Central Coast Hydrologic Region — Table of Contents

Tables

Figures

Boxes

Acronyms and Abbreviations Used in This Report

[acronyms and abbreviations to come]

Central Coast Hydrologic Region

[This section is underdevelopment.]

Current State of the Region

Setting

The Central Coast Hydrologic Region extends from southern San Mateo County in the north to Santa Barbara County in the south (Figure CC-1 Central Coast Hydrologic Region). The region includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties, most of San Benito, and parts of San Mateo, Santa Clara, Ventura, and Kern counties. Geographically, the vegetation and topography of the Central Coast is highly variable and includes redwood forests, foggy coastal terraces, chaparral-covered hills, green cultivated valley floors, stands of oak, warm and cool vineyards, and semi-arid grasslands. The climate and microclimates of the region are unique and foster both ecological and agricultural diversity.

PLACEHOLDER Figure CC-1 Central Coast Hydrologic Region

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Among all of California's hydrologic regions, the Central Coast is the most reliant on groundwater for its water supply (Figure CC-2).

PLACEHOLDER Figure CC-2 Agricultural and Urban Demand Supplied by Groundwater – DWR Bulletin 118

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Groundwater supplies are locally supplemented by stream diversions, timed releases from regional reservoirs, and some imported surface water. Factors that affect water availability in the region include precipitation, groundwater recharge capacity, groundwater quality degradation, groundwater pumping management styles or practices, surface water and reservoir storage capacity, as well as the annually variable SWP and CVP water deliveries.

Groundwater supplies are locally supplemented by stream diversions, timed releases from regional reservoirs, and some imported surface water. Factors that affect water availability in the region include precipitation, groundwater recharge capacity, groundwater quality degradation, groundwater pumping management styles or practices, surface water and reservoir storage capacity, as well as the annually variable SWP and CVP water deliveries.

The Central Coast Hydrologic Region receives very little snow, and floodwaters originate primarily from rainstorms in winter and spring. Streams draining the mountains of the Central Coast are subject to short, intense floods, causing frequent flood damage in agricultural and urban areas. Most streams produce slow-rise floods, but the steep mountainous terrain can produce flash floods that are intense and of short duration. Extended precipitation may produce debris flows, particularly after a season of hillside fire damage, and the steepness of the streams can increase the sediment size to boulder proportions. In urban areas, excessive stormwater runoff can result in shallow flooding, especially in coastal communities where storm surges may coincide with high tides. Tsunamis, though rare, also pose a threat to the low-lying coastal areas. Structural failure of the region's dams, levees, and other water-related infrastructure also provides the potential for flooding.

Flooding is a significant issue in the Central Coast Hydrologic Region, and exposure to a 500-year flood event threatens one in three residents, more than $40 billion dollars of assets (crops, buildings, and public infrastructure), and over 310 sensitive species. In Monterey County, more than 50 percent of the population is exposed to 500-year flood event. In the Central Coast region, local flood-related projects totaling $280 million have been proposed, including major projects on the Carmel River, Pajaro River, Salinas River, Soap Lake, and Llagas Creek.

Flood damage has been observed in the Central Coast Hydrologic Region since at least 1861. For a list of floods in this hydrologic region, refer to the California Flood Future Report Attachment C: Flood History of California Technical Memorandum.

Watersheds

The Central Coast Hydrologic Region is divided here into the Northern and Southern Planning Areas. These Planning Areas are geographic collections of individual and shared watersheds with the Monterey-San Luis Obispo county line serving as the boundary between the two Planning Areas. All rivers within the Central Coast region drain into the Pacific Ocean. Following are summary descriptions of each Planning Area. See Figure CC-3.

PLACEHOLDER Figure CC-3 Central Coast Hydrologic Region Watersheds

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Northern Planning Area Watersheds

The Northern Planning Area contains all of Santa Cruz and Monterey counties, most of San Benito County, the southern part of Santa Clara County, and a small part of southern San Mateo County. The main rivers in the region are the San Lorenzo, Pajaro, Salinas, San Benito, Carmel, San Antonio, and Nacimiento. Coastal watersheds west of the northern Santa Lucia Range include the Little Sur and Big Sur rivers and numerous coastal streams, some of which are perennial.

The San Lorenzo River originates at the crests of the Santa Cruz and Ben Lomond Mountain ranges and enters the Pacific Ocean at Santa Cruz. The upper areas are heavily forested, and criss-crossed with many old logging roads that now serve rural residences. The Pajaro River begins in southern Santa Clara County and is joined by Pacheco Creek, the San Benito River, and Tres Piños Creek. The Pajaro River watershed spans four counties, covering over 1,300 square miles. The river enters Monterey Bay and the Pacific Ocean west of Watsonville. The Pajaro River watershed is one of the Central Coast regions largest and is well known for its productive agricultural soils and powerful flooding characteristics.

The largest watershed in the region is the Salinas River watershed, covering 4,600 square miles, draining more than 40 percent of the Central Coast region. The Salinas River originates in the La Panza Mountains of San Luis Obispo County and flows northward through the Salinas Valley to Monterey Bay, a length of approximately 170 miles. Major tributaries to the Lower Salinas River watershed are the Nacimiento, San Antonio, and Arroyo Seco rivers, all of which originate west of the Salinas River in the Santa Lucia Range. Other tributaries are the Estrella River and San Lorenzo Creek, which begin east of the Salinas River in the Cholame Hills and Gabilan Range, joining the river at King City. Agriculture dominates the bottomlands of this watershed.

The Carmel River watershed begins on the western slopes of the Sierra de Salinas range, covering about 200,000 acres of Monterey County. Numerous creeks join the Carmel River, which flows through Carmel Valley to the Carmel River lagoon and into the Monterey Bay National Marine Sanctuary at Carmel Bay. The Carmel Valley has a mixture of urban areas, rural residential, agriculture, rangeland and recreational areas. The upper reaches of the Carmel River, above the Los Padres Dam, flow through the Los Padres National Forest.

The Santa Lucia watersheds originate in Los Padres National Forest, on the steep northwestern slopes of the Santa Lucia Mountains in Monterey County, characterized by many small coastal streams that flow directly to the ocean.

Southern Planning Area Watersheds

The Southern Planning Area contains all of San Luis Obispo and Santa Barbara counties, as well as a portion of northwest Ventura and a few square miles of Kern counties. The principal watersheds are the Upper Salinas, the Santa Maria — which includes the Huasana, Cuyama, and Sisquoc rivers — the San Luis Obispo, San Antonio, Santa Ynez, Carrizo Plain, and the Santa Barbara Channel Islands. As in the Northern Planning Area, coastal watersheds here are mostly short and steep.

The Upper Salinas River originates in the La Panza Mountains of southern San Luis Obispo County and flows northward, joined by several creeks and the Estrella River before crossing over into the Northern Planning Area. The Morro Bay watershed and estuary, south of Big Sur, covers about 48,450 acres, and is one of the last relatively unaltered coastal wetlands along the central and southern California coast.

The Santa Maria, San Antonio, and Santa Ynez watersheds drain to the Pacific Ocean through rivers that originate 10 or more miles inland to the east. The Santa Maria River watershed covers 1,880 square miles, making it the second largest watershed in the Central Coast hydrologic region. The broad, flat Santa Maria valley is protected from flooding by levees and a series of flood control channels and basins. The Santa Ynez River watershed in Santa Barbara County includes Lake Cachuma, the Santa Ynez River and other smaller tributaries within the area.

The San Luis Obispo watershed consists of coastal streams that originate in the hills and mountains southeast of the Santa Lucia Range. The Carrizo Plain, just west of the San Luis Obispo-Kern county line, is a large semi-enclosed alkali ephemeral lake basin traversed by the San Andreas Fault. The Santa Barbara Channel Islands watersheds drain to the Pacific Ocean through streams and minor drainages on each of the islands.

Additional descriptions of these watersheds and the water quality discussion can be found in the Water Quality section.

Groundwater Aquifers

Groundwater resources in the Central Coast Hydrologic Region are supplied by both alluvial and fractured rock aquifers. Alluvial aquifers are composed of sand and gravel or finer grained sediments, with groundwater stored within the voids, or pore space, between the alluvial sediments. Fractured-rock aquifers consist of impermeable granitic, metamorphic, volcanic, and hard sedimentary rocks, with groundwater being stored within cracks, fractures, or other void spaces. The distribution and extent of alluvial and fractured-rock aquifers and water wells vary significantly within the region. A brief description of the aquifers for the region is provided below.

Aquifer Description

Alluvial Aquifers

The Central Coast Hydrologic Region contains 60 DWR Bulletin 118-2003 recognized alluvial groundwater basins and subbasins which underlie approximately 3,700 square miles, or 35 percent of the region. The majority of the groundwater in the region is stored in alluvial aquifers.

Figure CC-4 shows the location of the alluvial groundwater basins and subbasins and Table CC-1 lists the associated names and numbers. The most heavily used groundwater basins in the region include the Salinas Valley, Pajaro Valley, Gilroy-Hollister Valley, Santa Maria Valley, and the Santa Barbara Valley.

PLACEHOLDER Figure CC-4 Alluvial Groundwater Basins and Subbasins within the Central Coast Hydrologic Region

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PLACEHOLDER Table CC-1 Alluvial Groundwater Basins and Subbasins within the Central Coast Hydrologic Region

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The Salinas Valley Groundwater Basin is the largest groundwater basin in the Central Coast Hydrologic Region, encompassing approximately 1,500 square miles. It is composed of 8 subbasins — 180/400-Foot Aquifer, East Side Aquifer, Forebay Aquifer, Upper Valley Aquifer, Paso Robles Area, Seaside Area, Langley Area, and the Corral de Tierra Area. The primary aquifers in the Salinas Valley basin consist of a wide variety of sand, silt, and clay sediments.

Pajaro Valley Groundwater Basin is the second largest groundwater basin in the region, encompassing approximately 120 square miles. The basin's best water-producing units are well-sorted brown to red sands that are medium-grained and weakly-cemented with iron oxide, and interbedded with confining layers of clay and silty clay (USGS, 2007). Beneath this unit there is another formation which consists of poorly consolidated, moderately permeable gravel, sands, silts, and silty clays. Well yields have been reported up to 2,000 gallons per minute.

The Gilroy-Hollister Groundwater Basin covers approximately 29 square miles. The primary groundwater-bearing formation consists of fairly well consolidated clay, silt, and sand with gravel lenses (DWR, 2004). The formation underlies most of the basin and well yields in the aquifers average around 400gpm.

The Santa Maria River Valley Groundwater Basin encompasses approximately 290 square miles. Primary groundwater-bearing formations include unconsolidated alluvium and dune sands consisting of layers of gravel, sand, silt, and clay and range up to 250 feet thick (DWR, 2004). Well yields have been reported up to 2,500 gpm.

The Santa Barbara Groundwater Basin encompasses approximately 10 square miles. Primary groundwater-bearing formations include alluvium consisting of unconsolidated deposits of gravel, sand, silt, and clay with cobbles and boulders with a maximum alluvium thickness up to 500 feet. The alluvium is overlain by unconsolidated marine deposits. The sand, silt, and clay deposits range up to 500 feet thick beneath the City of Santa Barbara and up to 2,000 feet near the Lavigia Fault (DWR, 2004). Well yields have been reported up to 625 gpm.

Fractured-Rock Aquifers

Fractured-rock aquifers are generally found in the mountain and foothill areas adjacent to alluvial groundwater basins. Due to the highly variable nature of the void spaces within fractured-rock aquifers, wells drawing from fractured-rock aquifers tend to have less capacity and less reliability than wells drawing from alluvial aquifers. On average, wells drawing from fractured-rock aquifers yield 10 gpm or less. Although fractured-rock aquifers are less productive compared to alluvial aquifers, they commonly serve as the sole source of water and a critically important water supply for many communities. The majority of the water used in the Central Coast Hydrologic Region is derived from alluvial aquifers; therefore, information related to fractured-rock aquifers in the region was not developed as part of the Update 2013.

More detailed information regarding the aquifers in the Central Coast Hydrologic Region is available online from California Water Plan Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013 and DWR Bulletin 118-2003.

Well Infrastructure and Distribution

Well logs submitted to DWR for water supply wells completed during 1977 through 2010 were used to evaluate the distribution of water wells and the uses of groundwater in the Central Coast Hydrologic Region. DWR does not have well logs for all the wells drilled in the region; and for some well logs, information regarding well location or use is inaccurate, incomplete, ambiguous, or missing. Hence, some well logs could not be used in the current assessment. However, for a regional scale evaluation of well installation and distribution, the quality of the data is considered adequate and informative. The number and distribution of wells in the region are grouped according to their location by county and according to six most common well-use types: domestic, irrigation, public supply, industrial, monitoring, and other. Public supply wells include all wells identified in the well completion report as municipal or public. Wells identified as "other" include a combination of the less common well types, such as stock wells, test wells, or unidentified wells (no information listed on the well log).

Five counties were included in the analysis of well infrastructure for the Central Coast Hydrologic Region. Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties are fully contained within the region and most of San Benito County is also contained within the region, while San Mateo, Santa Clara, and Ventura Counties are only partially contained within the region. Well log data for counties that fall within multiple hydrologic regions were assigned to the hydrologic region containing the majority of alluvial groundwater basins within the county. Well log data for San Mateo and Santa Clara counties are discussed in the Regional Report for the San Francisco Bay Hydrologic Region and well log data for Ventura County are discussed in the Regional Report for the South Coast Hydrologic Region. Well log information listed in Table CC-2 and illustrated in Figure CC-5 show that the distribution and number of wells vary widely by county and by use. The total number of wells installed in the region between 1977 and 2010 is approximately 31,000. In most counties, domestic use wells make up the majority of well logs — about 8,400 is in San Luis Obispo County, followed by about 3,800 in Monterey County, and 2,500 in Santa Cruz County. The small number of well logs in San Benito County (about 1,700) is the result of community water providers in the northern portion of the county for the cities of Gilroy and Hollister, where most of the county's population is located, along with the remote access and sparse population within the other groundwater basins and sub-basins in San Benito County.

PLACEHOLDER Table CC-2 Number of Well Logs by County and Use for the Central Coast Hydrologic Region (1977-2010)

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PLACEHOLDER Figure CC-5 Number of Well Logs by County and Use for the Central Coast Hydrologic Region (1977-2010)

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Figure CC-6 shows that domestic wells make up the majority of well logs (56 percent) for the region while irrigation wells account for about 12 percent of well logs; monitoring wells account for about 16 percent of well logs. Communities with a relatively high percentage of monitoring wells may indicate the presence of groundwater quality monitoring to help characterize groundwater quality issues. Since the region is heavily reliant on groundwater for domestic consumption, groundwater monitoring, as expected, is extensive.

PLACEHOLDER Figure CC-6 Percentage of Well Logs by Use for the Central Coast Hydrologic Region (1977-2010)

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Figure CC-7 shows a cyclic pattern of well installation for the region, with new well construction ranging from about 375 to 1600 wells per year. Multiple factors are known to affect the annual number and type of wells drilled. Some of these factors include annual variations in climate, economy, agricultural cropping trends, or alternative water supply availability.

The large fluctuations in domestic well drilling are likely associated with population growth and residential housing construction. For example, between 2000 and 2010, the number of domestic well logs increased from approximately 250 in 1999 to a high of about 600 by 2003 and the number of domestic well logs continued at that level up to 2005. However, due to the economic downturn, the number declined to approximately 300 by 2008 and to 100 by 2009. As mentioned previously, a portion of the lower number of well logs recorded for the 2007 through 2010 period could be due to late processing of well logs.

The onset of monitoring well installation in the mid- to late-1980s is likely associated with federal underground storage tank programs signed into law in the mid-1980s. The installation of monitoring wells in the region peaked in 1989 at about 300 wells, with an average of about 200 monitoring wells installed per year from 1987 through 1994. From 2000 through 2006, about 300 wells were again installed per year. Since 2007, monitoring well installation in the region has averaged approximately 150 wells per year.

Irrigation well installation is more closely related to climate conditions, cropping trends and surface water supply cutbacks, and as a result more irrigation well records are generally submitted following drought years. However, due to elevated precipitation amounts in the region relative to other regions of the state and relatively shallow groundwater tables, dramatic increases in irrigation well logs after drought years are not apparent.

PLACEHOLDER Figure CC-7 Number of Well Logs Filed per Year by Use for the Central Coast Hydrologic Region (1977-2010)

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More detailed information regarding assumptions and methods of reporting well log information is available online from Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013.

California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization

The Legislature in 2009, as part of a larger package of water-related bills, passed Senate Bill 7x 6 (SBx7 6; Part 2.11 to Division 6 of the California Water Code § 10920 et seq.), requiring that groundwater elevation data be collected in a systematic manner on a statewide basis and be made readily and widely available to the public. DWR was charged with administering the program, which was later named the "California Statewide Groundwater Elevation Monitoring" or "CASGEM" Program. The new legislation requires DWR to identify the current extent of groundwater elevation monitoring within each of the alluvial groundwater basins defined under Bulletin 118-2003. The legislation also requires DWR to prioritize groundwater basins to help identify, evaluate, and determine the need for additional groundwater level monitoring by considering available data. Box CC-1 provides a summary of these data considerations and resulting possible prioritization category of basins. *More detailed information on groundwater basin prioritization is available online from California Water Plan Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013.*

PLACEHOLDER Box CC-1 California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Data Considerations

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Figure CC-8 shows the groundwater basin prioritization for the region. Of the 60 basins within the region, eight basins and subbasins were identified as high priority, 17 as medium priority, one as low priority, and the remaining 34 basins as very low priority. Table CC-3 lists the high, medium, and low CASGEM priority groundwater basins for the region. The eight high priority basins account for about 48 percent of the population and about 45 percent of groundwater supply for the region. The basin prioritization could be a valuable tool to help evaluate, focus, and align limited resources for effective groundwater management, and reliability and sustainability of groundwater resources.

PLACEHOLDER Figure CC-8 CASGEM Groundwater Basin Prioritization for the Central Coast Hydrologic Region

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PLACEHOLDER Table CC-3 CASGEM Groundwater Basin Prioritization for the Central Coast Hydrologic Region

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Central Coast Hydrologic Region Groundwater Monitoring Efforts

Groundwater resource monitoring and evaluation is a key aspect to understanding groundwater conditions, identifying effective resource management strategies, and implementing sustainable resource management practices. California Water Code (§10753.7) requires local agencies seeking State funds administered by DWR to prepare and implement groundwater management plans that include monitoring of groundwater levels, groundwater quality degradation, inelastic land subsidence, and changes in surface water flow and quality that directly affect groundwater levels or quality. This section summarizes some of the groundwater level, groundwater quality, and land subsidence monitoring efforts within the Central Coast Hydrologic Region. Groundwater level monitoring well information includes only active monitoring wells — those wells that have been measured since January 1, 2010. *Additional information regarding the methods, assumptions, and data availability associated with the groundwater monitoring is available online from California Water Plan Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013.*

Groundwater Level Monitoring

A list of the number of monitoring wells in the region by monitoring agencies, cooperators, and CASGEM monitoring entities is provided in Table CC-4. The locations of these monitoring wells by monitoring entity and monitoring well type are shown in Figure CC-9. Table CC-4 shows that a total of 817 wells in the region have been actively monitored for groundwater levels since 2010. The U.S. Geological Survey (USGS) monitors 414 wells in the region. Four cooperators and four CASGEM monitoring entities monitor a combined 403 wells in 13 basins and subbasins. A comparison of Figure CC-8 discussed previously and Figure CC-GW-6 indicate that groundwater basins identified as having high and medium priorities under the CASGEM groundwater basin prioritization have been monitored for groundwater levels.

PLACEHOLDER Table CC-4 Groundwater Level Monitoring Wells by Monitoring Entity in the Central Coast Hydrologic Region

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PLACEHOLDER Figure CC-9 Monitoring Well Location by Agency, Monitoring Cooperator, and CASGEM Monitoring Entity in the Central Coast Hydrologic Region

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The groundwater level monitoring wells are categorized by the type of well use and include domestic, irrigation, observation, public supply, and other. Groundwater level monitoring wells identified as "other" include a combination of the less common well types, such as stock wells, test wells, industrial wells, or unidentified wells (no information listed on the well log). Wells listed as "observation" also include those wells described by drillers in the well logs as "monitoring" wells. Domestic wells are typically relatively shallow and are in the upper portion of the aquifer system, while irrigation wells tend to be deeper and are in the middle-to-deeper portion of the aquifer system. Some observation wells are constructed as a nested or clustered set of dedicated monitoring wells, designed to characterize groundwater conditions at specific and discrete production intervals throughout the aquifer system. Figure CC-10 shows that wells identified as "other" account for approximately 63 percent of the monitoring wells in the region, while observation wells and irrigation wells account for 18 and 12 percent, respectively.

PLACEHOLDER Figure CC-10 Percentage of Monitoring Wells by Use in the Central Coast Hydrologic Region

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Groundwater Quality Monitoring

Groundwater quality monitoring is an important aspect to effective groundwater basin management and is one of the components that are required to be included in groundwater management planning in order for local agencies to be eligible for State funds. Numerous State, federal, and local agencies participate in groundwater quality monitoring efforts throughout California. A number of the existing groundwater quality monitoring efforts were initiated as part of the Groundwater Quality Monitoring Act of 2001, which implemented goals to improve and increase the statewide availability of groundwater quality data. A summary of the larger groundwater quality monitoring efforts and references for additional information are provided below.

Regional and statewide groundwater quality monitoring information and data are available on the SWRCB Groundwater Ambient Monitoring and Assessment (GAMA) Web site and the GeoTracker GAMA groundwater information system developed as part of the Groundwater Quality Monitoring Act of 2001. The GAMA Web site describes GAMA program and provides links to all published GAMA and related reports. The GeoTracker GAMA groundwater information system geographically displays information and includes analytical tools and reporting features to assess groundwater quality. This system currently includes groundwater data from the SWRCB, Regional Water Quality Control Boards (RWQCBs), California Department of Public Health (CDPH), Department of Pesticide Regulation (DPR), DWR, USGS, and Lawrence Livermore National Laboratory (LLNL). In addition to groundwater quality data, GeoTracker GAMA has more than 2.5-million depth to groundwater measurements from the Water Boards and DWR, and also has oil and gas hydraulically fractured well information from the California Division of Oil, Gas, and Geothermal Resources. Table CC-5 provides agency-specific groundwater quality information. Additional information regarding assessment and reporting of groundwater quality information is furnished later in this report.

PLACEHOLDER Table CC-5 Sources of Groundwater Quality Information

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Land Subsidence Monitoring

Land subsidence has been shown to occur in areas experiencing significant declines in groundwater levels. The 2006 Groundwater Management Plan (GWMP) submitted by the Monterey County Resource Management Agency recognizes the potential for land subsidence in Salinas Valley, but due to stable groundwater elevations, the Agency has opted not to monitor subsidence. The 2007 GWMP, submitted by the Soquel Creek Water District, also discusses the potential for land subsidence within the district's groundwater basin boundaries despite there being no anecdotal evidence of such nor any previous formal studies conducted (Soquel, 2007). However, to be in compliance with Senate Bill (SB) 1938, they have elected to monitor the potential for such within the district's groundwater basins.

In the southern portion of the hydrologic region, the Santa Barbara County Water Agency in cooperation with the USGS, is in the process of publishing a report (to be released in 2014) showing subsidence due to groundwater withdrawal in the Cuyama Basin. Results from this monitoring effort are provided later in this report.

In the 2011 GWMP issued by City of Paso Robles and the San Luis Obispo County Flood Control and Water Conservation District, minor land subsidence in the northeast portion of the basin has been documented by the use of Interferometric Synthetic Aperture Radar (InSAR). Since the maximum decline in surface elevation was approximately two inches with a corresponding 60-foot groundwater level decline, no further study after the 1997 report was planned. The GWMP states that no correlation exists in measured land subsidence resulting from groundwater withdrawal from the basin over long periods of time. However, some of the areas with documented subsidence by InSAR analysis do correspond with reduction in groundwater levels during 1997 (PRGAC, 2011).

Ecosystems

Within the Central Coast region, the varied and often unique flora and fauna are supported by ecosystems that reflect the local geology, hydrology, and climate. Distinct ecological sections are represented in the region: the Central California Coast, the Central California Coast Range, and the Southern California Coast, of which only Santa Barbara County is a part. Each of these ecological sections has ecosystems that support diverse, sometimes specialized, assemblages of plants and animals. The Central Coast is home to numerous threatened and endangered wildlife (Box CC-2) (Table CC-6) and plant species (Table CC-7).

PLACEHOLDER Box CC-2 Explanation of Federal and State listed Plant and Wildlife Ranking/Determinations

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PLACEHOLDER Table CC-6 Critical Wildlife Species List for the Central Coast

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PLACEHOLDER Table CC-7 Critical Plant Species List for the Central Coast

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Watersheds in the Northern Planning Area are variable in habitat, climate, and geology. The Santa Cruz Mountains bioregion supports redwood and Douglas fir forests, Coast live oak, chaparral and manzanita shrub lands, coyote brush, and native California grasses. Unique to the area are plant communities such as sand hills and sand parklands. The northern Santa Cruz County planning region includes the southernmost range for coho salmon, and contains three of the five streams where these fish occur south of San Francisco. Santa Cruz County watersheds also support populations of steelhead trout and the California red-legged frog.

The ecological subsection of Watsonville Plain-Salinas Valley contains the Pajaro and Salinas rivers, and the Elkhorn Slough. The landscape is predominantly alluvial plain, covered with stream-derived, rich soils. Woodlands contain Valley and Coast live oak, and riparian areas have scattered stands of cottonwood and willow. Elkhorn Slough harbors one of the largest tracts of tidal salt marsh in California. This ecological area provides much-needed habitat for hundreds of species of plants and animals, including more than 340 species of birds. More than 7,000 acres of protected lands are in the Elkhorn Slough watershed. Moss Landing Wildlife Area is in Monterey County adjacent to Elkhorn Slough. There are 728 acres of salt ponds and salt marsh just north of Monterey. This is part of the largest unaltered salt marsh along the California coast.

The Salinas River watershed’s riparian habitat occurs along narrow strands along the banks of the Salinas River but rarely exists as extensive, mature stands. Over time, the riparian habitat has been reduced and fragmented by agricultural conversion, urban development, grazing, and flood control activities. Tributaries to the Salinas River provide natural habitat for steelhead trout.

The Santa Lucia Range contains canyons populated by Douglas fir, redwood, oaks and mixed conifers, California sagebrush, chaparral, and manzanita shrubs.

Watersheds in the Southern Planning Area in San Luis Obispo and Santa Barbara counties support a wide variety of landscapes populated by coastal chaparral, Valley, Coast live, and Blue oaks, mixed conifers, willows, sycamores, manzanita, and grasslands. Semiarid mountains, serpentine habitats, grasslands, juniper and oak woodlands provide habitat and migration corridors for a wide variety of native species.

The Carrizo Plain, east of the Cuyama River and the Caliente Range, contains 250,000 acres of native California grasslands — the largest single native grassland remaining in California. The plain's ecosystem supports the largest concentration of endangered animal species in California.

Santa Barbara County is located at a point of transition between the Southern California and Northern California ecozones and is characterized by rare plant assemblages. More than 1,400 plant and animal species are found in the county. Several salt marshes occur in Santa Barbara County and provide habitat for a number of estuarine invertebrates and fish, migratory birds, and rare and endangered animal species.

Flood

Slow-rise flooding is the overwhelmingly predominant type of flood in the Central Coast Hydrologic Region. Debris flows occur in most major storms, particularly when forest fires of the previous season have damaged vegetation. Tsunamis are infrequent but have been known to cause major devastation. Flash floods and coastal flooding also cause damage at times, and stormwater and structure failures occasionally occur. Flood damage has been observed in the Central Coast Hydrologic Region since at least 1861.

The region was included in a statewide inundation identified as "The Great Flood" in 1861-1862. During the Great Flood, the narrow coastal plains in Santa Barbara County were flooded. In San Luis Obispo County, many creeks overflowed, including Villa, Cayucos, Morro, Little Morro, Chorro, Los Osos, and San Simeon creeks. Up to 4 feet of floodwater was sustained in downtown San Luis Obispo, and widespread flooding damaged 142 homes, 110 businesses, 16 bridges, 1,800 acres of agricultural land, and many schools, parks, and other public properties, as well as utility and rail lines.

In 1937, Llagas Creek overflowed and damaged the Gilroy-Morgan Hill-San Martin area. There was regional inundation in February and March of 1938, and damages totaled $1.2 million. The December 1955 flood inundated 14,400 acres in the northern portion of the Central Coastal Hydrologic Region and caused $16 million in damage. In March and April of 1958, the Pajaro River severely eroded its levees, and the Carmel River flooded adjacent lands near State Highway 1. In December 1966 through January 1967, in the Salinas Valley, the Salinas River overflowed and damaged farmlands, industry, and to a lesser extent public facilities, businesses, homes, and its own banks. One life was lost, about 32,000 acres of agricultural lands were flooded, and USACE estimated $6.1 million in damages, approximately $1.1 million of which were in Santa Barbara County.

In January and February of 1969, a series of Pacific storms brought widespread damage to central and southern California. In the Central Coast Hydrologic Region, damage was most severe in the Salinas River and Santa Ynez River basins and in the Carpinteria-Montecito area. In January, both sides of the Salinas River flooded from San Ardo to Spreckels, destroying roads and bridges, flooding sewage treatment plants, and eroding farmland. The Carmel River overflowed and washed out a local bridge. In San Luis Obispo, businesses were damaged heavily when San Luis Obispo Creek became clogged with debris and overflowed. The Santa Maria River flooded lowlands west of Santa Maria. There was heavy damage at Lompoc, Solvang, and Vandenberg Air Force Base when the Santa Ynez River overflowed. Santa Monica, Franklin, and San Ysidro Creeks overflowed, causing heavy sedimentation and flood damage in Montecito and Carpinteria. Santa Ynez River flooding damaged Lompoc and Solvang extensively and inundated 4,000 acres of farmland.

In January-February of 1978, damage to homes and infrastructure occurred in San Luis Obispo County, notably in Corbit Canyon, where 20 homes were damaged, and on Arroyo Grande Creek. Damage also occurred on Pismo, Suey, Tar Spring, Prefumo, and Davenport creeks. In Santa Barbara County, erosion and deposition damaged channels and farmland along the Santa Maria River and other streams of the region. A flash flood washed away nine buildings, damaged infrastructure, and left debris deposits in Hidden Springs. Damage to roads, bridges, and farmland was extensive along the Cuyama River. In Santa Barbara County, San Antonio Creek damaged floodworks at Los Alamos and farmland elsewhere. Agricultural areas, parks, and infrastructure were damaged by flooding from the Santa Ynez River, notably at Lompoc. Landslides blocked Mission Creek causing an overflow that damaged Santa Barbara streets and an apartment building. Further damage occurred on San Ysidro, Romero, San Pedro, Atascadero, Tecolotito, Carneros, Gobernador, and Santa Monica creeks and Arroyo Paredo.

In January 1982, mudslides in the San Lorenzo basin destroyed 39 homes and damaged nearly 400 more, particularly in Felton, Ben Lomond, Brookdale, Lompico, and Boulder Creek. The San Lorenzo River washed out a bridge in Santa Cruz, damaging three main telephone cables, and a tributary ruptured a 24-inch water main serving the city. Local streams overflowed in Soquel and Aptos, damaging homes, businesses, and infrastructure. The Pajaro River inundated part of Watsonville and adjacent agricultural land. The Salinas River flooded residences along U.S. Highway 101 north of Salinas. In the Gilroy area, Llagas Creek breached levees of 10 sewage percolation ponds, and mudslides and washouts closed U.S. Highway 101 and State Highways 129 and 152.   A list of major flood events in the Central Coast Hydrologic Region is the California's Flood Future Report Attachment C: Flood History of California Technical Memorandum.

Climate

The Central Coast region has a temperate Mediterranean climate characterized by mild, wet winters and warm, dry summers. West of the Coast Range, the climate is dominated by the Pacific Ocean, characterized by small daily and seasonal temperature changes, and high relative humidity. As distance from the ocean increases, the maritime influence decreases, resulting in a more continental type of climate that generates warmer summers, colder winters, greater daily and seasonal temperature ranges, and lower relative humidity. For example, on a summer day, the maritime influence on climate can be felt by traveling from Cambria to Shandon.

Microclimates are prevalent throughout the region, where the local topography and geography creates pockets of climate that are distinct from the surrounding area. Microclimates are beneficial, if not crucial, to the region's agriculture and viticulture, providing both warm and cool environments for a broad spectrum of specialty crops such as wine grapes, fruits, nuts, and vegetables. The vineyard-growing areas throughout the region generally have summers that are long and cool due to the influence of the ocean. High-quality wine grapes thrive in this environment with moderate climate all summer, foggy mornings, bright sunshine through the afternoon, and very windy afternoons and early evenings.

Between 2008 and 2012, the average annual precipitation — usually rain — in the region ranged from about 11 to 36 inches. Most of the rain occurs between late November and mid-April, with the mountain areas receiving more rainfall than the valley floors.

Demographics

Population

The Central Coast Hydrologic Region had a population of 1.53 million people in the 2010 census. The three largest cities are Salinas, Santa Maria, and Santa Barbara. The region had a growth rate of 2.59 percent between 2006 and 2010 (39,587 people). In 2012, the Central Coast Hydrologic Region had an estimated 1.53 million people (Table CC-8). The population of the Central Coast is projected to increase by about 20% by 2050 (Table CC-9).

PLACEHOLDER Table CC-8 Population Estimates for the Central Coast from 2000 to 2010

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Table CC-9 Population Estimates and Decadal Projections for the Central Coast

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Tribal Communities

Tribes with historic or cultural ties to the Central Coast region are primarily different bands of the Chumash, Esselen, Ohlone, and Coastanoan (previously referred to collectively as the Mission Indians). These bands include the following: Amah Mutsun Tribal Band, Amah Mutsun Band of Ohlone/Coastanoan, Coastal Band of Chumash, Santa Ynez Band of Chumash, Coastanoan Ohlone Rumsen-Mutsen, Indian Canyon Nation of Costanoan People, Northern Chumash Tribal Council, Ohlone/Coastanoan-Esselen Nation, Ohlone Tribe, and the Salinan Tribe (of Monterey, San Luis Obispo, and San Benito Counties).

Currently, tribal landholdings in this region include the Ohlone-Costanoan Indian Canyon community, near Hollister in San Benito County, and the 137-acre Santa Ynez Indian Reservation, located in Santa Barbara County, under the jurisdiction of the Santa Ynez Band of Chumash Indians. A resort casino was added to the reservation in 2004 and is a major source of tourism to the Santa Ynez Valley area.

