• Roads Maintenance Guide</li> <li>• Implementation of Stormwater Management Plans (SWMPs)</li> </ul>
	<b>Data Coordination and Management:</b> A coordinated effort of data synthesis, assessment, management and accessibility is important to determine effectiveness of efforts.	<ul style="list-style-type: none"> <li>• Make data comparable, accessible, and useful</li> <li>• Develop consistent evaluation tools</li> </ul>	<ul style="list-style-type: none"> <li>• Synthesis, Analysis and Management (SAM) Program</li> <li>• Upload of data to the Surface Water Ambient Monitoring Program (SWAMP)</li> <li>• Regional Web</li> </ul>

			Information Station • Central Coast Wetland Group
<b>Water Quality/ Water Supply</b>	<b>Groundwater Management:</b> 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 • RWQCB LID Strategy
<b>Water Supply</b>	<b>Water Availability:</b> 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 mgmt to restore naturally functioning systems • Seaside Aquifer Storage and Recovery (ASR)
<b>Ecosystem Protection</b>	<b>Fisheries Enhancement:</b> Many Central Coast streams provide habitat for federally threatened or endangered species such as coho, steelhead, and the red-legged frog.	• Promote, improve or re-establish habitat	• Removing fish passage barriers • Watershed assessments • Habitat restoration
<b>Flood Management</b>	<b>Flood Management:</b> 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

An additional issue—and an increasingly urgent 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.

**Q.3 COORDINATION WITH AGENCIES**

The Greater Monterey County RWMG is composed of a diverse mix of agencies, organizations, nonprofit organizations, educational institutions, and interest groups, including several government agencies and

districts. The participation of these agencies and local districts on the RWMG 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 either the planning or the implementation stage of the IRWM Plan. Greater Monterey County RWMG agency/district members include:

- **Federal Agencies:**  
Elkhorn Slough National Estuarine Research Reserve  
Monterey Bay National Marine Sanctuary
- **Local/Regional Government and Districts:**  
Castroville Community Services District  
City of Salinas  
City of Soledad  
Marina Coast Water District  
Monterey County Agricultural Commissioner's Office  
Monterey County Water Resources Agency  
Monterey Regional Water Pollution Control Agency  
Resource Conservation District of Monterey County

Additionally, the Greater Monterey County RWMG has entered into 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.

### **Q.3.1 Coordination with Federal Agencies**

#### **National Oceanographic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS)**

The RWMG communicates with NMFS primarily in an advisory capacity. NMFS is also involved in IRWM Plan project implementation through permitting requirements. The MCWRA is currently working with NMFS to implement its project, "Salinas River Fisheries Enhancement Project," and has worked closely with NMFS in the past on issues associated with the Salinas Valley Water Project (SVWP), including evaluation of impacts and appropriate mitigations for endangered species that may be impacted by the SVWP.

#### **NOAA Monterey Bay National Marine Sanctuary (MBNMS)**

The MBNMS is an active participating member of the RWMG as well as a project proponent for several implementation projects in the IRWM Plan (including "Watershed Approach to Water Quality Solutions," which is currently being implemented through Round 1 IRWM Implementation Grant funds). 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 Greater Monterey County IRWM region to assist with water quality information and monitoring and to promote implementation of the MBNMS's Action Plans.

#### **US Army Corps of Engineers (COE)**

The COE is involved in the IRWM planning process primarily in its capacity as a permitting agency. A 404 Permit from the COE, 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 (USDA) Natural Resources Conservation Service (NRCS)**

The RWMG coordinates with the NRCS primarily through the implementation of agricultural water

quality and water conservation projects through the IRWM Plan. For example, the RCD of Monterey County will be collaborating with the NRCS on its project, “Monterey County Farm Water Quality 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 (USFWS)**

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. For example, the USFWS will be providing technical program guidance, site assessment, and property owner assistance to the RCD of Monterey County on its project, “Livestock and Land,” and will be partnering with the RCD with a stockpond-improvement grant to meet shared program goals.

#### **US Environmental Protection Agency (US EPA)**

MCWRA received grant funding from the US 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 Greater Monterey County IRWM region. The US EPA is signatory to the MBNMS Water Quality Protection Program Memorandum of Agreement (MOA).

#### **US Forest Service**

Wildfire management is an issue of critical importance to water and natural resource managers in the Greater Monterey County IRWM region, particularly given the region’s dependence on surface water and reservoir storage, the predominance of high quality ecological habitats in the region, and the prediction of increased fires as a result of climate change. The Greater Monterey County 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.

### **Q.3.2 Coordination with State Agencies**

#### **California Coastal Commission**

The California Coastal Commission is an active participant in the Greater Monterey County IRWM planning process, regularly attending and participating in the monthly RWMG meetings and providing “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. Several projects in the IRWM Plan are located within the coastal zone. For example, the Central Coast Wetlands Group’s “Coastal Wetland Erosion Control and Dune Restoration” implements parts of the Moro Cojo Slough Wetland Management Plan, which is part of the Local Coastal Plan for Monterey County.

#### **California Department of Fish and Game (CDFG)**

The CDFG has been involved in the IRWM planning process in an advisory capacity, as well as on an individual project basis through the California Environmental Quality Act (CEQA) permitting. For example, MCWRA has worked closely with the CDFG on issues associated with the SVWP, including coordination for a Stream Alteration Agreement and issues associated with endangered species that may be impacted by the SVWP.

### **California Department of Transportation (Caltrans)**

Caltrans is involved in the IRWM planning process mainly through project implementation. For example, the Central Coast Wetlands Group will be collaborating with Caltrans on their project, “Coastal Wetland Erosion Control and Dune Restoration,” to source sand for dune reconstruction and mulch for weed control.

### **California Department of Water Resources (DWR)**

The Greater Monterey County RWMG cooperates with DWR on all aspects of the IRWM planning process in accordance with the IRWM Program Guidelines. The Greater Monterey County’s regional representative at DWR regularly attends the monthly RWMG meetings, and is the grant manager for the Round 1 IRWM Planning Grant and Implementation Grant. The IRWM Plan Coordinator communicates with the DWR regional representative on a regular basis regarding requirements of the program. In addition, MCWRA had been in extensive contact with DWR’s Division of Safety of Dams (DSOD) regarding the evaluation of the modification to the Nacimiento Dam Spillway and the proposed changes in the operating rule curve associated with the SVWP.

### **California Natural Resources Agency**

The RWMG coordinates with the California Natural Resources Agency mainly through its involvement with the Agency’s California Adaptation Strategy process. The California Adaptation Strategy summarizes climate change impacts in California and recommends adaptation strategies. Cal-Adapt is a web-based tool developed by the California Natural Resources Agency and the California Energy Commission that enables city and county planners, government agencies, and the public to identify potential climate change risks in specific areas throughout California. In developing the Climate Change section for this IRWM Plan, the RWMG reviewed the California Adaptation Strategy and utilized Cal-Adapt extensively to determine climate change impacts in the Greater Monterey County region and to develop a preliminary adaptation strategy for the region. The RWMG will continue to stay involved in the California Natural Resources Agency’s California Adaptation Strategy process to help shape the IRWM Plan as more climate change tools and data are generated.

### **California Regional Water Quality Control Board, Region 3 (RWQCB)**

The RWMG has made a concerted effort to incorporate the RWQCB’s Water Quality Priorities (July 2011, see Appendix H) as well as other Regional Board directives and initiatives into the IRWM Plan and planning process. 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, MCWRA has worked closely with the RWQCB in development of the Nitrate Management Plan and other programs, including non-point source, TMDL, and other management programs. The City of Soledad has worked closely with the RWQCB in developing the Water Recycling/Reclamation Project.

### **California State Parks**

California State Parks serves as an advisor to the RWMG, and also coordinates with the RWMG through the FireScope Monterey planning process. The RWMG is proposing to implement two projects that will be located within the jurisdiction of California State Parks, including the Central Coast Wetlands Group’s “Coastal Wetland Erosion Control and Dune Restoration” project, and “Big Sur River Steelhead Enhancement Project” which has been proposed by State Parks. State Parks is consulted whenever projects are proposed for implementation within their jurisdiction.

### **California State Water Resources Control Board (SWRCB)**

The SWRCB serves in an advisory capacity to the RWMG, and the RWMG works to ensure that projects



included in the IRWM Plan comply with State Board regulations. MCWRA has been in extensive contact with the SWRCB Division of Water Rights regarding the status of development of a solution to the groundwater overdraft and seawater intrusion issues. In addition, the RWMG is proposing to implement several projects through the IRWM Plan that address priorities of the SWRCB programs, including for example the State's Nonpoint Source Pollution Control Program (addressed by the Central Coast Wetlands Group's "Coastal Wetland Erosion Control and Dune Restoration," "Study of Environmental Services from Nutrient Reducing BMPs" and "Water Quality Enhancement of the Tembladero Slough Phase II" projects, Ecology Action's "Monterey Bay Green Gardener Training & Certification Program," and by the Elkhorn Slough National Estuarine Research Reserve's project, "Integrated Restoration: Beneficial Reuse of Sediment to Restore Tidal Marsh and Agricultural Stormwater Treatment by a Native Grassland Buffer").

### **Q.3.3 Coordination with Local Agencies, Governments, and Districts**

#### **County of Monterey – Public Works Department, Planning Department, Redevelopment & Housing Office**

The RWMG works with various departments within the County of Monterey on projects that involve land use planning or development permits, as described further in the Relation to Land Use Planning section of this IRWM Plan. Many project proponents for implementation projects included in the IRWM Plan have coordinated with the Public Works, Planning Department, or Redevelopment Agency on site plans, permits, and other requirements and information needs for their projects. Project proponents are required to ensure that their projects are consistent with the Monterey County General Plan and with local ordinances (as applicable). For example, the MCWRA is collaborating with the Public Works Department on County Right-of-Way and soil stability for "Coastal Dedicated Monitoring Well Drilling" project in the IRWM Plan.

#### **Fort Ord Reuse Authority**

The Fort Ord Reuse Authority (FORA) is responsible for the redevelopment of the former Fort Ord military base, a 45-square mile/28,000-acre facility. Following a competitive selection process in 1997, the FORA Board approved the 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 the permitting agency for public water systems in Monterey County, the Health Department is integrally involved with water resource management decisions in the Greater Monterey County IRWM planning 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/quantity problems. For example, the County of Monterey Redevelopment & Housing Office is collaborating with the Health Department on its IRWM Plan project, "Well Replacement and Pipeline – San Lucas Water District." The Health Department has been involved in the San Lucas Water District's on-going efforts to resolve the nitrate and total dissolved solids (TDS) contamination issues in its public water supply. The Health Department will be collaborating with the Redevelopment & Housing Office in the design and review of the plans for construction of the test well and the subsequent sampling and testing program, the construction plans for the final production well and pipeline, and the final production testing of the completed well.

