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 19 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
- Coastlands Mutual Water Company
- 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.

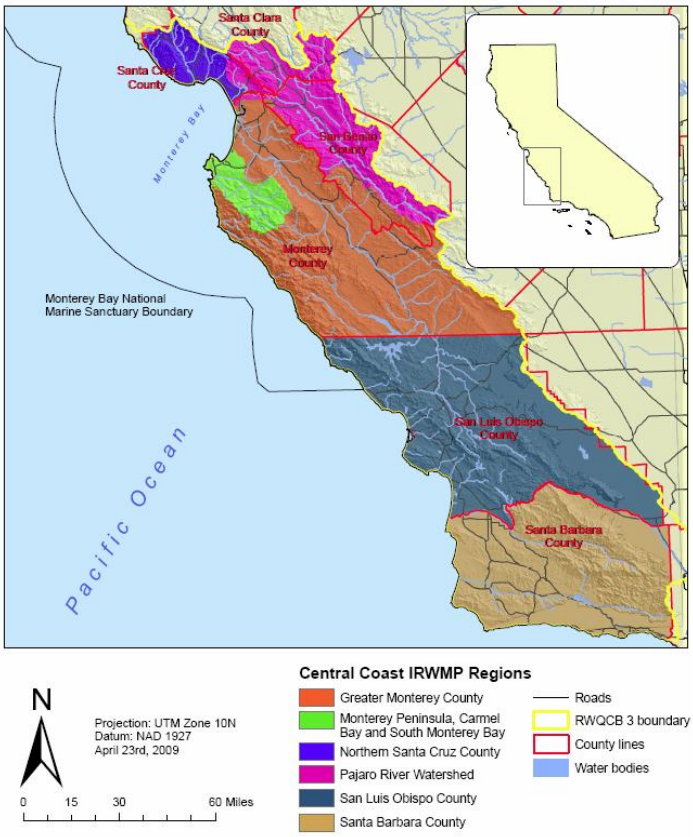
Areas within Monterey County that are not represented in this IRWM Plan (but that are represented in other IRWM Plans) include: the Pajaro River watershed, represented in the Pajaro River Watershed IRWM Plan; and the Carmel River watershed, the San Jose Creek watershed, areas overlying the Seaside

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.

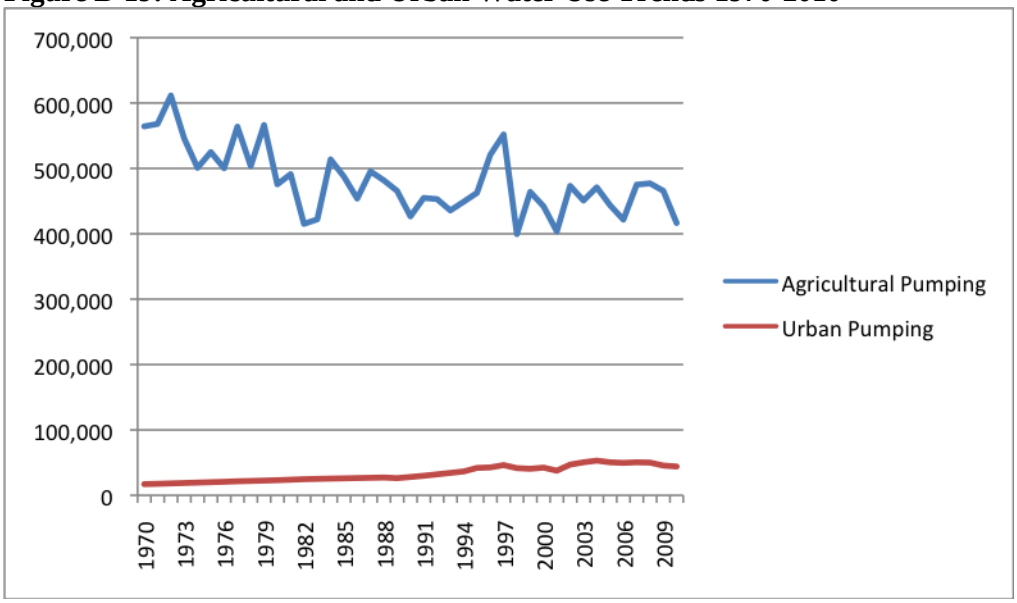
Water Use Trends

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

	Urban Water Use in the Salinas Valley (AFY)					
Method	**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
Total Demand	**463,000+**	**443,000+**

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

	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
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 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_3, 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
TOTAL		100

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.