The Santa Ynez Chumash Environmental Office (SYCEO) actively manages and maintains a portion of Zanja de Cota Creek and its tributaries as part of the Tribe's Water Pollution Control Program (WPCP). Under this program, the tribe conducts surface and groundwater quality monitoring, riparian habitat assessments, and biological assessments to assist with identifying potential pollution sources and invasive species removal. The SYCEO is currently developing a Tribal Fish, Wildlife, and Habitat Management Plan as well as an Integrated Resource Management Plan for conserving and protecting natural resources on Tribal lands. The SYCEO leads activities and workshops during the Culture Department's annual Camp Kalawa Shaq to teach the Chumash youth the importance of waste reduction, pollution prevention, and natural resource protection. The Santa Ynez Chumash Tribe is working with several federal, State, and local agencies plus non-profit organizations to ensure the success of these and its other environmental programs.

Disadvantaged Communities

Like the rest of California, many small agricultural communities in the Central Coast are considered disadvantaged communities (DAC) (Table CC-10). These are communities where the Median Household

Income (MHI) is less than 80% of the statewide MHI, which for 2006-2010 is $60,883. Therefore, a DAC MHI is less than $48,706.

For the Central Coast, many disadvantaged communities are population centers for Spanish-speaking workers associated with seasonal and year-round labor-intensive agricultural production. According to a population study (Reed, 2006), the regions of California with the highest percentage of population living in poverty were the San Joaquin Valley and Central Coast- two regions that rely heavily on agricultural production and farm labor.

PLACEHOLDER Table CC-10 Disadvantaged Communities within the Central Coast

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Land Use Patterns

The varied topography of the Central Coast region and its distance from California's major population centers results in a landscape that is primarily pastoral and agricultural. Major economic activities include tourism, agriculture and agriculture-related processing, universities and education, government and service-sector employment.

Federal lands in the region total more than 2 million acres and include Los Padres National Forest, Pinnacles National Park, Channel Islands National Park, Carrizo Plain National Monument, Monterey Bay National Marine Sanctuary, Fort Ord National Monument, Guadalupe-Nipomo Dunes National Wildlife Refuge, and the Salinas River National Wildlife Refuge. Military installations include Vandenberg Air Force Base, Fort Liggett, Camp Roberts, Camp San Luis Obispo, and Presidio of Monterey. State facilities include University of California at Santa Cruz, California Polytechnic State University San Luis Obispo, California State University Monterey, and nearly 60 parks, beaches, and monuments. The region's economy benefits greatly from its parks, beaches, and forests, which draw millions of visitors each year.

Agriculture is the backbone of the Central Coast, contributing around $6.3 billion in gross agricultural production value to the regional economy in 2011, not including wine production. The climate, microclimates, and rich soils allow for specialty food and nursery crops as well as range pasture and dry-farmed grain. Between 2005 and 2009, the annual average acreage of all crops was about 661,000 acres, and the average acreage of irrigated crops was approximately 447,000 acres (DWR, Land and Water Use estimates). Top crops for the Central Coast region include strawberries, lettuce, and wine grapes, yet each county in the region produces a wide variety of produce and products. See Figures CC-11 through CC-16 for more information on crops grown in the region.

PLACEHOLDER Figure CC-11 Central Coast Strawberry Production

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-12 Central Coast Total Vegetables and Row Crops

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-13 Central Coast Total Fruit and Nuts

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-14 Central Coast Total Nursery

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-15 Central Coast Total Livestock

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-16 Central Coast Acres of Wine Grapes over Time

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

The conversion of farmland to non-agricultural use in the Central Coast region varied from county to county, and resulted in a net loss of about 5,591 acres of farmland, from 2008 to 2010. Farmland includes *Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance*, and *Grazing*. Data from http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx.

Northern Planning Area

Northern Santa Cruz County is dominated by residential land use, including rural and mountain residential zoning, timber production, open space, agriculture, and a mix of commercial and special districts. The lower portions of the watersheds, close to Monterey Bay, are more urbanized with residential, commercial, and light industrial land use. Upper watershed land use consists predominantly of rural residential, timber production, open space, some mining, and limited agriculture. On the northern coastline, the coastal terraces are used for agriculture and grazing. Santa Cruz County is economically dependent upon tourism, recreation, and the UC Santa Cruz campus. Agriculture is the county's second largest industry, with a gross production value of $566 million in 2011.

Southern Santa Cruz County, including Watsonville Sloughs, is a productive agricultural district yielding strawberries, raspberries, landscape plants, flowers, and vegetables. Coastal agriculture includes brussel sprouts, strawberries, lettuce, and other specialty crops.

Monterey County has the highest density areas of urban development, clustered near Monterey Bay. Along the Salinas River are several urban and residential centers, including the City of Salinas. The gross agricultural production value of Monterey County in 2011 was $3.85 billion. The predominant land use in the Salinas Valley is agriculture and rangeland, with discrete areas of urban development in the cities and towns along the Salinas River. Near Seaside, more than 1,300 acres of the former military installation Fort Ord have been redeveloped into California State University, Monterey Bay.

The Monterey Peninsula and its surrounding areas are composed of a wide range of land uses that serve residential, commercial, industrial, recreational, and open space uses. Urban development is concentrated primarily in the coastal cities. Outside of the cities, low- to rural-density residential areas dominate. Land use in the 255-square mile Carmel River watershed includes wilderness, viticulture, grazing, recreation (golf courses and park areas), and sparse residential, suburban, commercial, and light industrial. Very little of the watershed is in traditional agricultural use. Resource conservation represents another important land use throughout the region, with parts of the planning area including the Ventana Wilderness and Los Padres National Forest.

Santa Clara and San Benito county land use includes agricultural, rural residential, and urban. In San Benito County, the gross agricultural production value of 2011 was $263 million, and for 2010, the gross agricultural production value of Santa Clara County was $266 million.

As of 2011, the Northern Planning Area currently devotes more than 47,300 acres to growing wine grapes.

Southern Planning Area

The southern Central Coast is primarily pastoral and agricultural with scattered population clusters developed on coastal terraces and interior lowlands and valleys. Agriculture in the region has grown significantly in the last several years, thanks largely to vineyard expansions. As of 2012, about 58,000 active vineyard acres support about 280 wineries in the Southern Planning Area.

Agriculture comprises two-thirds of the land use in San Luis Obispo County with the majority of this acreage used for livestock grazing. The gross value of agricultural production in 2011 was $736 million Active vineyards cover about 38,000 acres of the county; other land uses include rural lands, open space, and residential, commercial, and urban uses.

Major land use in Santa Barbara County includes agricultural preserves (land zoned for 100-acre or greater lot size) or other agriculturally zoned land. Less than 3 percent of the county is within incorporated cities, and 2 percent is within unincorporated urban areas. The value of agricultural production in 2011 was $1.2 billion. As of 2012, the county has more than 20,000 active vineyard acres, generating more than $100 million annually in wine grapes. Oil production continues offshore, but onshore production continues to decline.

Regional Resource Management Conditions

Water in the Environment

The California Department of Fish and Wildlife has identified the following water-related needs for the Central Coast Hydrologic Region:

- Restoration projects that facilitate the improvement of aquatic habitat, including deep and shallow open water;
- Acquisition of conservation easements on lands;

- Protect or restore fish habitat through the improvement of fish passage conditions, gravel augmentation, hydrology, fish screens, min/max flow, etc…;
- Restoration of floodplain process, including hydrodynamic process, to benefit listed species;
- Development, collection and publication of instream flow data, including recommended instream flow levels and minimum instream flow requirements;
- Prevent or reduce negative impacts from invasive non-native species including those associated with water supply and conveyance projects such as quagga and zebra mussels, egeria densa, water hyacinth, and others;
- Improvements in the coordination, management and implementation of groundwater management;
- Development, collection and publication of instream flow data, including recommended instream flow levels and minimum instream flow requirements;
- Restoration or modification to allow for a more natural regime of hydrology and hydraulics;
- Restoration projects that facilitate the increase of populations and improvement of habitat for salmon, especially Coho;
- Restoration of riparian habitat, including conservation of riparian corridors;
- Restoration of upland plant communities;
- Water quality improvements (sediment, oxygen saturation, pollution, temperature, etc…) to support healthy ecosystems;
- Improvements in coordination, management and implementation of watersheds;
- And, restoration projects that will improve upon existing wetlands, or create new wetlands in appropriate areas

The Central California Coast Coho Salmon Recovery Plan (2012), released by the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, is currently a major driver of coastal water policy and projects for the entire Central Coast hydrologic region.

Northern Planning Area

Santa Cruz

The amount of water for the environment in the Santa Cruz IRWM region is determined by water rights, diversions, and recent studies completed to support the recovery of coho salmon and steelhead trout.

The San Lorenzo River is the largest surface water supply for the Santa Cruz region. The San Lorenzo River Watershed Management Plan, adopted in 1979, established minimum streamflow requirements for salmonid migration, spawning, and rearing. More recently, the City of Santa Cruz Water Department began negotiations with the California Department of Fish and Wildlife and the National Marine Fisheries Service to develop a habitat conservation plan (HCP) to minimize adverse impacts to aquatic habitat from its water supply facilities operations. The HCP contains in-stream flow targets for the City's diversion points, for five different hydrologic year types.

In-stream flow requirements for Soquel Creek (to sustain fish) maintain 15 cfs or the natural flow from December 1 to June 1, and 4 cfs or the natural flow from June 1 to December 1.

The National Oceanic and Atmospheric Administration (NOAA) Fisheries Service recently released the Central California Coast Coho Salmon Recovery Plan, which recommends that recovery efforts in Santa Cruz focus first on Scott and San Vicente Creeks by improving flow conditions.

Pajaro River Watershed

The water for the environment in the Pajaro River watershed is determined by water rights in the region and the requirement to maintain sufficient flows to support marine fisheries. The Pajaro River drains into the Monterey Bay Marine Sanctuary and adequate flows are necessary to maintain the health of fisheries. Recently two projects have been implemented in the region to support environmental water needs. The South County Resources Management Program and the Corrralitos Creek Surface Fisheries Enhancement Project aim to maintain sufficient water flows to support fish populations.

Greater Monterey

In general, the environmental water needs for the Greater Monterey County IRWM planning region need quantification, especially for the following areas:

1. Rivers and streams that provide habitat, or potential habitat, for steelhead and other special status aquatic species. Critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast, including Big Sur River, Little Sur River, San Carpoforo and Arroyo de la Cruz Creeks, and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries.
2. Significant wetlands and estuaries such as Elkhorn Slough and Tembladero Slough; and
3. Protected coastal waters such as the federally protected Monterey Bay National Marine Sanctuary (MBNMS), which encompasses four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA). Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS). Notably, one of the main environmental water uses in the region is for the 366-acre Salinas River National Wildlife Refuge, where the Salinas River empties into Monterey Bay.

The California Department of Fish and Wildlife (DFW) developed Streamflow Recommendations for rivers and streams throughout the state, and the Big Sur River was assigned a high priority for future instream flow studies.

Efforts to maintain water for the environment include the Monterey County Water Resources Agency's water releases from the San Antonio and Nacimiento reservoirs in routine, seasonal conservation releases to maintain flows on the Salinas River and recharge the river basin. Annual instream flow requirements for the Nacimiento River below the Nacimiento Dam are 18,099 acre-feet. In addition, segments of the Big Sur River are part of the national Wild and Scenic River system, and the North Fork and South Fork segments have unimpaired runoff from their headwaters to their confluence at the boundary of the Ventana Wilderness in Los Padres National Forest in Monterey County.

Monterey Peninsula, Carmel Bay, and South Monterey Bay

Environmental water use within the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Region centers on the Carmel River and its tributaries. The Carmel River, below the San Clemente Dam and Reservoir, has an annual minimum instream flow of 3,620 acre-feet. This year, however, the removal of San Clemente Dam has begun and complete removal is scheduled to be finished by the end of 2015. The removal of the dam will aid in restoration of the lower Carmel River, which will include providing renewed unimpaired access to 25 miles of spawning and rearing habitat for the threatened South-Central California Coast steelhead.

Southern Planning Area

San Luis Obispo

The San Luis Obispo IRWM region is organized into 16 Water Planning Areas (WPAs.) For this region, the federally protected species South-Central California Coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species to develop regional Environmental Water Demands, as shown in the table below (Table CC-11):

PLACEHOLDER Table CC-11 Environmental Water Demands, San Luis Obispo IRWM

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A Habitat Conservation Plan for the upper watershed of the Arroyo Grande Creek calls for modified stream releases from Lopez Reservoir into the creek, with the intention of partially restoring and enhancing the habitat of steelhead trout and red-legged frogs.

Santa Barbara Countywide

Segments of the Sisquoc River (mostly within the San Rafael Wilderness) are designated as part of the national Wild and Scenic River system, which results in unimpaired runoff along a 33-mile stretch. Populations of fish exist in the upper reaches of the River.

Cachuma Reservoir, on the Santa Ynez River, is the main water supply for southern Santa Barbara County. Operations procedures endeavor to accommodate fish within the Santa Ynez River, and include surcharge of Cachuma Reservoir for a fish “pool” with specific protocol for releases, ramping, and water temperature to support fish.

In addition, ephemeral creeks along the south coast experience periods of continuous flow to the ocean.

Water Supplies

In California, both water supply and land-use planning are local responsibilities of utilities and city and county governments. Given its limited desire for and access to imported water, local groundwater and surface water provides most of the Central Coast supply. For 2010, imported water for the Northern Planning Area includes 60,000 AF of Central Valley Project and about 23,700 AF of State Water Project; imported water for the Southern Planning Area includes about 22,400 AF of SWP. See Figure CC-17 for an overview of the flow of water in the region.

PLACEHOLDER Figure CC-17 Central Coast Regional Inflows and Outflows in 2010

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Northern Planning Area

Santa Cruz

For the Santa Cruz area, streams and groundwater provide all of the supply for agricultural users, residential, municipal, and industrial. In 2010, the Santa Cruz Region used approximately 35,000 AF. Seventy-eight percent of this supply was groundwater, 21% came from surface water and less than 2% came from recycled wastewater.

The City of Santa Cruz Water Department obtains surface water from the San Lorenzo watershed, with diversions from the San Lorenzo River, Liddell Spring, several creeks, Loch Lomond reservoir, and groundwater from the Live Oak Wells. The San Lorenzo Valley Water District utilizes surface water diversions first and then groundwater obtained from the Santa Margarita and Lompico Sandstone aquifers. Soquel Creek Water District and Central Water District rely entirely on groundwater from the Purisima Formation and Aromas Formation aquifers. Lompico County Water District supply is obtained from the Santa Margarita and Monterey aquifers as well as Lompico Creek. The supplies for Davenport County Sanitation District are surface water diversions from Mill Creek and San Vicente Creek. Otherwise, small drinking water systems rely mostly upon groundwater.

There are two major groundwater basins recognized in the Santa Cruz IRWM region - the Santa Margarita and Soquel-Aptos. The Santa Margarita Basin, in the San Lorenzo River watershed, is a sequence of Tertiary-age sandstone, siltstone, and shale. A 2006 groundwater model calculates a sustainable yield of about 3,320 AFY for the basin. Although current pumping rates are less than the modeled sustainable yield, groundwater levels still appear to be declining in the Scotts Valley area sub-basins. The Soquel -Aptos Basin consists of the Purisima Formation, a Tertiary sandstone, and the Aromas Formation, a younger unconsolidated sandstone. The Purisima extends at depth beneath the Pajaro Valley, and the overlying Aromas serves as the main water-bearing aquifer in the Pajaro Valley. Sustainable yield of the Purisima is estimated to be less than 5,700 AFY, while groundwater production over the past 5-years is estimated by the Santa Cruz County Water Resources to have averaged about 5,900 AFY.

Because the Purisima and Aromas Formations extend offshore beneath Monterey Bay, the aquifers are in hydrologic connection with the Pacific Ocean. Consequently, overdraft of the basin has the potential to pull seawater into the aquifer beneath the inland areas. Groundwater levels are currently below the elevations determined to be necessary to prevent seawater intrusion. The Soquel Creek Water District has determined that it needs to reduce pumping by 1500 AFY for 20 years in order for groundwater levels to recover to safe levels in the Soquel-Aptos basin.

Ben Lomond Mountain provides a limited source of groundwater, and the Summit Area has limited groundwater as well, with many homes relying on trucked water for supply during dry parts of the year.

Water supply reliability for both agriculture and municipal use is a concern in the Watsonville area. Due to seawater intrusion, some coastal wells have become too brackish for domestic or agricultural use. Groundwater is the primary source of agricultural water supply, supplemented by recycled water and surface water that has been captured and recharged to the groundwater basin.

Pajaro River Watershed

The Pajaro River watershed is reliant on groundwater supplies which have been affected by both seawater intrusion and overdraft. The quality and quantity of groundwater supplies varies throughout the region. In the region about 90% of water demand comes from agriculture, which also affects groundwater quality due to irrigation run-off and percolation.

Portions of San Benito and Santa Clara Counties rely on imported water from the Central Valley Project and State Water Project from the San Luis Reservoir, as well as, groundwater, recycled water, and local surface water. Both Santa Clara Valley Water District and San Benito County Water District have conjunctive use programs. Uvas and Hernandez reservoirs are important for conjunctive use operations in Santa Clara and San Benito counties, respectively.

Greater Monterey

Groundwater is the main source of water for most of the Greater Monterey County IRWM planning region; however, residents along the Big Sur coast depend entirely on surface water and shallow wells for their water supply, and residents near Greenfield in the Salinas Valley have a diversion from the Arroyo Seco River. The Greater Monterey County IRWM region receives no imported water.

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 but do not contain barriers to horizontal flow. The Upper Valley, Arroyo Seco and Forebay subareas are unconfined and in direct hydraulic connection with the Salinas River.

Groundwater recharge in the Salinas Valley is principally from the Salinas River, Arroyo Seco, 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. Deep percolation of applied irrigation water is the second largest component of the groundwater budget.

Other groundwater basins in the Greater Monterey County IRWM region include a portion of the Pajaro Valley Groundwater Basin in the north and Lockwood Valley, Cholame Valley, and Peach Tree Valley basins in the south. As well, approximately one quarter of the Paso Robles Groundwater Basin lies within the Greater Monterey County IRWM region, with the remainder residing in the San Luis Obispo IRWM region.

Monterey Peninsula, Carmel Bay, South Monterey Bay

For part of coastal Monterey, nearly all of the water supply comes from the Carmel River and groundwater in the Carmel Valley aquifer, which underlies the alluvial portion of the Carmel River downstream of the San Clemente Dam, and groundwater in the coastal subareas of the Seaside Groundwater Basins. About 70 to 80 percent of the surface runoff in the Carmel River watershed is from rainfall within the Los Padres National Forest and Ventana Wilderness.

Hydrological investigations have shown that the Seaside Groundwater Basin can sustainably yield about 3,000 acre-feet of water annually, before being degraded by seawater intrusion. However, between 1995 and 2006, California American (Cal-Am) Water Company, the major water supplier in the Monterey area, pumped on average 4,000 acre-feet per year from the coastal area of the Seaside Basin and 700 acre-feet per year from the Laguna Seca area. Adjudication of the basin in 2006 called for reductions in pumping from the Seaside Basin, likely at a rate of 10% reduction (520 AF) every three years until year 2021. In 2009, the State Water Resources Control Board, Division of Water Rights issued a Cease and Desist Order to Cal-Am, , to reduce its water diversion from the Carmel River by 70% by 2017. Due to these significant water supply reductions, a significant portion of Cal-Am's water supply for the Monterey Peninsula must be replaced with water from new sources (Monterey Peninsula Water Management District, 2011).

Several regional projects are under consideration for the replacement water supply project: groundwater replenishment project for the Seaside groundwater basin; regional desal facility; and small strormwater capture and reuse for Pacific Grove.

Southern Planning Area

Water supplies for the area include groundwater, surface water, imported State Water Project water via the Coastal Branch Aqueduct, and recycled water. The State Water Project can deliver up to 70,500 acre-feet per year into San Luis Obispo and Santa Barbara counties. Water supplies also are enhanced by conjunctive use of surface and groundwater supplies, as well as cloud seeding.

Groundwater is an important source of water supply to the region; 28 groundwater basins underlie the southern part the Central Coast region. Groundwater beneath large extensive alluvial valleys — such as the Salinas, Paso Robles, and Santa Maria valleys — occurs in thick and sometimes confined aquifers. In contrast, groundwater underlying smaller valleys — such as Huasna Valley inland and the San Simeon, Cayucos, and Morro valleys along the coast — occurs in thinner, unconfined aquifers.

USBR projects in the area include the Santa Maria Project and the Cachuma Project. The Santa Maria Project constructed Twitchell Dam and Reservoir in by 1958 for water conservation and flood control. Twitchell Reservoir stores floodwaters of the Cuyama River, which are released as needed to recharge the groundwater basins in the Santa Maria Valley; this prevents salt water intrusion and also provides full and supplemental irrigation water to approximately 35,000 acres of cropland. The objective of the project is to release regulated water from storage as quickly as it can be percolated into the Santa Maria Valley ground-water basin.

The Cachuma Project, constructed by 1956, consists of dams, reservoirs, tunnels and conveyances. Bradbury Dam stores floodwaters of the Santa Ynez River which are eventually routed to croplands and municipal users of Goleta, Montecito, Summerland, Carpinteria, and the city of Santa Barbara.

Whale Rock Reservoir, owned by the Whale Rock Commission, and the USACE's Santa Margarita Lake both provide water to the city of San Luis Obispo and surrounding communities.

Lake Nacimiento, a reservoir built by the Monterey County Water Authority in San Luis Obispo County, was completed in 1961 and has provided water supplies for agriculture in Monterey County, mitigation of salt water intrusion in the lower Salinas Valley, and urban demands in San Luis Obispo County. San Luis Obispo County, since 1959, has an annual entitlement of 17,500 AF of water from Lake Nacimiento.

Conjunctive use of surface water and groundwater is a long-standing practice in the region. San Luis Obispo County obtains nearly 80 percent of its water from groundwater supplies and about 20 percent from reservoirs and other sources.

The Santa Ynez River Basin is the largest drainage system wholly located in Santa Barbara County, draining about 40 percent of the mainland part of the county. It is the primary source of water for about two-thirds of Santa Barbara County residents. Three dams have been constructed on the river to store and divert water to the south county (Cachuma, Gibraltar, and Jameson).

Surface water supplies are an important part of the regional water supply. Lake Cachuma on the Santa Ynez River and Gibraltar Reservoir provide the majority of the south coast's water supply annually. Twitchell Reservoir on the Cuyama River is important to both the water supply and the flood protection of the Santa Maria Valley; the reservoir supplies recharge to the Santa Maria Groundwater Basin.

San Luis Obispo

The City of Morro Bay operates the only desalination plant in the SLO region. In the past, Morro Bay has used the salt water reverse osmosis (SWRO) treatment plant to treat water from saltwater wells and to remove nitrates from fresh water wells. Recently, two 450 gallons per minute (gpm) brackish water reverse osmosis (BWRO) treatment trains were installed, enabling the facility to treat both fresh water and salt water wells simultaneously. The SWRO plant is designed to produce approximately 645 AFY of potable water from seawater. The BWRO system capacity is about 581 AF of Morro Basin groundwater extracted by permit. Operation and maintenance costs are estimated to be about $1,700 per AF, but with possible installation of energy recovery equipment, costs would drop to $1,100 -$1,300 per AF range.

<u>Recycled Water</u>

The City of San Luis Obispo currently delivers 135 AFY to nearby golf courses, schools and commercial establishments, with expectations of increasing recycled water deliveries to 1,000 AFY. The City must also maintain discharge to San Luis Obispo Creek, and this flow amounts to approximately 1,800 AFY. Other water recycling projects in the County include:

- Nipomo CSD (Black Lake WWTP, Southland WWTP)
- California Men's Colony (Dairy Creek Golf Course)
- Templeton CSD (Meadowbrook WWTP/recharge Salinas River underflow)
- City of Atascadero WRF (Chalk Mountain Golf Course)
- Rural Water Company (Cypress Ridge Golf Course)
- Woodlands MWC (Monarch Dunes Golf Course)

Santa Barbara

Water supplies include groundwater, surface water in reservoirs, and imported State Water Project. The City of Santa Barbara also constructed a desalination plant which may be utilized at some time in the future, but remains in "moth balled" state. Other sources include recycled water, cloud seeding, and an aggressive local and regional water conservation program. Table CC-12 shows the different water sources for the seventeen water service districts in Santa Barbara County.

PLACEHOLDER Table CC-12 Santa Barbara Countywide IRWM Water Supplies

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Groundwater

The amount and timing of groundwater extraction, along with the location and type of its use, are fundamental components for building a groundwater basin budget and identifying effective options for groundwater management. Although some types of groundwater extractions are reported for some California basins, the majority of groundwater pumpers are not required to monitor, meter, or publicly record their annual groundwater extraction amounts. Groundwater supply estimates furnished herein are based on water supply and balance information derived from DWR land use surveys, and from groundwater supply information voluntarily provided to DWR by water purveyors or other State agencies.

Groundwater supply is reported by water year (October 1 through September 30) and categorized according to agriculture, urban, and managed wetland uses. The associated information is presented by planning area (PA), county, and by the type of use. Reference to total water supply represents the sum of surface water and groundwater supplies in the region, and does not take into account local reuse.

2005-2010 Average Annual Groundwater Supply and Trend

Water uses in the region are met through a combination of local river supplies, reservoir storage, imported surface water, local groundwater extraction, and recycled water supply. Table CC-13 provides the 2005-2010 average annual groundwater supply by PA and by type of use, while Figure CC-18 depicts the PA locations and the associated 2005-2010 groundwater supply in the region. The estimated average annual 2005-2010 total water supply for the region is 1,294 TAF. Out of the 1,294 TAF total supply, groundwater supply is 1,117 TAF and represents about 86 percent of the region's total water supply. Although groundwater extraction in the region accounts for only about 7 percent of California's 2005 - 2010 average annual groundwater supply; it meets 91 percent (906 TAF) of the agricultural water use and 72 percent (211 TAF) of the urban water use in the region. No groundwater resources are used for meeting managed wetland uses in the region.

PLACEHOLDER Table CC-13 Central Coast Hydrologic Region Average Annual Groundwater Supply by Planning Area and by Type of Use (2005-2010)

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-18 Contribution of Groundwater to the Central Coast Hydrologic Region Water Supply by Planning Are (2005-2010)

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Regional totals for groundwater based on county area will vary from the PA estimates shown in Table CC-13 because county boundaries do not necessarily align with PA or hydrologic region boundaries. The Central Coast Hydrologic Region includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties, most of San Benito County, and small portions of San Mateo, Santa Clara, and Ventura Counties. For the Central Coast Hydrologic Region, county groundwater supply is reported for Santa

Cruz, San Benito, Monterey, San Luis Obispo, and Santa Barbara Counties (Table CC-14). Overall, groundwater contributes to approximately 89 percent of the total water supply for the five-county area; the range varies from about 73 percent for San Benito County to 99 percent for Monterey County. Groundwater supplies in the five-county area are used to meet about 94 percent of the agricultural water use and 72 percent of the urban water use.

PLACEHOLDER Table CC-14 Central Coast Hydrologic Region Average Annual Groundwater Supply by County and by Type of Use (2005-2010)

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

As shown in Table CC-13 and Figure CC-18, both PAs constituting the region are heavy users of groundwater - Northern PA with an average annual groundwater supply equal to 680 TAF (61 percent) and Southern PA with an average annual groundwater supply equal to 437 TAF (39 percent) of the total groundwater supply for the region.

More detailed information regarding groundwater water supply and use analysis is available online from Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013.

Changes in annual groundwater supply and type of use may be related to a number of factors, such as changes in surface water availability, urban and agricultural growth, market fluctuations, and water use efficiency practices.

Figures CC-19 and 20 summarize the 2002 through 2010 groundwater supply trends for the region. The right side of Figure CC-19 illustrates the annual amount of groundwater versus surface water supply, while the left side identifies the percent of the overall water supply provided by groundwater relative to surface water. The center column in the figure identifies the water year along with the corresponding amount of precipitation, as a percentage of the 30-year running average for the region. Figure CC-20 shows the annual amount and percentage of groundwater supply trends for meeting urban, agricultural, and managed wetland uses.

PLACEHOLDER Figure CC-19 Central Coast Hydrologic Region Annual Groundwater Water Supply Trend (2002-2010)

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-20 Central Coast Hydrologic Region Annual Groundwater Supply Trend by Type of Use (2002-2010)

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Figure CC-19 indicates that the annual water supply for the region has fluctuated between 1,100 TAF in 2006 and 1,520 TAF in 2007. During the same period, groundwater supply has fluctuated between 930 TAF in 2006 and 1,370 TAF in 2007, and provided between 83 and 91 percent of the total water supply for the region. Figure CC-20 indicates that groundwater supply meeting agricultural use ranged from 87 to 95 percent of the annual groundwater extraction, while groundwater extraction meeting urban use ranged from 62 to 75 percent. Groundwater was not used for meeting any managed wetland use.

Water Uses

There are about 1.53 million people in the Central Coast region and groundwater accounts for approximately 83 percent of the water supply used for agricultural, industrial, and municipal (urban) purposes and nearly 100 percent for rural domestic purposes (DWR, 2003). In the Salinas Valley, groundwater accounts for nearly 100% of the potable supply.

Drinking Water

In the Central Coast region there are an estimated 400 community drinking water systems and over 80% are small (serving less than 3,300 people) and most serve less than 500 people. Small water systems face unique financial and operational challenges in providing safe drinking water. Given their small customer base, many small water systems cannot develop or access the technical, managerial and financial resources needed to comply with new and existing regulations. These water systems may be geographically isolated, and their staff often lacks the time or expertise to make needed infrastructure repairs, install or operate treatments, or develop comprehensive source water protection plans, financial plans or asset management plans (EPA 2012).

In contrast, less than 20% of the region's 400 community drinking water systems are medium and large water systems, and deliver drinking water to over 90% of the region's population (see Table CC-15). These larger water systems have the financial resources to hire staff to oversee daily operations, maintenance needs, and to plan for future infrastructure replacement and capital improvements. This helps to ensure that existing and future drinking water standards can be met.

PLACEHOLDER Table CC-15 Summary of Large, Medium, Small, and Very Small Community Drinking Water Systems in the Central Coast Hydrologic Region

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Agricultural Water

All Central Coast IRWM regions utilize water for agricultural purposes, with most of the demand met by groundwater extraction and surface water diversions. Major centers of agriculture include Gilroy, Hollister, Pajaro Valley, Watsonville, Salinas Valley, Paso Robles, San Luis Obispo, Santa Maria, Lompoc, Solvang, and Santa Barbara.

San Benito County and Santa Clara County use water purchased from USBR via the San Felipe Project in addition to groundwater supplies and recycled water. The majority of San Felipe water goes toward agricultural irrigation, with the remainder for domestic, municipal, industrial purposes, and for groundwater recharge. Southern Santa Clara County uses San Felipe water for agricultural irrigation and groundwater recharge.

Urban Water

Central Coast Urban Water Use by IRWM Region

The urban water suppliers of the Central Coast are in Table CC-16, along with total estimated delivered supplies. Urban water use includes residential, schools, parks, restaurants, hotels, office buildings, firefighting, water main flushing, and losses from leaks in the water system.

Outside of urban areas served by water purveyors, residential and small community water needs are self-supplied.

PLACEHOLDER Table CC-16 Urban Water Suppliers by IRWM Region

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Water Conservation Act of 2009 (SB x7-7) Implementation Status and Issues

Twenty-five Central Coast urban water suppliers have submitted 2010 urban water management plans to DWR. The Water Conservation Law of 2009 (SBx7-7) required urban water suppliers to calculate baseline water use and set 2015 and 2020 water use targets. Based on data from the 2010 urban water management plans, Central Coast Hydrologic Region had a population-weighted baseline average water use of 145 gallons per capita per day and an average population-weighted 2020 target of 125 gallons per capita per day. The Baseline and Target Data for individual Central Coast urban water suppliers is available on the Department of Water Resources (DWR) Urban Water Use Efficiency website.

The Water Conservation Law of 2009 (SBx7-7) required agricultural water suppliers to prepare and adopt agricultural water management plans by December 31, 2012, and update those plans by December 31, 2015, and every 5 years thereafter. One Central Coast agricultural water supplier has submitted 2012 agricultural water management plans to DWR.

Water Balance Summary

The Northern Planning Area (PA 301) is the more urbanized and agriculturally active area in the Central Coast Region. Urban applied water varies from about 140-183 TAF. Agricultural use ranges from around 500 to 700 TAF. The wild and scenic and instream applied water varies from 25 to 124 TAF per year and is reused downstream rather than being depleted as happens in most coastal regions. There is about 400-500 acre-feet of water applied to managed wetlands in this planning area each year.

Supplies rely heavily on groundwater, with local deliveries dependent upon water year type and showing a marked decrease in recent years. The area receives about 60 to 90 TAF per year in Central Valley Project water, depending on year type. Similarly, the area receives up to 30 TAF State Water Project water in years where such water is available. There are small amounts of reclaimed water available also.

In the Southern Planning Area (PA 302), urban applied water ranges from about 140-150 TAF and agricultural use from 280-500 TAF. There is less instream environmental applied water in this PA, but it has also been reused downstream since 2005. The surface water supplies (local, State Water Project, and other federal) have remained fairly constant at about 80-90 TAF per year. Recycled water accounts for 3-5 TAF, with the rest of the water uses being supplied by groundwater.

PLACEHOLDER Figure CC-21 Central Coast Region Water Balance by Water Year, 2001-2010

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Table CC-17 Central Coast Hydrologic Water Balance Summary, 2001-2010

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Project Operations

One of two sources of imported water to the Central Coast, the State Water Project – Coastal Branch Aqueduct was completed in 1997, and extends from Kettleman City in Kings County to Vandenberg Air Force Base in Santa Barbara County. It consists of 143 miles of pipeline, five 7.5 megawatt capacity pumping plants, a water treatment plant, and four water storage tanks. The pipeline consists of a 101-mile long DWR Coastal pipeline from Kern County to Vandenberg Air Force Base in Santa Barbara County and 42-mile long Central Coast Water Authority (CCWA) pipeline from Vandenberg Air Force Base to Lake Cachuma.

Supplying as much as 47,816 acre-feet of water a year, Coastal Branch supplements supplies from area reservoirs and groundwater basins. San Luis Obispo County has an agreement for 4,830 acre-feet a year and Santa Barbara County for 42,986 acre-feet.

The Nacimiento and San Antonio Reservoirs are owned and operated by the Monterey County Water Resources Agency (MCWRA) and were constructed to control floodwaters and to release water into the Salinas River for percolation to underground aquifers throughout the summer. Nacimiento Reservoir has a storage capacity of 377,900 AF, and yields on average about 62 percent of the total water in the Salinas River system. San Antonio Reservoir has a storage capacity of 335,000 AF, and yields on average about 13 percent of the total water in the Salinas River system.

The Salinas Valley Water Project, implemented by MCWRA, was created in order to reduce seawater intrusion in the downstream, coastal portion of the Salinas Valley Groundwater Basin. The Salinas Valley Water Project moves timed releases from Nacimiento and San Antonio Reservoirs down the Salinas River channel, allowing diversions into the Castroville Seawater Intrusion Project (CSIP) distribution system. The water then percolates into the Salinas Valley Groundwater Basin and is blended with recycled water for irrigation use on 12,000 acres of farmland in the Castroville area. The blended water replaces groundwater pumping in downstream coastal portion of the groundwater basin, thereby helping to reduce seawater intrusion.