### **Monterey County Parks Department**

The Monterey County Parks Department is involved in the IRWM planning process primarily in regards to projects that take place on County Parks properties. For example, the MCWRA and Monterey County Parks are collaborating on an implementation project included in the IRWM Plan entitled the “Aquatic Invasive Species Inspection Project,” which will take place at Lake Nacimiento and Lake San Antonio. Lakes Nacimiento and San Antonio are owned and operated by the MCWRA; recreation on the lakes and on properties owned by the MCWRA is administered by Monterey County Parks. The MCWRA and Monterey County Parks have determined that the threat of aquatic invasive species (specifically zebra and quagga mussels) represents a serious risk to local water conveyance systems and the general welfare of the public. The purpose of the project is to provide a response to this threat by imposing an inspection process at the lakes with a program that assesses and manages the risks without shutting the waters to all recreational boating.

### **Monterey County Water Resources Agency**

The MCWRA is an active participating member of the RWMG, and a project proponent for several projects included in the IRWM Plan. The 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 “in-house expertise” for the RWMG on all matters related to water supply and flood management in the County. Note that MCWRA had authored the Salinas Valley IRWM Functionally Equivalent Plan, which this Greater Monterey County IRWM Plan is based on, and now supersedes.

### **Municipalities**

The Greater Monterey County RWMG includes representatives from two municipalities in the region—the City of Salinas and the City of Soledad. These RWMG members help provide a municipal perspective to the IRWM planning process, and generally represent the interests of other municipalities within the planning region. Project proponents with implementation projects in the IRWM Plan are required to ensure that their projects are consistent with City 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 both a participating RWMG member and a project proponent for projects included in the IRWM Plan. 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. As noted in Section Q.1 above, the RWMG is coordinating with the Central Coast RCDs to utilize the new Conservation Action Tracker database as a way to track water resource projects within the Greater Monterey County IRWM region. The Conservation Action Tracker database is a data system for tracking land-use management improvements in the Central Coast region. It will be implemented by the Central Coast RCDs and project partners of the Greater Monterey County IRWM Plan.

### **Transportation Agency for Monterey County (TAMC)**

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. For example, the Monterey County Department of Public Works will be collaborating with TAMC on their “Las Lomas Drive Storm Drain Improvements Project.”

## Section R: Climate Change

The Proposition 84/1E Integrated Regional Water Management (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. 68).

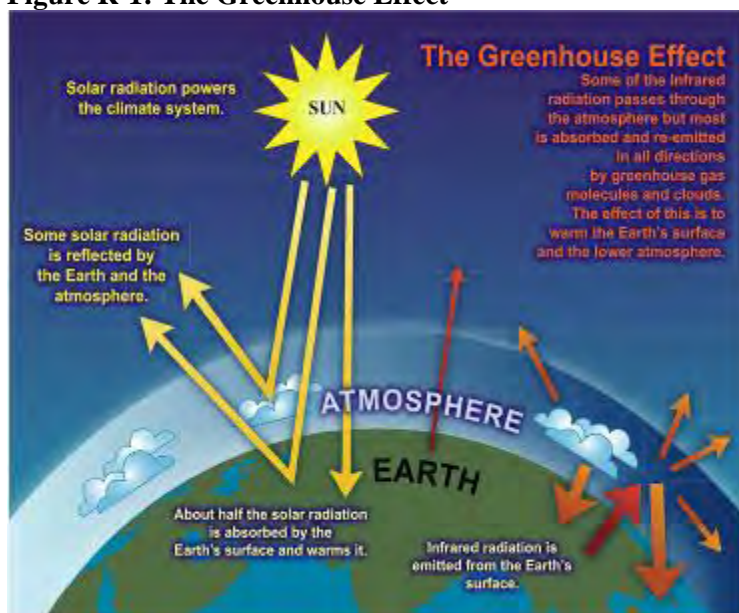
By design, IRWM planning efforts are collaborative and include many entities dealing with water management. These aspects make IRWM a good platform for addressing broad-based concerns like climate change, where multiple facets of water management are affected. The intent of the Climate Change standard in the Proposition 84/1E 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 global climate change and its anticipated impacts for the Greater Monterey County region, including an initial 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.

### R.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 2009).

**Figure R-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)*

Eleven of the twelve years between 1995-2006 were the warmest in recorded history. 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. In 2007, the IPCC stated that “observations since 1961 show that the average temperature of the global ocean has increased to depths of at least 3000 meters and that the ocean has been absorbing more than 80 percent of the heat added to the climate system” (IPCC 2007b, p. 5).

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 3 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.<sup>1</sup> Over the period from 1855 (beginning of the tide gauge record) to 2009, global sea level has risen approximately 8 inches (21 cm) (Church and White 2011). During this period the rate of sea level rise has also increased (Church and White 2006 and 2011; Bindoff et al. 2007). From 1961 to 1993 average global sea level rose at approximately 0.07 inches per year (1.9 mm/ yr) (Church and White 2011). Since 1993, sea level rise has accelerated to a rate of approximately 0.13 inches per year (3.2 cm/yr) (Church and White 2006; IPCC 2007a). The IPCC's 2007 Fourth Assessment Report (IPCC 2007b) projected sea level rise by the end of the century as a result of thermal expansion to range from 7 to 23 inches (18-59 cm). However, recent evidence suggests these values may prove to be underestimates of the potential rise in global sea level. Since the publication of the AR4 in 2007, advances in the understanding of the complexities of ice sheet dynamics have led to improved projections of sea level rise during the 21st century. These studies suggest actual sea level may rise as much as 28 to 79 inches (72-190 cm) by 2100 (Vermeer and Rahmstorf 2009; Jevrejeva et al. 2008; Grinsted et al. 2009; and Nicholls et al. 2011).

IPCC scientists predict that the serious consequences of climate change will continue to grow and expand. The rapid and unprecedented increase in surface temperature is accelerating the planet's water cycle, which will make extreme storms and droughts more frequent and severe (U.S. Global Climate Research Program 2009). These events will likely disrupt and damage food and fresh water supplies. The extreme increases in temperature to come will continue to melt portions of the Greenland ice shelf and cause the oceans to thermally expand, both of which will raise the average level of all oceans. This continuing rise in sea level will have multiple effects, including coastline destruction, the displacement of major population centers, and economic disruption.

### **R.1.2 State Response to Climate Change: Legislation and Policy**

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 2006). 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 Environmental Protection Agency 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:

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<sup>1</sup> Note: This paragraph has been almost entirely excerpted from "Preparing for the Future: Climate Change and the Monterey Bay Shoreline. Summary Report for Participants," a summary report of a December 6, 2011 workshop, prepared by Center for Ocean Solutions and the Monterey Bay National Marine Sanctuary. All of the references in this paragraph are cited in the "Preparing for the Future" report.

- 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 Assembly Bill (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 the Association of Monterey Bay Area Governments (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/>.

## **R.2 PREDICTED EFFECTS OF CLIMATE CHANGE IN CALIFORNIA**

Climate change models predict changes in temperature, precipitation patterns, water availability, and sea levels, and these altered conditions can have severe impacts on natural and human systems in California (California EPA 2010). 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 year (California Natural Resources Agency 2009). According to the California Department of Water Resources (DWR 2009a), 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.<sup>2</sup>

In 2009, the Pacific Institute completed one of the first statewide evaluations of the vulnerability of California coastal infrastructure and communities to sea level rise. The study reports:

*Rising sea levels will be among the most significant impacts of climate change to California. Sea level will rise as a result of thermal expansion of the oceans and an increase in ocean volume as land ice melts and runs off. Over the past century, sea level has risen nearly eight inches along the California coast and general circulation model scenarios suggest very substantial increases in sea level due to climate change over the coming century. (Heberger et al. 2009)*

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<sup>2</sup> 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 Pacific Institute study 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 evaluates how the cumulative impacts of increased watershed flooding, sea level rise, and storm surge can impact coastal areas through increased flooding and coastal erosion.

The study evaluated and mapped areas of the California coast that are vulnerable to flooding with a 55-inch (1.4 meter) increase in sea level rise. Table R-1, below, shows the population vulnerable to flood and erosion from a 1.4-meter sea level rise along the Pacific coast in California, by county. Monterey and Santa Cruz counties were identified as the two counties most vulnerable to flood-related risks of sea level rise in terms of population, due to the vast low lying areas of the Pajaro and Salinas valleys.

**Table R-1: Population Vulnerable to Flood and Erosion from Sea Level Rise**

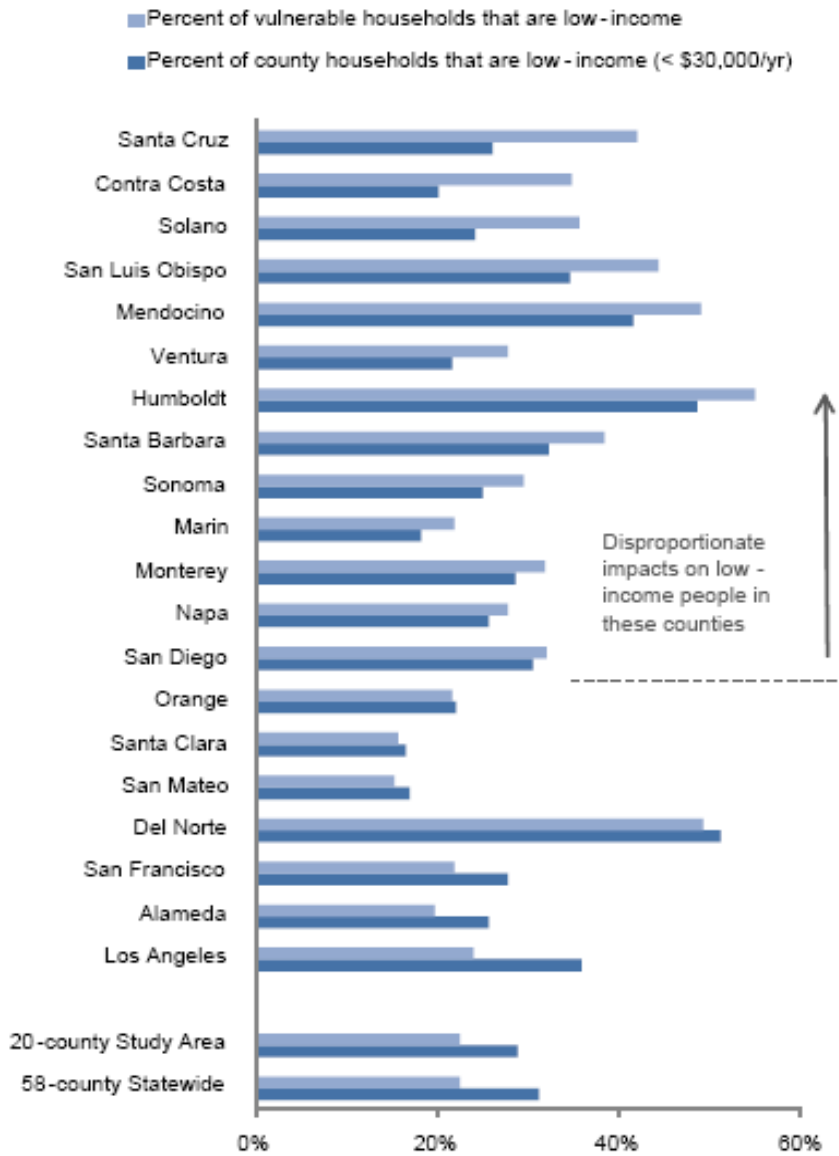
County	Flood-related Risk	Erosion-related Risk
Del Norte	2,600	620
Humboldt	7,800	580
Marin	630	570
Mendocino	650	930
Monterey	14,000	820
San Francisco	6,500	1,200
San Luis Obispo	1,300	1,100
San Mateo	5,900	2,900
Santa Barbara	6,700	2,100
Santa Cruz	16,000	2,600
Sonoma	700	300
<b>Total</b>	<b>63,000</b>	<b>14,000</b>