The flood management reservoirs of the Central Coast Hydrologic Region are two major multipurpose reservoirs with flood management reservations, San Antonio Reservoir on the San Antonio River, and Twitchell Reservoir on the Cuyama River, and a small flood storage amount in Nacimiento Reservoir on Nacimiento Creek.

Water Quality

Surface Water Quality

In 1998, the Central Coast Water Board established a regional monitoring program, the Central Coast Ambient Monitoring Program (CCAMP) to assess the health and beneficial use support of the region's surface waters on a regular basis. In addition, since 2004, the Cooperative Monitoring Program for Agriculture (CMP), developed under the Conditional Waiver for Irrigated Lands (Ag Order), has been monitoring 50 long-term trend monitoring sites in agricultural areas (Figure CC-22).

The Water Board uses CCAMP, CMP and other data to assess the health of the region's surface waters and identify waters (streams, lakes, bays and estuaries) in the region that do not meet water quality objectives and are not supporting their designated beneficial uses, as outlined in the Central Coast Region's Water Quality Control Plan (Basin Plan). Those waters are placed on the Clean Water Act Section 303(d) list of impaired water bodies and the Water Board develops Total Maximum Daily Loads (TMDLs) to restore their beneficial uses.

PLACEHOLDER Figure CC-22 Central Coast Hydrologic Units and Monitoring Sites

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Water Board staff has developed a multi-metric approach to assess general surface water quality conditions that combines and scores multiple parameters into a water quality index (Worcester, 2011). Parameters for this water quality index include water temperature, unionized ammonia, water column chlorophyll a, total dissolved solids (TDS), nitrate-nitrite (as N), orthophosphate, turbidity, and dissolved oxygen. Each parameter is scored into one of five categories: good condition (green), slightly impacted (yellow), impacted (red), and very impacted (dark red). Unscored areas are white, and most occur in the upper watershed areas (Figure CC-23). Water quality evaluations were performed at 250 sites, revealing that the most severely impacted areas of the Central Coast are 1) the lower Salinas watershed and tributaries, Tembladero Slough-Salinas Reclamation Canal watershed and Moro Cojo Slough (hereafter referred to as the "lower Salinas area") and 2) the lower Santa Maria watershed and tributaries, and lower Oso Flaco Creek (hereinafter referred to as the "lower Santa Maria area"). These are both areas of intensive agricultural activity.

Surface water quality is also evaluated using a toxicity index. Toxicity testing exposes test organisms to water or sediment from a stream or other water body, and measures effects on survival, growth and reproduction (lethal and sub lethal effects). The surface water quality toxicity index for the Central Coast region also shows severe impacts in the lower Salinas and Santa Maria areas (Figure CC-24). Other impacted areas include the lower Santa Ynez River and the San Juan Creek and Watsonville Slough areas of the Pajaro River watershed.

PLACEHOLDER Figure CC-23 Central Coast Surface Water Quality Index using Multiple Parameters

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-24 Central Coast Surface Water Quality Toxicity Index

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Two of the region's most impaired water bodies drain directly to sensitive estuarine habitat. In the north, flows from the Salinas Reclamation Canal move into the Old Salinas River and- during an incoming tide- flow into the Elkhorn Slough, a State Marine Protected Area and a National Estuarine Research Reserve. In the south, Orcutt Creek provides the primary flow into the Santa Maria estuary, which provides critical habitat for endangered snowy plovers, threatened steelhead trout, and other sensitive species.

Surface Water Quality by Watershed

Water quality for the Central Coast is problematic for both groundwater and surface water supplies, and improving both is an over-arching goal for the hydrologic region.

The Central Coast is a region of unique habitat areas, significant biodiversity, and many sensitive natural habitats and species of concern. Several areas of the California Central Coast region are severely degraded by high levels of nitrates in surface and groundwater, toxicity to test organisms, pesticides in surface water and sediment that exceed toxic thresholds, and other water quality concerns. Benthic invertebrate communities in these areas, and their associated habitat, are also degraded. These areas are generally dominated by very intensive agricultural activities, some of which result in the addition of nutrients to surface and groundwater. The term nutrient refers to the primary plant nutrients- nitrogen, phosphorus and potassium. Generally, potassium stays bound to soil and is not a water quality problem, but nitrogen in the form of ammonia and nitrate is highly mobile and soluble. Phosphorus is also mobile. The most common nutrients added to the waters of the Central Coast are nitrate and orthophosphate, and the main sources of nutrients are agricultural fertilizers, livestock operations including dairies, and wastewater from sewage treatment plants. Failing and broken septic systems also contribute nutrients to groundwater; locally, this has been a long-standing problem for the city of Los Osos in San Luis Obispo County.

San Lorenzo River and Santa Cruz Area Watersheds

Anthropogenic watershed disturbances have accelerated most of the natural processes of erosion and sedimentation in the San Lorenzo River watershed, resulting declines in anadromous fisheries and the quality of fish habitat. Fecal coliform exceeds the Basin Plan criteria in many streams and sloughs. The Santa Cruz area hydrologic unit has 33 water bodies on the Clean Water Act (CWA) 303(d) list, including the San Lorenzo River and many of its tributaries, Soquel Creek, Aptos Creek and the San Lorenzo River Lagoon.

Pajaro Watershed

Water quality problems for the watershed and the river include erosion and sedimentation, pesticides, nutrients, heavy metals, pathogens, streambed flow alterations, endangered habitat, and riparian vegetation removal. Agriculture is the dominant land use in the watershed, and grazing is common in the remote areas of the watershed such as along the upper San Benito River. Agricultural lands are the major source of nutrient and sediment loading into the Pajaro River. Low-density residential development, flood control projects, sand and gravel and mercury mining, and off-road vehicle activity have contributed to accelerated erosion and sedimentation, impacting steelhead habitat for migration and spawning. Fecal coliform levels in the Pajaro River and many of its tributaries exceed water quality objectives, and cyanobacteria cause harmful algal blooms in Pinto Lake near Watsonville. The CWA 303(d) list contains 29 water bodies, including Coralitos Creek, Harkins Slough, the Pajaro River, Watsonville Slough, Llagas Creek, and Uvas Creek.

Elkhorn Slough Watershed

Water quality concerns include erosion, pesticides, bacteria, and scour. Surrounding agricultural activities and Moss Landing Harbor activities, including ongoing dredging, are impacting the slough. The CWA 303(d) list contains six water bodies, including Carneros Creek, Bennet Slough, and Moss Landing Harbor.

Carmel River Watershed

Steelhead trout are common in the Carmel River, and there are currently no segments of the river or its tributaries identified as impaired on the CWA 303(d) list of impaired waters; however, water supply and habitat issues are major concerns. The CWA 303(d) list contains one water body, Tularcitos Creek.

Salinas River Watershed

Agriculture is the dominant land use within the Salinas watershed, and some agricultural practices have resulted in degradation of water resources. Over the last 100 years, groundwater pumping for irrigation has led to seawater intrusion nearly six miles inland near the Castroville area, and has necessitated the abandonment of several water supply wells. Additionally, nitrate contamination is widespread throughout the Salinas Valley Groundwater Basin. Surface waters are also impacted by high levels of nitrate, as well as toxicity and pesticides. The CWA 303(d) list contains 32 water bodies, including the Salinas Reclamation Canal, Tembladero Slough, Blanco Drain, Espinosa Slough, segments of the Salinas River, Natividad Creek, Merrit Ditch, and Alisal Slough. These water bodies are listed for fecal coliform, nutrients, toxicity and pesticides. Overall, fecal coliform bacteria impair recreational water uses of the lower Salinas River and its tributaries. Elevated nutrient concentrations have led to the degradation of municipal and domestic water supplies and have impaired most aquatic freshwater habitat beneficial uses for the lower Salinas River and its tributaries. The pesticides chlorpyrifos and diazinon are present in several areas at levels that are not protective of aquatic life- beneficial uses, such as fish habitat, migration, spawning and development.

Santa Lucia Hydrologic Area/Big Sur

This area is located along the remote Big Sur coastline, so many of the watersheds have little or no disturbance by agricultural or urban activities. Upper watersheds originate in the Los Padres National Forest, on the steep northwestern slopes of the Santa Lucia Mountains. Impacts to the forested upper watersheds stem primarily from roads, cattle grazing, fire management, inactive mines, and other sources of sediment. Rural residential uses are common at lower watershed elevations. No water bodies are listed on the CWA 303(d) list.

Morro Bay

Morro Bay and estuary provide critical habitat for marine mammals, fish, shellfish, more than 200 species of birds, and other life, including 16 threatened and endangered species. Anthropogenic watershed disturbances have accelerated the natural processes of erosion and sedimentation in the estuary and bay resulting in impairment of biological resources and recreational uses. Water quality objectives for fecal coliform are often exceeded, impairing recreational use and shellfish harvesting. The CWA 03(d) list contains 26 water bodies, including Chorro and Los Osos Creeks and many of their tributaries, and the Morro Bay Estuary. The tributaries Chorro and Los Osos Creeks to Morro Bay are impaired by nutrients, fecal coliform, sediment and low dissolved oxygen.

Santa Maria Watershed

Land uses in the lower Santa Maria River watershed include rangeland, urban development, and irrigated agriculture. The Santa Maria watershed has 15 water bodies on the CWA 303(d) list, including Bradley Canyon Creek, Blosser Channel, Orcutt Creek, Main Street Canal and the Santa Maria River. The Santa Maria River and its estuary, Oso Flaco Creek, the Bradley Channel, and the Main Street Canal are impaired by fecal coliform, nutrients, ammonia, salts, temperature, dissolved oxygen, toxicity, and pesticides. The Santa Maria watershed experiences extensive water column invertebrate toxicity and the estuary undergoes routine toxic concentrations of chlorpyrifos.

Santa Ynez Watershed

Urban development, increased groundwater pumping, ranching, irrigated agriculture, and expanding recreational use have all contributed to the degradation of water quality in the Santa Ynez watershed. Areas of concern include erosion, sedimentation, flood control and habitat loss (especially for steelhead). Summer flow in the lower Santa Ynez River is dominated by a wastewater treatment plant discharge from the City of Lompoc. The CWA 303(d) list contains six water bodies, including the Santa Ynez River, Salispuedes Creek, and Santa Rosa Creek. The Santa Ynez River is listed as impaired by nitrate, sodium, chloride, E. coli, fecal coliform, low dissolved oxygen, water temperature, and total dissolved solids.

Santa Barbara/South Coast

The South Coast watersheds consist of numerous coastal-drainage streams, with several streams flowing through upland areas which contain grazing rangelands and orchards before flowing through more intensively developed land which includes the urban areas of Goleta, the City of Santa Barbara and Carpinteria. These areas of mixed land use include many greenhouses and nurseries. Routine monitoring of the ocean near stream outflows frequently finds levels of fecal coliform bacteria in violation of water quality standards, requiring the County's Environmental Health Services Department to close beaches to public access. Other water quality issues include sedimentation, pesticides and nutrients. The CWA 303(d) list contains 38 water bodies, including San Jose Creek, Jalama Creek, Canada del Refugio, Glen Annie Canyon, Mission Creek, Carpinteria Creek, Franklin Creek, and Rincon Creek.

Surface Water Quality Parameters of Special Concern

For the Central Coast region, surface water quality parameters of special concern include nitrate, water toxicity, pesticides, fecal coliform, sediment, temperature, and dissolved oxygen. Surface waters that exceed the TMDLs for these parameters are placed on a Clean Water Act Section 303(d) list of impaired water bodies.

Nitrate

Nitrate is a severe and widespread pollutant for the Central Coast region. Nitrate enters the waters of the region most commonly as runoff from agricultural fields or through percolation to groundwater. The 2010 List of Impaired Waterbodies (State Water Resources Board, 2010) includes 47 Central Coast water bodies that have drinking water beneficial uses impaired by nitrate pollution. The three major agricultural areas of the Central Coast contain 68% of these nitrate listings: the Lower Salinas (15 water bodies), the Pajaro River (5 water bodies), and the lower Santa Maria (12 water bodies).

Fecal Coliform

Fecal coliform is an indicator for pathogenic bacteria, and enters the waters of the region through storm water runoff (which picks up bacteria from pet, animal, and human waste), the presence of cattle and other animals in creeks, and through surfacing water from failing septic systems. Measurements of fecal coliform in many Central Coast water bodies exceed Basin Plan criteria, impairing water contact recreation and shellfish harvesting.

Toxicity

Toxicity is a measure of the detrimental effects of pollutants on aquatic organisms and can be caused by metals, fertilizers, pesticides, petroleum products and other organic compounds. Region-wide, CCAMP and the CMP have conducted toxicity monitoring in 80 streams and rivers at sample sites near the most agriculturally intensive land use. No toxic effects were observed in 16% of the sample sites, and some measure of lethal effect was observed at 65% of the sample sites. Results of this monitoring indicate that 90% of all severely toxic sample sites measured on the Central Coast occur in the agricultural areas of the Lower Salinas, Pajaro River, and the lower Santa Maria. Within these areas, 29 water bodies are listed as impaired by toxicity.

Erosion and Sedimentation

Regionally, erosion and excessive sedimentation in rivers and streams have led to a decline in anadromous fish habitat for migration and spawning. Common causes of erosion and excessive sedimentation include clearing land for development without adequate storm water controls, farming too close to creek banks or on steep slopes, and increased storm water runoff from impervious surfaces. Degradation of riparian corridors through encroachment and poor land management practices reduces riparian vegetation, which leads to a reduction in shaded areas of a creek or stream. Without shade, water temperatures rise and dissolved oxygen levels decrease, and the riparian habitat for fish and aquatic life is severely compromised.

Groundwater Quality

Groundwater Quality Parameters of Special Concern

Nitrate

The Central Coast region has widespread and severe groundwater nitrate pollution within areas of intensive agricultural land use as documented by numerous studies and regional monitoring data. The most significant areas of nitrate impact associated with irrigated agriculture are within the Salinas Valley, Gilroy-Hollister Valley, Pajaro Valley, and Santa Maria River Valley basins, and to a lesser extent within southern portions of the San Luis Obispo Valley and the Santa Ynez River Valley basins. Numerous lines of evidence indicate irrigated agriculture is the primary source of the ongoing nitrate pollution. Although less significant, nitrate pollution from point source municipal discharges and domestic septic systems can be locally relevant. In particular, localized nitrate pollution within the Langley Area and Corral de Tierra Area sub-basins of the Salinas Valley, and portions of the Los Osos Valley and Santa Ynez River Valley basins is likely attributable to higher-than-normal septic system densities and/or unfavorable soil conditions.

Salts

Although additional study is needed, there is a potential for significant regional-scale salt loading to groundwater from various point and non-point source discharges, particularly within areas with high agricultural and municipal wastewater return flows. Whereas salt impacts from seawater intrusion as a result of overdraft conditions are generally well defined, non-point source loading of salts and the resulting impacts (increased soil and groundwater salinity) are relatively undefined in the Region. Historical studies indicate that agricultural operations are the leading source of salt loading to the Salinas and Pajaro Valley groundwater basins. To a lesser extent, analogous to the nitrate loading estimates, point source wastewater (both industrial and municipal) and septic system discharges also contribute to salt loading to groundwater within localized areas around these discharges.

Basin Overdraft/Seawater Intrusion

Groundwater overdraft within several Central Coast groundwater basins has resulted in seawater intrusion and the loss of riparian habitat due to insufficient base flows. Excessive pumping (primarily to meet agricultural demands) continues to cause seawater intrusion into the Salinas Valley and Pajaro groundwater basins, with increasing portions of these basins becoming unusable for agriculture and municipal supply. Seawater intrusion attributable primarily to over-pumping of groundwater for municipal supply has been documented in the Los Osos Valley groundwater basin. Excessive pumping of the Carmel Valley alluvial aquifer has resulted in the significant loss and degradation of riparian and aquatic habitat within both the Carmel River and Carmel River Lagoon, which are critical habitats for threatened steelhead trout.

Portions of the Gilroy-Hollister and Santa Maria River Valley basins are or were historically in overdraft, but changes in basin management practices appear to have stabilized- or caused a rebound in- groundwater levels within these basins. The Gilroy-Hollister, Salinas Valley, and Santa Maria River Valley groundwater basins are actively managed to enhance groundwater recharge in order to meet pumping demand and to offset pumping via recycled water use. Surface water diversions from the Salinas Valley Water Project to the Castroville Seawater Intrusion Project have reportedly offset additional pumping west of Salinas that will halt, if not push back, seawater intrusion in this area. Although these and other related conjunctive use projects can be effective, maximizing irrigation efficiency is essential given that irrigated agriculture accounts for a majority of groundwater pumping.

Drinking Water Quality

In general drinking water systems in the region deliver water to their customers that meet federal and State drinking water standards. Recently the Water Boards completed a draft assessment of community water systems that rely on contaminated groundwater (SWRCB, 2013). This draft report identified 68 community drinking water systems in the region that rely on at least one contaminated groundwater well as a source of supply. Nitrate and naturally-occurring arsenic are the most prevalent groundwater contaminants affecting community drinking water wells in the region. The majority of the affected systems are small water systems which often cannot provide the economies of scale necessary to construct, operate, and maintain a water treatment facility.

In the Salinas Valley, groundwater accounts for nearly 100% of the potable supply. A 2012 UC Davis study found the largest percentage of nitrate exceedances are in the northern, eastern, and central Salinas Valley, and approximately one-third of the domestic and irrigation wells tested exceed the nitrate drinking water standard of 45 ppm (10 mg/liter as nitrogen) (Harter et al., 2012.). Smaller water systems and domestic wells are typically reliant on shallow groundwater wells and are often located in rural agricultural areas where nitrate pollution is the most significant. Consequently, residents of the Salinas Valley may be impacted by nitrate contamination exposing local residents to unsafe nitrate-contaminated groundwater now or in the future.

Groundwater Conditions and Issues

Groundwater Occurrence and Movement

Aquifer conditions and groundwater levels change in response to varying supply, demand, and climate conditions. During dry years or periods of increased groundwater use, seasonal groundwater levels tend to fluctuate more widely and, depending on annual recharge conditions, may result in a long-term decline in groundwater levels, both locally and regionally. Depending on the amount, timing, and duration of groundwater level decline, nearby well owners may need to deepen wells or lower pumps to regain access to groundwater.

Lowering of groundwater levels can also impact the surface water–groundwater interaction by inducing additional infiltration and recharge from surface water systems, thereby reducing the groundwater discharge to surface water base flow and wetlands areas. Extensive lowering of groundwater levels can also result in land subsidence due to the dewatering, compaction, and loss of storage within finer grained aquifer systems.

During years of normal or above normal precipitation, or during periods of low groundwater use, aquifer systems tend to recharge and respond with rising groundwater levels. As groundwater levels rise, they reconnect to surface water systems, contributing to surface water base flow or wetlands, seeps, and springs.

The movement of groundwater is from areas of higher hydraulic potential to areas of lower hydraulic potential, typically from higher elevations to lower elevations. The direction of groundwater movement can also be influenced by groundwater extractions. Where groundwater extractions are significant, groundwater may flow towards the extraction point. Rocks with low permeability can restrict groundwater flow through a basin. For example, a fault may contain low permeability materials and restrict groundwater flow.

Depth to Groundwater

The depth to groundwater has a direct bearing on the costs associated with well installation and groundwater extraction operations. Understanding the local depth to groundwater can also provide a better understanding of the local interaction between the groundwater table and the surface water systems, and the contribution of groundwater aquifers to the local ecosystem. In some parts of the region, groundwater may be found near the ground surface, whereas in other parts, groundwater is found hundreds of feet below the ground surface. Depth-to-groundwater contours for the region were not developed as part of the groundwater content enhancement for Update 2013. Depth-to-groundwater data for a few of the groundwater basins in the region are available online via DWR's Water Data Library, DWR's CASGEM system, and the USGS National Water Information System. Nearly every local water agency within the region reports or presents groundwater level data to the public on a routine or annual basis. Websites of agencies in the region provide information pertaining to groundwater elevations.

Groundwater Elevations

Groundwater elevation contours can help estimate the direction of groundwater movement and the gradient, or rate, of groundwater flow. The DWR does not currently monitor groundwater elevations in the region. Thus, groundwater elevation contours for the region could not be developed as part of the groundwater content enhancement for Update 2013. Several local agencies within the region independently monitor the groundwater elevations in the basins they operate and produce groundwater elevation contour maps.

Groundwater Level Trends

Plots of depth-to-water measurements in wells over time (groundwater level hydrographs) allow analysis of seasonal and long-term groundwater level variability and trend over time. Because of the highly variable nature of the physical aquifer systems within each groundwater basin, and because of the variable nature of annual groundwater availability, recharge, and surrounding land use practices, the hydrographs presented herein do not attempt to illustrate or depict average aquifer conditions over a broader region. Rather, the selected hydrographs are intended to help tell a story about how the local aquifer systems respond to changing groundwater pumping quantity and to the implementation of resource management practices. The hydrographs are designated according to the State Well Number System (SWN), which identifies each well by its location using the public lands survey system of township, range, section, and tract.

<u>Hydrograph PV8D PV8M/ PV8S</u>

Hydrograph PV8D PV8M/ PV8S (CC-25A) is from a well representing data from three hydrographs provided by the Pajaro Valley Water Management Agency. The well consists of a triple-completion nested monitoring well located in the Pajaro Valley Groundwater Basin. The nested well is located approximately 5,600 feet inland from the Pacific Ocean and is completed in consolidated marine and dune sediments. Monitoring well PV8D is the deepest well in the nested well cluster with a total depth of 590 feet and a screened interval from 570 to 580 feet below the top of casing. Monitoring well PV8M is the intermediate well with a total depth of 530 feet with screened intervals from 420 feet to 470 feet below top of casing. Monitoring well PV8S is the shallow well with a total depth of 210 feet and screened intervals from 130 feet to 190 feet below top of casing. According to the Pajaro Valley Water Management Agency and illustrated in the hydrograph, while there has been significant amounts of groundwater withdrawal for urban and agricultural uses during 1991 through 2012, there is very little overall change seasonally in groundwater levels due to seawater intrusion into the aquifer.

<u>Hydrograph 12S06E18G001M</u>

Hydrograph 12S06E18G001M (CC-25B) is from a well located in the Hollister Area subbasin and has a total depth of approximately 200 feet. The well is completed in poorly consolidated sedimentary sequences of clay, silt, sand, and gravel. The San Benito County Water District maintains that groundwater storage in the subbasin increased by 3,000 acre-feet due to changes in water management measures leading to the storage and use of more surface water, which in response reduced the amount of groundwater pumping. The groundwater hydrograph reflects the increase in storage as the groundwater elevation in the well showed an overall increase of approximately 15 feet from 1950 through 1990.

<u>Hydrograph FO-09D/ FO-09S</u>

Hydrograph FO-09D/ FO-09S (CC-25C) is from a dual completion monitoring well. Monitoring well FO-09 shallow is approximately 660 feet deep with a screened interval from 610 to 650 feet below top of casing. Monitoring well FO-09 deep is approximately 840 feet deep with a screened interval from 790 to 830 feet below top of casing, completed in consolidated sediments. The hydrograph illustrates that the deeper well exhibit much greater seasonal fluctuations (approximately 11 feet per year) compared to that by the shallow well (approximately 4 feet per year). While the shallow well shows a net increase of approximately six feet in groundwater level from 1994 through 2011, the deep well shows a net groundwater level decline of approximately 29 feet over the same time period. The lower seasonal fluctuation exhibited by the shallow well and the increase in groundwater level is likely due to seawater intrusion into the shallower aquifer.

Hydrograph 10N26W04R001S

Hydrograph 10N26W04R001S (CC-25D) is from an irrigation well located within the Cuyama Valley Groundwater Basin. The well is constructed in poorly consolidated clay, silt, and gravel. The hydrograph shows seasonal fluctuations when sufficient data are available. Seasonal fluctuations appear to be greater prior to 1962 and become less throughout the 1960s. The long term Spring-to-Spring trend is a relatively steady decline since the 1970s. The spike in 2007 is due to a measurement collected during the fall and represents a seasonal fluctuation which is not directly comparable to Spring measurements after 1972.

Hydrograph 04N28W10F003S

Hydrograph 04N28W10F003S (CC-25E) is from a domestic well located in the northeastern portion of the Goleta Groundwater Basin. The well is constructed in alluvium consisting primarily of coarse- to fine-grained sands and clays. Seasonal fluctuations and responses to the amount of precipitation are observed prior to 1990. Groundwater levels rapidly declined throughout most of the 1980s, but have steadily increased following the 1989 Wright Judgment and implementation of other groundwater management practices. From the 1940s to the 1970s, the Goleta area in Santa Barbara County received lower amounts of precipitation than average and the existing water supplies could not meet the growing water demand. In 1972, the Goleta Water District adopted Ordinance 72-2 which placed a moratorium on new water service connections (Bachman, 2010). In 1973, the adjudication of groundwater entitlement began and was finalized in 1989 through the Wright Judgment. In 1995, with cooperation from the Goleta Sanitary District, the Goleta Water District began recycled water deliveries for irrigation. By using recycled water instead of potable water for irrigation, it allowed the groundwater supply to be reserved for drinking water purposes. In 1997, the Goleta Water District also began importing their share of water from the State Water Project. In 1998, the basin achieved hydrologic balance as stipulated in the Wright Judgment.

Hydrograph 04N27W16R001S

Hydrograph 04N27W16R001S (CC-25F) is from a well located within the Santa Barbara Groundwater Basin. The well is constructed in a semi-confined to confined aquifer, consisting of unconsolidated marine deposits of sand, silt, and clay. Although large seasonal fluctuations are observed in the groundwater levels between 1980 and 1991, the Spring-to-Spring groundwater levels were relatively stable during that period. A drought in the late 1980s resulted in a sharp decline in Spring-to-Spring groundwater levels. Improved groundwater management awareness and better management practices led to a rapid groundwater level rise in 1991; groundwater levels continued to rise until 2008. Following the beginning of the importation of water from the State Water Project in 1997, groundwater levels have remained relatively stable and have not been severely affected by droughts or high precipitation.

PLACEHOLDER Figure CC-25 Groundwater Level Trends in Selected Wells in the Central Coast Hydrologic Region

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Change in Groundwater Storage

Change in groundwater storage is the difference in stored groundwater volume between two time periods. Examining the annual change in groundwater storage over a series of years helps identify the aquifer response to changes in climate, land use, or groundwater management over time. If the change in storage is negligible over a period represented by average hydrologic and land use conditions, the basin is considered to be in equilibrium under the existing water use scenario and current management practices. However, declining storage over a period characterized by average hydrologic and land use conditions does not necessarily mean that the basin is being managed unsustainably or subject to conditions of overdraft. Utilization of groundwater in storage during years of diminishing surface water supply, followed by active recharge of the aquifer when surface water or other alternative supplies become available, is a recognized and acceptable approach to conjunctive water management. *Additional information regarding the risks and benefits of conjunctive management can be found online from California Water Plan Update 2013 Vol. 3 Ch. 9 Conjunctive Management and Groundwater Storage Resource.*

Because of resource and time constraints, changes in groundwater storage estimates for basins within the region were not developed as part of the groundwater content enhancement for Update 2013. Some local groundwater agencies within the region periodically develop change in groundwater storage estimates for basins within their service area. Determining the change in storage allows the local groundwater managers to evaluate trends, land use patterns, responses to climate, and water sustainability. Examples of local agencies who have determined change in storage include the San Benito County Water District, Monterey Peninsula Water Management District, and Pajaro Valley Water Management Agency.

Near Coastal Issues

Seawater Intrusion

Many coastal groundwater basins of the Central Coast have been, and continue to be, threatened by seawater intrusion. Seawater intrusion in the northern Salinas Valley was first documented in 1933 by the California State Water Commission. Seawater intrusion in the Pajaro groundwater basin was first identified in the 1940s and current pumping now exceeds estimates of sustainable yield by more than 20,000 acre-feet per year. Seasonal groundwater withdrawals for agriculture in Santa Cruz and Monterey counties were recognized then and now as a contributing factor to seawater intrusion.

The City of Santa Cruz Water Department (SCWD) and Soquel Creek Water District (SqCWD) have been collaborating to conserve, protect and create reliable water resources. Both have already implemented numerous stringent conservation and curtailment requirements to maximize efficient water use, but the region needs a reliable supplemental water source that will provide needed supply during droughts and protect groundwater aquifers from seawater intrusion. After over 20 years of multiple studies and scores of public meetings, SCWD and SqCWD have identified desalination as the best option for delivering this supplemental water source. This program is currently in an Environmental Review process evaluating the potential for a 2.5 million gallon per day desalination facility in Santa Cruz. No decision has yet been made on the actual construction of the proposed project.

Further south, continued groundwater pumping in overdraft conditions is contributing to seawater intrusion along several coastal basins in San Luis Obispo County. Seawater intrusion is problematic in the community of Los Osos, where the impact of intrusion has been estimated to be migrating 100 feet per year. Recent studies show strong potential for seawater intrusion into the Nipomo area.

Santa Barbara and areas near Santa Maria have experienced signs of seawater intrusion, which at this time do not pose a threat to drinking water supplies. Santa Barbara County, as with all coastal areas, will be impacted by the potential sea-level rise associated with climate change. Topographically, the County is subject to rapid flooding due to its position between the Pacific Ocean and steep coastal ranges. Despite utilizing multiple coastal aquifers, significant seawater intrusion does not appear to be occurring. After the 1986 – 1991 period of drought, the City of Santa Barbara constructed a desalination plant but has since de-activated it due to the cost of operation and the availability of other supplies. It remains available in case of emergency or extreme water shortage.

Another near-coastal issue is stormwater runoff and sewage spills into the ocean. In Santa Cruz, recent upgrades to the wastewater collection system will reduce the potential for sewage leaks and spills from entering coastal waters.

Flood Management

The Central Coast has a long history of flooding in most of the region's rivers and creeks. Traditionally, the approach to flood management was to develop narrowly focused flood infrastructure projects. This infrastructure often altered or confined natural watercourses, which reduced the chance of flooding thereby minimizing damage to lives and property. This traditional approach looked at floodwaters primarily as a potential risk to be mitigated, instead of as a natural resource that could provide multiple societal benefits.

Today, water resources and flood planning involves additional demands and challenges, such as multiple regulatory processes and permits, coordination with multiple agencies and stakeholders, and increased environmental awareness. These additional complexities call for an integrated water management approach that incorporates natural hydrologic, geomorphic, and ecological processes to reduce flood risk.

The Pajaro River Parkway Plan is a good example of the new approach to flood management. This is a technical evaluation to identify public access and recreational opportunities that can be incorporated into the Levee Reconstruction Project. The plan will include an evaluation of expanding recreational opportunities within the Pajaro River levee reconstruction project area, engagement with the public, outreach and negotiation with landowners, development of alternatives, cost estimates, benefit analysis, environmental constraints analysis, and implementation plan.

Flood exposure in the Central Coast Hydrologic Region occurs primarily along the Salinas River Basin, the Pajaro River, and along the coastline. Floods within the Central Coast region originate principally from winter storms and coastal flooding. Most flood events occur in December and January as a result of multiple storms and saturated soil conditions, but floods can occur in October and November or during the late winter or early spring months.

In the Central Coast Hydrologic Region, more than 425,000 people and over $40 billion in assets are exposed to the 500-year flood event. Figures CC-26 and CC-27 provide a snapshot of people, structures, crops, and infrastructure exposed to flooding in the region. Over 315 State and Federal threatened, endangered, listed, or rare plant and animal species exposed to flood hazards are distributed throughout the Central Coast Hydrologic Region.

PLACEHOLDER Figure CC-26 Flood Hazard Exposure to the 100-Year Floodplain in the Central Coast Region

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

PLACEHOLDER Figure CC-27 Flood Hazard Exposure to the 500-Year Floodplain in the Central Coast Region

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Levee Performance and Risk Studies

In the Central Coast Hydrologic Region, forty-one local flood management projects or planned improvements were identified. Twenty-five of those projects have identified costs totaling approximately $280 million. The remaining projects are in the planning phase and do not have cost estimates. Twenty-eight local planned projects use an integrated water management (IWM) approach to flood management. Examples of local IWM projects include the Coastal Wetland Erosion Control and Dune Restoration Project, the Lower Carmel River and Lagoon Floodplain Restoration and Enhancement Project and, the Salinas Valley Water Project. These identified projects and improvements are also summarized in the California's Flood Future Report Attachment E: Information Gathering Technical Memorandum.

Water Governance

Water management in the Central Coast is widely distributed between county governments, water supply districts, wastewater treatment and stormwater management. They are mostly local agencies that have a high level of coordination with each other, and do a number of coordinated water supply projects, such as Lake Nacimiento and Lake San Antonio. The Pajaro River Watershed Flood Prevention Authority has brought together four counties, two water districts, and a flood control district. Many current projects in the region come as a response to water quality objectives and the work of the Regional Water Quality Control Board.

Flood Management Governance and Laws

California's water resource development has resulted in a complex, fragmented, and intertwined physical and governmental infrastructure. Although primary responsibility for flood might be assigned to a specific local entity, aggregate responsibilities are spread among more than 135 agencies in the Central Coast Hydrologic Region with many different governance structures. A list of agencies can be found in the California's Flood Future Report Attachment E: Information Gathering Technical Memorandum. Agency roles and responsibilities can be limited by how the agency was formed, which might include enabling legislation, a charter, a memorandum of understanding with other agencies, or ownership.

The Central Coast region contains floodwater storage facilities and channel improvements funded and/or built by State and Federal agencies. Flood management agencies are responsible for operating and maintaining 260 miles of levees, more than 70 dams and reservoirs and, more than 210 debris basins within the Central Coast Hydrologic Region. For a list of major infrastructure in this hydrologic region, refer California's Flood Future Report Attachment E: Information Gathering Technical Memorandum.

Groundwater Governance

California does not have a statewide management program or statutory permitting system for groundwater. However, one of the primary vehicles for implementing local groundwater management in California is a Groundwater Management Plan (GWMP). Some agencies utilize their local police powers to manage groundwater through adoption of groundwater ordinances. Groundwater management also occurs through other avenues such as basin adjudication, IRWMPs, Urban Water Management plans, and Agriculture Water Management plans.

Groundwater Management Assessment

Figure CC-28 shows the location and distribution of the GWMPs within the Region based on a GWMP inventory developed through a joint DWR/Association of California Water Agencies (ACWA) online survey and follow-up communication by DWR in 2011-2012. Table CC-18 furnishes a list of the same. GWMPs prepared in accordance with the 1992 AB 3030 legislation, as well as those prepared with the additional required components listed in the 2002 SB 1938 legislation are shown. Information associated with the GWMP assessment is based on data that was readily available or received through August 2012. Requirements associated with the 2011 AB 359 (Huffman) legislation, related to groundwater recharge mapping and reporting, did not take effect until January 2013 and are not included in the current GWMP assessment.

PLACEHOLDER Figure CC-28 Location of Groundwater Management Plans in the Central Coast Hydrologic Region

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PLACEHOLDER Table CC-18 Groundwater Management Plans in the Central Coast Hydrologic Region

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The GWMP inventory indicates that nine GWMPs exist within the region. Eight of the nine GWMPs are fully contained within the Central Coast Hydrologic Region, while one plan includes portions of the adjacent San Francisco Bay Hydrologic Region. All nine GWMPs cover areas overlying Bulletin 118-2003 alluvial basins. However, two plans also include areas that are not identified in Bulletin 118-2003 as alluvial basins. Collectively, the nine GWMPs cover 1,700 square miles. This includes about 1,100 square miles (33 percent) of the Bulletin 118-03 alluvial groundwater basin area in the region. Four GWMPs have been developed or updated to include the SB 1938 requirements and are considered active for the purposes of Update 2013 GWMP assessment. The four active GWMPs cover 16 of the 25 basins identified as high or medium priority basins under the CASGEM basin prioritization project (see Table CC-GW-3). The 25 high and medium priority basins account for about 96 percent of the population and about 91 percent of groundwater supply for the region.

Based on the information compiled through inventory of the GWMPs, an assessment was made to understand and help identify groundwater management challenges and successes in the region, and provide recommendations for improvement. Information associated with the GWMP assessment is based on data that were readily available or received through August 2012 by DWR. The assessment process is briefly summarized below.

The California Water Code §10753.7 requires that six components be included in a groundwater management plan for an agency to be eligible for State funding administered by DWR for groundwater projects, including projects that are part of an integrated regional water management program or plan (see Table CC-19). Three of the components also contain required subcomponents. The requirement associated with the 2011 AB 359 (Huffman) legislation, applicable to groundwater recharge mapping and reporting, did not take effect until January 2013 and was not included in the current GWMP assessment. In addition, the requirement for local agencies outside of recognized groundwater basins was not applicable for any of the GWMPs in the region.

In addition to the six required components, Water Code §10753.8 provides a list of twelve components that may be included in a groundwater management plan (Table CC-19). Bulletin 118-2003, Appendix C provides a list of seven recommended components related to management development, implementation, and evaluation of a GWMP, that should be considered to help ensure effective and sustainable groundwater management plan (Table CC-19).

As a result, the GWMP assessment was conducted using the following criteria:

- How many of the post SB 1938 GWMPs meet the six required components included in SB 1938 and incorporated into California Water Code §10753.7?
- How many of the post SB 1938 GWMPs include the twelve voluntary components included in California Water Code §10753.8?
- How many of the implementing or signatory GWMP agencies are actively implementing the seven recommended components listed in DWR Bulletin 118 - 2003?

PLACEHOLDER Table CC-19 Assessment for SB 1938 GWMP Required Components, SB 1938 GWMP Voluntary Components, and Bulletin 118-03 Recommended Components

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

In summary, assessment of the groundwater management plans in the Central Coast Hydrologic Region indicates the following:

- Two of the four GWMPs adequately address all of the required components listed under Water Code §10753.7.
- Three of the four GWMPs incorporate at least 10 voluntary components listed in Water Code §10753.8 and the remaining plan incorporates eight of the voluntary components.
- Two of the four GWMPs include all seven components, and the other two plans include six or fewer of the seven components recommended in Bulletin 118-03.

The DWR/ACWA survey asked respondents to identify key factors that contributed to the successful implementation of the agency's GWMP. Six agencies from the region participated in the survey. All six survey respondents identified data collection and sharing, sharing of ideas and information with other water resource managers, and funding as key factors for successful GWMP implementation. Outreach and education, developing an understanding of common interest, and developing and using a water budget were also identified as important factors.

Survey participants were also asked to identify factors that impeded implementation of the GWMP. Respondents pointed to a lack of adequate funding as the greatest impediment to GWMP implementation. Funding is a challenging factor for many agencies because the implementation and the operation of groundwater management projects typically are expensive and because the sources of funding for projects typically are limited to either locally raised monies or to grants from State and Federal agencies. Unregulated pumping is also a major concern and hindrance in implementing GWMPs in the region. The lack of surface storage and conveyance and the lack of groundwater were also identified as factors that impede implementation of GWMPs.

Finally, the survey asked if the respondents were confident in the long-term sustainability of their current groundwater supply. Three respondents felt long-term sustainability of their groundwater supply was possible while the other three respondents contended long-term sustainability was possible

The responses to the survey are furnished in Tables CC-20 and CC-21. *More detailed information on the DWR/ACWA survey and assessment of the GWMPs are available online from Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013.*

PLACEHOLDER Table CC-20 Factors Contributing to Successful Groundwater Management Plan Implementation in the Central Coast Hydrologic Region

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PLACEHOLDER Table CC-21 Factors Limiting Successful Groundwater Management Plan Implementation in the Central Coast Hydrologic region

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Groundwater Ordinances

Groundwater ordinances are laws adopted by local authorities, such as cities or counties, to manage groundwater. In 1995, the California Supreme Court declined to review a lower court decision (Baldwin v. Tehama County) that says that State law does not occupy the field of groundwater management and does not prevent cities and counties from adopting ordinances to manage groundwater under their police powers. Since 1995, the Baldwin v. Tehama County decision has remained untested; thus the precise nature and extent of the police power of cities and counties to regulate groundwater is still uncertain.

There are a number of groundwater ordinances that have been adopted by counties in the region (Table CC-22). The most common ordinances are associated with groundwater wells. These ordinances regulate well construction, abandonment, and destruction; however, none of the ordinances provide for comprehensive groundwater management. San Benito County enacted an ordinance that requires a permit for exporting groundwater beyond adjoining properties and for injecting imported surface water; the ordinance also restricts operation of groundwater wells that would adversely affect adjoining property. New groundwater well development in the county must show that it will have no adverse effect on groundwater supply and wells in the county.

PLACEHOLDER Table CC-22 Groundwater Ordinances that Apply to Counties in the Central Coast Hydrologic Region

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Special Act Districts

Greater authority to manage groundwater has been granted to a few local agencies or districts created through a special act of the Legislature. The specific authority of each agency varies, but the agencies can be grouped into two general categories: (1) agencies having authority to limit export and extraction (upon evidence of overdraft or threat of overdraft) or (2) agencies lacking authority to limit extraction, but having authority to require reporting of extraction and to levy replenishment fees.

Court Adjudication of Groundwater Rights

Another form of groundwater management in California is through the courts. There are currently 24 groundwater adjudications in California. The Central Coast Hydrologic Region contains four of those adjudications (Table CC-23 and Figure CC-29), two of which, the Santa Maria Valley basin and Los Osos were ranked as high priority basins in the CASGEM basin prioritization project, while the other two, Seaside and Goleta were ranked as medium priority basins.

PLACEHOLDER Table CC-23 Groundwater Adjudications in the Central Coast Hydrologic Region

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PLACEHOLDER Figure CC-29 Groundwater Adjudications in the Central Coast Hydrologic Region

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Other Groundwater Management Planning Efforts

Groundwater management also occurs through other avenues such as IRWMPs, Urban Water Management plans, and Agriculture Water Management plans. Box CC-3 summarizes these other planning efforts.

PLACEHOLDER Box CC-3 Other Groundwater Management Planning Efforts in the Central Coast Hydrologic Region

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Funding

Central Coast IRWM regions have been awarded over $83.3 million for planning and implementation projects, as shown in Table 24.

PLACEHOLDER Table CC-24 IRWM Grant Funding to the Central Coast (2005 to 2012)

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Current Relationships with Other Regions and States

Regional Relationships

[This section is underdevelopment.]

Regional Water Planning and Management

Integrated Regional Water Management Coordination and Planning

[This section is under development.]

The Central Coast region is actively engaged in integrated regional water management (IRWM) planning and implementation of water projects. Each of the six Central Coast IRWM regions have demonstrated a commitment to inter-regional communication and coordination by planning and participating regularly in Central Coast conference calls. The goal of IRWM is to meet regional water management challenges by developing integrated solutions and diversified water management portfolios through the collaboration of the region's stakeholders and by planning at the regional scale. The IRWM efforts serve a vital role, in combination with local and statewide planning, to provide for sustainable water use, water quality, and environmental functions. Find information about the program at www.water.ca.gov/irwm/

Implementation Activities (2009-2013)

Implementation Projects

[This section is under development.]

Santa Cruz

- **Conjunctive Use and Enhanced Aquifer Recharge for the Lower San Lorenzo River** – Work for this project has led to the development of a potential water exchange project between four water districts in the IRWM area.
- **Integrated Watershed Restoration Program** – The program consists of watershed enhancement projects, erosion control projects, habitat restoration projects, watershed education programs, and a permit coordination program to promote voluntary participation in long-term watershed restoration.
- **Desalination Analysis** – The City of Santa Cruz partnered with the Soquel Creek Water District to complete a rigorous and successful analysis of a potential desalination plant.
- **Davenport Water Treatment Plant Improvements -** The Davenport County Sanitation District completed construction of a new membrane filtration system and water tank for the Davenport drinking water system, which no longer met State or federal drinking water standards.

Pajaro River Watershed

- **San Jerardo Water System Improvements** – San Jerardo, a disadvantaged community, has been on a bottled water order since 2001 due to nitrate and trichloropropane (TCP) contamination of its well. Construction was completed on a new well, transmission pipelines, water storage tank, and a booster pump station.

San Luis Obispo

- **Lake Nacimiento Regional Pipeline Project** – San Luis Obispo County completed construction of a 45-mile raw water transmission pipeline with the ability to deliver 15,750 acre-feet per year of raw water to the communities of Paso Robles, Templeton, Atascadero, and San Luis Obispo.

Accomplishments

Water Quality Accomplishments

The Central Coast has many important collaborative efforts to protect and enhance water quality. These partnerships leverage Central Coast Regional Water Quality Control Board (CCRWQCB) staff work by bringing stakeholders and experts together to find funding and implement projects that improve water quality, provide habitat and enhance watershed functions. The CCRWQCB supports these and other efforts through grant and settlement funding and participation on technical advisory committees. Below is a list of notable partnership efforts across the region, and some of their recent projects and accomplishments.

The Integrated Watershed Restoration Program (IWRP)

IWRP began in Santa Cruz County in 2003 and has now expanded to include San Mateo and Monterey counties. The IWRP brings together local, State and federal partners to provide technical and financial assistance for multi-benefit restoration projects. IWRP has begun or completed approximately 30 projects in Santa Cruz County creeks since 2009, including projects to restore riparian and wetland habitat, and projects to aid steelhead and coho salmon recovery by improving in-stream habitat, reducing sediment delivery to creeks, and removing barriers to migration. Direct water quality benefits from these projects include erosion reduction, sediment capture, increased in-stream dissolved oxygen levels and lower summer in-stream water temperatures.

IWRP's largest restoration project to date will protect and restore 70 acres of marginal farmland in Watsonville Slough and will be completed in 2013. This project is the culmination of nearly eight years of work with landowners and growers, and represents a partnership between Santa Cruz Resource Conservation District, the Land Trust of Santa Cruz, USDA's Natural Resources Conservation Service, US Fish and Wildlife Service's Coastal Program and the Coastal Conservancy. The project will provide a mosaic of wetland and upland habitats and provide breeding, nesting and foraging habitat and migration corridors for sensitive species of amphibians. Additional information can be found at: http://iwrp.rcdsantacruz.org/about/index.html#evol

Elkhorn Slough Foundation

The Elkhorn Slough Tidal Wetland Project is a collaborative effort to develop and implement conservation and restoration strategies for critical estuarine habitats in Elkhorn Slough- the largest tract of tidal salt marsh in California outside of San Francisco Bay. Initiated in 2004, the project involves over 100 coastal resource managers, scientific experts, agency representatives and community members. In 2011, the Tidal Wetlands Project completed the Parsons Slough Sill project. The sill is acting to reduce erosive tides and prevent thousands of cubic yards of sediment from washing into the bay each year. It is anticipated that this project will result in restoration of an additional seven acres of tidal marsh. Additional information can be found at: http://www.elkhornslough.org/

Agriculture Water Quality Alliance (AWQA)

The Agriculture Water Quality Alliance is a partnership of agriculture industry groups, resource conservation agencies, researchers, and environmental organizations working toward protection of the Monterey Bay National Marine Sanctuary and the adjacent watersheds while sustaining the economic viability of agriculture throughout the Sanctuary's watersheds. In 2009, AWQA received funds from USDA to assist farmers in implementing improved irrigation and nutrient management practices. In the first two years, the program helped 71 growers install 384 conservation practices, treating 12,423 acres to reduce runoff and leaching of nutrients, and conserve water. Additional information can be found at: http://www.awqa.org/ and http://www.awqa.org/farmers/AWEP.html

Morro Bay National Estuary Program (MBNEP)

Morro Bay is designated as a national estuary (one of 28 in the nation) and is the largest relatively undisturbed estuary along the southern and central California coast. MBNEP is a multi-stakeholder program that works with agencies, landowners, and researchers to protect the bay and its watershed. Water quality problems include increased sedimentation, bacteria and nutrients. The CCRWQCB has adopted several TMDLs for the bay and its tributaries. By working with landowners and managers to implement rangeland and road improvements, and wetland enhancement projects, MBNEP has been able to prevent thousands of tons of sediment from reaching the bay. A recently completed project by MBNEP, in coordination with local ranchers, implemented off-stream water supplies and fencing to keep cattle out of San Luisito Creek, a subwatershed of the bay. The project resulted in a significant drop in bacterial levels in the stream by 2010, and a potential de-listing by 2013. Additional information can be found at: http://www.mbnep.org/index.html

Reducing Sediment from Rural Roads

Santa Cruz Resource Conservation District began a rural roads cost-share funding program several years ago and completed the third phase in 2010. This program has helped landowners implement practices to reduce erosion on mountainous roads in rural Santa Cruz County. The RCD estimates that the most recent phase of the program is preventing nearly 900 tons of sediment per year from entering steelhead and salmon-bearing river systems.

Reducing Sediment, Pathogens and Nutrients from Small Livestock Operations

Ecology Action of Santa Cruz is implementing a multi-phase project to assist landowners with implementing management practices to reduce impacts from small livestock operations, which are common in rural areas throughout the region. Livestock facilities have been shown to contribute significantly to impairment of local waterways through contribution of nutrients, pathogens and sediment. For example, in the San Lorenzo river mouth, livestock contributes 30% of the known pathogen sources. Practices implemented include vegetated swales and buffer strips, manure containment, and revegetation. Since the three grant projects have been implemented, hundreds of tons of manure and hundreds of pounds of nutrients have been kept out of Central Coast waterways.

Improving Irrigation and Nutrient Management on Farm Lands

Grant funding from Propositions 50 and 84 has been allocated to the Santa Cruz County Resource Conservation District, the Monterey Bay Sanctuary Foundation, and the Cachuma Resource Conservation District for irrigation and nutrient management on agricultural lands in the Pajaro, Salinas, and Santa Maria River watersheds, respectively. Grants provide cost-share assistance for improved agricultural practices such as irrigation system conversions and tailwater treatment, and will serve as a model for agricultural BMP implementation.

Clean Water Act Section 319(h) Nonpoint Source Pollution Control Program grant funds were awarded to the Coastal San Luis Resource Conservation District to implement agricultural water quality improvement projects on rangeland and farms to reduce sediment, nutrient, and pesticide pollutant loading to Morro Bay.

Agricultural Sustainability CCVT SIP Certification

In 1996, a group of Central Coast wine-grape growers pioneered an innovative whole-farm assessment system to assess vineyard sustainability. In 2008, the Central Coast Vineyard Team (CCVT) program launched a sustainability certification program, wherein third-party auditors assess the sustainability of the entire wine-growing operation. Those that meet the Sustainability in Practice (SIP) certification requirements are eligible to use the SIP seal on their wine. Currently, there are 27,000 acres certified and 300,000 cases of wine bearing the SIP seal. Additional information can be found at: http://www.vineyardteam.org/sip

Low-Impact Development

Under the guidance of the Low Impact Development Center, the following LID projects are underway:

1. A redesign of the parking lot at the Atascadero Zoo to incorporate pervious pavement, rain gardens and native vegetation to mimic the processes and functions of natural systems, allowing storm water to slow, spread and sink in. Such design features increase recharge of aquifers and filter pollutants. Additional features, such as trees and other vegetation, will provide aesthetic, cooling, and storm water management functions.
2. The Paso Robles 21st Street Complete Green Street, is a project to redesign a street near the Paso Robles Event Center that was built in a natural drainage-way and currently floods during large storms. The planned and funded project will reduce the volume and intensity of storm water runoff, increase groundwater recharge, improve pedestrian and bicyclist mobility, shade the street and promote redevelopment.

Removing Water Quality Impairments through Implementing TMLDs

The Central Coast region has many water bodies that are listed on the Clean Water Act Section 303(d) list of impaired water bodies. Total Maximum Daily Load (TMDL) development and implementation is a high priority. In 2010, the CCRWQCB was able to remove Chorro Creek (a tributary to Morro Bay), from the 303(d) list as a result of improvement in dissolved oxygen levels. The delisting was a result of actions by a discharger, several landowners, and the Morro Bay National Estuary Program. Actions included upgrade of a waste water treatment plant, restoration of a segment of Chorro Creek, and several stream fencing projects in tributaries. Dissolved oxygen is now meeting water quality standards, and nutrient and pathogen levels are declining.

Groundwater Cleanup

During the period from 2009 through 2011, 184 groundwater cleanups were completed, including 145 leaking underground fuel storage tanks and 39 other groundwater cleanup cases, such as dry cleaners and munitions production facilities. Groundwater cleanup is necessary to protect drinking water supplies throughout this groundwater-dependent region. For example, a cleanup remedy is currently underway in the Llagas groundwater basin in southern Santa Clara County, where potassium perchlorate from a facility that manufactured signal flares created a contaminant plume that reached 10 miles in length and polluted 188 domestic wells. The Water Board ordered cleanup in 2007, and by 2010, over 255 million gallons of groundwater had been treated and 176 of the polluted domestic wells were meeting the drinking water standard for percholorate (94%). Additional information can be found at: http://www.waterboards.ca.gov/rwqcb3/board_info/agendas/2011/July/Item9/9_stfrpt.pdf

Challenges

Region Challenges

Disadvantaged Community Water Systems

Disadvantaged communities in the region often cannot provide the economies of scale necessary to construct, operate and maintain new water facilities to meet drinking water standards. Recent grant funding has assisted some systems to begin design and construction of these needed projects, however not all projects were funded. Additional grant funding is needed to assist these and future projects.

Proposition 218

Water and wastewater systems in the region continue to plan, design and complete upgrades to their water and wastewater systems in order to meet stricter drinking water and wastewater regulations. These upgrades typically require rate increases from rate payers who may challenge these rate increases through the Proposition 218 process, which requires that any local tax imposed to pay for specific governmental programs be approved by two-thirds of the voters. The required system upgrades may be jeopardized if the rate increases are overturned, which may result in continued violations of drinking water or wastewater effluent standards or continued deterioration of water system facilities that have outlived their useful life.

Disposal of Drinking Water Treatment Waste Products

Disposal of drinking water treatment waste products can significantly increase treatment costs that are ultimately passed on to rate payers. When selecting drinking water treatment alternatives, especially for arsenic, water systems must consider the cost to dispose of drinking water treatment waste products such as backwash water or spent filter media. Spent filter media must be evaluated under the California Waste Extraction Test (WET), which is more stringent than the federal leaching tests, for classification prior to determining appropriate disposal options. As well, some spent filter media may qualify as a hazardous or radioactive waste due to the concentration and leaching characteristics of the contaminant.

Protecting Groundwater Basins

A major challenge in the Central Coast is protecting groundwater basins. The decades-long accumulation of nitrates in the groundwater basins of the Salinas, Pajaro and Santa Maria watersheds, as the result of the intensive, year-round agriculture that produces the majority of the nation’s lettuce, celery, cabbage and strawberries, and the associated groundwater pumping demands, threatens the sustainability of the region’s main source of water. Central Coast groundwater basins supply not only irrigation water, but also drinking water to the majority of the region’s growing population.

Area Challenges

Santa Cruz

- **IRWM Funding and Resource Limitations** – The Central Coast has little funding relative to the rest of the state; inter-regional IRWM planning is difficult because the Central Coast IRWM regions must compete against each other for limited grant funds.
- **Water Reliability in Santa Cruz County -** An evaluation of water supplies and demands for the City of Santa Cruz and the Soquel Creek Water District indicates that a new water supply source will be necessary to meet community demands, reduce groundwater pumping and maintain in-stream flows for fish. In 2010, both water systems completed a joint desalination pilot study to evaluate alternative treatment systems for a seawater reverse osmosis desalination plant.

Pajaro River Watershed

- The Pajaro River watershed region wants to improve water quality in Northern San Benito County.

Monterey Peninsula

- **Water Reliability in Monterey Peninsula -** The Monterey Peninsula must develop new water supplies due to a water rights cease and desist order requiring Cal-Am Water Company (the major local water supplier) to reduce water diversion from the Carmel River and an adjudication of the Seaside groundwater basin requiring Cal-Am to reduce its groundwater pumping. The Monterey Peninsula Water Management District (MPWMD) estimates that 6,000 to 8,000 acre-feet per year on average are needed to replace the required reduction in water diversions from the Carmel River and Seaside Groundwater Basin.

San Luis Obispo

- **Paso Robles Groundwater Basin Overdraft -** Groundwater levels in some parts of the basin have dropped 70 feet or more within the last 16 years. In mid-2013, San Luis Obispo County Board of Supervisors approved an emergency ordinance that requires all new water use (development or agricultural) in the basin be offset in a 1-to-1 ratio, and all new irrigation wells must be metered.

Santa Barbara

- **IRWM Funding** – Six Central Coast IRWM regions must compete for a limited amount of funding; it is difficult to connect potential project partners for interregional planning.
- **City of Santa Barbara's Cater Water Treatment Plant -** Upgrades are needed to meet more stringent disinfection byproduct regulations, so the City is constructing an ozone treatment facility to replace chlorine as a pre-oxidant for surface water supplies.
- **Groundwater** – The City began construction of a centralized groundwater treatment facility to improve groundwater quality.

Flood Challenges

Flood management in the Central Coast Hydrologic Region of California has a unique set of challenges that were identified during meetings with local agencies in the hydrologic region. These challenges include:

- Impacts of sea level rise
- Operations and maintenance costs
- Environmental regulations that restrict the ability of agencies to utilize options for flood management
- Inconsistent and unreliable funding

- Inadequate access to training and/or experienced flood managers
- Difficulty quantifying the benefit (intangible) of improved habitat and other intangible aspect of a project to prove that the project provides a net benefit
- Inadequate agency alignment and inconsistent agency roles and responsibilities
- Inadequate public awareness about flood risk
- Land use planning and economic pressures promote development in the floodplain in some areas
- Permitting that is costly and difficult to navigate

Looking to the Future

Future Conditions

Future Scenarios

For Update 2013, the California Water Plan (CWP) evaluates different ways of managing water in California depending on alternative future conditions and different regions of the state. The ultimate goal is to evaluate how different regional response packages, or combinations of resource management strategies from Volume 3, perform under alternative possible future conditions. The alternative future conditions are described as future scenarios. Together the response packages and future scenarios show what management options could provide for sustainability of resources and ways to manage uncertainty and risk at a regional level. The future scenarios are comprised of factors related to future population growth and factors related to future climate change. Growth factors for the Central Coast are described below. Climate change factors are described in general terms in Chapter 5, Volume 1.

Water Conservation

The CWP scenario narratives include two types of water use conservation. The first is conservation that occurs without policy intervention (called background conservation). This includes upgrades in plumbing codes and end user actions such as purchases of new appliances and shifts to more water efficient landscape absent a specific government incentive. The second type of conservation expressed in the scenarios is through efficiency measures under continued implementation of existing best management practices in the Memorandum of Understanding (CUWCC 2004). These are specific measures that have been agreed upon by urban water users and are being implemented over time. Any other water conservation measures that require additional action on the part of water management agencies are not included in the scenarios, and would be represented as a water management response.

Central Coast Growth Scenarios

Future water demand in the Central Coast hydrologic region is affected by a number of growth and land use factors, such as population growth, planting decisions by farmers, and size and type of urban landscapes. See Table CC-25 for a conceptual description of the growth scenarios used in the CWP. The CWP quantifies several factors that together provide a description of future growth and how growth could affect water demand for the urban, agricultural, and environmental sectors in the Central Coast region. Growth factors are varied between the scenarios to describe some of the uncertainty faced by water managers. For example, it is impossible to predict future population growth accurately, so the CWP uses three different but plausible population growth estimates when determining future urban water demands. In addition, the CWP considers up to three alternative views of future development density. Population growth and development density will reflect how large the urban landscape will become in 2050 and are used by the CWP to quantify encroachment into agricultural lands by 2050 in the Central Coast region.

PLACEHOLDER Table CC-25 Conceptual Growth Scenarios

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

For Update 2013, DWR worked with researchers at the University of California, Davis, to quantify how much growth might occur in the Central Coast region through 2050. The UPlan model was used to estimate a year 2050 urban footprint under the scenarios of alternative population growth and development density (see http://ice.ucdavis.edu/project/uplan for information on the UPlan model). UPlan is a simple rule-based urban growth model intended for regional or county-level modeling. The needed space for each land use type is calculated from simple demographics and is assigned based on the net attractiveness of locations to that land use (based on user input), locations unsuitable for any development, and a general plan that determines where specific types of development are permitted. Table CC-26 describes the amount of land devoted to urban use for 2006 and 2050, and the change in the urban footprint under each scenario. As shown in the table, the urban footprint grew by about 20 thousand acre under low population growth scenario (LOP) by 2050 relative to 2006 base-year footprint of about 320 thousand acres. Urban footprint under high population scenario (HIP), however, grew by about 180 thousand acres. The effect of varying housing density on the urban footprint is also shown.

PLACEHOLDER Table CC-26 Growth Scenarios (Urban) – Central Coast

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Table CC-27 describes how future urban growth could affect the land devoted to agriculture in 2050. Irrigated land area is the total agricultural footprint. Irrigated crop area is the cumulative area of irrigated agriculture, including multi-crop area, where more than one crop is planted and harvested each year. Each of the growth scenarios shows a decline in irrigated acreage over existing conditions, but to varying degrees. As shown in the table, irrigated crop acreage declines by about 20 thousand acres by year 2050 as a result of low population growth and urbanization in the Central Coast region, while the decline under high population growth was about 100 thousand acres.

PLACEHOLDER Table CC-27 Growth Scenarios (Agriculture) – Central Coast

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Central Coast 2050 Water Demands

In this section a description is provided for how future water demands might change under scenarios organized around themes of growth and climate change described earlier in this chapter. The change in water demand from 2006 to 2050 is estimated for the Central Coast region for the agriculture and urban sectors under nine growth scenarios and 13 scenarios of future climate change. The climate change scenarios included the 12 CAT scenarios described in Chapter 5, Volume 1 and a 13th scenario representing a repeat of the historical climate (1962-2006) to evaluate a “without climate change” condition.

Figure CC-30 shows the change in water demands for the urban and agricultural sectors under nine growth scenarios, with variation shown across 13 climate scenarios. The nine growth scenarios include three alternative population growth projections and three alternative urban land development densities, as shown in Table CC-25. The change in water demand is the difference between the historical average for 1998 to 2005 and future average for 2043 to 2050. Urban demand is the sum of indoor and outdoor water demand where indoor demand is assumed not to be affected by climate. Outdoor demand, however, depends on such climate factors as the amount of precipitation falling and the average air temperature. The solid blue dot in Figure CC-30 represents the change in water demand under a repeat of historical climate, while the open circles represent change in water demand under 12 scenarios of future climate change.

PLACEHOLDER Figure CC-30 Change in Central Coast Agricultural and Urban Water Demands for 117 Scenarios from 2006-2005 (thousand acre-feet per year)

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Urban demand increased under all 9 growth scenarios tracking with population growth. On average, it increased by about 40 thousand acre-feet under the three low population scenarios, 130 thousand acre-feet under the three current trend population scenarios and about 230 thousand acre-feet under the three high population scenarios when compared to historical average of about 270 thousand-acre-feet. The results show change in future urban water demands are less sensitive to housing density assumptions or climate change than to assumptions about future population growth.

Agricultural water demand decreases under all future scenarios due to reduction in irrigated lands as a result of urbanization and background water conservation when compared with historical average water demand of about 1030 thousand acre-feet. Under the three low population scenarios, the average reduction in water demand was about 100 thousand acre-feet while it was about 210 thousand acre-feet for the three high population scenarios. The results show that low density housing would result in more reduction in agricultural demand since more lands are lost under low-density housing than high density housing.

Future Water Quality

Below are recommendations that, if implemented on a regional scale, will protect water quality and public health, promote sustainable water supplies, and improve our ability to measure performance in protecting and restoring groundwater resources. Most require coordination and cooperation among many entities, and may entail changes in policy as well.

Groundwater Recharge Area Protection - The Central Coast Region relies heavily on groundwater for drinking water and agricultural irrigation. Preservation of groundwater quality in source areas will be accomplished by identifying and protecting groundwater recharge locations.

- Identify and map recharge areas (consistent with AB 359, Huffman 2011)
- Develop local and statewide land use management requirements (e.g., ordinances, regulations, Basin Plan amendments, etc.) to protect and restore recharge areas.
- Implement programs and projects to increase the amount of clean water recharge (e.g., Low-Impact Development).

- Utilize integrated regional water management to address complex issues, such as infiltration management, basin recharge, etc.

Regional/Basin-wide Groundwater Monitoring and Assessment- Understanding of the quality and quantity of water in our groundwater basins is essential to successful management. The following strategies will provide increased data availability/transparency and use:

- Coordinate with local agencies to build on existing programs and develop programs where they are lacking.
- Improve data management - build on GeoTracker GAMA as the centralized database to consolidate groundwater quality, and CASGEM for well and hydrogeologic data.
- Develop monitoring programs for shallow groundwater.
- Implement drinking water quality monitoring requirements, with reporting into GeoTracker, for the most at-risk population of water users who rely on domestic wells and local small and State small water systems/wells for their potable supply.

Source Control of Nitrate and Salt Loading to Groundwater - The significant and ongoing loading of nitrate and salts is the largest threat to public health and groundwater quality within the region. Irrigated agriculture is the most significant source of loading.

- Implement the Central Coast's Irrigated Lands Regulatory Program to monitor and reduce pollutant loading from irrigated agriculture.
- Facilitate the development and implementation of salt and nutrient management plans (per SWRCB Recycled Water Policy, Resolution 2009-0011).
- Develop regional permitting strategy, in alignment with pending salt and nutrient management plans, to address salt and nutrient loading from municipal discharges and recycling projects (e.g., develop consistent permit requirements and support development of coastal brine disposal facilities).

Widespread Improvements in Agricultural Irrigation Efficiency and Management - The Central Coast has approximately 435,000 acres of very productive irrigated agriculture, much of it intensively cropped nearly year-round, making it the third largest land use in the region, after open space and rangeland. Irrigated agriculture is the largest user/pumper of groundwater within the agricultural areas of the region, and contributes the largest fraction of return flows to both surface water and groundwater. Improved irrigation management can reduce off-site movement of water that carries pollutants to surface and groundwater, reduce erosion and sedimentation, and reduce overdraft of groundwater basins.

- Improve water use measurement
- Improve irrigation scheduling, such as through expanded use of climate information (CIMIS)
- Increase knowledge of crop water needs

Riparian Buffer Zone Designation and Protection - Riparian lands adjacent to streams, lakes, or other surface water bodies that are adequately vegetated provide an important environmental protection and water resource management benefit.

- Implement specifications for the establishment, protection, and maintenance of riparian vegetation
- Adopt a Basin Plan amendment for riparian protection
- Adopt local ordinances protecting riparian areas
- Improve statewide riparian and wetland protection policies

- Implement rangeland management measures

Widespread Implementation of low-impact development (LID) – low-impact development techniques, such as increasing urban surface permeability and creating swales and vegetated areas to allow increased infiltration of rainwater, can improve water quality by reducing pollution being transported to streams and coastal areas (e.g. bacteria, pesticides, and fertilizers) and increasing recharge of clean groundwater.

- Adopt local ordinances requiring LID
- Establish standards for hydromodification
- Expand the Central Coast LID Initiative

Widespread Implementation of Urban Water Conservation - Urban water conservation has the potential to improve water quality by reducing basin overdraft/seawater intrusion in some areas and eliminating summer flows that carry pollutants to surface waters.

- Increase use of incentives to encourage rapid adoption of water saving technologies (e.g., toilet exchange programs, credits for drought-tolerant landscaping, grey water retrofits, rainwater collection systems)

The recommendations, implementation actions and accomplishments of the Central Coast Water Board identify solutions and actively address the water quality challenges we face. Integrated regional water management, the Central Coast Ambient Monitoring Program, the Cooperative Monitoring Program, and the Low Impact Development Initiative are just a few examples of how coordinating and leveraging both internal and external resources has the potential to achieve tangible results on a regional scale.

Integrated Water Management Plan Summaries

Inclusion of the information contained in IRWMP's into the CWP regional reports has been a common suggestion by regional stakeholders at the regional outreach meetings since the inception of the IRWM program. To this end, the CWP update has taken on the task of summarizing readily available integrated water management plan in a consistent format for each of the regional reports. This collection of information will not be used to determine IRWM grant eligibility. his effort is ongoing and will be included in the final CWP updates and will include up to four pages for each IRWMP in the regional reports.

In addition to these summaries being used in the regional reports we intend to provide all of the summary sheets in one IRWMP Summary "Atlas" as an article included in Volume 4. This atlas will, under one cover, provide an "at-a-glance" understanding of each IRWM region and highlight each region's key water management accomplishments and challenges. The atlas will showcase how the dedicated efforts of individual regional water management groups (RWMGs) have individually and cumulatively transformed water management in California.

All IRWMPs are different in how they are organized. Therefore, finding and summarizing the content in a consistent way proved difficult. It became clear through these efforts that a process is needed to allow those with the most knowledge of the IRWMPs — those who were involved in the preparation — to have input on the summary. It is the intention that this process be initiated following release of Update 2013 and will continue to be part of the process of the update process for Update 2018. This process will also allow for continuous updating of the content of the atlas as new IRWMPs are released or existing IRWMPs are updated.

As can be seen in Figure CC-31, there are 7 IRWM planning efforts ongoing in the Central Coast Hydrologic Region.

PLACEHOLDER Figure CC-31 Integrated Water Management Planning in the Central Coast Hydrologic Region

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Placeholder Text: At the time of the Public Review Draft the collection of information out of the IRWMPs in the region has not been completed. Below are the basic types of information this effort will summarize and present in the final regional report for each IRWMP available. An opportunity will be provided to those with responsibility over the IRWMP to review these summaries before the reports are final.

Region Description: This section will provide a basic description of the IRWM region. This would include location, major watersheds within the region, status of planning activity, and the governance of the IRWM. In addition, a IRWM grant funding summary will be provided.

Key Challenges: The top five challenges identified by the IRWM would be listed in this section.