Source: Pacific Institute (Heberger et al. 2009)

The Pacific Institute study notes that a 1.4-meter sea level rise will put a wide range of critical infrastructure, such as roads, hospitals, schools, emergency facilities, wastewater treatment plants, and power plants, at risk. Throughout California, \$100 billion (in year 2000 dollars) in property is at risk of coastal flooding. To help protect against the impacts of sea level rise, the study identified the need to construct, raise, or repair 53 miles of levees and seawalls in Monterey County. The cost to construct the new sea walls was estimated at \$650 million, or \$12 million dollars a mile (note that this estimate does not include the options of adaptation or retreat). A risk assessment and resource protection prioritization process will need to be completed to identify which resources and infrastructure are most in need of protection.

The Pacific Institute study also evaluated the potential impacts of sea level rise on disadvantaged communities (DACs). Monterey County, along with 12 other coastal counties, is expected to see a disproportionate impact of sea level rise on DACs (see Figure R-2). In Monterey County, this impact will be seen particularly within the community of Castroville and in the Salinas Valley.

**Figure R-2: Impact of Sea Level Rise on DACs**



Source: Pacific Institute (Heberger et al. 2009). Used by permission.

The changes in sea levels, temperature, and precipitation from global climate change 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 result in increased droughts and flooding. Climate change could 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.

Climate change is also 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.

The IPCC modeled several possible emissions trajectories to determine what level of reductions would be needed worldwide to stabilize global temperatures and minimize climate change impacts. Regardless of the analytic method used, global average temperature and sea level rise were predicted to rise under all scenarios (ibid). For example, the IPCC predicted that the range of global mean temperature change from year 1990 to 2100, given different emissions reductions scenarios, could range from 1.1°C to 6.4°C (2.0°F to 11.5°F). In other words, there is evidence that emissions reductions can reduce the severity of climate change effects but cannot reverse them entirely.

### **R.3 PREDICTED EFFECTS OF CLIMATE CHANGE IN THE GREATER MONTEREY COUNTY REGION**

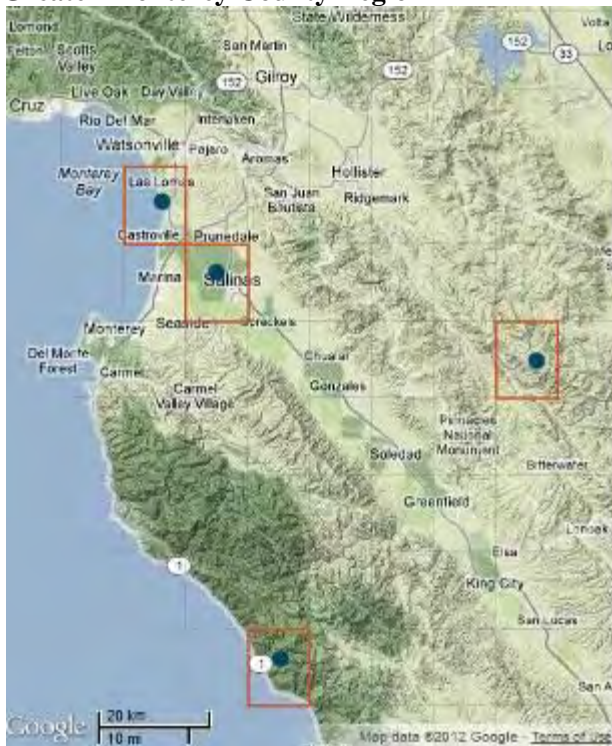
This section first takes a look at projected changes in climate variables, and then considers the impacts of climate change for the local region.

#### **R.3.1 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 using 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 (<http://cal-adapt.org/>) provides a geographically based climate model interpretation tool that generates predictive changes to various climate variables using different IPCC GHG emissions projections. Specifically, emissions scenario A2 (High Emissions Scenario) coincides with a scenario in which no effort is taken to alter present practices, resulting in increasing rates of emissions. Emissions scenario B1 (Low Emissions Scenario) coincides with emission rates associated with global success at curbing emissions as prescribed within international climate treaties.

The Cal-Adapt tool was used to project changes in various climate variables that may affect water resources within the Greater Monterey County IRWM planning area. Four areas of the region were used to reflect different climate regimes: Coastal Monterey Bay, Coastal Big Sur Mountains, Inland Valley, and Inland Mountains (Figure R-3). Changes in climate variables are presented for the A2 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.

**Figure R-3: Four Climate Regimes Modeled in the Greater Monterey County Region**



Source: Cal-Adapt (<http://cal-adapt.org/>)

**Temperature Changes**

Table R-2 below shows the projected difference in temperature between a baseline time period (1961-1990) and an end of century period (2070-2090) for the four climate regime areas selected for the Greater Monterey County IRWM planning region.

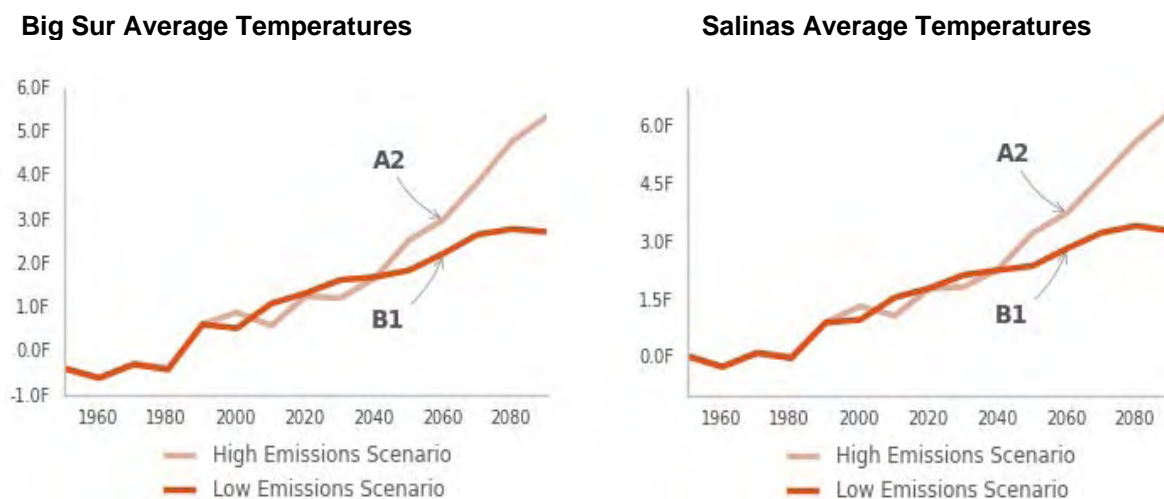
**Table R-2: Projected Increases in Average Temperature**

Location	Low emission-B1 (°F)	Change in temp (°F)	High emission-A2 (°F)	Change in temp (°F)	Historical average (°F)
Salinas	60.6	3.4	63	5.6	57.4
Moss Landing	60.4	3.2	62.7	5.5	57.2
Big Sur	54.3	2.8	56.2	4.7	51.5
Paicines (mountains)	57.7	3.3	59.9	5.5	54.4

Source: Cal-Adapt web tool (<http://cal-adapt.org/>)

Projected increases in average temperature are graphed for the Big Sur coast and the Salinas Valley in Figure R-4 below. Projected increases in temperature are similar through 2050 for both the A2 (High Emissions) and B1 (Low Emissions) scenarios. After 2050, temperature increases more rapidly using the high emissions rate scenario.

**Figure R-4: Projected Average Temperatures in Big Sur and Salinas**



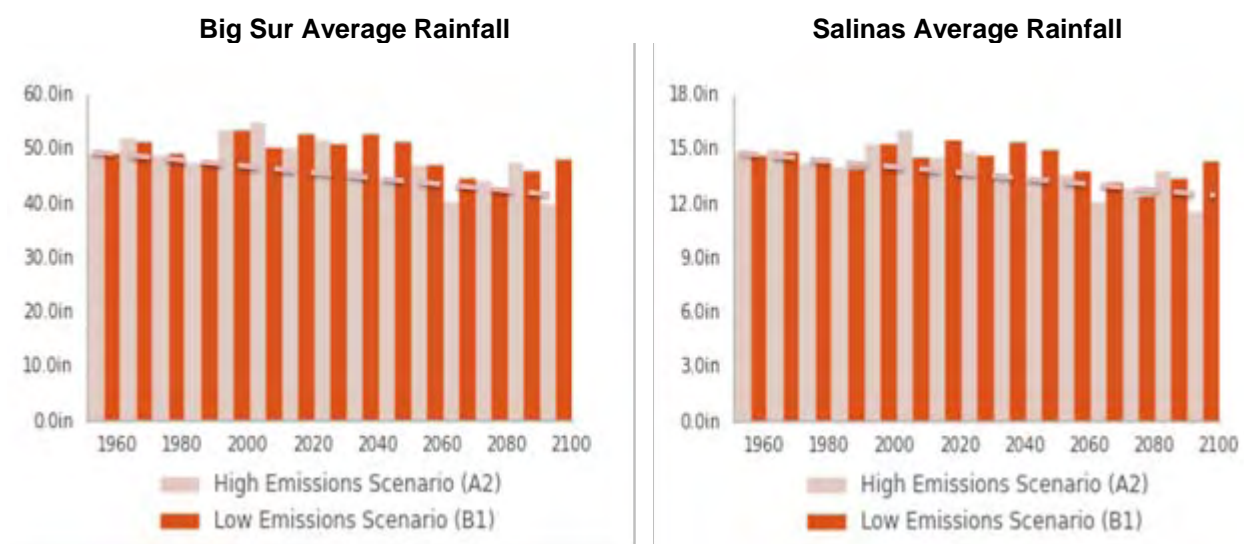
Source: Cal-Adapt web tool (<http://cal-adapt.org/>)

### Rainfall Changes

The Cal-Adapt tool predicts that average rainfall will begin to decline throughout the Greater Monterey County region with projected decreases of approximately ten inches (20 percent) in the Big Sur area and approximately three inches in the Salinas Valley region (20 percent) by 2100 (High Emissions Scenario A2). Figure R-5 below represents the inter-decadal fluctuations in precipitation (integrating historic decadal fluctuations) and the long-term decline in total precipitation for the areas in question. Note, however, that while most climate change scientists agree that precipitation patterns will change, there is less consensus on the direction of the precipitation change, with some climate models suggesting decreases while others suggest increases.<sup>3</sup> 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 2009a). The actual change in precipitation is more difficult to predict on the local level.