Principal Goals/Objective: The top five goals and objectives identified in the IRWMP will be listed in this section.

Major IRWM Milestones and Achievements: Major milestones (Top 5) and achievements identified in the IRWMP would be listed in this section.

Water Supply and Demand: A description (one paragraph) of the mix of water supply relied upon in the region along with the current and future water demands contained in the IRWMP will be provided in this section.

Flood Management: A short (one paragraph) description of the challenges faced by the region and any actions identified by the IRWMP will be provided in this section.

Water Quality: A general characterization of the water quality challenges (one paragraph) will be provided in this section. Any identified actions in the IRWMP will also be listed.

Groundwater Management: The extent and management of groundwater (one paragraph) as described in the IRWMP will be contained in this section.

Environmental Stewardship: Environmental stewardship efforts identified in the IRWMP will be summarized (one paragraph) in this section.

Climate Change: Vulnerabilities to climate change identified in the IRWMP will be summarized (one paragraph) in this section.

Tribal Communities: Involvement with tribal communities in the IRWM will be described (one paragraph) in this section of each IRWMP summary.

Disadvantaged Communities: A summary (one paragraph) of the discussions on disadvantaged communities contained in the IRWMP will be included in this section of each IRWMP summary.

Governance: This section will include a description (less than one paragraph) of the type of governance the IRWM is organized under.

Resource Management Strategies

Volume 3 contains detailed information on the various strategies which can be used by water managers to meet their goals and objectives. A review of the resource management strategies addressed in the available IRWMP's are summarized in Table CC-28.

PLACEHOLDER Table CC-28 Resource Management Strategies addressed in IRWMP's in the Central Coast Hydrologic Region

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Conjunctive Management and Groundwater Storage

Conjunctive management, or conjunctive use, refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. Managing both resources together, rather than in isolation, allows water managers to use the advantages of both resources for maximum benefit. Conjunctive use of surface water and groundwater has been utilized for decades by numerous coastal and inland basins throughout the region. Many agencies have erected systems of barriers to allow more efficient percolation of ephemeral runoff from surrounding mountains.

A survey undertaken in 2011-2012 jointly by DWR and ACWA to inventory and assess conjunctive management projects in California is summarized in Box CC-4. *More detailed information about the survey results and a statewide map of the conjunctive management projects and operational information, as of July 2012, is available online from Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013.*

PLACEHOLDER Box CC-4 Statewide Conjunctive Management Inventory Effort in California

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Conjunctive Management Inventory Results

Of the 89 agencies or programs identified as operating a conjunctive management or groundwater recharge program in California, five programs are located in the Central Coast Hydrologic Region. Two of the management agencies identified in the region reported the details of their conjunctive management program, as discussed below.

The Monterey Peninsula Water Management District conjunctive management program is listed as the Phase I Aquifer Storage and Recovery Project and was implemented in 1998 with a capital cost of $6.5 million. The project goals are to mitigate aquifer overdraft and saline intrusion into coastal basins, protect water quality, and meet regulatory requirements. The Aquifer Storage and Recovery project currently recharges approximately 5,300 acre-foot per year into Santa Margarita Aquifer and extracts approximately 3,000 acre-foot per year. The project has an annual operating cost of approximately $225,000.

The Pajaro Valley Water Management Agency's unnamed conjunctive management program is also an aquifer storage and recovery project which allows an annual recharge of approximately 700 acre-foot and extraction of approximately 170 acre-foot. Cumulatively, the project since inception has recharged an estimated 6,800 acre-foot and extracted an estimated 1,500 acre-foot. Similar to those of Monterey Peninsulas program, the goals of the Pajaro valley program are to mitigate overdraft and saline intrusion into coastal basins, protect water quality, and meet regulatory requirements. Costs associated with this program were not furnished.

Additional information regarding conjunctive management in California as well as discussion on associated benefits, costs, and issues can be found online from California Water Plan Update 2013 Vol. 3 Ch. 9 Conjunctive Management and Groundwater Storage Resource Management Strategy.

Regional Resource Management Strategies

The 27 Resources Management Strategies (RMS) included in *California Water Plan Update 2009* are intended to help water managers achieve the following six objectives:

1. Reduce Water Demand
2. Improve Operational Efficiency and Transfers
3. Increase Water Supply
4. Improve Water Quality
5. Practice Resource Stewardship
6. Improve Flood Management

Below, each Central Coast IRWM Region identifies current activities which address the 2009 RMSs.

Santa Cruz

- **Agricultural Water Use Efficiency** – Under the County's new well ordinance, all new agricultural wells are required to develop and implement a water conservation plan as a condition of permit approval.
- **Urban Water Use Efficiency** – Water districts within the Santa Cruz IRWM region have some of the lowest per-capita water use rates within the state and of the district's updated urban water management plans call out for conservation, and those programs are continually being updated and improved.
- **Water Transfers** – The County, City of Santa Cruz, Soquel Creek Water District, Scotts Valley Water District and San Lorenzo Valley Water District are studying the feasibility of a water exchange project.
- **Conjunctive Management & Groundwater Storage** – The County completed a conjunctive use analysis for the lower San Lorenzo River and identified three priority projects. This project laid the groundwork for the current water exchange project, described above.

- **Desalination –** The City of Santa Cruz has partnered with the Soquel Creek Water District to complete a rigorous and successful analysis of a potential desalination plant.
- **Recycled Municipal Water** – The City of Scotts Valley and the Scotts Valley Water District operate an expanded facility that provides recycled water for landscape irrigation to reduce groundwater pumping. A project is currently being pursued with local funding to recycle the balance of Scotts Valley wastewater for irrigation on a nearby golf course, which will reduce the demand for municipal water.
- **Drinking Water Treatment and Distribution** – The City of Santa Cruz and San Lorenzo Valley Water District operate a centralized water treatment plant to treat surface water prior to distribution. The other water agencies typically utilize wellhead treatment at their individual wells prior to distribution.
- **Groundwater/Aquifer Remediation** – Santa Cruz County Environmental Health Service has a comprehensive program to assist the Central Coast Regional Water Quality Control Board in the cleanup of contaminated groundwater, particularly in the Scotts Valley area, where contamination plumes pose potential threats to municipal wells.
- **Pollution Prevention** – Almost all local jurisdictions are implementing pollution prevention efforts, and most of this work is being done under NPDES stormwater permits.
- **Urban Runoff Management** – Same as for pollution prevention.
- **Agricultural Lands Stewardship** – Many agricultural operations within the region conduct agricultural land stewardship under the Monterey Bay National Marine Sanctuary's Ag and Rural Lands plan, supported by Federal 319(h) and State Proposition 13, 40, 50 and 84 grants. The Resource Conservation District of Santa Cruz County, the Natural Resources Conservation Service, and willing landowners have also implemented projects.
- **Economic Incentives –** Water agencies utilize tiered pricing and rebates to encourage water conservation.
- **Ecosystem Restoration** –The Resource Conservation District of Santa Cruz County coordinates many restoration activities in the region, including the Healthy Watersheds Restoration Program (HWRP), and the Integrated Watershed Restoration Program (IWRP).
- **Forest and Watershed Management –** The City of Santa Cruz and San Lorenzo Valley Water District both own extensive forested watershed lands, and have developed watershed management plans to improve the watershed and limit potential impacts of timber harvesting.
- **Land Use Planning and Management -** The Santa Cruz County General Plan includes policies and programs for water resource, watershed, aquifer protection, including restrictions in mapped groundwater recharge areas and water supply watersheds. Santa Cruz County has ordinances for protection of riparian corridors and erosion control as well as pollution prevention.
- **Recharge Area Protection** – Santa Cruz County has mapped primary groundwater recharge areas and has specific policies for minimum parcel size, septic system design and maintenance of infiltration in those areas.
- **Water-dependent Recreation** – The region supports boating and fishing in Loch Lomond; white-water boating, salmon and steelhead fishing, swimming and wading in the San Lorenzo River; and swimming, surfing and boating in the near-coastal waters.
- **Flood Risk Management** – Active flood risk management includes flood plain zoning and development restrictions; operation of an ALERT flood warning system; reconstruction projects to raise bridges on the San Lorenzo River and Soquel Creek; levee reconstruction and

maintenance on the lower San Lorenzo River; and grants to elevate flood-prone homes in the Felton area.

Greater Monterey

- **Agricultural Water Use Efficiency -** The Resource Conservation District (RCD) of Monterey County works with farmers to increase agricultural water use efficiency through BMPs such as use of a time clock/pressure switch, water flowmeters, leakage reduction, sprinkler improvements, pre-irrigation reduction, reduced sprinkler spacing, micro irrigation systems, land leveling/grading, and soil moisture sensors.
- **System Re-operation -** The Salinas Valley Water Project, implemented by the Monterey County Water Resources Agency (MCWRA) in April 2010, involves re-operation of the Nacimiento and San Antonio Reservoirs to provide additional water to the Salinas Valley which is then used for both groundwater basin recharge and for blending with recycled water. The blended water replaces some of the groundwater pumped for irrigation. Together, increased groundwater recharge and the use of recycled water for irrigation have helped to reduce seawater intrusion.
- **Recycled Municipal Water -** The City of Soledad completed construction of the new Soledad Water Reclamation Facility, with a capacity of 5.5 million gallons/day (MGD), at its wastewater treatment plant in February 2010. The City plans to also construct a recycled water pump station and additional recycled water transmission mains, which will enable delivery of recycled water to multiple landscaped areas currently being irrigated with potable water.
- **Watershed Management/Planning -** The Monterey County RCD is drafting a watershed management plan for the Big Sur River watershed.

San Luis Obispo

- **Reduce Water Demand** through conservation.
- **Increase Water Supply** through optimizing use of the Nacimiento Water Project and State Water Project; increasing recycled water use; groundwater banking and recharge; desalination; new off-stream and on-stream storage; and precipitation enhancement .
- **Practice Resource Stewardship** through improved Land Use Management.
- **Improve Operational Efficiency and Transfers** through Salinas Reservoir and Lopez Lake expansion and exchanges, as well as optimization of Nipomo supplemental water project.

Climate Change

For over two decades, the State and federal governments have been preparing for climate change effects on natural and built systems with a strong emphasis on water supply. Climate change is already impacting many resource sectors in California, including water, transportation and energy infrastructure, public health, biodiversity, and agriculture (USGRCP, 2009; CNRA, 2009). Climate model simulations based on the Intergovernmental Panel on Climate Change's 21st century scenarios project increasing temperatures in California, with greater increases in the summer. Projected changes in annual precipitation patterns in California will result in changes to surface runoff timing, volume, and type (Cayan, 2008). Recently developed computer downscaling techniques indicate that California flood risks from warm-wet, atmospheric river type storms may increase beyond those that we have known historically, mostly in the form of occasional more-extreme-than-historical storm seasons (Dettinger, 2011).

Currently, enough data exist to warrant the importance of contingency plans, mitigation (i.e., reduction) of greenhouse gas (GHG) emissions, and incorporating adaptation strategies (i.e., methodologies and infrastructure improvements that benefit the region at present and into the future). While the State of California is taking aggressive action to mitigate climate change through reducing emissions from greenhouse gases and implementing other measures (CARB, 2008), global impacts from carbon dioxide and other GHGs that are already in the atmosphere will continue to impact climate through the rest of the century (IPCC, 2007).

Resilience to an uncertain future can be achieved by implementing adaptation measures sooner rather than later. Due to the economic, geographical and biological diversity of the state, vulnerabilities and risks due to current and future anticipated changes are best assessed on a regional basis. Many resources are available to assist water managers and others in evaluating their region-specific vulnerabilities and identifying appropriate adaptive actions (EPA/DWR, 2011; Cal-EMA/CNRA, 2012).

Observations

The region's observed temperature and precipitation vary greatly due to complex topography. Regionally-specific temperature observations can be retrieved through the Western Regional Climate Center (WRCC). The WRCC has temperature and precipitation data for the past century. Through an analysis of National Weather Service Cooperative Station and PRISM Climate Group gridded data, scientists from the WRCC have identified 11 distinct regions across the state for which stations located within a region vary with one another in a similar fashion. These 11 climate regions are used when describing climate trends within the state (Abatzoglou et al. 2009). DWR's hydrologic regions, however, do not correspond directly to WRCC's climate regions. A particular hydrologic region may overlap more than one climate region and, hence, have different climate trends in different areas. For the purpose of this regional report, climate trends of the major overlapping climate regions are considered to be relevant trends for respective portions of the overlapping hydrologic region.

The Central Coast Hydrologic Region is covered by two WRCC regions - the Central Coast and San Joaquin Valley regions. Temperatures in the WRCC Central Coast region during the period of record indicate that a mean increase of about 1.1 – 2.0 °F (0.6 – 1.1 °C) has occurred, with minimum values increasing more than maximums [1.6 – 2.6 °F (0.9 – 1.4 °C) and 0.4 – 1.5 °F (0.2 – 0.8 °C), respectively]. Temperatures in the WRCC San Joaquin Valley region show a similar trend. A mean increase of 0.9 – 1.9 °F (0.5 – 1.0 °C) was recorded, with minimum temperatures increasing 2.0 – 3.0 °F (1.1 – 1.6 °C) compared to the mean maximum temperature trend, which was relatively stable.

Projections and Impacts

While historic data is a measured indicator of how the climate is changing, it can't project what future conditions may be like under different GHG emissions scenarios. Current climate science uses modeling methods to simulate and develop future climate projections. A recent study by Scripps Institution of Oceanography uses the most sophisticated methodology to date, and indicates that by 2060-2069, temperatures are projected to be 3.4 -4.9oF (1.9 -2.7oC) higher across the state than they were from 1985 to1994 (Pierce et al, 2012). By 2060-69, the annual mean temperature is projected to increase by 3.6 °F (2.0 °C) for the Central Coast, with an increase of 2.9 °F (1.6 °C) in mean winter temperatures and 4.0 °F (2.2 °C) in summer (Pierce et.al., 2012). By 2100, an increase of 4 – 5 °F (2.2 – 2.8 °C) in winter and 4-7 °F (2.2 – 3.9 °C) in summer are projected for the Central Coast (Cal-EMA/CNRA, 2012).

Changes in annual precipitation across California, either in timing or total amount, will result in changes to the type of precipitation (rain or snow) in a given area and to the timing and volume of surface runoff.

Precipitation projections from climate models for California are not all in agreement, but most anticipate drier conditions in the southern part of California, with heavier and warmer winter precipitation in the north (Pierce, et al., 2012). Because there is less scientific detail on localized precipitation changes, there exists a need to adapt to this uncertainty at the regional level (Qian, et al., 2010).

The National Research Council has projected that sea level will rise approximately 2-12 inches (4-30 cm) by 2030, 5-24 inches (12-61 cm) by 2050 and 17-66 inches (42-167 cm) by 2100 ((National Research Council [NRC], 2012)). For the Central Coast, approximately 66 percent of the region's water comes from groundwater, and salt water intrusion into the coastal groundwater aquifers is a current and historical problem. It is likely that, as sea level continues to rise and groundwater continues to be extracted, this problem will be exacerbated (Cal-EMA/CNRA, 2012).

Critical habitats in the region such as near-shore ecosystems and estuaries will be impacted by sea level rise. Coastal infrastructure will be particularly vulnerable to increased storm surges. For Central Coast counties, the estimated increase in acreage vulnerable to flooding is 36 percent in Santa Barbara, 15 percent in San Luis Obispo, 12 percent in Santa Cruz, and 11 percent in Monterey (Cal-EMA/CNRA, 2012). It is anticipated that these storm surge events, which will result in flooding and erosion, will be more damaging to the coastline than the gradual sea level rise that California is experiencing, and these changes to the coastline will likely have a significant economic impact on the region's coastal tourism industry (CNRA, 2009).

Agricultural crops in the region, particularly wine and table grapes, almonds, and avocadoes, will be affected by the increase in average temperatures as well as variations in the timing and amount of precipitation (USGRCP 2009). For the Central Coast, approximately 80% of the region's drinking and irrigation water comes from groundwater, and salt water intrusion into the coastal groundwater aquifers is a current and historical problem. As sea level continues to rise and groundwater continues to be extracted, this problem may be exacerbated (CNRA, 2012). Heat waves, defined as five days over 79 to 85 degrees along the coast and 99 to 101 degrees F inland, are expected to occur three to four more times inland by 2050. By 2100, they are expected to occur four to eight times more often in coastal areas and eight to ten times more often in inland areas (Cal-EMA/CNRA 2012). Wildfire risk will increase, with as much as a 200-350% increase in the area burned in 2085 compared to historic amounts (Westerling, 2009).

Adaptation

Climate change has the potential to impact the region, which the state depends upon for its economic and environmental benefits. These changes will increase the vulnerability of natural and built systems in the region. Impacts to natural systems will challenge aquatic and terrestrial species with diminished water quantity and quality, and shifting eco-regions. Built systems will be impacted by changing hydrology and runoff timing, loss of natural snowpack storage, making the region more dependent on surface storage in reservoirs and groundwater sources. Increased future water demand for both natural and built systems may be particularly challenging with less natural storage and less overall supply.

The Central Coast Hydrologic Region contains a diverse landscape with different climate zones, making it difficult to find one-size-fits-all adaptation strategies. Water managers and local agencies must work together to determine the appropriate planning approach for their operations and communities. While climate change adds another layer of uncertainty to water planning, it does not fundamentally alter the way water managers already address uncertainty (US EPA and DWR, 2011). However, stationarity (the idea that natural systems fluctuate within an unchanging envelope of variability) can no longer be assumed, so new approaches will likely be required (Milly, et al., 2008). Whatever approach is used, it is necessary for water managers and communities to start implementing adaptation measures sooner rather than later in order to be prepared for an uncertain future.

Integrated regional water management (IRWM) planning is a framework that allows water managers to address climate change at the regional scale. Climate change is now a required component of all IRWM plans and IRWM regions should begin addressing climate change by performing a vulnerability assessment (DWR, 2010 and 2012). This assessment will help each IRWM region to identify and prioritize their specific vulnerabilities, and identify adaptation strategies that are most appropriate for each region and sub-region. Planning strategies to address vulnerabilities and adaptation to climate change should be both proactive and adaptive, starting with low-regrets strategies that benefit the region in the present-day while adding future flexibility and resilience under uncertainty.

Local agencies, as well as federal and State agencies, face the challenge of interpreting new climate change data and determining which adaptation methods and approaches are appropriate for their planning needs. The Climate Change Handbook for Regional Water Planning provides an analytical framework for incorporating climate change impacts into the regional and watershed planning process and considers adaptation to climate change (EPA/DWR, 2011). This handbook provides guidance for assessing the vulnerabilities of California's watersheds and hydrologic regions to climate change impacts, and prioritizing these vulnerabilities.

The State of California has developed additional tools and resources to assist resource managers and local agencies in adapting to climate change, including:

- California Climate Adaptation Strategy (2009) - California Natural Resources Agency (CNRA) at: http://www.climatechange.ca.gov/adaptation/strategy/index.html
- California Climate Change Adaptation Planning Guide (2012) - California Emergency Management Agency (Cal-EMA) and CNRA at: http://resources.ca.gov/climate_adaptation/local_government/adaptation_planning_guide.html
- Cal-Adapt website at: http://cal-adapt.org/
- Urban Forest Management Plan (UFMP) Toolkit - sponsored by the California Department of Forestry and Fire Management at: http://ufmptoolkit.com/
- California Climate Change Portal at: http://www.climatechange.ca.gov/
- DWR Climate Change website at: http://www.water.ca.gov/climatechange/resources.cfm
- The Governor's Office of Planning and Research (OPR) website at: http://www.opr.ca.gov/m_climatechange.php.

Many of the Resource Management Strategies from *California Water Plan Update 2009* (Volume 2) provide benefits for adapting to climate change in addition to meeting water management objectives. These include:

- Agricultural/Urban Water Use Efficiency
- Conveyance – Regional/local.
- System Reoperation.
- Conjunctive Management and Groundwater Storage.

- Precipitation Enhancement.
- Surface Storage – Regional/Local.
- Pollution Prevention.
- Agricultural Land Stewardship.
- Ecosystem Restoration.
- Forest Management.
- Land Use Planning and Management.
- Recharge Area Protection.
- Watershed Management.
- Flood Risk and Integrated Flood Management.

The myriad of resources and choices available to managers can seem overwhelming, and the need to take action given uncertain future conditions is daunting. However, there are many 'low-regrets' actions that water managers in the Central Coast Hydrologic Region can take to prepare for climate change, regardless of the magnitude of future warming (GEOS/LGC, 2010). These actions often provide economic and public health co-benefits. Water and energy conservation are examples of strategies that make sense with or without the additional pressures of climate change. For the Central Coast region, developing adaptive management plans to address the impacts of sea level rise on groundwater supplies and coastal geomorphology should serve to facilitate the gradual land-ward retreat of the region’s vulnerable coastal municipal and urban infrastructure (DWR, 2008; Cal-EMA and CNRA, 2012).

Water managers need to consider both the natural and built environments as they plan for the future. Stewardship of natural areas and protection of biodiversity are critical for maintaining ecosystem services important for human society such as flood management, carbon sequestration, storm water pollution remediation, as well as, habitat for the pollinators of our natural and agricultural landscapes. Increased cross-sector collaboration between water managers, land use planners and ecosystem managers provides opportunities for identifying common goals and actions needed to achieve resilience to climate change and other stressors.

Mitigation

California’s water sector has a large energy footprint, consuming 7.7% of statewide electricity (CPUC, 2010). Energy is used in the water sector to extract, convey, treat, distribute, use, condition, and dis-pose of water. Figure 3-26, Water-Energy Connection in Volume 1, CA Water Today shows all of the connections between water and energy in the water sector; both water use for energy generation and energy use for water supply activities. The regional reports in Update 2013 are the first to provide detailed information on the water-energy connection, including energy intensity (EI) information at the regional level. This EI information is designed to help inform the public and water utility managers about the relative energy requirements of the major water supplies used to meet demand. Since energy usage is related to Greenhouse Gas (GHG) emissions, this information can support measures to reduce GHG’s, as mandated by the State.

Figure CC-32 shows the amount of energy associated with the extraction and conveyance of 1 acre-foot of water for each of the major sources in this region. The quantity used is also included, as a percent. For reference, Figure 3-26, Water-Energy Connection in CA Water Today, Volume 1 highlights which water-energy connections are illustrated in Figure CC-32; only extraction and conveyance of raw water. Energy required for water treatment, distribution, and end uses of the water are not included. Not all water types are available in this region. Some water types flow by gravity to the delivery location and therefore do not require any energy to extract or convey (represented by a white light bulb).

Recycled water and water from desalination used within the region are not show in Figure CC-32 because their energy intensity differs in important ways from those water sources. The energy intensity of both recycled and desalinated water depend not on regional factors but rather on much more localized, site, and application specific factors. Additionally, the water produced from recycling and desalination is typically of much higher quality than the raw (untreated) water supplies evaluated in Figure CC-32. For these reasons, discussion of energy intensity of desalinated water and recycled water are included in Volume 3, *Resource Management Strategies*.

Energy intensity, sometimes also known as embedded energy, is the amount of energy needed to extract and convey an acre-foot of water from its source (e.g. groundwater or a river) to a delivery location, such as a water treatment plant or a State Water Project (SWP) delivery turnout . Energy intensity should not be confused with total energy — that is, the amount of energy (e.g. kWh) required to deliver all of the water from a water source to customers within the region. Energy intensity focuses not on the total amount of energy used to deliver water, but rather the energy required to deliver a single unit of water (in kWh/acre-foot). In this way, energy intensity gives a normalized metric which can be used to compare alternative water sources.

In most cases, this information will not be of sufficient detail for actual project level analysis. However, these generalized, region-specific metrics provide a range in which energy requirements fall. The information can also be used in more detailed evaluations using tools such as WeSim (http://www.pacinst.org/publication/wesim/) which allows modeling of water systems to simulate outcomes for energy, emissions, and other aspects of water supply selection. It's important to note that water supply planning must take into consideration a myriad of different factors in addition to energy impacts; costs, water quality, opportunity costs, environmental impacts, reliability and other many other factors.

Energy intensity is closely related to Greenhouse Gas (GHG) emissions, but not identical, depending on the type of energy used (see CA Water Today, Water-Energy, Volume 1). In California, generation of 1 megawatt-hour (MWh) of electricity results in the emission of about 1/3 of a metric ton of GHG, typically referred to as carbon dioxide equivalent or CO_2e (eGrid, 2012). This estimate takes into account the use of GHG-free hydroelectricity, wind, and solar and fossil fuel sources like natural gas and coal. The GHG emissions from a specific electricity source may be higher or lower than this estimate.

Reducing GHG emissions is a State mandate. Water managers can support this effort by considering energy intensity factors, such as those presented here, in their decision making process. Water use efficiency and related best management practices can also reduce GHGs (See Volume 3, *Resource Management Strategies*).

Accounting for Hydroelectric Energy

Generation of hydroelectricity is an integral part of many of the state's large water projects. In 2007, hydroelectric generation accounted for nearly 15% of all electricity generation in California. The State Water Project, Central Valley Project, Los Angeles Aqueduct, Mokelumne Aqueduct, and Hetch Hetchy Aqueducts all generate large amounts of hydroelectricity at large multi-purpose reservoirs at the heads of each system. In addition to hydroelectricity generation at head reservoirs, several of these systems also generate hydroelectric energy by capturing the power of water falling through pipelines at in-conduit generating facilities. Hydroelectricity is also generated at hundreds of smaller reservoirs and run-of-the-river turbine facilities.

Hydroelectric generating facilities at reservoirs provide unique benefits. Reservoirs like the State Water Project's Oroville Reservoir are operated to build up water storage at night when demand for electricity is low, and release the water during the day time hours when demand for electricity is high. This operation, common to many of the state's hydropower reservoirs, helps improve energy grid stabilization and reliability and reduces GHG emissions by displacing the least efficient electricity generating facilities. Hydroelectric facilities are also extremely effective for providing back-up power supplies for intermittent renewable resources like solar and wind power. Because the sun can unexpectedly go behind a cloud or the wind can die down, intermittent renewables need back up power sources that can quickly ramp up or ramp down depending on grid demands and generation at renewable power installations.

Despite these unique benefits and the fact that hydroelectric generation was a key component in the formulation and approval of many of California's water systems, accounting for hydroelectric generation in energy intensity calculations is complex. In some systems like the SWP and CVP, water generates electricity and then flows back into the natural river channel after passing through the turbines. In other systems like the Mokelumne aqueduct water can leave the reservoir by two distinct out flows, one that generates electricity and flows back into the natural river channel and one that does not generate electricity and flows into a pipeline flowing into the East Bay Municipal Utility District service area. In both these situations, experts have argued that hydroelectricity should be excluded from energy intensity calculations because the energy generation system and the water delivery system are in essence separate (Wilkinson, 2000).

DWR has adopted this convention for the energy intensity for hydropower in the regional reports. All hydroelectric generation at head reservoirs has been excluded from Figure CC-32. Consistent with Wilkin-son (2000) and others, DWR has included in-conduit and other hydroelectric generation that occurs as a consequence of water deliveries, such as the Los Angeles Aqueduct's hydroelectric generation at San Francisquito, San Fernando, Foothill and other power plants on the system (downstream of the Owen's River Diversion Gates). DWR has made one modification to this methodology to simplify the display of results: energy intensity has been calculated at each main delivery point in the systems; if the hydroelectric generation in the conveyance system exceeds the energy needed for extraction and conveyance, the energy intensity is reported as zero (0). I.e., no water system is reported as a net producer of electricity, even though several systems do produce more electricity in the conveyance system than is used (e.g., Los Angeles Aqueduct, Hetch Hetchy Aqueduct). (For detailed descriptions of the methodology used for the water types presented, see *Technical Guide*, Volume 5).

PLACEHOLDER Figure CC-32 Energy Intensity of Raw Water Extraction and Conveyance in the Central Coast Hydrologic Region

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

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Table CC-1 Alluvial Groundwater Basins and Subbasins within the Central Coast Hydrologic Region

Basin/Subbasin	Basin Name	Basin/Subbasin	Basin Name
3-1	Soquel Valley	3-23	Upper Santa Ana Valley
3-2	Pajaro Valley	3-24	Quien Sabe Valley
3-3	Gilroy-Hollister Valley	3-25	Tres Pinos Valley
3-3.01	Llagas Area	3-26	West Santa Cruz Terrace
3-3.02	Bolsa Area	3-27	Scotts Valley
3-3.03	Hollister Area	3-28	San Benito River Valley
3-3.04	San Juan Bautista Area	3-29	Dry Lake Valley
3-4	Salinas Valley	3-30	Bitter Water Valley
3-4.01	180/400 Foot Aquifer	3-31	Hernandez Valley
3-4.02	East Side Aquifer	3-32	Peach Tree Valley
3-4.04	Forebay Aquifer	3-33	San Carpoforo Valley
3-4.05	Upper Valley Aquifer	3-34	Arroyo De La Cruz Valley
3-4.06	Paso Robles Area	3-35	San Simeon Valley
3-4.08	Seaside Area	3-36	Santa Rosa Valley
3-4.09	Langley Area	3-37	Villa Valley
3-4.10	Corral De Tierra Area	3-38	Cayucos Valley
3-5	Cholame Valley	3-39	Old Valley
3-6	Lockwood Valley	3-40	Toro Valley
3-7	Carmel Valley	3-41	Morro Valley
3-8	Los Osos Valley	3-42	Chorro Valley
3-9	San Luis Obispo Valley	3-43	Rinconada Valley
3-12	Santa Maria	3-44	Pozo Valley
3-13	Cuyama Valley	3-45	Huasna Valley
3-14	San Antonio Creek Valley	3-46	Rafael Valley
3-15	Santa Ynez River Valley	3-47	Big Spring Area
3-16	Goleta	3-49	Montecito
3-17	Santa Barbara	3-50	Felton Area
3-18	Carpinteria	3-51	Majors Creek
3-19	Carrizo Plain	3-52	Needle Rock Point
3-20	Ano Nuevo Area	3-53	Foothill
3-21	Santa Cruz Purisima Formation		
3-22	Santa Ana Valley		

Table CC-2 Number of Well Logs by County and Use for the Central Coast Hydrologic Region (1977-2010)

County	Total Number of Well Logs by Well Use						
	Domestic	Irrigation	Public Supply	Industrial	Monitoring	Other	Total Well Records
Santa Cruz	2,514	304	47	6	904	915	4,690
San Benito	689	255	19	5	320	428	1,716
Monterey	3,808	1,472	149	15	1,535	2,112	9,091
San Luis Obispo	8,387	1,087	181	22	1,027	522	11,226
Santa Barbara	1,739	731	105	32	1,094	503	4,204
Total Well Records	17,137	3,849	501	80	4,880	4,480	30,927

Table CC-3 CASGEM Groundwater Basin Prioritization for the Central Coast Hydrologic Region

Basin Prioritization	Count	Basin/Subbasin Number	Basin Name	Subbasin Name	2010 Census Population
High	1	3-4.02	Salinas Valley	East Side Aquifer	128,646
High	2 4	3-4.01	Salinas Valley	180/400 Foot Aquifer	55,740
High	3	3-2	Pajaro Valley		114,282
High	4	3-7	Carmel Valley		5,086
High	5	3-1	Soquel Valley		18,634
High	6	3-12	Santa Maria Valley		201,759
High	7	3-8	Los Osos Valley		13,948
High	8	3-4.06	Salinas Valley	Paso Robles Area	56,077
Medium	1	3-4.08	Salinas Valley	Seaside Area	65,899
Medium	2	3-26	West Santa Cruz Terrace		70,336
Medium	3	3-16	Goleta		47,252
Medium	4	3-3.01	Gilroy-Hollister Valley	Llàgas Area	91,706
Medium	5	3-17	Santa Barbara		63,966
Medium	6	3-9	San Luis Obispo Valley		18,834
Medium	7	3-4.09	Salinas Valley	Langley Area	9,833
Medium	8	3-4.04	Salinas Valley	Forebay Aquifer	43,867
Medium	9	3-4.10	Salinas Valley	Corral de Tierra Area	7,831
Medium	10	3-3.04	Gilroy-Hollister Valley	San Juan Bautista Area	26,150
Medium	11	3-15	Santa Ynez River Valley		75,460
Medium	12	3-3.03	Gilroy-Hollister Valley	Hollister Area	22,013
Medium	13	3-3.02	Gilroy-Hollister Valley	Bolsa Area	2,935
Medium	14	3-49	Montecito		9,885
Medium	15	3-4.05	Salinas Valley	Upper Valley Aquifer	15,862
Medium	16	3-14	San Antonio Creek Valley		2,279
Medium	17	3-21	Santa Cruz Purisima Formation		17,963
Low	1	3-13	Cuyama Valley		1,236

Basin Prioritization	Count	Basin/Subbasin Number	Basin Name	Subbasin Name	2010 Census Population
Very Low	34	*See Water Plan Update 2013 Vol. 4 Reference Guide – California's Groundwater Update 2013*			
Totals:	**60**	**Population of GW Basin Area:**			**1,230,274**

Table CC-4 Groundwater Level Monitoring Wells by Monitoring Entity in the Central Coast Hydrologic Region

State and Federal Agencies	Number of Wells
USGS	414
Total State and Federal Wells:	**414**
Monitoring Cooperators	**Number of Wells**
Santa Barbara County Flood Control and Water Conservation District	23
City of Santa Barbara	68
Santa Maria Valley Water Conservation District	21
Ventura County Flood Control District	2
Total Cooperator Wells:	**114**
CASGEM Monitoring Entities	**Number of Wells**
Carpinteria Valley Water District	12
Monterey Peninsula Water Management District	38
San Benito County Water District	123
Santa Cruz County Environmental Health Services	116
Total CASGEM Monitoring Entities:	**289**
Grand Total:	**817**

Note: Table includes groundwater level monitoring wells having publically available online data. DWR currently monitors 70 wells in the Central Coast Hydrologic Region; however, not all of these data are publicly available due to privacy agreements with well owners or operators.