<sup>3</sup> As an example of variable predictions of precipitation impacts in California: A US Department of the Interior Bureau of Reclamation report (2011) predicts 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 21<sup>st</sup> century.

**Figure R-5: Projected Average Rainfall in Big Sur and Salinas**



Source: Cal-Adapt web tool (<http://cal-adapt.org/>). Note: dashed line represents the average decline in projected rainfall (using the high emissions scenario) when inter-decadal variability is omitted.

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<sup>4</sup> 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—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.

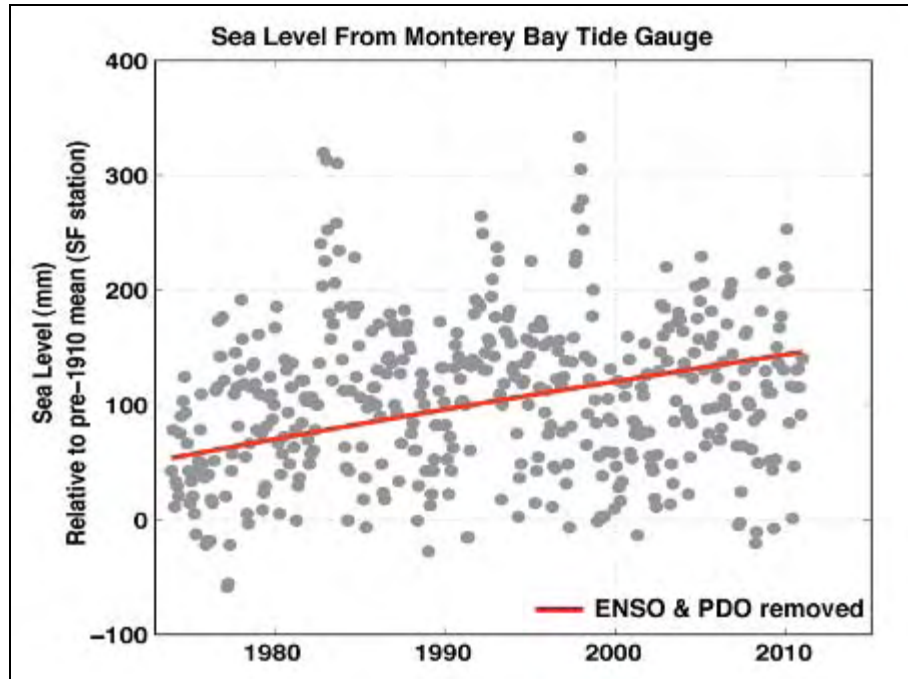
Sea level rose approximately seven inches (18 cm) over the past century (1900–2005) along most of the California coast (Cayan et al. 2008). The local tide gauge at Monterey dates back to 1973 (compared to the San Francisco gauge dating from 1855), but even during this short time period, a trend of sea level rise is evident at the rate of approximately 0.05 inches per year (Figure R-6). 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-13-08. 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, recent evidence suggests these values may prove to be underestimates of the possible rise in global sea level.

<sup>4</sup> This section regarding sea level rise has been excerpted from the “Climate Change and Monterey Bay” website ([http://www.climatechangemontereybay.org/impacts\\_main.shtml](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.



**Figure R-6: Sea Level in Monterey Bay from 1976-2010**



Sea level from the Monterey Bay Tide Gauge. 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. (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.)

The anticipated consequences of sea level rise for the Monterey Bay region are serious and far-reaching, and are discussed in Section R.3.2 below, 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.<sup>5</sup> 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 on water supplies in the Greater Monterey County IRWM region.

California coastal fog is caused by the temperature differential between the cool ocean water and the warmer air. The Monterey Bay region 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

<sup>5</sup> 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.



temperature of the global ocean has increased to depths of at least 3000 meters” (IPCC, 2007b). 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 Greater Monterey County 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.

### **R.3.2 Predicted Impacts of Climate Change in the Greater Monterey County 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 has also provided guidance on possible impacts to state infrastructure and resources due to changing climate variables. These resources were used to identify local impacts that are most likely to occur in the Greater Monterey County IRWM region, due to local changes in rainfall patterns, temperature increases, evapotranspiration, storm intensity and runoff rates, and urban and agricultural water use.

Table R-3 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 Greater Monterey County region (adapted from Appendix B of *Climate Change Handbook for Regional Water Planning*). Following this list is a more detailed discussion of potential impacts of climate change in the Monterey Bay region, as presented at a December 2011 regional workshop called “Preparing for the Future: Climate Change and the Monterey Bay Shoreline.”

**Table R-3: Potential Impacts to Water Resources in the Greater Monterey County Region**

<p><i>Water Supply and Demand</i></p> <ul style="list-style-type: none"> <li>▪ Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration.</li> <li>▪ Rangelands are expected to be drier.</li> <li>▪ Domestic landscaping water needs will be higher.</li> <li>▪ Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion.</li> <li>▪ Droughts will be more frequent and severe.</li> </ul>
<p><i>Water Quality</i></p> <ul style="list-style-type: none"> <li>▪ Lower seasonal surface flows will lead to higher pollutant concentrations.</li> <li>▪ Changes in storm intensity will increase sediment loading in many systems.</li> <li>▪ Channel stability will be impacted from higher storm flows causing additional turbidity.</li> <li>▪ Sea level rise will impact current estuary brackish water interface towards more marine systems.</li> </ul>
<p><i>Flooding</i></p> <ul style="list-style-type: none"> <li>▪ Regional river levees will provide less protection during higher storm flow events.</li> <li>▪ Natural creeks and managed conveyance will see higher flow rates leading to increased erosion and flooding.</li> <li>▪ Coastal levees and control structures will be undersized to manage the combined influences of higher river flows and sea level rise.</li> </ul>
<p><i>Aquatic Ecosystem Vulnerabilities</i></p> <ul style="list-style-type: none"> <li>▪ Migration patterns and species distribution will change.</li> <li>▪ Invasive species populations will expand.</li> <li>▪ Coastal wetland systems are likely to be inundated with increasing frequency, leading to the dieback of tidal marshes (Philip Williams &amp; Associates 2008b) and the salinization of fresh and brackish marshes.</li> <li>▪ Changes in hydrograph (driven by rain pattern changes) will cause increased erosion and habitat loss in creeks and rivers.</li> <li>▪ Some locally unique species and communities such as maritime chaparral, coastal prairie, 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. As conditions change, these ecosystems and species may face an uncertain future (see Dayton 2011).</li> </ul>
<p><i>Hydropower and Reservoir Storage</i></p> <ul style="list-style-type: none"> <li>▪ Changes in rainfall patterns may be problematic for timing of release from reservoirs.</li> <li>▪ More intense rainfall and increased risk of fires in watershed lands can lead to increased sediment loading to reservoirs.</li> </ul>

***Preparing for the Future: Climate Change and the Monterey Bay Shoreline***

On December 6, 2011, the Monterey Bay National Marine Sanctuary (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 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.

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 southern 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: 1) the “Climate Change and Monterey Bay” website, <http://www.climatechangemontereybay.org/>; and 2) the workshop Summary Report (Abeles et al. 2012), which is available at: <http://centerforoceansolutions.com/preparingforthefuture>.

### **Coastal Erosion**

Existing levels of coastal erosion in the Monterey Bay region cause significant threats to critical infrastructure, property, and natural habitats.<sup>6</sup> 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 km<sup>2</sup>) 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 southern 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<sup>2</sup>) 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 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 at risk of 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

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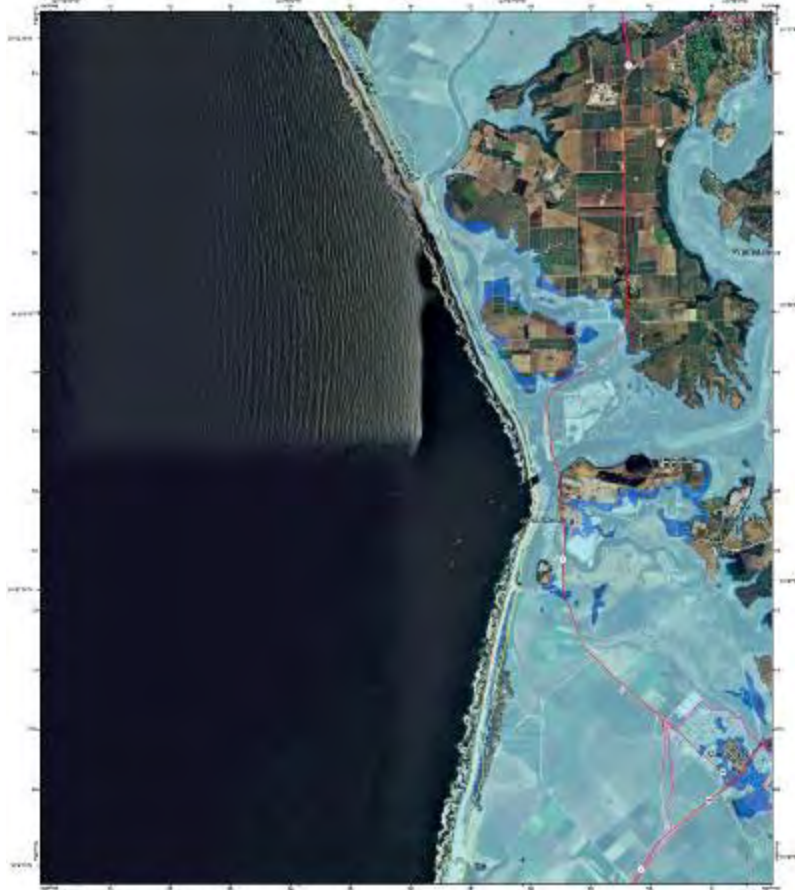
<sup>6</sup> This section on coastal erosion has been excerpted from the “Climate Change and Monterey Bay” website: [http://www.climatechangemontereybay.org/impacts\\_erosion.shtml](http://www.climatechangemontereybay.org/impacts_erosion.shtml). Text prepared by Michael Fox, COS. All references included in this section are cited on the website.

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.<sup>7</sup> 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).

**Figure R-7: Predicted Flooding in Moss Landing Area due to Sea Level Rise and Increased Winter River Flows**



Map depicting where increased inundation will occur within the Moss Landing area without adaptation from a 1.4m sea level rise. The light blue is the current 500-year flood zone as defined by the Federal Emergency Management Agency. Source: Heberger 2009 (Pacific Institute). Used by permission.

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

<sup>7</sup> 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](http://www.climatechangemontereybay.org/impacts_inundation.shtml). Text prepared by Michael Fox, COS. All references included in this section are cited on the website.

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 Greater Monterey County 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 Elkhorn Slough, will become permanently submerged (Heberger 2009; Largier 2010). If these wetland systems become submerged, 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 interact with the main Elkhorn system, including the Moro Cojo and Bennett Sloughs and the Old Salinas River channel. All of these systems' tidal interactions are muted due to culverts and tide gates. Sea level rise will pose significant threats to these systems as well, but those interactions are less well understood.

Monterey County also hosts about 30 coastal river and creek mouth lagoon systems that provide a diverse set of environmental services and span the entire of the 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 Region Description of this Plan, coastal groundwater basins in the region have been experiencing overdraft for many years. It is estimated that the Salinas Valley Groundwater Basin has an average annual non-drought overdraft of approximately 50,000 acre feet (AF) (Cal Water 2010a), though during the last drought the annual overdraft was estimated at 150,000–300,000 acre-feet/year (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). Because of the hydrologic continuity between the ocean and the aquifers of the Pressure Area, seawater has been intruding into these aquifers at a rate of approximately 28,800 AFY (Cal Water 2010b).

In the mid-1990s, due to seawater intrusion, the Monterey County Water Resources Agency (MCWRA) constructed a water delivery system known as the Castroville Seawater Intrusion Project (CSIP), aimed at providing recycled water to agricultural growers within the seawater intrusion front area. These growers use the recycled water in lieu of pumping groundwater. Since 1998, recycled water deliveries have ranged from approximately 7,500-14,000 AFY. As a result of the CSIP, the seawater intrusion front has slowed, but has not been halted (*ibid.*). More recently, MCWRA developed the Salinas Valley Water Project as a means to increase the availability of recycled water, thereby further reducing agricultural pumping from intruded Pressure Subarea Aquifers.

While basin overdraft conditions are expected to improve by the year 2030 due to these and other efforts, recent groundwater modeling (from the Salinas Valley Integrated Ground and Surface Water Model, or SVIGSM) predicts seawater intrusion to continue to worsen, though at a decreased rate. The SVIGSM modeling did not take into account, however, expected sea level rise due to climate change. The problem of seawater intrusion is expected to be exacerbated significantly by sea level rise. Groundwater contaminated by saltwater is not suitable for agricultural use or for drinking water without treatment.

### **Coastal Storms and Waves**

Seasonal patterns of storms and wave intensity are the primary driving forces behind coastal erosion along the California coast.<sup>8</sup> While a natural process that shape 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.

### **Simulation of Climate Change in the Santa Cruz Mountains**

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. Hydrologic models predicted reduced early and late wet season runoff and 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.

## **R.4 EVALUATING THE ADAPTABILITY OF WATER MANAGEMENT SYSTEMS IN THE REGION TO CLIMATE CHANGE**

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 the Region Description chapter of this IRWM Plan, stakeholders in the Greater Monterey County IRWM region work to address a number of critical and sometimes conflicting water issues. The county has made great strides in addressing many of these issues, but challenges remain. Essentially, whatever challenges exist currently for water managers in the Greater Monterey County IRWM 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.

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<sup>8</sup> 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](http://www.climatechangemontereybay.org/impacts_storms.shtml). Text prepared by Michael Fox, COS.

### **R.4.1 Initial Climate Risk Analysis**

The State 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 described above. 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 Greater Monterey County region.

Key documents used for this climate risk 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.

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. Below is a listing of the vulnerabilities defined in the *Climate Change Handbook*, as applicable to the Greater Monterey County IRWM planning region:

#### **Water Demand**

- Major industries require cooling/process water that could be impacted by changes in rainfall and sea level rise:
  - the Moss Landing Electric Power Plant in particular relies on water from the Moss Landing harbor;
  - agro-business relies on water for processing leafy green produce within the Salinas Valley.
- Water use varies more than 50 percent seasonally because agricultural irrigation needs vary significantly through the planting season.
- Some crops are climate sensitive to changes in daily high temperatures, including leafy greens. Vineyards are also vulnerable to changes in temperature.
- Groundwater supplies in the region lack resiliency in droughts because groundwater supplies are already overdrafted.
- Water use cannot be curtailed quickly because agriculture resource needs are extensive.
- Some stream flows are insufficient to support anadromous fish in many coastal streams within Big Sur.

#### **Water Supply**

- The Greater Monterey County region relies on coastal aquifers and suffers from saltwater intrusion.
- The Greater Monterey County region has significant invasive species issues that reduce water conveyance and water supply in local streams and rivers.

#### **Water Quality**

- Increased wildfires are a risk in mountains surrounding many of our reservoirs and creeks that supply water.
- The Greater Monterey County region relies on surface water supplies that are impacted by eutrophication, and that could be exacerbated by climate change.



- Many beneficial uses cannot be met currently.
- Both increased water temperatures and increased fog are associated with poor estuarine water quality.<sup>9</sup>

### **Sea Level Rise**

- Coastal erosion is a significant issue in the Greater Monterey County region.
- Numerous coastal structures and levees are at risk from sea level rise.
- The region includes significant infrastructure and other assets, including water treatment facilities, water control structures, a state highway, the major north-south coastal rail road, and a marina, and thousands of acres of prime agricultural land that are located within six feet of the current high tide line, and therefore are most vulnerable to sea level rise.
- There are significant low-lying coastal habitats in the region including estuaries, dunes, coastal lagoons and brackish water marshes that play an important role in water quality.
- There are substantial areas that flood during storm surge events.
- Land subsidence exists in coastal areas, making estuarine wetland management difficult and sensitive to sea level rise.
- Tidal records suggest ocean levels in the Monterey Bay have been increasing by 1.34 mm/yr over the past few decades.

### **Flooding**

- Critical infrastructure lies within the 200-year flood plain.
- Critical flood control infrastructure is old and undersized.
- Rising sea level will increase the extent of river flooding.
- Flood control structures of the Salinas Valley have been insufficient in the past (1995 and 1998) to contain flooding.
- Wildfires are a major concern for flooding in coastal and inland mountain ranges.

### **Ecosystem and Habitat Vulnerabilities**

- Our region has coastal aquatic systems that are vulnerable to erosion and sedimentation.
- Numerous threatened and endangered species exist in the region.
- The region relies on significant aquatic recreational opportunities along the coast, beaches, and the Moss Landing harbor and Elkhorn Slough.
- Water quality and quantity concerns affect a number of the region's creeks and rivers.
- The region hosts a vast network of coastal estuaries, lagoons, and river mouths as well as beaches and dune complexes that would be affected by changes in storm intensity.
- The region hosts a number of habitats that are particularly vulnerable to climate change, including estuaries, dunes, coastal prairie, maritime chaparral, freshwater marshes, brackish marshes, and redwood forests.
- There is considerable habitat fragmentation in the region that restricts species migration, and fragmentation may continue if policies are not developed to minimize such actions.

### **Hydropower**

- Monterey County generates hydroelectric power at the Nacimiento Reservoir, which could be impacted by increased watershed erosion from changes in rainfall and fire intensity.
- Energy use is expected to increase in the region, and hydroelectric power has been increased recently.

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<sup>9</sup> Personal communication from Ken Johnson (Marine Chemist, Monterey Bay Aquarium Research Institute) to Bryan Largay, Elkhorn Slough National Estuarine Research Reserve, January 2, 2009.

## R.4.2 Risk Assessment

In 2011, the City of Santa Cruz completed the first Climate Vulnerability and Risk Assessment in the Monterey Bay Area (see Atchison 2011). The City used the guidance of the *Preparing for Climate Change* document (Snover et al. 2007) and the Excel spreadsheet tools provided by ICLEI, including the Excel spreadsheet decision-making matrix to complete a vulnerability and risk assessment. The results of the vulnerability and risk assessments led to a resiliency analysis and adaptation strategy (Atchison 2011). A vulnerability analysis for the Greater Monterey County IRWM planning region will help the RWMG to 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 Greater Monterey County RWMG conducted this preliminary vulnerability analysis for the region, following the guidance provided by ICLEI and the State and as demonstrated by the City of Santa Cruz. Below is a description of that process and the assumptions that went into our analysis.

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. Information provided in this chapter has been reviewed and vetted at length by a Climate Task Force comprised of local scientists, land use managers, water resource managers, and coastal policy experts before the chapter was submitted for inclusion within this Plan. Participating entities on the Climate Task Force 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.

Climate preparedness planning relies on the evaluation and prioritization of risks. Risk is determined based on the probability that a certain impact will occur (*likelihood*) and the significance of that impact (*consequence*) on life, land uses, water resources, the economy, and the environment. The equation is:  $Risk = Consequences \times Likelihood$ . 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*).

### R.4.2.a Likelihood

The probability that a specific impact will occur, defined within the ICLEI workbook as likelihood, is estimated based on the increased chance, or periodicity, that a certain event will occur. Table R-4 illustrates how the combined factors of risk and likelihood relate to the determination of priority planning areas. Table R-5 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 R-4: Risk Variables**

	<b>Low Likelihood</b>	<b>Medium Likelihood</b>	<b>High Likelihood</b>
<b>High to Extreme Risk</b>	May be priority planning areas	Should be priority planning areas	Should be priority planning areas
<b>Low to Medium Risk</b>	Are unlikely to be priority planning areas	May be priority planning areas	Likely to be priority planning areas

**Table R-5: Probability Variables**

Likelihood Rating	Recurrent Risks	Single Event
<b>Almost Certain (5)</b>	Could occur several times per year	More likely than not - probability greater than 50%
<b>Likely (4)</b>	May arise about once per year	As likely as not - 50/50 chance
<b>Possible (3)</b>	May arise once in 10 years	Less likely than not but still appreciable - probability less than 50% but still notable
<b>Unlikely (2)</b>	May arise once in 10 years to 25 years	Unlikely but not negligible - probability low but noticeably greater than zero
<b>Rare (1)</b>	Unlikely during the next 25 years	Negligible - probability very small, close to zero

**R.4.2.b Consequence**

The consequence of a specific climate change impact occurring was evaluated individually for five different social, economic, and environmental factors, including specifically:

- 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 was 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 was estimated from little or no consequence (0) to serious devastation to infrastructure or significant economic or environmental impacts or loss of life (5).

**R.4.2.c 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 Greater Monterey County region based on the consequences that are expected to arise from any particular impact occurring within the region. Consequences were evaluated for human wellbeing, economic stability, environmental health, and the ability of municipalities to respond. The Climate Impact Risk Analysis results, shown in Table R-6 below, defines the risk associated with each likely impact. Those that are most probable and devastating have been placed in yellow and pink boxes, representing higher likelihood and higher consequences.

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 – with input from the Climate Task Force – will 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.