Table represents monitoring information as of July, 2012

Table CC-5 Sources of Groundwater Quality Information

Agency	Links to Information
State Water Resources Control Board	Groundwater • Communities that Rely on a Contaminated Groundwater Source for Drinking Water • Nitrate in Groundwater: Pilot Projects in Tulare Lake Basin/Salinas Valley • Hydrogeologically Vulnerable Areas • Aquifer Storage and Recovery • Central Valley Salinity Alternatives for Long-Term Sustainability (CV-Salts) GAMA • GeoTracker GAMA (Monitoring Data) • Domestic Well Project • Priority Basin Project • Special Studies Project • California Aquifer Susceptibility Project Contaminant Sites • Land Disposal Program • Department of Defense Program • Underground Storage Tank Program • Brownfields
California Department of Public Health	Division of Drinking Water and Environmental Management • Drinking Water Source Assessment and Protection (DWSAP) Program • Chemicals and Contaminants in Drinking Water • Chromium-6 • Groundwater Replenishment with Recycled Water
Department of Water Resources	Groundwater Information Center • Bulletin 118 Groundwater Basins • California Statewide Groundwater Elevation Monitoring (CASGEM) • Groundwater Level Monitoring • Groundwater Quality Monitoring • Well Construction Standards • Well Completion Reports
Department of Toxic Substances Control	• EnviroStor
Department of Pesticide Regulation	Groundwater Protection Program • Well Sampling Database • Groundwater Protection Area Maps
U.S. Environmental Protection Agency	US EPA STORET Environmental Data System
United States Geological Survey	USGS Water Data for the Nation

Table CC-6 Critical Wildlife Species List for the Central Coast

Scientific Name	Common Name	Federal Status [1]	State Status [2]
Invertebrates			
Branchinecta longiantenna	Longhorn fairy shrimp	FE	
Branchinecta lynchi	Vernal pool fairy shrimp	FT	
Cicindela ohlone	Ohlone tiger beetle	FE	
Euphilotes enoptes smithi	Smith's blue butterfly	FE	
Euphydryas editha bayensis	Bay checkerspot butterfly	FT	
Euproserpinus euterpe	Kern primrose sphinx moth	FT	
Helminthoglypta walkeriana	Morro shoulderband snail	FE	
Polyphylla barbata	Mount Hermon June	FE	
Trimerotropis infantilis	Zayante band-winged grasshopper	FE	
Fish			
Eucyclogobius newberryi	Tidewater goby	FE	
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	FE	SE
Oncorhynchus	Southern steelhead - S. CA coast DPS	FE	
Oncorhynchus kisutch	Coho salmon - Central CA coast ESU	FE	SE
Oncorhynchus mykiss irideus	Steelhead - Central CA coast DPS	FT	
Oncorhynchus mykiss irideus	Steelhead - S./Central CA coast DPS	FT	
Bird			
Aquila chrysaetos	Golden eagle	FP	FP
Brachyramphus marmoratus	Marbled murrelet	FT	SE
Buteo swainsoni	Swainson's hawk		ST
Charadrius alexandrinus nivosus	Western snowy plover	FT	
Coccyzus americanus occidentalis	Western yellow-billed cuckoo		SE
Elanus leucurus	White-tailed kite	FP	FP
Empidonax traillii extimus	Southwestern willow flycatcher	FE	SE
Gymnogyps californianus	California condor	FE	SE
Haliaeetus leucocephalus	Bald eagle		SE
Laterallus jamaicensis coturniculus	California black rail		ST
Passerculus sandwichensis beldingi	Belding's savannah sparrow		SE
Rallus longirostris levipes	Light-footed clapper rail	FE	SE
Rallus longirostris obsoletus	California clapper rail	FE	SE
Riparia riparia	Bank swallow		ST
Sternula antillarum browni	California least tern	FE	SE
Vireo bellii pusillus	Least Bell's vireo	FE	SE
Mammal			
Ammospermophilus nelsoni	Nelson's antelope squirrel		ST
Dipodomys heermanni morroensis	Morro Bay kangaroo rat	FE	SE
Dipodomys ingens	Giant kangaroo rat	FE	SE
Dipodomys nitratoides nitratoides	Tipton kangaroo rat	FE	SE
Eumetopias jubatus	Steller sea-lion	FT	
Vulpes macrotis mutica	San Joaquin kit fox	FE	ST

Scientific Name	Common Name	Federal Status [1]	State Status [2]
Amphibian			
Ambystoma californiense	California tiger salamander	FT	ST
Ambystoma macrodactylum croceum	Santa Cruz long-toed salamander	FE	SE
Anaxyrus californicus	Arroyo toad	FE	
Rana draytonii	California red-legged frog	FT	
Reptile			
Gambelia sila	Blunt-nosed leopard lizard	FE	SE, FP

Notes: KEY: FP Fully Protected FE Federally Endangered FT Federally Threatened SE State Endangered ST State Threatened SR State Rare ESU Evolutionary Significant Unit DPS Distinct Population Segment [1] website reference [2] website reference

Table CC-7 Critical Plant Species List for the Central Coast

Scientific Name	Common Name	Federal Status [1]	State Status [2]	CNPS Rank [3]	Scientific Name	Common Name	Federal Status [1]	State Status [2]	CNPS Rank [3]
Ancistrocarphus keilii	Santa Ynez groundstar			1B.1	Clarkia speciosa ssp. immaculata	Pismo clarkia	FE		1B.1
Arctostaphylos crustacea ssp. eastwoodiana	Eastwood's brittle-leaf manzanita			1B.1	Cordylanthus rigidus ssp. littoralis	Seaside bird's-beak		SE	1B.1
Arctostaphylos morroensis	Morro manzanita		ST	1B.1	Deinandra halliana	Hall's tarplant			1B.1
Arctostaphylos ohloneana	Ohlone manzanita			1B.1	Deinandra increscens ssp. villosa	Gaviota tarplant	FE	SE	1B.1
Arctostaphylos pajaroensis	Pajaro manzanita			1B.1	Dithyrea maritima	Beach spectaclepod		ST	1B.1
Arctostaphylos purissima	La Purisima manzanita			1B.1	Dudleya abramsii ssp. setchellii	Santa Clara Valley dudleya	FE		1B.1
Arctostaphylos tomentosa ssp. daciticola	Dacite manzanita			1B.1	Dudleya blochmaniae ssp. blochmaniae	Blochman's dudleya			1B.1
Arenaria paludicola	Marsh sandwort	FE	SE	1B.1	Ericameria fasciculata	Eastwood's goldenbush			1B.1
Astragalus tener var. titi	Coastal dunes milk-vetch	FE	SE	1B.1	Eriodictyon altissimum	Indian Knob mountainbalm	FE	SE	1B.1
California macrophylla	Round-leaved filaree			1B.1	Eriogonum nudum var. decurrens	Ben Lomond buckwheat			1B.1
Calycadenia villosa	Dwarf calycadenia			1B.1	Eriophyllum lanatum var. hallii	Fort Tejon woolly sunflower			1B.1
Calyptridium parryi var. hesseae	Santa Cruz Mtns. pussypaws			1B.1	Eryngium aristulatum var. hooveri	Hoover's button-celery			1B.1
Calystegia sepium ssp. binghamiae	Santa Barbara morning-glory			1B.1	Erysimum menziesii ssp. menziesii	Menzies' wallflower	FE	SE	1B.1
Camissonia benitensis	San Benito evening-primrose		ST	1B.1	Erysimum teretifolium	Santa Cruz wallflower	FE	SE	1B.1
Castilleja ambigua ssp. insalutata	Pink johnny-nip			1B.1	Erysimum yadonii	Yadon's wallflower	FE	SE	1B.1
Caulanthus amplexicaulis var. barbarae	Santa Barbara jewel-flower			1B.1	Eschscholzia rhombipetala	Diamond-petaled CA poppy			1B.1
Caulanthus californicus	California jewel-flower	FE	SE	1B.1	Hoita strobilina	Loma Prieta hoita			1B.1
Ceanothus ferrisiae	Coyote ceanothus	FE		1B.1	Holocarpha macradenia	Santa Cruz tarplant	FT	SE	1B.1
Centromadia parryi ssp. australis	Southern tarplant			1B.1	Horkelia cuneata ssp. puberula	Mesa horkelia			1B.1

Scientific Name	Common Name	Federal Status [1]	State Status [2]	CNPS Rank [3]	Scientific Name	Common Name	Federal Status [1]	State Status [2]	CNPS Rank [3]
Chlorogalum purpureum var. purpureum	Santa Lucia purple amole		ST	1B.1	Horkelia cuneata ssp. sericea	Kellogg's horkelia			1B.1
Chlorogalum purpureum var. reductum	Camatta Canyon amole		ST	1B.1	Lasthenia conjugens	Contra Costa goldfields	FE		1B.1
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	FE		1B.1	Lasthenia glabrata ssp. coulteri	Coulter's goldfields			1B.1
Chorizanthe robusta var. robusta	Robust spineflower	FE		1B.1	Layia carnosa	Beach layia	FE	SE	1B.1
Chorizanthe robusta var. hartwegii	Scotts Valley spineflower	FE		1B.1	Layia discoidea	Rayless layia			1B.1
Cirsium scariosum var. loncholepis	La Graciosa thistle	FE	ST	1B.1	Layia heterotricha	Pale-yellow layia			1B.1
Legenere limosa	Legenere			1B.1	Piperia yadonii	Yadon's rein orchid	FE		1B.1
Leptosiphon croceus	Coast yellow leptosiphon			1B.1	Plagiobothrys diffusus	San Francisco popcorn-flower		SE	1B.1
Leptosiphon rosaceus	Rose leptosiphon			1B.1	Polygonum hickmanii	Scotts Valley polygonum	FE	SE	1B.1
Lupinus nipomensis	Nipomo Mesa lupine	FE	SE	1B.1	Potentilla hickmanii	Hickman's cinquefoil	FE	SE	1B.1
Lupinus tidestromii	Tidestrom's lupine	FE	SE	1B.1	Quercus dumosa	Nuttall's scrub oak			1B.1
Madia radiata	Showy golden madia			1B.1	Sanicula maritima	Adobe sanicle		SR	1B.1
Malacothamnus abbottii	Abbott's bush-mallow			1B.1	Streptanthus albidus ssp. albidus	Metcalf Canyon jewel-flower	FE		1B.1
Mimulus fremontii var. vandenbergensis	Vandenberg monkeyflower			1B.1	Stylocline masonii	Mason's neststraw			1B.1
Nasturtium gambelii	Gambel's water cress	FE	ST	1B.1	Suaeda californica	California seablite	FE		1B.1
Navarretia fossalis	Spreading navarretia		ST	1B.1	Trifolium buckwestiorum	Santa Cruz clover			1B.1
Navarretia prostrata	Prostrate vernal pool navarretia			1B.1	Trifolium polyodon	Pacific Grove clover		SR	1B.1
Pentachaeta bellidiflora	White-rayed pentachaeta	FE	SE	1B.1	Trifolium trichocalyx	Monterey clover	FE	SE	1B.1
Pinus radiata	Monterey pine			1B.1	Tropidocarpum capparideum	Caper-fruited tropidocarpum			1B.1

Notes: FE Federally Endangered FT Federally Threatened SE State Endangered ST State Threatened SR State Rare CNPS – California Native Plant Society Rank CA Endemic - native or indigenous to CA

Regional Endemic - native to region [1] website reference [2] website reference P3P http://www.rareplants.cnps.org/

Table CC-8 Population Estimates for the Central Coast from 2000 to 2010

County	2000	2002	2004	2006	2008	2010
San Mateo	415	406	402	394	393	388
Santa Clara	90,110	93,439	95,397	97,094	100,665	101,945
San Benito	52,809	54,872	55,299	54,951	54,949	55,200
Santa Cruz	254,815	255,890	254,986	255,107	258,737	262,552
Monterey	399,392	407,440	411,544	406,935	409,387	415,108
San Luis Obispo	245,696	252,604	257,045	260,873	265,505	269,333
Santa Barbara	397,877	404,794	410,357	412,271	418,309	423,740
Total for Hydrologic Region	1,441,114	1,469,445	1,485,030	1,487,625	1,507,945	1,528,266

Source: Population estimates are from CA Dept. of Finance. Population estimates include those portions of San Mateo and Santa Clara counties which are within the Central Coast Hydrologic Region.

Table CC-9 Population Estimates and Decadal Projections for the Central Coast

Region	Estimates	Projections				
	2000	2010	2020	2030	2040	2050
State of California	34,000,835	37,312,510	40,817,839	44,574,756	47,983,659	51,013,984
Monterey	402,854	415,758	436,275	459,359	483,868	511,956
San Benito	53,635	55,341	57,138	59,259	61,032	62,217
San Luis Obispo	247,724	269,710	290,132	311,388	328,786	344,805
Santa Barbara	399,874	424,223	448,986	469,070	485,777	501,283
Santa Cruz	255,869	263,132	270,776	278,008	281,053	283,108
Total for Hydrologic Region	1,359,956	1,428,164	1,503,307	1,577,084	1,640,515	1,703,370

Note: Population estimates and projections prepared by Demographic Research Unit, CA Department of Finance, May 2012; does not include Santa Clara or San Mateo Counties. From: http://www.dof.ca.gov/research/demographic/reports/projections/interim/view.php.

Table CC-10 Disadvantaged Communities within the Central Coast

Community	Type	Population	MHI	Households
Amesti	CDP	3,339	$47,483	1,007
Boronda	CDP	1,778	$37,295	415
Casmalia	CDP	400	$42,692	98
Castroville	CDP	5,490	$44,286	1,300
Chualar	CDP	1,337	$48,516	287
Cuyama	CDP	51	$37,500	10
Freedom	CDP	2,816	$48,688	807
Guadalupe	City	6,770	$42,978	1,888
Isla Vista [1]	CDP	23,776	$30,087	5,078
Lompoc	City	41,864	$46,932	13,420
New Cuyama	CDP	413	$45,313	147
Oceano	CDP	7,883	$39,843	2,920
Pajaro	CDP	2,670	$36,094	614
Paradise Park	CDP	456	$40,134	235
San Ardo	CDP	665	$48,000	150
San Luis Obispo [2]	City	44,959	$40,812	19,734
San Miguel	CDP	2,695	$42,176	766
San Simeon	CDP	547	$43,092	221
Twin Lakes	CDP	5,005	$48,693	2,249
Watsonville	City	49,580	$46,675	13,805

Notes: [1] CDP includes UC Santa Barbara [2] City includes Cal Poly SLO

CDP = Census-Designated Place MHI = Median Household Income

Source: DWR website: http://www.water.ca.gov/irwm/integregio_resourceslinks.cfm.
Disadvantaged Communities (DAC) Mapping Tool - GIS Files - Census Places

Table CC-11 Environmental Water Demands, San Luis Obispo IRWM

WPA	Major Creeks and Streams	Environmental Water Demand – Acre Feet per Year (AFY)
1. San Simeon	San Carpoforo, Honda Arroyo, Arroyo de la Cruz, Arroyo de la Laguna, Arroyo del Osos, Arroyo del Corral, Arroyo Laguna, and Pico Creek	72,980
2. Cambria	San Simeon, Santa Rosa, and Villa Creek	51,460
3. Cayucos	Cayucos and Toro Creek	26,160
4. Morro Bay	Morro and Chorro Creek	27,880
5. Los Osos	Los Osos Creek	7,040
6. SLO/Avila	San Luis Obispo Creek	33,030
7 South Coast	Pismo and Arroyo Grande Creek	32,960
8. Huasna Valley	Huasna River and Alamo Creek	25,020
12. Santa Margarita	Salinas River	32,850
13. Atascadero /Templeton	Salinas River and Paso Robles Creek	41,010
16. Nacimiento	Nacimiento River	108,390

Notes: Environmental Water Demands are calculated for each WPA and not for individual streams. Due to the lack of data and regional physiographic differences, the Environmental Water Demands for the following WPAs are UNDETERMINED: 9 Cuyama Valley, 10 Carrizo Plain, 11 Rafael/Big Spring, 14 Salinas/Estrella, and 15 Cholame Valley.

From: San Luis Obispo County Master Water Report, 2012

Table CC-12 Santa Barbara Countywide IRWM Water Supplies

Water Service Districts in Santa Barbara County	Water Source
Carpinteria Valley Water District Service Area	Carpinteria Valley Groundwater Basin, Cachuma Project, and State Water Project (SWP)
Casmalia Community Services	Santa Maria Groundwater Basin
City of Guadalupe Service Area	Santa Maria Groundwater Basin and SWP
City of Lompoc Service Area	Lompoc Groundwater Basin
City of Santa Barbara Service Area	Cachuma Project, Gibraltar Reservoir, Devil's Canyon Creek, Mission Tunnel, Foothill and Santa Barbara Groundwater Basins, SWP, recycled and desalination (drought and emergency)
City of Santa Maria Service Area	Santa Maria Groundwater Basin, SWP, and Twitchell Reservoir recharge
City of Solvang Service Area	Santa Ynez Uplands and Santa Ynez Riparian Groundwater Basin, SWP
Cuyama Community Services District	Cuyama Groundwater Basin
Golden State Water Company Service Area	Santa Maria Groundwater Basin and SWP
Goleta Water District Service Area	Goleta North/Central Groundwater Basin, Cachuma Project, and SWP
La Cumbre Mutual Water Company Service Area	Goleta North/Central and Foothill Groundwater Basins, and SWP
Los Alamos Community Services District	San Antonio Groundwater Basin
Mission Hills Community Services District	Lompoc Groundwater Basin
Montecito Water District Service Area	Montecito Groundwater Basin, the Cachuma Project, SWP, Jameson Lake, Fox and Alder creeks, and Doulton Tunnel
Santa Ynez River Water Conservation District	Cachuma Project, SWP, Santa Ynez Uplands and Santa Ynez Riparian Groundwater Basins
Vandenberg Air Force Base Service Area	San Antonio Groundwater Basin and SWP
Vandenberg Village Community Services District	Lompoc Groundwater Basin

Table CC-13 Central Coast Hydrologic Region Average Annual Groundwater Supply by Planning Area (PA) and by Type of Use (2005-2010)

Central Coast Hydrologic Region		Agricultural Use Met by Groundwater		Urban Use Met by Groundwater		Managed Wetlands Use Met by Groundwater		Total Water Use Met by Groundwater	
PA Number	**PA Name**	**TAF**	**%**	**TAF**	**%**	**TAF**	**%**	**TAF**	**%**
301	Northern	550.2	91%	130.0	83%	0.0	0%	680.2	89%
302	Southern	355.9	92%	81.3	58%	0.0	0%	437.2	83%
2005-10 Annual Average HR Total:		906.1	91%	211.3	72%	0.0	0%	1,117.4	86%

Note: 1) TAF = thousand acre-feet

2) Percent use is the percent of the total water supply that is met by groundwater, by type of use.

3) 2005-10 Precipitation equals 94% of the 30-yr average for the Central Coast Region

Table CC-14 Central Coast Hydrologic Region Average Annual Groundwater Supply by County and by Type of Use (2005-2010)

Central Coast Hydrologic Region	Agriculture Use Met by Groundwater		Urban Use Met by Groundwater		Managed Wetlands Use Met by Groundwater		Total Water Use Met by Groundwater	
County	**TAF**	**%**	**TAF**	**%**	**TAF**	**%**	**TAF**	**%**
Santa Cruz	17.6	98%	28.9	71%	0.0	0%	46.5	79%
San Benito	48.2	74%	7.7	70%	0.0	0%	55.9	73%
Monterey	464.2	99%	67.1	100%	0.0	0%	531.3	99%
San Luis Obispo	161.2	97%	39.0	74%	0.0	0%	200.3	92%
Santa Barbara	186.6	87%	42.1	48%	0.0	0%	228.7	76%
2005-10 Annual Ave. Total:	877.8	94%	184.8	72%	0.0	0%	1,062.6	89%

Note: 1) TAF = thousand acre-feet

2) Percent use is the percent of the total water supply that is met by groundwater, by type of use

3) 2005-10 Precipitation equals 94% of the 30-yr average for the Central Coast Hydrologic Region

Table CC-15 Summary of Large, Medium, Small, and Very Small Community Drinking Water Systems in the Central Coast Hydrologic Region

	Community Water Systems (CWS)		Population Served	
Water System Size	**(Systems)**	**(%)**	**(Population)**	**(%)**
Large (> 10,000 people)	31	8%	1,201,754	82%
Medium (3,301 – 10,000 people)	25	6%	157,343	11%
Small (500 – 3,300 people)	47	12%	68,574	5%
Very Small (<500 people)	292	73%	36,411	2%
CWS that Primarily Provide Wholesale Water	5	1%	---	---
TOTAL	**400**		**1,464,082**	

Table CC-16 Urban Water Suppliers by IRWM Region

IRWM Region	Urban Water Suppliers	2010 Water Use Acre-feet/ Year
Santa Cruz	Scotts Valley Water District	2,079
	Soquel Creek Water District	4,986
	Santa Cruz City of	11,555
Santa Cruz/Pajaro River Watershed	Watsonville City of	7,658
Pajaro River Watershed	Morgan Hill City of	9,096
	Gilroy City of	9,078
Greater Monterey	California Water Service Co. King City	2,075
	California Water Service Co. Salinas District	22,057
	Soledad, City of	2,680
	Marina Coast Water District	4,795
Monterey Peninsula	California-American Water Co. Monterey District	16,033
San Luis Obispo	Paso Robles City of	8,118
	Nipomo Community Services District	3,266
	Pismo Beach City of	2,029
	Arroyo Grande City of	3,521
	Grover Beach City of	2,140
	Morro Bay City of	1,485
	San Luis Obispo City of	6,267
	Cambria Community Services District	757
Santa Barbara Countywide	Golden State Water Co. Orcutt	8,925
	Santa Maria City of	16,504
	Santa Barbara City of	13,107
	Carpinteria Valley Water District	2,137
	Lompoc City of	5,509
	Goleta Water District	11,590

Data from Urban Water Management Plans, as submitted to DWR, 2012.

Table CC-17 Central Coast Hydrologic Water Balance Summary, 2001-2010

Table CC-X Central Coast Hydrologic Region water balance for 2001-2010 (in TAF)

Central Coast (TAF)	Water Year (Percent of Normal Precipitation)									
	2001 (107%)	2002 (73%)	2003 (73%)	2004 (102%)	2005 (114%)	2006 (117%)	2007 (45%)	2008 (88%)	2009 (68%)	2010 (119%)
Water Entering the Region										
Precipitation	11,848	8,741	8,822	12,308	13,737	13,966	5,393	10,461	8,167	14,185
Inflow from Oregon/Mexico	0	0	0	0	0	0	0	0	0	0
Inflow from Colorado River	0	0	0	0	0	0	0	0	0	0
Imports from Other Regions	180	181	168	198	142	27	32	22	19	22
Total	**12,028**	**8,922**	**8,990**	**12,506**	**13,879**	**13,993**	**5,425**	**10,483**	**8,186**	**14,207**
Water Leaving the Region										
Consumptive Use of Applied Water * (Ag, M&I, Wetlands)	860	872	756	935	708	647	940	881	817	691
Outflow to Oregon/Nevada/Mexico	0	0	0	0	0	0	0	0	0	0
Exports to Other Regions	133	127	110	135	88	0.0	0.0	0.0	0.0	0.0
Statutory Required Outflow to Salt Sink	49	7	15	20	20	0	0	0	0	0
Additional Outflow to Salt Sink	183	193	137	163	134	123	165	152	142	135
Evaporation, Evapotranspiration of Native Vegetation, Groundwater Subsurface Outflows, Natural and Incidental Runoff, Ag Effective Precipitation & Other Outflows	11,688	8,846	8,671	12,277	13,183	13,351	5,106	9,851	7,816	13,540
Total	**12,913**	**10,045**	**9,689**	**13,530**	**14,133**	**14,122**	**6,211**	**10,884**	**8,775**	**14,366**
Change in Supply										
[+] Water added to storage [-] Water removed from storage										
Surface Reservoirs	-14	-235	21	-175	422	124	-338	-4	-221	169
Groundwater **	-871	-888	-719	-849	-676	-253	-448	-397	-368	-328
Total	**-885**	**-1123**	**-698**	**-1024**	**-254**	**-129**	**-786**	**-401**	**-589**	**-159**
Applied Water * (Ag, Urban, Wetlands) (compare with Consumptive Use)	1,442	1,468	1,267	1,565	1,170	1,088	1,514	1,438	1,352	1,157

* Definition: Consumptive use is the amount of applied water used and no longer available as a source of supply. Applied water is greater than consumptive use because it includes consumptive use, reuse, and outflows.

** Definition: Change in Supply: Groundwater – The difference between water extracted from and water recharged into groundwater basins in a region. All regions and years were calculated using the following equation:

change in supply: groundwater = intentional recharge + deep percolation of applied water + conveyance deep percolation and seepage - withdrawals

This equation does not include unknown factors such as natural recharge and subsurface inflow and outflow. For further details, refer to Volume 4, Reference Guide – *California's Groundwater Update 2013* and Volume 5 Technical Guide.

n/a = not applicable

Table CC-18 Groundwater Management Plans in the Central Coast Hydrologic Region

Map Label	Agency Name	Date	County	Basin Number	Basin Name
CC-1	Carpinteria Valley Water District	1996	Ventura	3-18	Carpinteria Basin
	Carpinteria County WD				
	Casitas Municipal Water District				
	Montecito Water District				
CC-2	Goleta Water District	2010	Santa Barbara	3-16	Goleta Basin
	No signatories on file				
CC-3	Monterey County Water Resources Agency	2006	Monterey	3-4.01	180/400 Foot Aquifer Subbasin
	No signatories on file			3-4.02	East Side Aquifer Sub-
				3-4.04	Forebay Aquifer Sub-
				3-4.05	Upper Valley Aquifer
				3-4.06	Paso Robles Area Sub-
				3-4.08	Seaside Area Subbasin
				3-4.09	Langley Area Subbasin
				3-4.10	Corral De Tierra Area
				3-2	Pajaro Valley Basin
				3-6	Lockwood Valley Basin
CC-4	Santa Ynez River Water Conservation District	1995	Santa Barbara	3-15	Santa Ynez River Valley Basin
	City of Buellton				
CC-5	Scotts Valley Water District.	1994	Santa Cruz	3-27	Scotts Valley Basin
	No signatories on file				
CC-6	Soquel Creek Water District	2007	Santa Cruz	3-1	Soquel Valley Basin
	Central Water District			3-21	Santa Cruz Purisima Formation Basin
				3-2	Pajaro Valley Basin
				3-26	West Santa Cruz Terrace Basin

Map Label	Agency Name	Date	County	Basin Number	Basin Name
					Non-B118 Basin
CC-7	Montecito Water District	1998	Santa Barbara	3-49	Montecito
	No signatories on file				
CC-8	Water Resources Association of San Benito County	2004	San Benito	3-3.02	Bolsa Area
				3-3.03	Hollister Area
				3-3.04	San Juan Bautista Area
				3-25	Tres Pinos Valley
SF-2	Santa Clara Valley Water District	2001	Santa Clara	2-9.02	Santa Clara Subbasin
	No signatories on file			3-3.01	Llagas Subbasin

Table CC-19 Assessment for SB 1938 GWMP Required Components, SB 1938 GWMP Voluntary Components, and Bulletin 118-03 Recommended Components

SB 1938 GWMP Required Components	Percent of plans that meet requirement
Basin Management Objectives	50%
BMO: Monitoring/Management Groundwater Levels	75%
BMO: Monitoring Groundwater Quality	75%
BMO: Inelastic Subsidence	75%
BMO: SW/GW Interaction & Affects to Groundwater Levels & Quality	75%
Agency Cooperation	100%
Map	75%
Map: Groundwater basin area	100%
Map: Area of local agency	100%
Map: Boundaries of other local agencies	75%
Recharge Areas (1/1/2013)	Not Assessed
Monitoring Protocols	50%
MP: Changes in groundwater levels	100%
MP: Changes in groundwater quality	100%
MP: Subsidence	75%
MP: SW/GW Interaction & Affects to Groundwater Levels & Quality	75%
SB 1938 GWMP Voluntary Components	**Percent of plans that include component**
Saline Intrusion	75%
Wellhead Protection & Recharge	100%
Groundwater Contamination	75%
Well Abandonment & Destruction	75%
Overdraft	100%
Groundwater Extraction & Replenishment	100%
Monitoring	100%
Conjunctive Use Operations	100%
Well Construction Policies	75%
Construction and Operation	100%
Regulatory Agencies	25%
Land Use	50%
Bulletin 118-03 Recommended Components	**Percent of plans that include component**
GWMP Guidance	50%
Management Area	100%
BMOs, Goals, & Actions	100%
Monitoring Plan Description	75%
IRWM Planning	100%
GWMP Implementation	100%
GWMP Evaluation	100%

Table CC-20 Factors Contributing to Successful Groundwater Management Plan Implementation in the Central Coast Hydrologic Region

Key components	Respondents
Data collection and sharing	6
Outreach and education	5
Developing an understanding of common interest	5
Sharing of ideas and information with other water resource managers	6
Broad stakeholder participation	4
Adequate surface water supplies	4
Adequate regional and local surface storage and conveyance systems	4
Water budget	5
Funding	6
Time	5

Table CC-21 Factors Limiting Successful Groundwater Management Plan Implementation in the Central Coast Hydrologic Region

Limiting Factors	Respondents
Funding for groundwater management projects	6
Funding for groundwater management planning	5
Unregulated Pumping	4
Groundwater Supply	3
Participation across a broad distribution of interests	2
Lack of Governance	-
Surface storage and conveyance capacity	3
Understanding of the local issues	1
Access to planning tools	-
Outreach and education	-
Data collection and sharing	-
Funding to assist in stakeholder participation	3

Table CC-22 Groundwater Ordinances that Apply to Counties in the Central Coast Hydrologic Region

County	Groundwater Management	Guidance Committees	Export Permits	Recharge	Well Abandonment & Destruction	Well Construction Policies
Monterey	-	-	-	-	Y	Y
San Benito	-	-	Y	Y	Y	Y
San Luis Obispo	-	-	-	-	-	Y
San Mateo	-	-	-	-	Y	Y
Santa Barbara	-	-	-	-	-	Y
Santa Clara	-	-	-	-	-	-
Santa Cruz	-	-	-	-	Y	Y
Ventura	-	-	-	-	Y	Y

Table CC-23 Groundwater Adjudications in the Central Coast Hydrologic Region

Court Judgment	Basin Number	County	Judgment Date
Wright Judgment	3-16	Santa Barbara	1989
Los Osos	3-8	San Luis Obispo County	2004
Seaside Basin	3-4.08	Monterey County	2006
Santa Maria River Valley	3-12	Santa Barbara, San Luis Obispo	2008

Note: Table Represents information as of April, 2013.

Table CC-24 IRWM Grant Funding to the Central Coast (2005-2012)

IRWM Region	Prop. 50 2005-2006	Prop. 84 Planning Award Round 1	Prop. 84 Planning Award Round 2	Prop. 84 Implementation Award Round 1	Prop. 1E Stormwater Flood Management Award Round 1	Local Groundwater Assistance Award 2012
Greater Monterey County						
Monterey County Water Resources Agency	$997,000					
Monterey County Water Resources Agency-SWRCB	$12,500,000					
Monterey Bay Sanctuary Foundation		$755,264				
City of Soledad				$ 4,139,000		
Monterey Peninsula, Carmel Bay, So. Monterey Bay						
Monterey Peninsula Water Management District	$496,957					
Monterey Peninsula Water Management District		$995,000				
Pajaro River Watershed						
Pajaro Valley Water Management Agency	$25,000,000					
San Benito County Water District	$500,000					
San Benito County Water District		$996,170				
Santa Cruz County Flood Control and Water Conservation District					$5,000,000	
San Luis Obispo						
SLO County Flood Control and Water Conservation District	$500,000					
SLO County Flood Control and Water Conservation District			$1,000,000			
SLO County Flood Control and Water Conservation District				$10,401,000		
SLO County Flood Control and Water Conservation District					$2,797,000	
Santa Barbara Countywide						
Santa Barbara County Water Agency-SWRCB	$25,000,000					
Santa Barbara County IRWM Plan 2012		$555,737				
Santa Barbara County Water Agency				$3,000,996		
Santa Cruz						
Community Foundation of Santa Cruz-SWRCB	$12,500,000					
Regional Water Management Foundation		$999,750				
Soquel Creek Water District						$200,000
Total	**$52,493,957**	**$4,301,921**	**$1,000,000**	**$17,540,996**	**$7,797,000**	**$200,000**
Grand Total				**$83,333,874**		

Table CC-25 Conceptual Growth Scenarios

Scenario	Population Growth	Development Density
LOP-HID	Lower than Current Trends	Higher than Current Trends
LOP-CTD	Lower than Current Trend	Current Trends
LOP-LOD	Lower than Current Trends)	Lower than Current Trends
CTP-HID	Current Trends	Higher than Current Trends
CTP-CTD	Current Trends	Current Trends
CTP-LOD	Current Trends	Lower than Current Trends
HIP-HID	Higher than Current Trends	Higher than Current Trends
HIP-CTD	Higher than Current Trends	Current Trends
HIP-LOD	Higher than Current Trends	Lower than Current Trends

Source: California Department of Water Resources 2012.

Table CC-26 Growth Scenarios (Urban) — Central Coast

Scenario [a]	2050 Population (thousand)	Population Change (thousand) 2006 [b] to 2050	Development Density	2050 Urban Footprint (thousand acres)	Urban Footprint Increase (thousand acres) 2006 [c] to 2050
LOP-HID	1,629.2 [d]	140.1	High	336.4	19.0
LOP-CTD	1,629.2	140.1	Current Trends	338.8	21.4
LOP-LOD	1,629.2	140.1	Low	341.3	23.9
CTP-HID	1,830.0 [e]	340.9	High	379.7	62.3
CTP-CTD	1,830.0	340.9	Current Trends	385.8	68.4
CTP-LOD	1,830.0	340.9	Low	391.1	73.7
HIP-HID	2,755.2 [f]	1,266.1	High	480.8	163.4
HIP-CTD	2,755.2	1,266.1	Current Trends	496.0	178.6
HIP-LOD	2,755.2	1,266.1	Low	510.4	193.0

Source: California Department of Water Resources 2012.

Notes:

[a] See Table CC-25 for scenario definitions

[b] 2006 population was 1,489.1 thousand.

[C] 2006 urban footprint was 317.4 acres.

[d] Values modified by the California Department of Water Resources (DWR) from the Public Policy Institute of California.

[e] Values provided by the California Department of Finance.

[f] Values modified by DWR from the Public Policy Institute of California.

Table CC-27 Growth Scenarios (Agriculture) — Central Coast

Scenario [a]	2050 Irrigated Land Area [b] (thousand acres)	2050 Irrigated Crop Area [c] (thousand acres)	2050 Multiple Crop Area [d] (thousand acres)	Change in Irrigated Crop Area (thousand acres) 2006 to 2050
LOP-HID	441.9	654.5	212.6	-18.1
LOP-CTD	441.1	653.4	212.3	-19.2
LOP-LOD	440.4	652.3	211.9	-20.3
CTP-HID	425.4	630.1	204.7	-42.5
CTP-CTD	423.7	627.6	203.9	--45.0
CTP-LOD	422.3	625.5	203.2	-47.1
HIP-HID	395.0	585.1	190.1	-87.5
HIP-CTD	389.3	576.6	187.3	-96.0
HIP-LOD	384.1	568.9	184.8	-103.7

Source: California Department of Water Resources 2012.

Notes:

[a] See Table CC-25 for scenario definitions

[b] 2006 Irrigated land area was estimated by the California Department of Water Resources (DWR) to be 454.9 thousand acres.

[c] 2006 Irrigated crop area was estimated by DWR to be 672.6 thousand acres.

[d] 2006 multiple crop area was estimated by DWR to be 217.7 thousand acres.