**Table R-6: Climate Impact Risk Analysis**

	Low Likelihood (3)	Medium Likelihood (4)	High Likelihood (5)
<b>Low Consequence (8-12)</b>	<p>Lower seasonal surface flows can lead to higher pollutant concentrations</p> <p>State recommendations suggest no new critical facilities be built within the 200-year floodplain (DWR 2008, DWR 2009b, CNRA 2009)</p> <p>Migration patterns and species distribution will change</p> <p>Invasive species populations will expand</p> <p>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)</p> <p>Higher rainfall and increased risk of fires in watershed lands can lead to increased sediment loading to reservoirs</p>	<p>Rangelands are expected to be drier</p> <p>Changes in storm intensity will increase sediment loading in many systems</p> <p>Channel stability will be impacted from higher storm flows causing additional turbidity</p> <p>Coastal wetland systems are especially vulnerable to the combined influences of climate change</p> <p>Changes in rainfall patterns may be problematic for timing of releases from reservoirs</p>	<p>Domestic landscaping water needs will be higher</p>
<b>Medium Consequence (13-16)</b>		<p>Local rainfall is estimated to be reduced by 3-10 inches</p> <p>Droughts will be more frequent and severe</p> <p>Sea level rise will impact current estuary brackish water interface towards more marine systems</p> <p>Natural creeks throughout the region and managed conveyance within the Salinas Valley will see higher flow rates leading to increased erosion and flooding</p>	<p>Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration</p> <p>Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion</p>
<b>High to Extreme Consequence (17-20)</b>		<p>Regional levees will provide less protection during higher storm flow events</p>	<p>Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise</p>

#### R.4.2.d Environmental Consequence of Climate Impacts

During the initial review of the climate risk evaluation, the Climate Task Force recognized that impacts that lead to significant environmental consequence, but that do not lead directly to impacts to human life or the economic use of lands, were not identified as high priority (in Table R-6 above). Because the Greater Monterey County IRWM Plan and the Climate Task Force members recognize the inherent value of natural habitats, an additional risk assessment was completed separately, focused specifically on the environmental consequences of climate change impacts. The results of this analysis are shown in Table R-7 below.

**Table R-7: Environmental Resource-focused Climate Impact Risk Analysis**

	Low Likelihood (<3.5)	Medium Likelihood (3.5-4.5)	High Likelihood (4.5-5)
Low Consequence (<3)	<p>State recommendations suggest no new critical facilities be built within the 200-year floodplain (DWR 2008, DWR 2009b, CNRA 2009)</p> <p>Higher rainfall and increased risk of fires in watershed lands can lead to increased sediment loading to reservoirs</p>	<p>Changes in rainfall patterns may be problematic for timing of releases from reservoirs</p> <p>Rangelands are expected to be drier</p>	<p>Domestic landscaping water needs will be higher</p> <p>Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise</p>
Medium Consequence (<4)	<p>Lower seasonal surface flows can lead to higher pollutant concentrations</p> <p>Migration patterns and species distribution will change</p> <p>Invasive species populations will expand</p>	<p>Changes in storm intensity will increase sediment loading in many systems</p> <p>Channel stability will be impacted from higher storm flows causing additional turbidity</p> <p>Regional levees will provide less protection during higher storm flow events</p> <p>Natural creeks throughout the region and managed conveyance within the Salinas Valley will see higher flow rates leading to increased erosion and flooding</p>	
High Consequence (<5)	<p>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)</p>	<p>Local rainfall is estimated to be reduced by 3-10 inches</p> <p>Droughts will be more frequent and severe</p> <p>Sea level rise will impact current estuary brackish water interface towards more marine systems</p> <p>Coastal wetland systems are especially vulnerable to the combined influences of climate change</p>	<p>Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration</p> <p>Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion</p>

### R.4.2.e Prioritization of Impacts from Changes in Climate Variables

Table R-8 below outlines “priority impacts” for the Greater Monterey County 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 Greater Monterey County region were determined according to methods described by ICLEI and utilized by the City of Santa Cruz. Table R-8 depicts the relative risk of each climate change impact scenario, along with a relative level of urgency to act (priority level). The table illustrates results separately for all five socio-economic and environmental consequences (i.e., public safety, local economy and growth, community and lifestyle, environment and sustainability, and public administration) and for the environmental consequence only. This initial “priority impact” assessment was used by the Climate Task Force to prioritize implementation actions and future studies.

**Table R-8: Determining Priority Impacts: Prioritized Impacts Based on the Combined Consequences of All Five Social-economic Factors and for Environmental Consequence Alone**

Potential Climate Change Impact	Risk Score (c x I)	Priority Level	Risk Score (c x I)	Priority Level
<b>Water Supply</b>	<b>Based on All Five Consequences</b>		<b>Environmental Consequence Only</b>	
Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration	62	High	19	Extreme
Rangelands are expected to be drier	49	Medium	15	High
Domestic landscaping water needs will be higher	51	Medium	15	High
Local rainfall changes are estimated to be reduced by 3-10 inches	61	High	17	Extreme
Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion	66	High	17	Extreme
Droughts will be more frequent and severe	59	High	16	Extreme
<b>Water Quality</b>	<b>Based on All Five Consequences</b>		<b>Environmental Consequence Only</b>	
Lower seasonal surface flows can lead to higher pollutant concentrations	39	Low	12	High
Changes in storm intensity will increase sediment loading in many systems	48	Medium	13	High
Channel stability will be impacted from higher storm flows causing additional turbidity	39	Low	11	Medium
<b>Flooding</b>	<b>Based on All Five Consequences</b>		<b>Environmental Consequence Only</b>	
Regional levees will provide less protection during higher storm flow events	69	High	13	High
Natural creeks throughout the region and managed conveyance within the Salinas Valley will see higher flow rates leading to increased erosion and flooding	54	Medium	12	High
Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise	89	Extreme	17	Extreme
State recommendations suggest no new critical facilities be built within the 200-year floodplain (DWR 2008, DWR 2009b, CNRA 2009)	23	Low	3	Low
<b>Ecosystem Vulnerabilities</b>	<b>Based on All Five Consequences</b>		<b>Environmental Consequence Only</b>	
Sea level rise will impact current estuary brackish water interface towards more marine systems	50	Medium	16	Extreme

Migration patterns and species distribution will change	37	Low	13	High
Invasive species populations will expand	38	Low	10	Medium
Coastal wetland systems are especially vulnerable to the combined influences of climate change	45	Medium	16	Extreme
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)	37	Low	13	High
<b>Hydropower and Reservoir Storage</b>	<b>Based on All Five Consequences</b>		<b>Environmental Consequence Only</b>	
Changes in rainfall patterns may be problematic for timing of releases from reservoirs	47	Medium	10	Low
Higher rainfall and increased risk of fires in watershed lands can lead to increased sediment loading to reservoirs	37	Low	9	Medium

#### R.4.2.f Top Priority Climate Risks for the Greater Monterey IRWM Region

The climate risk analyses and priority impact assessment indicate the following climate risks to be top priority for the RWMG and other water managers in the Greater Monterey County 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.

#### R.4.2.g Adaptive Capacity

The Greater Monterey County region’s ability to respond to a given climatic impact enables us 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. Mathematically, this adaptive capacity is quantified as a number from 0 to 1, with a value of 0 indicating that adaptation is free and instantaneous and a value of 1 indicating that adaptation is impossible. 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 need to be evaluated and cost benefit analyses must be completed. The Climate Task Force emphasized the additional need to evaluate and quantify secondary unintended consequences of any adaptive measure to all of the social-economic factors defined within this chapter. Because of the complexity of this process, adaptive capacity was not systematically evaluated by the RWMG. Given adequate funding, the RWMG hopes to conduct such an analysis in the future. An example of an Adaptive Capacity Analysis is provided in Table R-9 below.



**Table R-9: Example of an Adaptive Capacity Analysis**

Impact	Strategy	Feasibility	Estimated Cost	Key Partners
Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise	Raise levees, replace tide gates, and expand pumping infrastructure.	Very feasible. Pumping requirements dependent on watershed flows and sea level. Seawater intrusion of shallow groundwater a key management concern.	Extremely high – Pump requirements for watershed are significant.	Monterey County Water Resources Agency
	Easements for retired low-lying areas most vulnerable to coastal inundation. Protection of critical infrastructure.	Feasible – privately held rolling easements have occurred elsewhere. Dependent on policy decisions regarding cost allocation for other options.	High – dependent on acreage.	Monterey County Planning, FEMA

**R.4.2.h Vulnerability**

Where *Risk = Likelihood x Consequence*, *Vulnerability = Likelihood x Consequence x Adaptive Capacity*. Vulnerability is the interpretation of the above variables leading to the conclusion: how likely is it that an event will occur, how bad will the impact be, and can we do anything about it? An analysis of the cost and effectiveness of the various adaptive measures must be completed prior to understanding the region’s vulnerability to various environmental impacts. An interim step towards completion of an evaluation of the region’s vulnerability to future coastal inundation is to consider the 1995 and 1998 el Niño floods, evaluate the likelihood that such events will occur again, and infer the region’s adaptive capacity currently (in 2012).

**R.5 INITIAL ADAPTATION STRATEGY**

The following section describes the RWMG’s initial adaptation strategy for addressing impacts to water resources in the Greater Monterey County 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 and Climate Task Force as more climate change data and analytical tools are generated.

**R.5.1 No Action Response**

The Proposition 84/1E Guidelines state that decisions about adapting water management systems, as well as mitigating climate change through reductions in GHG emissions, should take into account the risks to the region of no action. The results of a “no action” response have essentially been described by the various climate change scenarios outlined in the sections above. The RWMG considers the “no action” response to be an irresponsible and reckless response, given the predicted consequences of climate change for human life, the local economy, and natural resources in the region. The RWMG is actively pursuing climate change adaptation and mitigation strategies, as described below.

**R.5.2 Adaptation Goals and Objectives**

The Greater Monterey County 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 Climate Risks identified above as well as the

water resource goals and objectives defined within the Greater Monterey County IRWM Plan (see Section D, Objectives). The adaptation goals and objectives form the foundation for the RWMG's initial adaptation strategy for the Greater Monterey County region. The goals document specific responses to the priority Climate Risks 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 Greater Monterey County IRWM planning effort can serve as a forum to hear ideas and results of projects aimed to address these goals by numerous entities.

### **Adaptation Goals**

The Greater Monterey County IRWM Plan recognizes the importance of becoming a climate resilient region. Adaptation goals that 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 climate change related impacts.
- 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.

### **R.5.3 Adaptation Actions and Response**

To develop an adaptation strategy for the Greater Monterey County IRWM region, adaptation actions and response scenarios from the California Natural Resources Agency's *2009 California Climate Adaptation Strategy* were selected as applicable to the Greater Monterey County region. High priority responses along with climate mitigation actions are listed in Table R-10, "Adaptation and Response Strategies Based on Risk Assessment," below. The "high priority responses" were prioritized by the Climate Task Force according to the risk assessment described above and in accordance with the objectives of the Greater Monterey County IRWM Plan. Both the comprehensive risk assessment (i.e., that heavily favors human impacts as priorities) and the environmental risk assessment are presented together in Table R-10. We anticipate that these distinctions in prioritization will better enable IRWM Plan participants to

respond to funding opportunities that focus specifically on water infrastructure projects or environmental resource protection.

This prioritized list of adaptation actions is considered a first step toward developing a comprehensive adaptation strategy for the Greater Monterey County 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 Climate Task Force 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 through use of natural services.

**Table R-10: Adaptation and Response Strategies Based on Risk Assessment**

Climate Change Consequences	Including All Consequences		Environment and Sustainability Consequence Only		Adaptation and Response Strategies	Initial Actions
	Risk Score (c x l)	Priority Level	Risk Score (c x l)	Priority Level		
<b>Water Demand</b>						
Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration	62	High	19	Extreme	<ul style="list-style-type: none"> <li>Promote community resilience to reduce vulnerabilities: food sustainability</li> </ul>	<ul style="list-style-type: none"> <li>Expand water supplies (purple pipe) and storage</li> <li>Aquifer management</li> <li>Expand agriculture water conservation programs</li> </ul>
Rangelands are expected to be drier	49	Medium	15	High	<ul style="list-style-type: none"> <li>Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies.</li> <li>Implement adaptation strategies to conserve California's biodiversity.</li> </ul>	N/A
Domestic landscaping water needs will be higher	51	Medium	15	High	<ul style="list-style-type: none"> <li>Integrate land use and climate adaptation planning</li> </ul>	<ul style="list-style-type: none"> <li>Education</li> <li>Incentive programs</li> <li>Demonstration programs</li> <li>Grey water</li> <li>Xeriscaping</li> <li>Expand water supplies (purple pipe) and storage</li> <li>Aquifer management</li> <li>Expand domestic conservation programs</li> </ul>
Local rainfall is estimated to be reduced by 3-10 inches	61	High	17	Extreme	<ul style="list-style-type: none"> <li>Promote community resilience to reduce vulnerabilities: Food sustainability</li> <li>Implement water conservation and supply management efforts</li> <li>Manage watersheds, habitat, and vulnerable species</li> </ul>	<ul style="list-style-type: none"> <li>Education</li> <li>Incentive programs</li> <li>Demonstration programs</li> <li>Grey water</li> <li>Xeriscaping</li> <li>Aquifer management</li> <li>Expand agriculture water conservation programs</li> </ul>
Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion	66	High	17	Extreme	<ul style="list-style-type: none"> <li>Prepare a regional sea level rise adaptation strategy</li> <li>Promote working landscapes with ecosystem services</li> <li>Integrate land use and climate adaptation planning</li> </ul>	<ul style="list-style-type: none"> <li>Education</li> <li>Incentive programs</li> <li>Demonstration programs</li> <li>Grey water</li> <li>Xeriscaping</li> <li>Expand water supplies (purple pipe) and storage</li> <li>Aquifer management</li> <li>Expand agriculture water conservation programs</li> <li>Groundwater barriers</li> <li>More robust monitoring and testing</li> </ul>

						<ul style="list-style-type: none"> <li>• Easements for retired farmland</li> </ul>
Droughts will be more frequent and severe	59	High	16	Extreme	<ul style="list-style-type: none"> <li>• Implement adaptation strategies to conserve California's biodiversity</li> <li>• Educate, empower, and engage citizens regarding risks and adaptation</li> <li>• Integrate land use and climate adaptation planning</li> <li>• Promote community resilience to reduce vulnerabilities</li> </ul>	<ul style="list-style-type: none"> <li>• Human safety response</li> <li>• Education</li> <li>• Incentive programs</li> <li>• Demonstration programs</li> <li>• Grey water</li> <li>• Xeriscaping</li> <li>• Expand water supplies (purple pipe) and storage</li> <li>• Aquifer management</li> <li>• Expand agriculture and urban water conservation programs</li> <li>• Groundwater barriers</li> <li>• More robust monitoring and testing</li> <li>• Easements for retired farmland</li> </ul>
<b>Water Quality</b>						
Lower seasonal surface flows can lead to higher pollutant concentrations	39	Low	12	High	<ul style="list-style-type: none"> <li>• Manage watersheds, habitat, and vulnerable species</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize non-point source pollution</li> <li>• Buffers</li> </ul>
Changes in storm intensity will increase sediment loading in many systems	48	Medium	13	High	<ul style="list-style-type: none"> <li>• Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Erosion control on farms and creeks</li> <li>• Buffers</li> </ul>
Channel stability will be impacted from higher storm flows causing additional turbidity	39	Low	11	Medium	<ul style="list-style-type: none"> <li>• Provide guidance on protecting critical coastal ecosystems and development</li> </ul>	<ul style="list-style-type: none"> <li>• Erosion control on creeks</li> <li>• Wastewater and stormwater infrastructure vulnerability analysis</li> </ul>
Sea level rise will impact current estuary brackish water interface towards more marine systems	50	Medium	16	Extreme	<ul style="list-style-type: none"> <li>• Implement adaptation strategies to conserve California's biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>• Retain freshwater in watershed</li> <li>• Habitat migration</li> <li>• Buffers</li> <li>• Erosion control</li> <li>• Conservation easements</li> <li>• Xeriscaping</li> </ul>
<b>Flooding</b>						
Regional levees will provide less protection during higher storm flow events	69	High	13	High	<ul style="list-style-type: none"> <li>• Support essential data collection and information sharing</li> <li>• Manage watersheds, habitat, and vulnerable species</li> <li>• Prepare a regional sea level rise adaptation strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Refurbish or expand levees or tide gates (upgrade priority infrastructure)</li> <li>• Map/inventory infrastructure</li> </ul>

Natural creeks throughout the region and managed conveyance within the Salinas Valley will see higher flow rates leading to increased erosion and flooding	54	Medium	12	High	<ul style="list-style-type: none"> <li>• Manage watersheds, habitat, and vulnerable species</li> </ul>	<ul style="list-style-type: none"> <li>• Refurbish or expand levees or tide gates (upgrade priority infrastructure)</li> <li>• Map/inventory infrastructure</li> </ul>
Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise	89	Extreme	17	Extreme	<ul style="list-style-type: none"> <li>• Support essential data collection and information sharing</li> <li>• Prepare a regional sea level rise adaptation strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Refurbish or expand levees or tide gates (upgrade priority infrastructure)</li> <li>• Map/inventory infrastructure/levee locations and WCS, ownership</li> <li>• Phase II task 5 activity 3 - ecosystem services - be aware of services available</li> <li>• Elevations of levees and sea walls - maybe with PWA-management strategies</li> <li>• USGS elevation data?</li> <li>• Channel dredging</li> <li>• Ecological restoration</li> </ul>
State recommendations suggest no new critical facilities be built within the 200-year flood plain (DWR 2008, DWR 2009b, CNRA 2009)	23	Low	3	Low	<ul style="list-style-type: none"> <li>• Integrate land use and climate adaptation planning</li> </ul>	<ul style="list-style-type: none"> <li>• Work with Monterey County and cities, Coastal Commission (local jurisdiction)</li> </ul>
<b>Aquatic Ecosystem Vulnerabilities</b>						
Migration patterns and species distribution will change	37	Low	13	High	<ul style="list-style-type: none"> <li>• Establish a system of sustainable habitat reserves</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce migration impediments (dams, etc.)</li> <li>• Compile data on species distribution</li> <li>• Primary focus species - amphibians, waterfowl, salmonids, redwoods, tide water gobies</li> <li>• Maintain habitat corridors - contiguous areas</li> <li>• Fish and Game - wildlife adaptation plan - vulnerability for key species for each region</li> <li>• Remove barriers</li> </ul>
Invasive species populations will expand	38	Low	10	Medium	<ul style="list-style-type: none"> <li>• Habitat/ecosystem monitoring and adaptive management</li> </ul>	<ul style="list-style-type: none"> <li>• What are the invasive species and their ranges? Will they expand, be introduced? How are the habitats shifting (awareness)?</li> <li>• Ecological adaptation investigation and strategy</li> <li>• Model range shifts with climate change</li> </ul>

Coastal wetland systems are especially vulnerable to the combined influences of climate change	45	Medium	16	Extreme	<ul style="list-style-type: none"> <li>• Establish regional policies to protect critical habitats</li> <li>• Provide guidance on protecting critical coastal ecosystems and development</li> </ul>	<ul style="list-style-type: none"> <li>• Identify critical habitats and ecosystems</li> <li>• Integrate ecosystem management</li> <li>• Regulatory mechanisms dedicated to protecting future locations of these areas</li> <li>• Inventory of wetlands currently</li> <li>• What lands are adjacent?</li> <li>• Rolling easement for ag - retired ag lands</li> <li>• Hazard mitigation</li> </ul>
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)	37	Low	13	High	<ul style="list-style-type: none"> <li>• Manage watersheds, habitat, and vulnerable species</li> </ul>	<ul style="list-style-type: none"> <li>• Identify how they will be impacted - What are the changes?</li> <li>• USGS study outcome - get a better handle on modeling fog changes in climate change</li> </ul>
<b>Hydropower and Reservoir Storage</b>						
Changes in rainfall patterns may be problematic for timing of releases from reservoirs	47	Medium	10	Low	<ul style="list-style-type: none"> <li>• Implement water conservation and supply management efforts</li> </ul>	<ul style="list-style-type: none"> <li>• Modified flood control operations</li> <li>• Opportunities for more water storage</li> <li>• Maintain optimum flow capacity in channels</li> <li>• San Antonio and Nacimiento Reservoirs and rainfall – potential for interlake tunnel</li> </ul>
Higher rainfall and increased risk of fires in watershed lands can lead to increased sediment loading to reservoirs	37	Low	9	Medium	<ul style="list-style-type: none"> <li>• Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Fire prevention</li> <li>• Forest management - FireScape Monterey</li> <li>• Rangeland management (much of the area around the reservoirs is grassland)</li> <li>• Erosion control for infrastructure surrounding reservoirs</li> </ul>



#### **R.5.4 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, practicing 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.

#### **R.5.5 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.”<sup>10</sup> 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

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<sup>10</sup> The information in this section has been excerpted from the workshop Summary Report (Abeles et al. 2012).

*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

Several members of the Greater Monterey County RWMG (in particular MBNMS, the Central Coast Wetlands Group, Elkhorn Slough National Estuarine Research Reserve, California Coastal Commission, and the Monterey Regional Water Pollution Control Agency) participated in the “Preparing for the Future” workshop, and the MBNMS and Central Coast Wetlands Group were instrumental in organizing the event. 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 at: <http://centerforoceansolutions.com/preparingforthefuture>.