Table CC-28 Resource Management Strategies Addressed in IRWMP's in the Central Coast Hydrologic Region

Resource Management Strategy	IRWMP 1	IRWMP 2
Agricultural Water Use Efficiency		
Urban Water Use Efficiency		
Conveyance – Delta		
Conveyance – Regional/Local		
System Reoperation		
Water Transfers		
Conjunctive Management & Groundwater		
Desalination		
Precipitation Enhancement		
Recycled Municipal Water		
Surface Storage – CALFED		
Surface Storage – Regional/Local		
Drinking Water Treatment and Distribution		
Groundwater and Aquifer Remediation		
Match Water Quality to Use		
Pollution Prevention		
Salt and Salinity Management		
Agricultural Lands Stewardship		
Economic Incentives		
Ecosystem Restoration		
Forest Management		
Land Use Planning and Management		
Recharge Areas Protection		
Water-Dependent Recreation		
Watershed Management		
Flood Risk Management		
Flood Management		
Desalination (Brackish and Sea Water)		
Salt and Salinity Management		

Figure CC-1 Central Coast Hydrologic Region

PLACEHOLDER Figure CC-2 Agricultural and Urban Demand Supplied by Groundwater – DWR Bulletin 118

[figure to come]

Figure CC-3 Central Coast Hydrologic Region Watersheds

Figure CC-4 Alluvial Groundwater Basins and Subbasins within the Central Coast Hydrologic Region

Figure CC-5 Number of Well Logs by County and Use for the Central Coast Hydrologic Region (1977–2010)

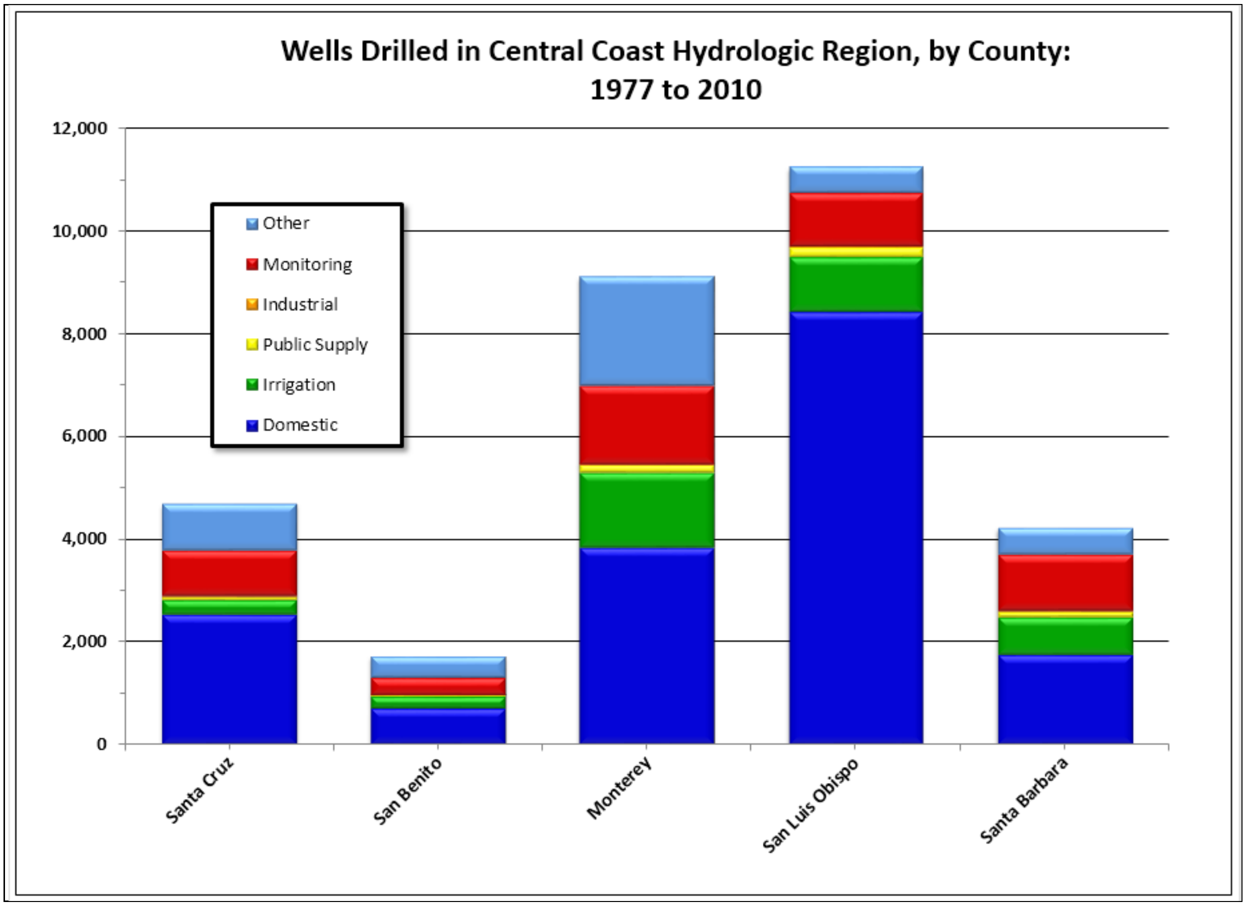


Figure CC-6 Percentage of Well Logs by Use for the Central Coast Hydrologic Region (1977–2010)

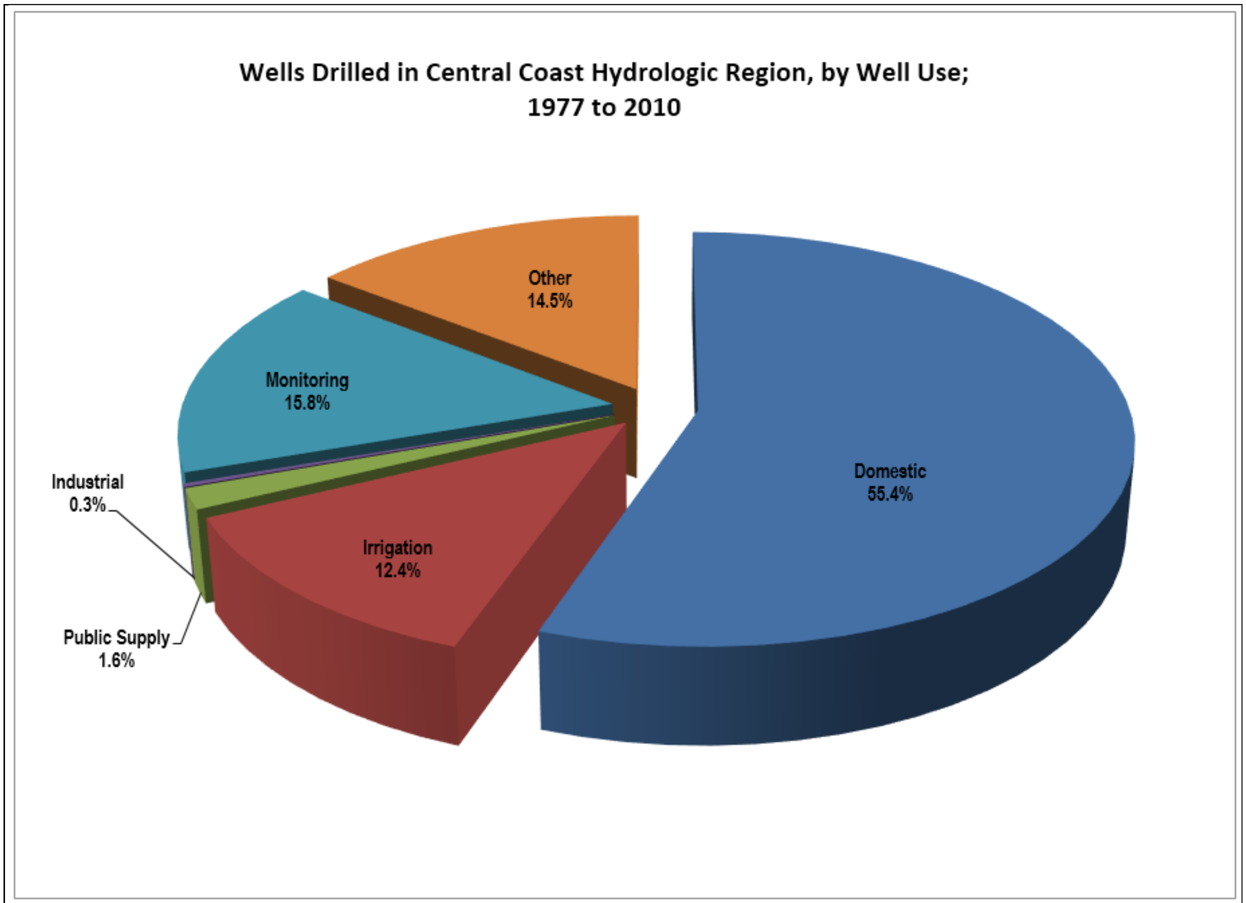


Figure CC-7 Number of Well Logs Filed per Year by Use for the Central Coast Hydrologic Region (1977–2010)

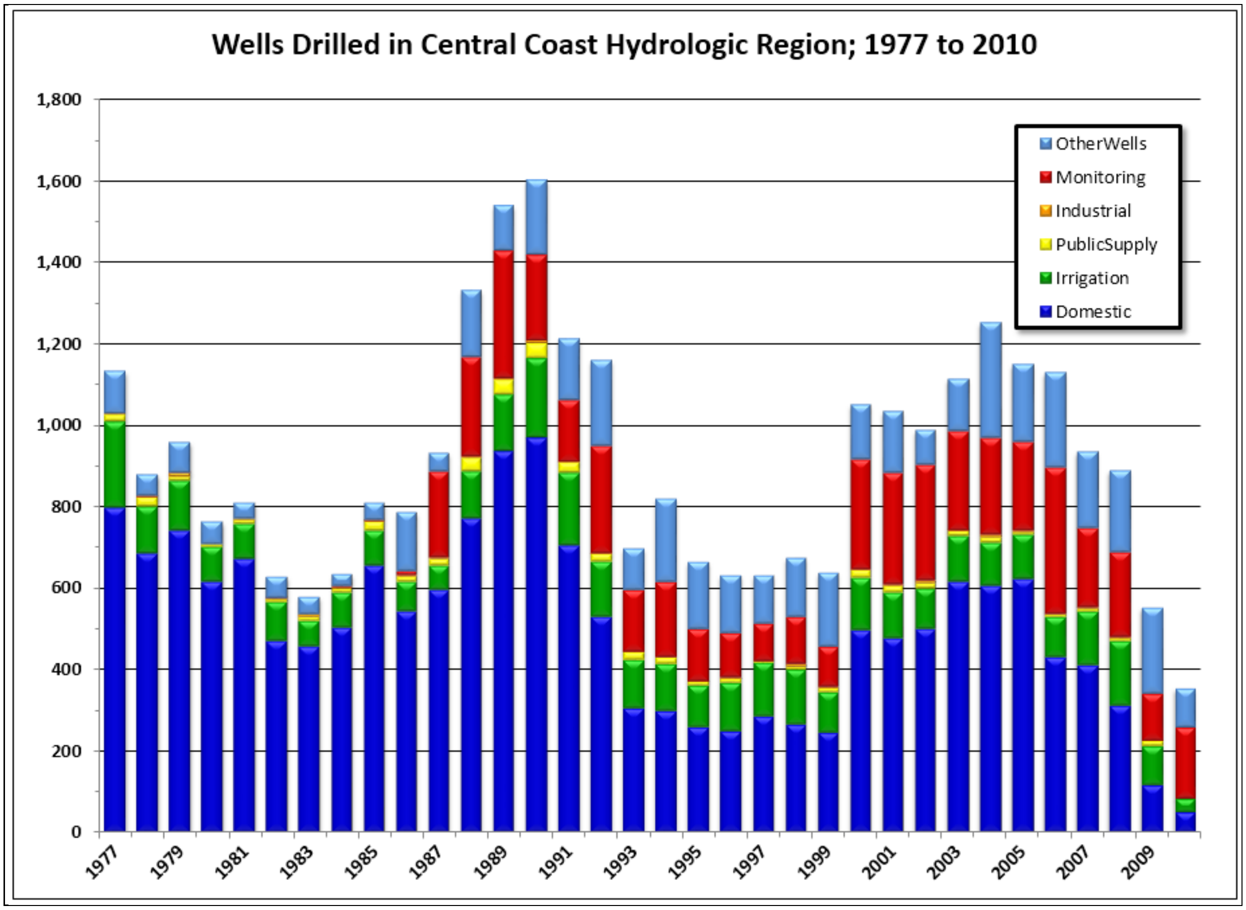


Figure CC-8 CASGEM Groundwater Basin Prioritization for the Central Coast Hydrologic Region

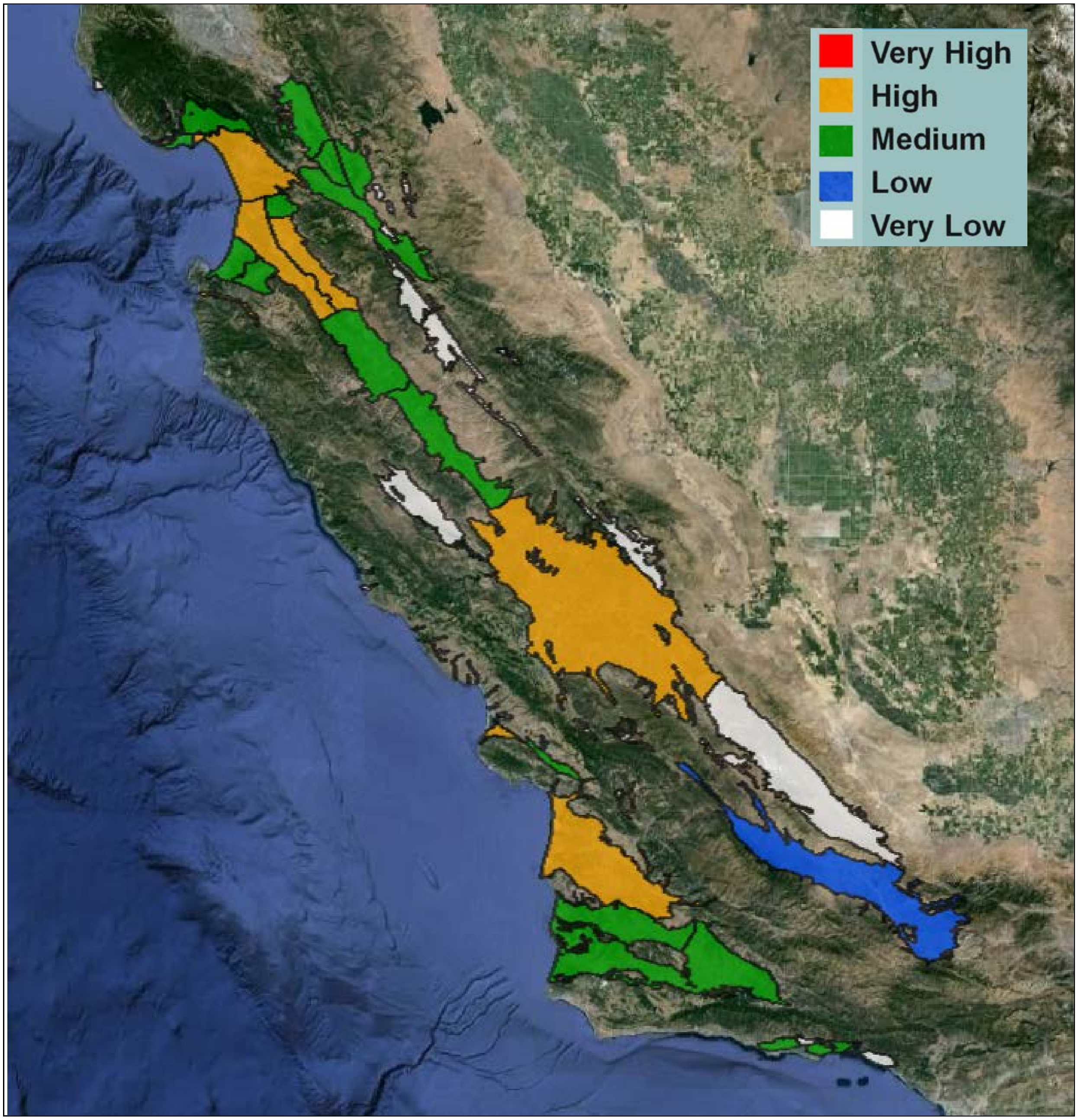
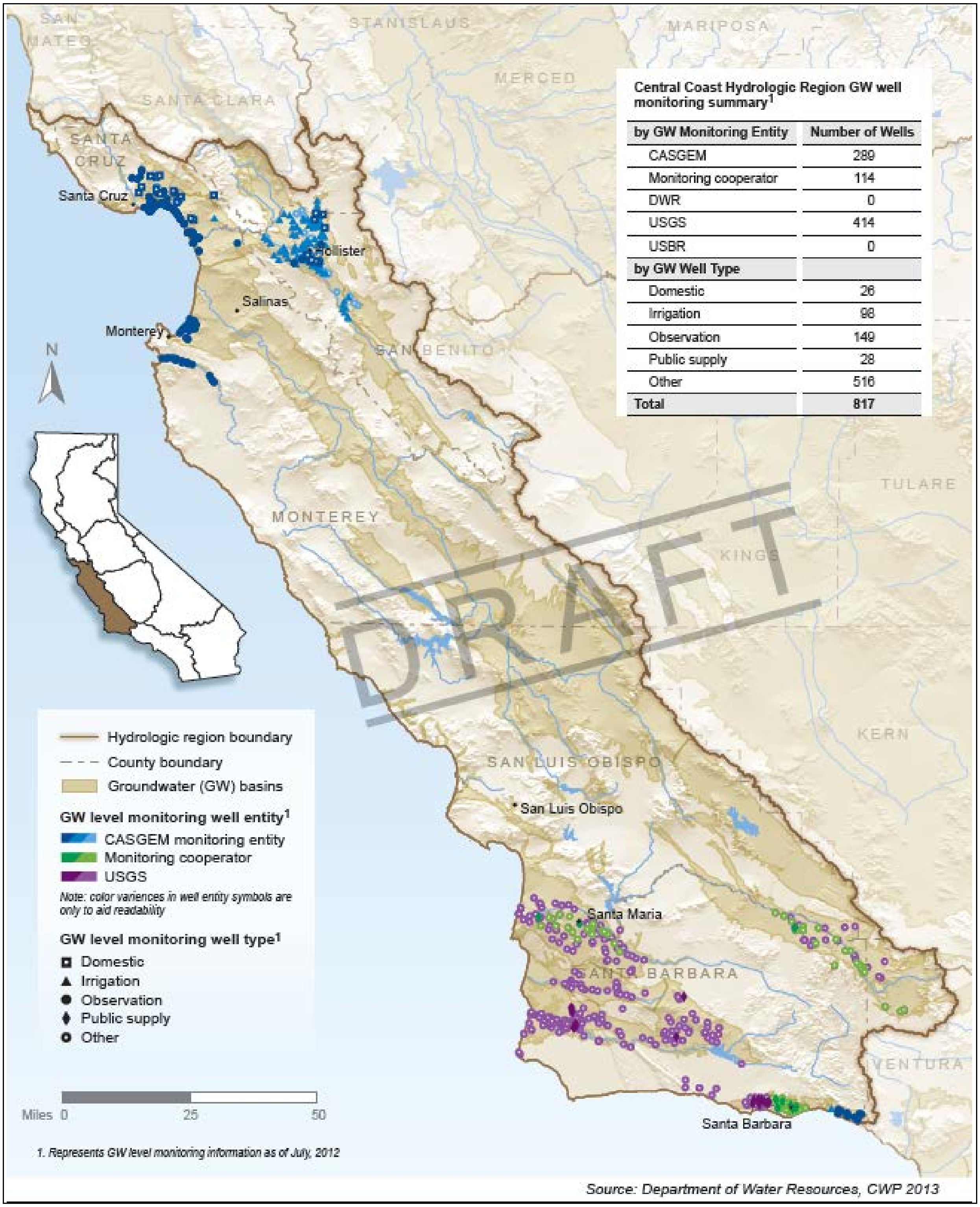


Figure CC-9 Monitoring Well Location by Agency, Monitoring Cooperator, and CASGEM Monitoring Entity in the Central Coast Hydrologic Region



by GW Monitoring Entity	Number of Wells
CASGEM	289
Monitoring cooperator	114
DWR	0
USGS	414
USBR	0
by GW Well Type	
Domestic	26
Irrigation	98
Observation	149
Public supply	28
Other	516
Total	**817**

Source: Department of Water Resources, CWP 2013

Figure CC-10 Percentage of Monitoring Wells by Use in the Central Coast Hydrologic Region

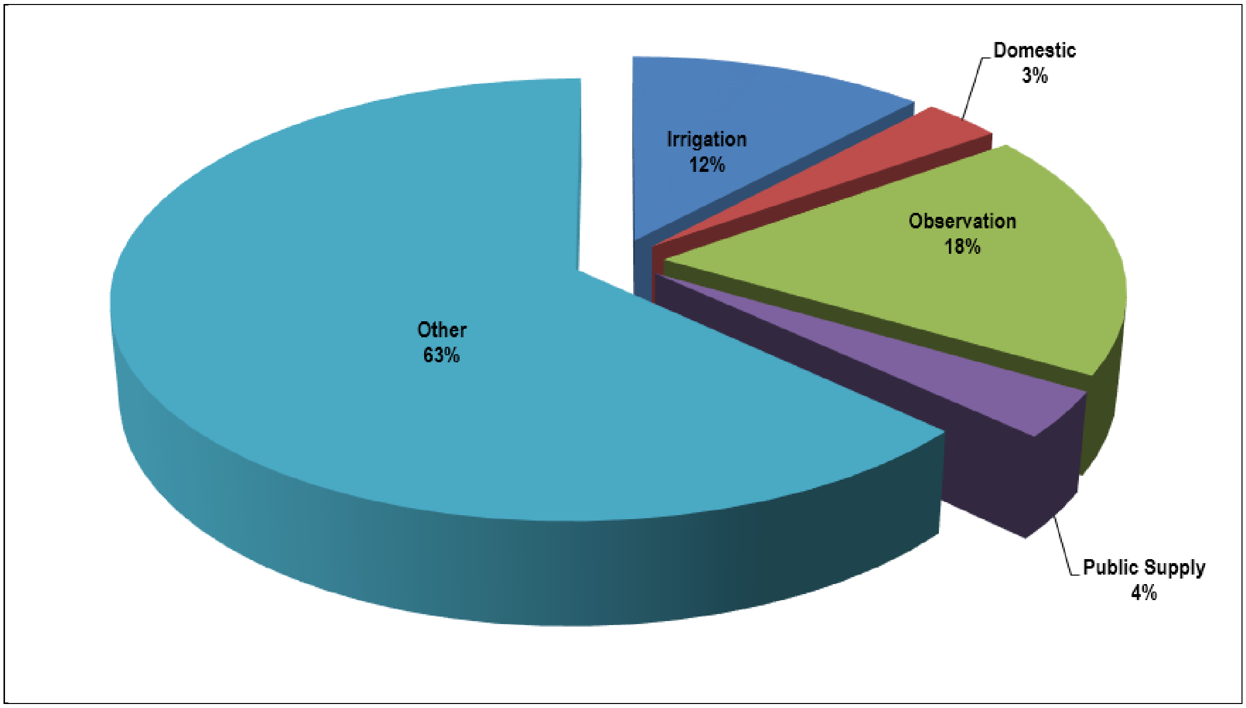


Figure CC-11 Central Coast Strawberry Production

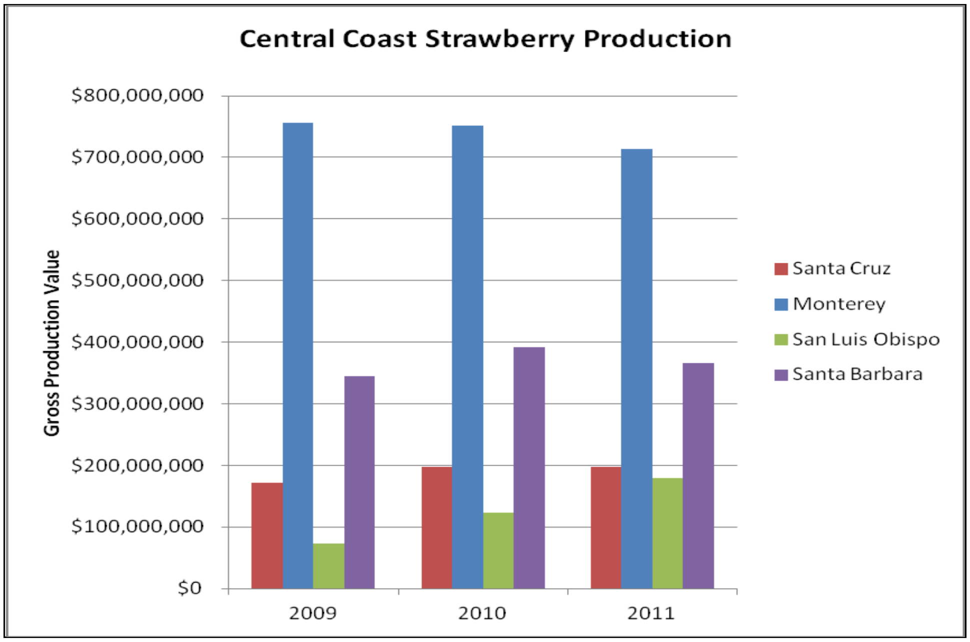
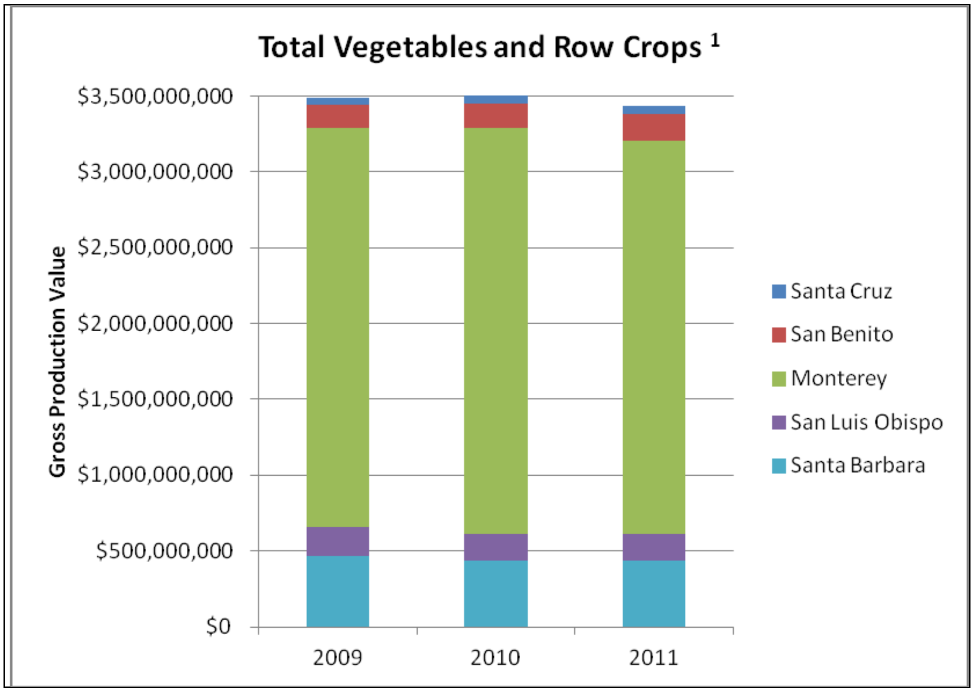
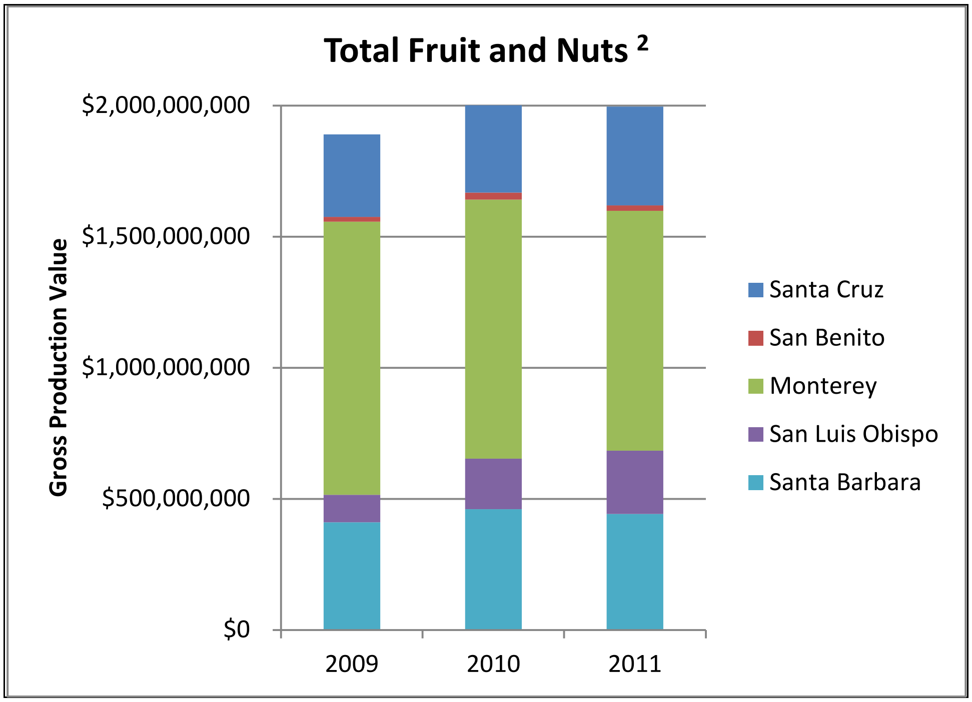


Figure CC-12 Central Coast Total Vegetables and Row Crops



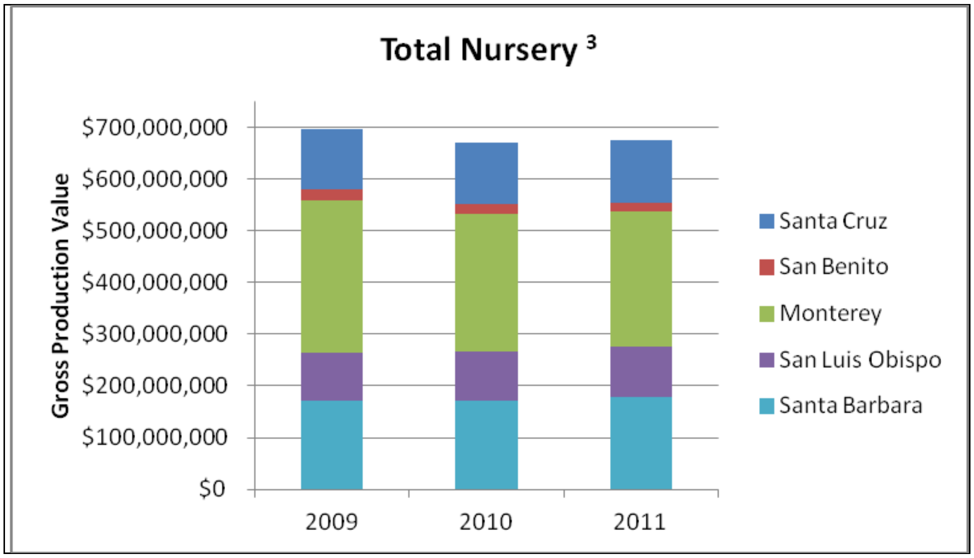
[1] Total vegetable and row crops can include: Arugula, Anise, Artichokes, Asparagus, Beans, Beets, Bok Choy, Borage, Broccoli, Brussel Sprouts, Cabbage, Carrots, Cantaloupe, Cauliflower, Celery, Chicory, Chard, Chili Peppers, Cilantro, Collards, Corn, Cucumbers, Daikon, Dandelion, Dill, Eggplant, Endive, Escarole, Fennel, Garlic, Green Onions, Garbanzo Beans, Herbs, Kale, Kohlrabi, Leeks, Lettuces, Melons, Mushrooms, Mizuna, Mustard, Okra, Onions, Parsley, Parsnips, Peas, Pepper, Potatoes, Pumpkins, Radicchio, Radishes, Rutabagas, Shallots, Spinach, Squash, Sweet Corn, Tomato, Tomatillo, Turnips, and Watermelon.

Figure CC-13 Central Coast Total Fruit and Nuts



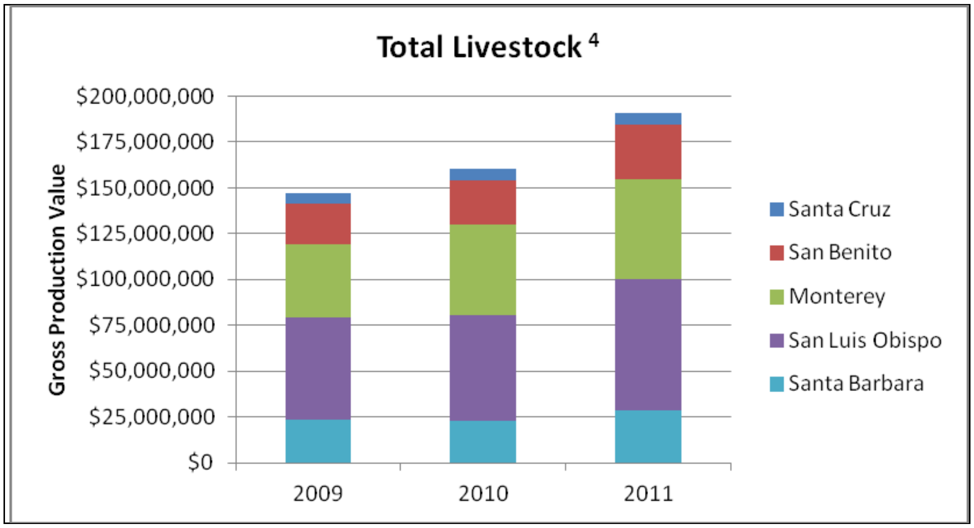
[2] Total fruit and nuts can include: Almonds, Apples, Apricots, Asian Pears, Avocados, Blackberries, Blueberries, Cherries, Feijoas, Figs, Grapefruit, Kiwis, Lemons, Limes, Mandarin Oranges, Navel Oranges, Nectarines, Olives, Passion Fruit, Peaches, Pears, Persimmons, Pistachios, Plums, Pluot, Pomegranates, Prunes, Raspberries, Specialty Citrus, Table Grapes, Tangerines, Table Grapes, and Walnuts.

Figure CC-14 Central Coast Total Nursery



[3] Total nursery can include: Aquatic plants, Bulbs, Cacti, Christmas trees, Farm stock transplants, Flowers, Flower seeds, Fruit-Nut trees, Herbs, Indoor potted plants, Landscape plants, Propagative plants, Scion wood, Specialty plants, Succulents, and Turf.

Figure CC-15 Central Coast Total Livestock



[4] Total Livestock can include: All cattle, chicken, eggs, goats, hogs, lambs, milk, turkey, and wool.