### **R.5.6 Pilot Coastal Vulnerability Evaluation**

The Natural Capital Project and the Center for Ocean Solutions have worked with the Greater Monterey County RWMG and Climate Task Force to assess the effects of coastal adaptation strategies and climate scenarios on the ecosystem services provided by coastal and near shore environments. Phase I of this project 1) assessed the physical vulnerability of the coast to hazards such as erosion and inundation, and 2) assessed the vulnerability of relevant infrastructure, land use types, and coastal communities. This assessment can be used to identify areas for future analysis and inform project prioritization and funding. Analysis of these vulnerabilities were developed through the use of the Integrated Valuation of Environmental Services and Tradeoffs (InVEST) decision support tool—a family of tools to map and value the goods and services provided by nature. The Coastal Vulnerability<sup>11</sup> model was utilized for Phase I of this project. Appendix K, “The Role of Natural Habitat in Coastal Vulnerability and Adaptation Planning,” provides a full description of the assessment in the Greater Monterey County Planning region.

### **R.5.7 Future Studies and Regional Data Needs**

As recognized in the climate risk assessment, priority actions to address local climate change impacts should focus on the three priority climate risks:

- *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*

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<sup>11</sup> [http://ncp-dev.stanford.edu/~dataportal/invest-releases/documentation/current\\_release/#marine-models](http://ncp-dev.stanford.edu/~dataportal/invest-releases/documentation/current_release/#marine-models)

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 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 R.5.3 above. The Climate Task Force has agreed that future research and program funds should be directed towards the three priority climate risk areas above. 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 Greater Monterey County RWMG met with the Climate Task Force and discussed each of these adaptation categories. The Climate Task Force supported the selection of these next steps, and has recommended that these ideas be integrated into project submittals for the following rounds of concept and implementation project proposals for the Greater Monterey County IRWM Plan.

### **R.5.8 Initial Climate Adaptation Project**

To ensure that the momentum developed by the Climate Task Force towards climate resilience planning was not lost, the Central Coast Wetlands Group at Moss Landing Marine Laboratories, a RWMG member, has submitted an implementation project proposal for inclusion in the Greater Monterey County IRWM Plan. The project is intended to provide resources to regional partners to compile the necessary

information needed to understand the region’s adaptive capacity to mitigate impacts associated with the priority climate risk factor, *Coastal inundation of urban development, other land uses, and impacts to river and wetland ecosystems.*

**Project Summary:**

The proposed project implements key steps in climate change planning outlined by the DWR 2011 *Climate Change Handbook for Regional Water Planning*. Phase I and Phase II of this project are based on the guidance provided within Sections 5 and 6 of the handbook.

During the review of this Climate Change chapter for the IRWM Plan, the Climate Task Force identified critical data gaps important to climate change planning, developed a methodology for running a vulnerability and risk assessment, and discussed next steps for climate change planning in the Greater Monterey County IRWM region. This project follows up on these topics, further and more accurately investigates regional climate change impacts, and seeks to recommend adaptation response strategies to address the impacts of sea level rise, storm surge, coastal inundation and coastal erosion.

The first phase of the project focuses on collecting and compiling data for the Elkhorn Slough, Gabilan, and Salinas River watersheds to further evaluate coastal inundation threats and responses in these watersheds. This data includes an inventory of water control structures (levees, culverts, tide gates, etc.) that manage current flood conveyance and topographic data using Light Detection and Ranging technology (LiDAR). These data will then be used to support an in-depth regional vulnerability analysis and risk assessment for coastal water control structures, communities, and ecosystems (defined as priority issues within the IRWM Plan vulnerability evaluation). The second phase of this project focuses on creating a climate change adaptation and response strategy plan followed by an economic evaluation of these different strategies. Response strategies will include nature-based responses and the economic and ecosystem effects of those responses. These tasks will enable resource managers and planners to better define alternative response strategies for each climatic risk and evaluate the feasibility, cost and longevity of each strategy. Resource managers can then correlate this information with land use and environmental valuation to prioritize responses. The outcome of this project will be a comprehensive report recommending feasible and long-term adaptation and response strategies to climate change impacts for the region. This project will help support the climate change planning efforts of multiple partners and stakeholders in the Greater Monterey County IRWM planning region.



Figure 1. Preliminary inventory of water control structure locations overlaid with the Coastal Commission’s priority SLR planning area.

The Climate Task Force will also work with DWR and the US Environmental Protection Agency to coordinate research opportunities and adaptation strategy development. One key action will be to conduct a regional adaptation study that integrates additional data collection with IRWM planning for the four IRWM Plans within the greater Monterey Bay region (i.e., the Greater Monterey County, Northern Santa Cruz County, Pajaro River Watershed, and the Monterey Peninsula, Carmel Bay, and South Monterey Bay regions).

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## **R.6 CLIMATE CHANGE MITIGATION AND GHG EMISSIONS REDUCTION STRATEGY**

The development of a GHG emissions reduction 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 (i.e., 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.<sup>12</sup>

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 included in the County for the production and distribution of water
- Emissions from privately owned pumps
- Emissions from county staff fleet and private vehicle emission associated with water project construction and maintenance
- Emissions from energy generation that could be mitigated through renewable energy sources

### **R.6.1 GHG Reduction Strategies**

A full GHG emissions reduction strategy for the region will be created by Monterey County in the near future to meet State mandates (AB 32, CEQA). In the meantime, several effective GHG reduction strategies can be addressed by the IRWM Plan and the projects 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):

#### **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
- Encourage efficient driving practices

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<sup>12</sup>This introductory paragraph has been excerpted from the Proposition 84/1E Program Guidelines, pp. 71-72.

### **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 Greater Monterey County IRWM region facilities
- Work with regional waste district to increase electricity generation from farm-generated food and animal bio-waste
- Increase hydro-electric generation within current water infrastructure

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 Greater Monterey County 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 substantial input from a Climate Task Force, to define possible next steps, responsible entities, and funding resources.

## **R.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 Greater Monterey County 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:<sup>13</sup>

- 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.

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<sup>13</sup> Source: City of Santa Cruz CAC website: <http://www.cityofsantacruz.com/index.aspx?page=1231> (March 2012).

***Association of Monterey Bay Area Governments Programs***

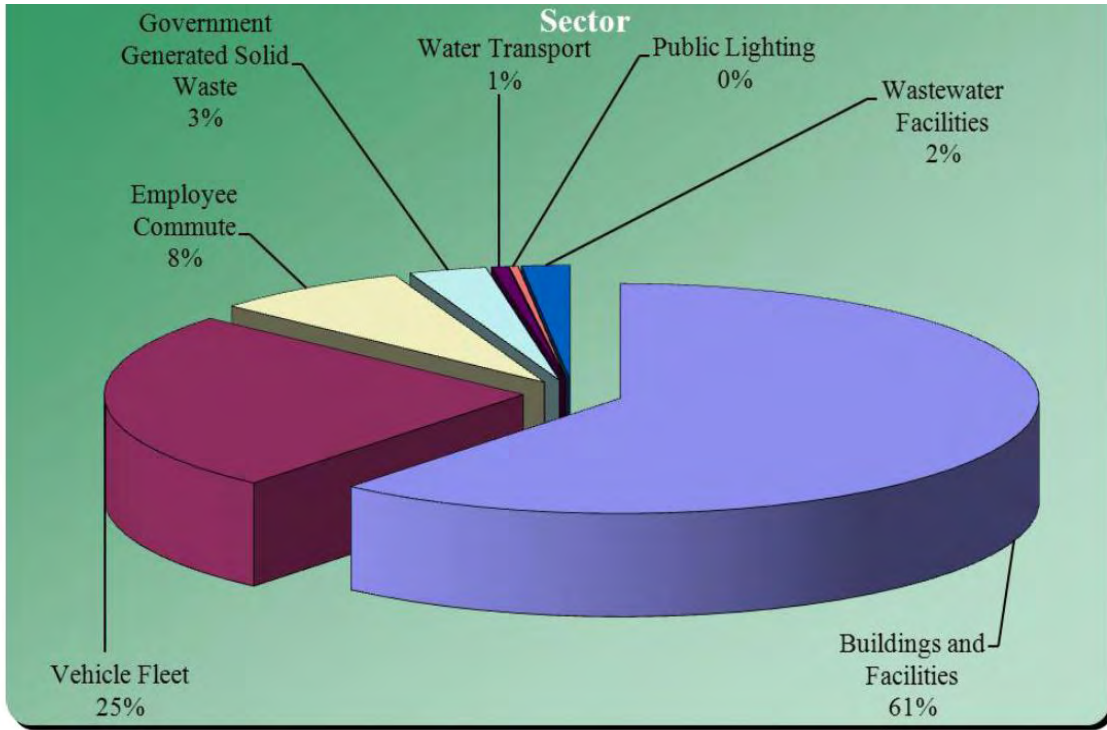
AMBAG has developed regional emission targets in accordance with requirements of SB 375. AMBAG has also initiated a program in collaboration with the Pacific Gas and Electric Company (PG&E) called “Energy Watch.” The Energy Watch Program helps local governments in Monterey, San Benito, and Santa Cruz 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.

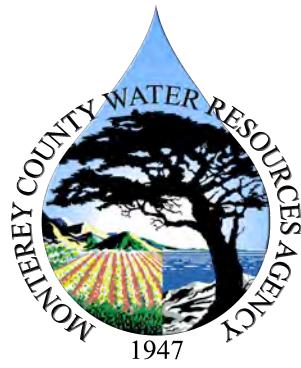
In 2010, AMBAG completed a set of GHG inventories for all of its 21 municipal members. The cumulative emissions from the unincorporated areas of Monterey County were quantified for various sectors including municipal (county government) residential and commercial/industrial. For 2005, countywide emissions were calculated to be 1,648,410 metric tons. Of that total, municipal emissions comprised 1.3 percent (21,641 tons); and of the municipal emissions total, emissions from municipal supply and distribution of water resources were 0.6 percent (133 tons). Figure R-8 below illustrates emissions from local government operations for Monterey County, by sector. Additional emissions attributable to water management in the Greater Monterey Region 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.



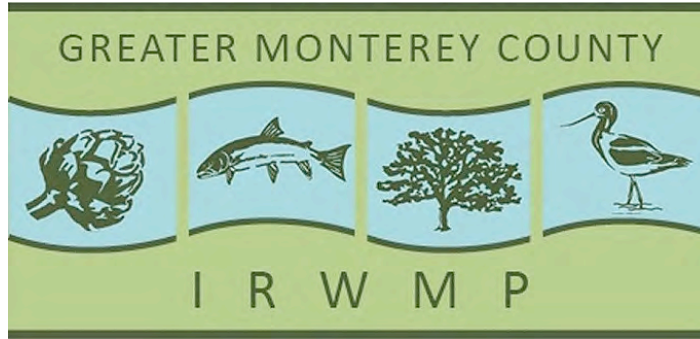
**Figure R-8: 2005 GHG Emissions from Monterey County Government Operations**



**Source:** AMBAG 2011, Monterey County Greenhouse Gas Emissions Inventory. Used by permission.



Garrapata  
Creek  
Watershed  
Council



Elkhorn Slough  
National Estuarine  
Research Reserve



San Jerardo Co-operative, Inc.



BIG SUR  
LAND TRUST



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