Figure CC-16 Central Coast Acres of Wine Grapes over Time

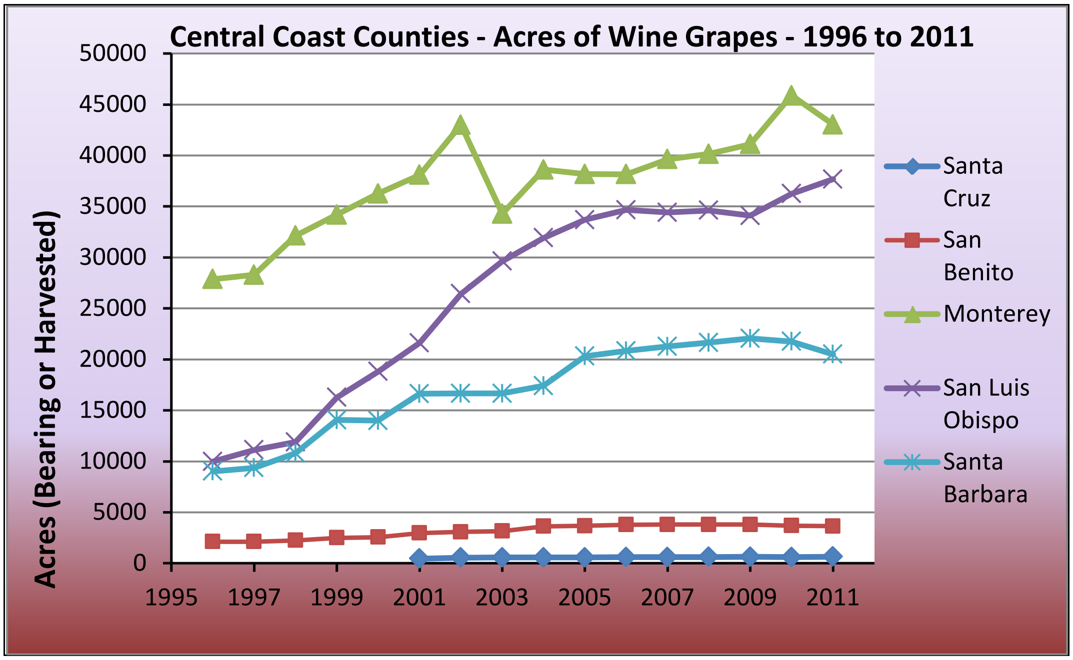


Figure CC-17 Central Coast Hydrologic Region Inflows and Outflows in 2010

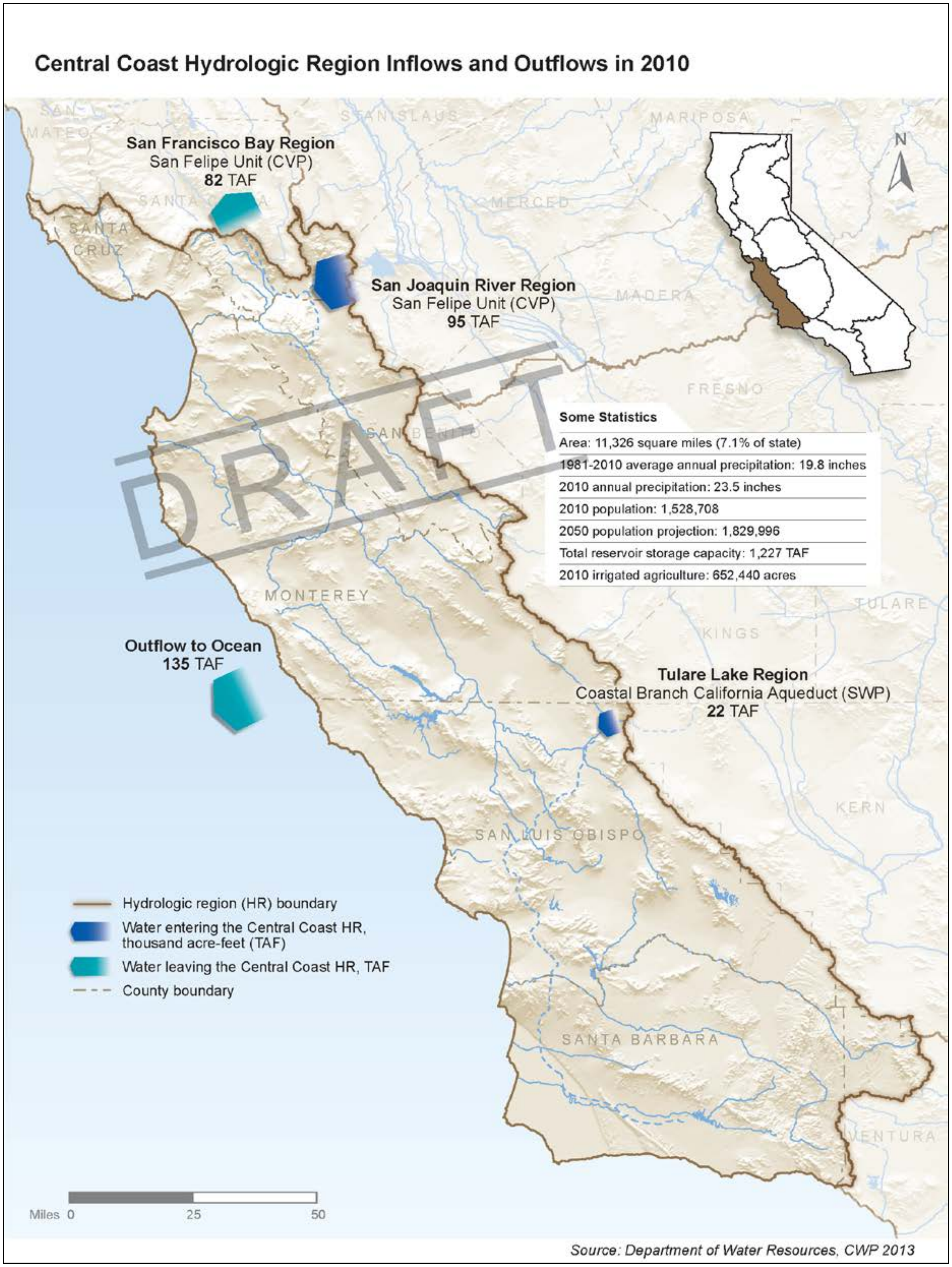


Figure CC-18 Contribution of Groundwater to the Central Coast Hydrologic Region Water Supply by Planning Area (2005-2010)

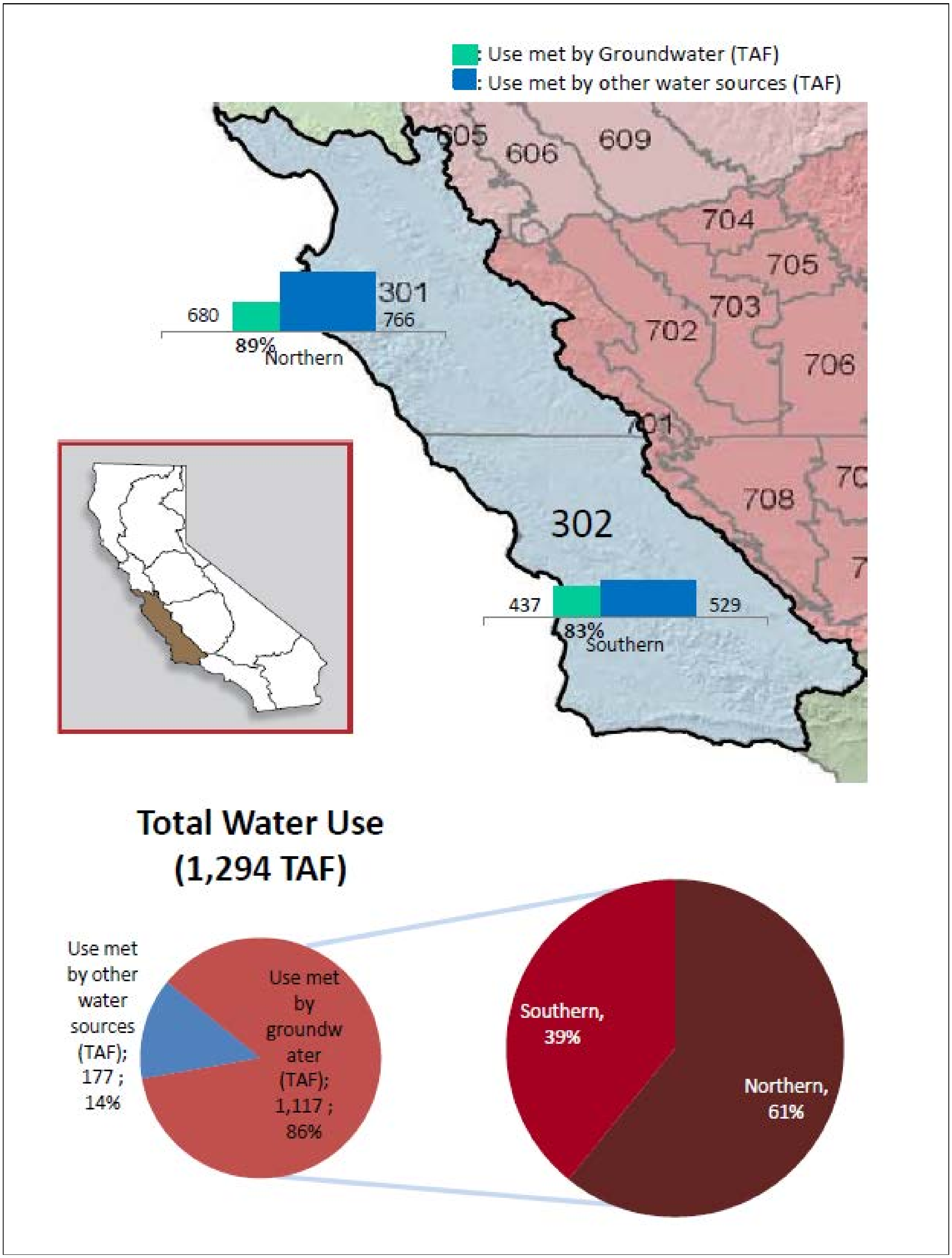


Figure CC-19 Central Coast Hydrologic Region Annual Groundwater Water Supply Trend (2002-2010)

This is North Coast. Central Coast is in development.

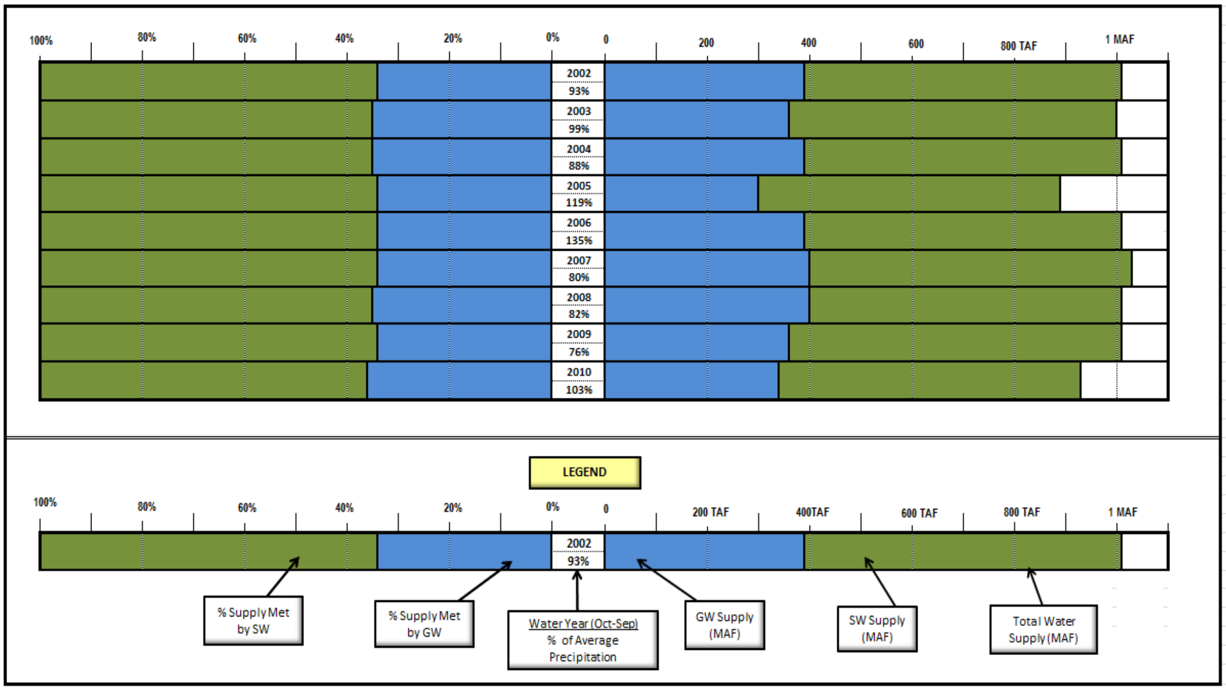


Figure CC-20 Central Coast Hydrologic Region Annual Groundwater Supply Trend by Type of Use (2002-2010)

This is North Coast. Central Coast is in development

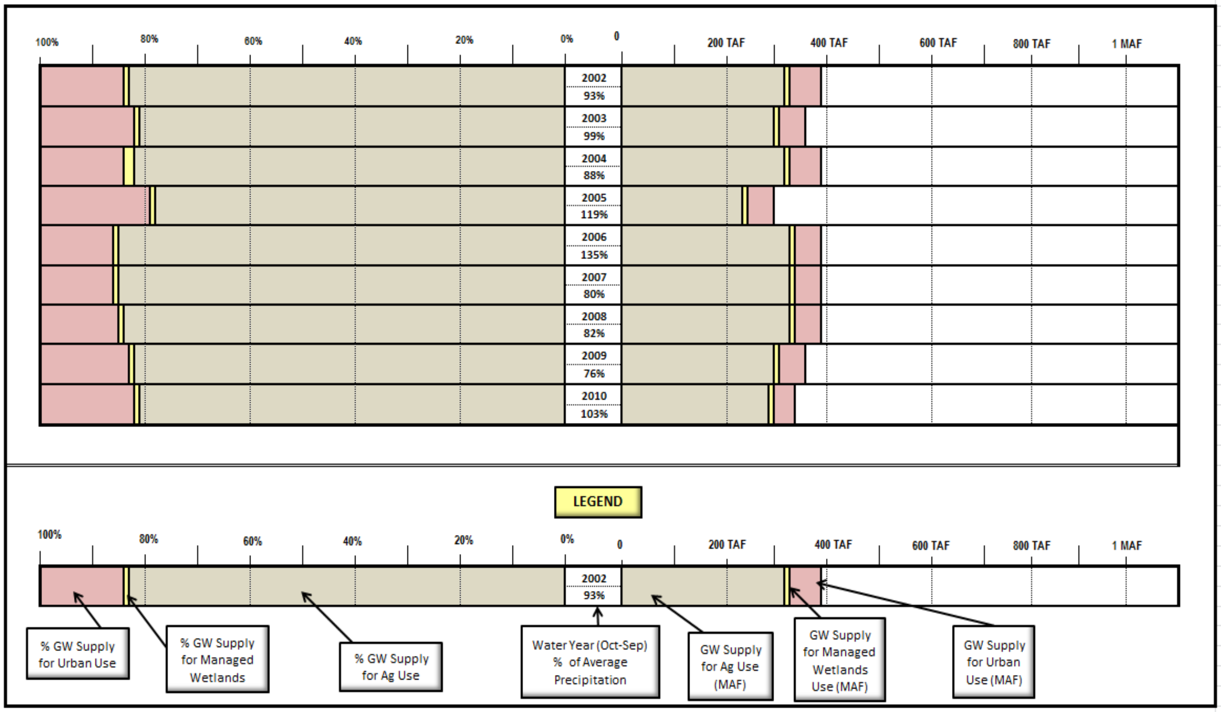
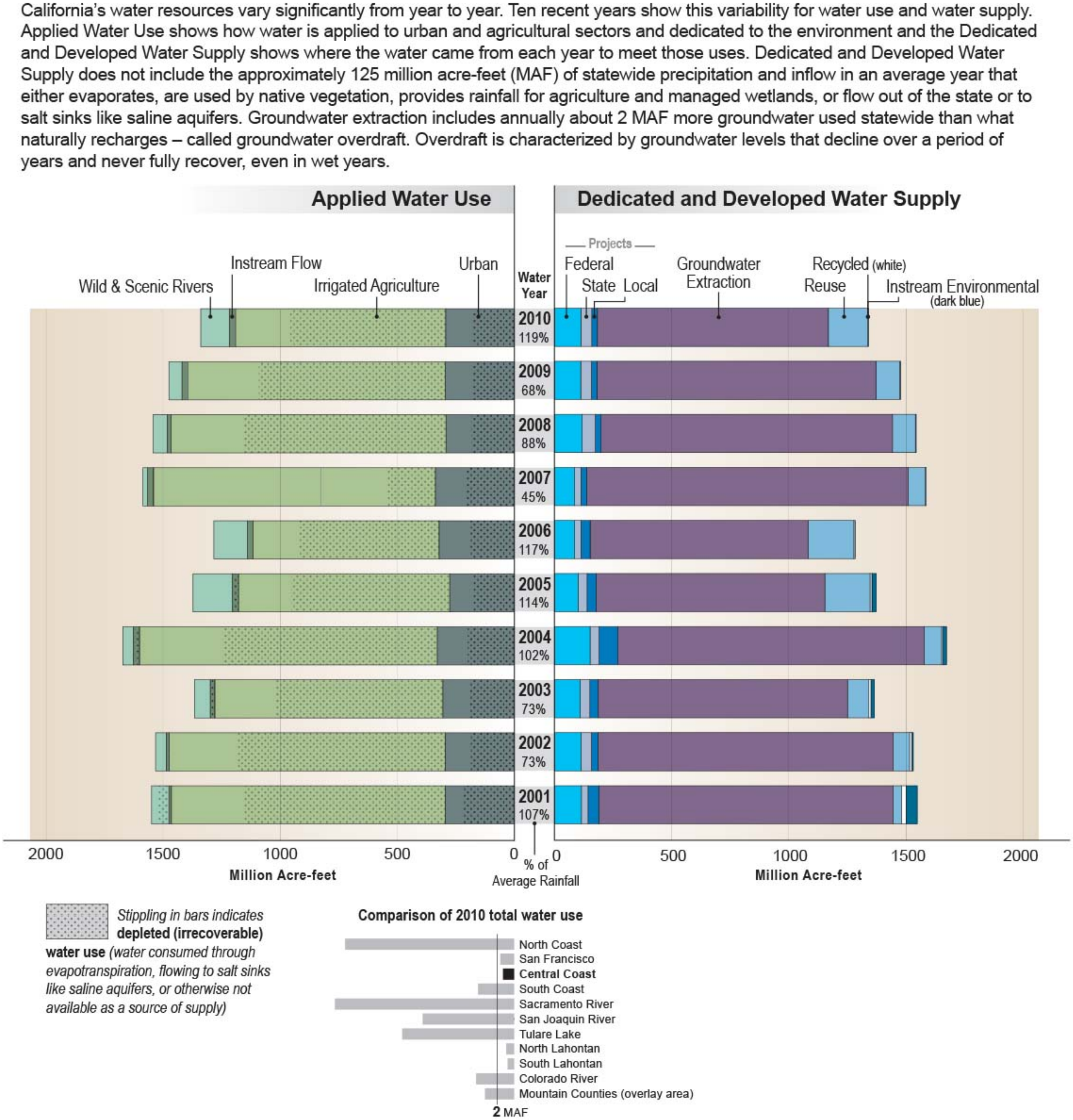


Figure CC-21 **Central Coast Region Water Balance by Water Year, 2001-2010**



Key Water Supply and Water Use Definitions

Applied water. The total amount of water that is diverted from any source to meet the demands of water users without adjusting for water that is depleted, returned to the developed supply or considered irrecoverable (see water balance figure).

Consumptive use is the amount of applied water used and no longer available as a source of supply. Applied water is greater than consumptive use because it includes consumptive use, reuse, and outflows.

Instream environmental. Instream flows used only for environmental purposes.

Instream flow. The use of water within its natural watercourse as specified in an agreement, water rights permit, court order, FERC license, etc.

Groundwater Extraction. An annual estimate of water withdrawn from banked, adjudicated, and unadjudicated groundwater basins.

Recycled water. Municipal water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

Reused water. The application of previously used water to meet a beneficial use, whether treated or not prior to the subsequent use.

Urban water use. The use of water for urban purposes, including residential, commercial, industrial, recreation, energy production, military, and institutional classes. The term is applied in the sense that it is a kind of use rather than a place of use.

Water balance. An analysis of the total developed/dedicated supplies, uses, and operational characteristics for a region. It shows what water was applied to actual uses so that use equals supply.

Central Coast Water Balance by Water Year Data Table (MAF)

	2001 (107%)	2002 (73%)	2003 (73%)	2004 (102%)	2005 (114%)	2006 (117%)	2007 (45%)	2008 (88%)	2009 (68%)	2010 (119%)
Applied Water Use										
Urban	294	294	305	329	276	321	337	292	295	293
Irrigated Agriculture	1171	1180	974	1272	902	795	1204	1174	1100	898
Managed Wetlands	0	1	1	0	0	0	1	1	0	0
Req Delta Outflow	0	0	0	0	0	0	0	0	0	0
Instream Flow	11	11	19	26	26	24	26	15	25	25
Wild & Scenic R.	74	47	68	46	169	144	19	62	56	124
Total Uses	**1550**	**1532**	**1366**	**1673**	**1373**	**1284**	**1586**	**1543**	**1476**	**1341**
Depleted Water Use (stippling)										
Urban	218	186	190	199	174	187	204	182	179	175
Irrigated Agriculture	859	887	715	916	677	601	919	864	796	664
Managed Wetlands	0	0	0	0	0	0	0	0	0	0
Req Delta Outflow	0	0	0	0	0	0	0	0	0	0
Instream Flow	0	7	15	20	20	0	0	0	0	0
Wild & Scenic R.	49	0	0	0	0	0	0	0	0	0
Total Uses	**1126**	**1080**	**921**	**1136**	**872**	**788**	**1123**	**1046**	**976**	**839**
Dedicated and Developed Water Supply										
Instream	48	7	15	16	19	0	0	0	0	0
Local Projects	46	29	36	81	39	39	25	25	24	24
Local Imported Deliveries	0	0	0	0	0	0	0	0	0	0
Colorado Project	0	0	0	0	0	0	0	0	0	0
Federal Projects	114	113	109	151	100	84	84	117	111	112
State Project	28	43	41	38	38	28	28	56	45	46
Groundwater Extraction	1,258	1,261	1,065	1,309	977	931	1,373	1,245	1,192	987
Inflow & Storage	0	0	0	0	0	0	0	0	0	0
Reuse & Seepage	36	70	91	74	193	196	73	98	102	168
Recycled Water	19	9	9	5	8	5	4	3	3	3
Total Supplies	**1,550**	**1,532**	**1,366**	**1,673**	**1,373**	**1,284**	**1,586**	**1,543**	**1,476**	**1,341**

Figure CC-22 Central Coast Hydrologic Region Units and Monitoring Sites

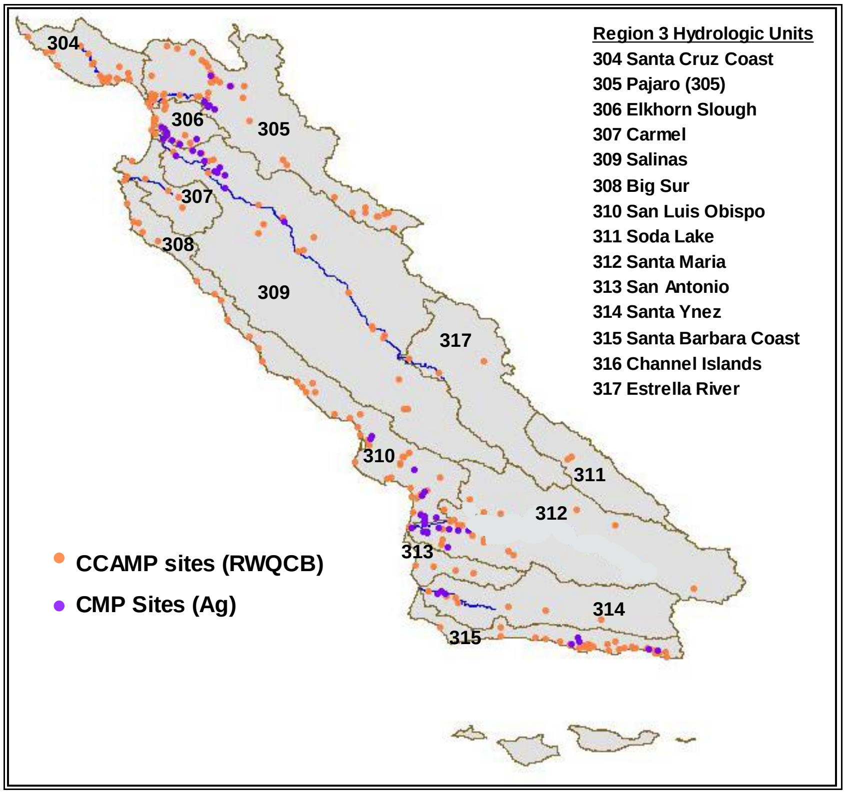


Figure CC-23 Central Coast Surface Water Quality Index using Multiple Parameters

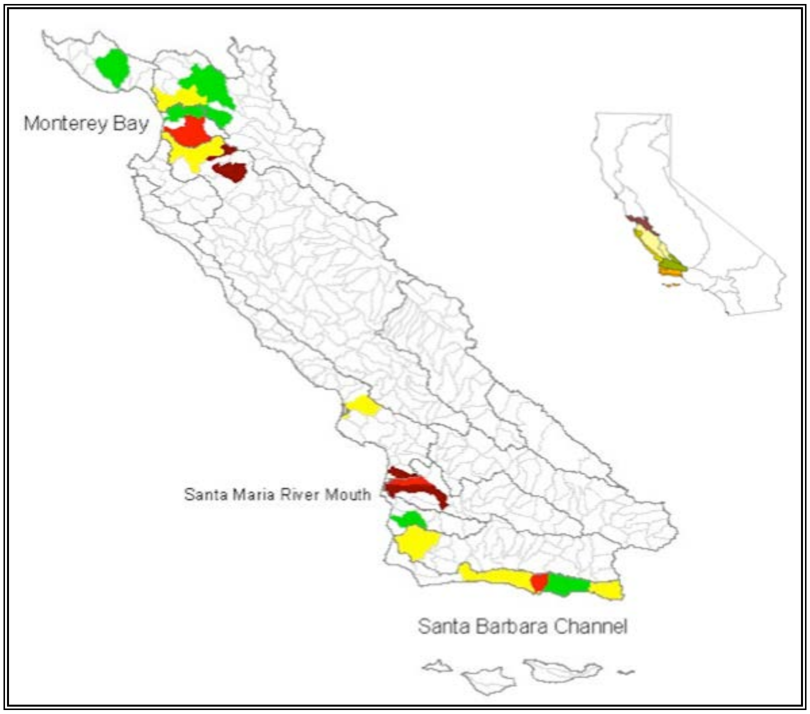


Figure CC-24 Central Coast Surface Water Quality Toxicity Index

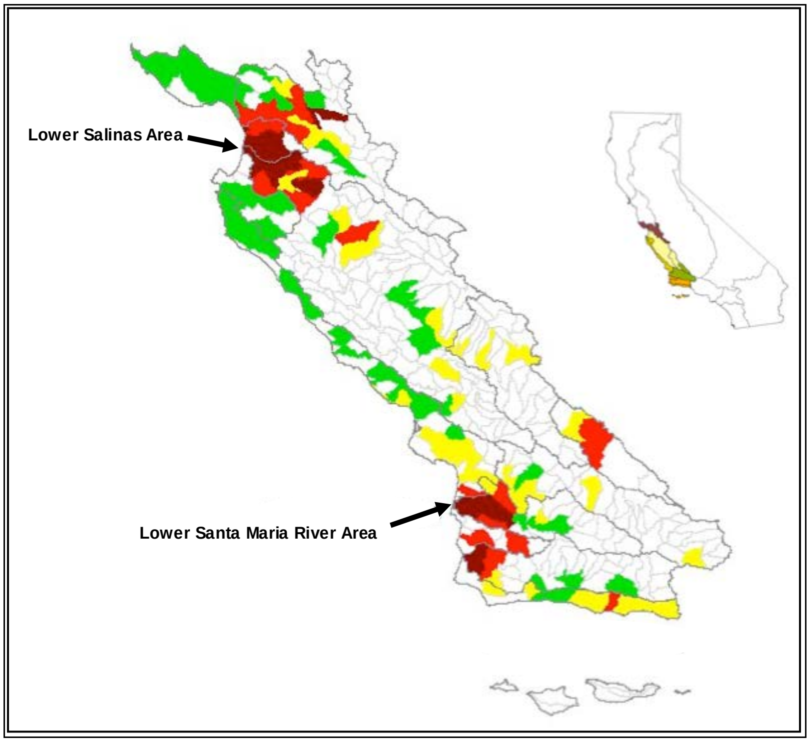
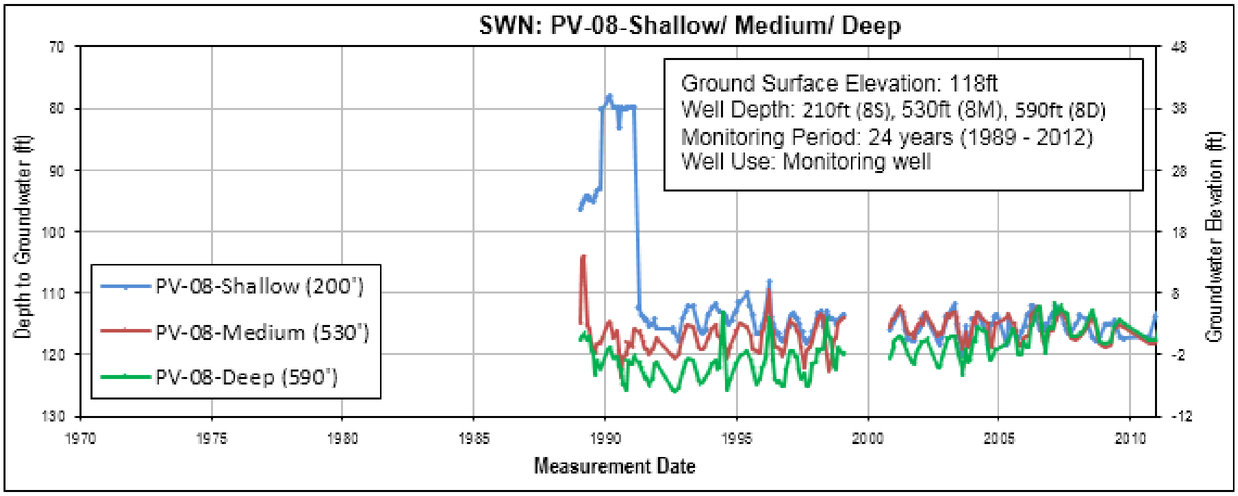
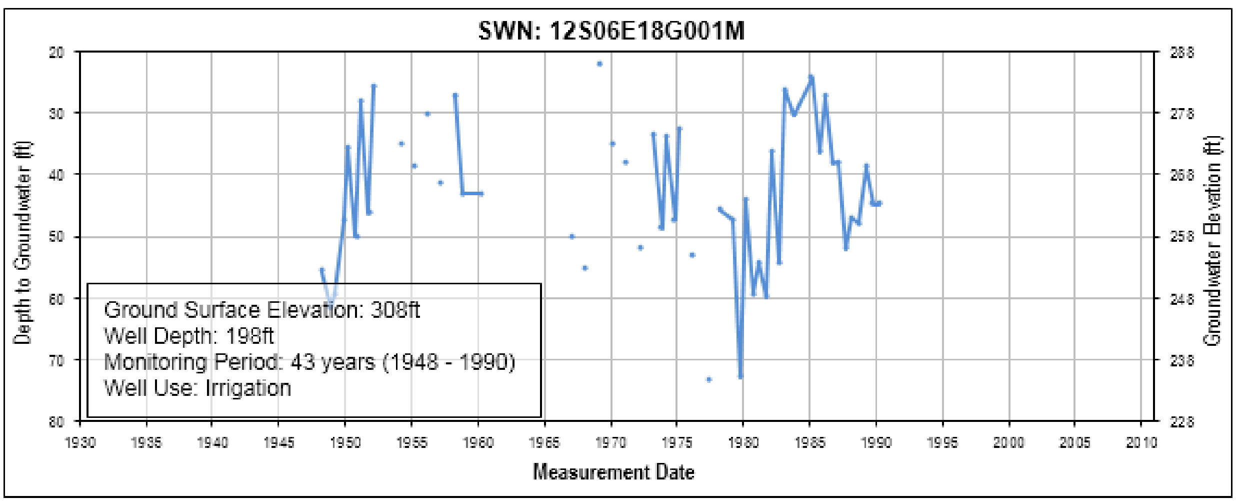
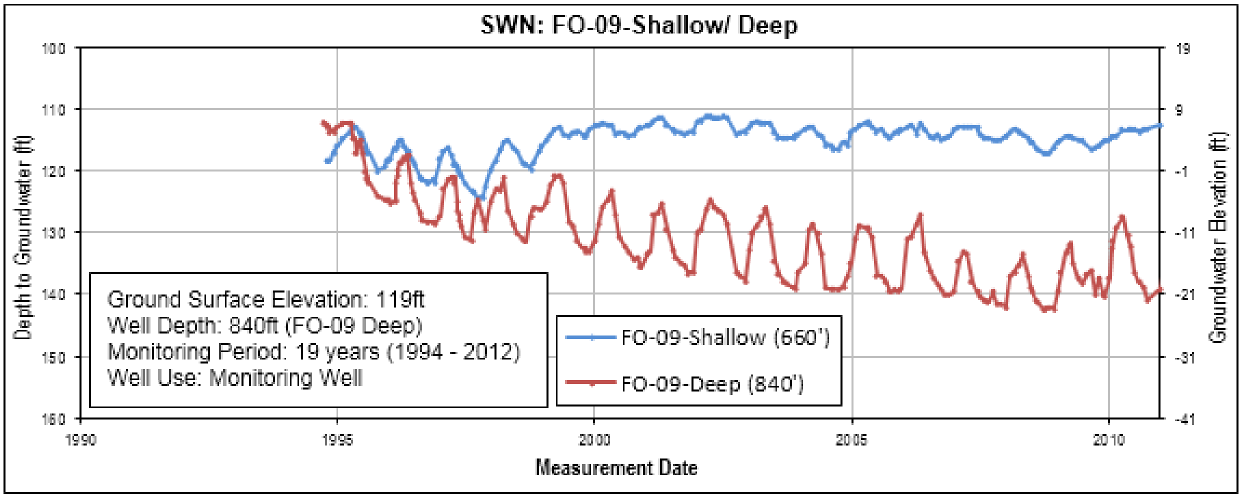


Figure CC-25 Groundwater Level Trends in Selected Wells in the Central Coast Hydrologic Region

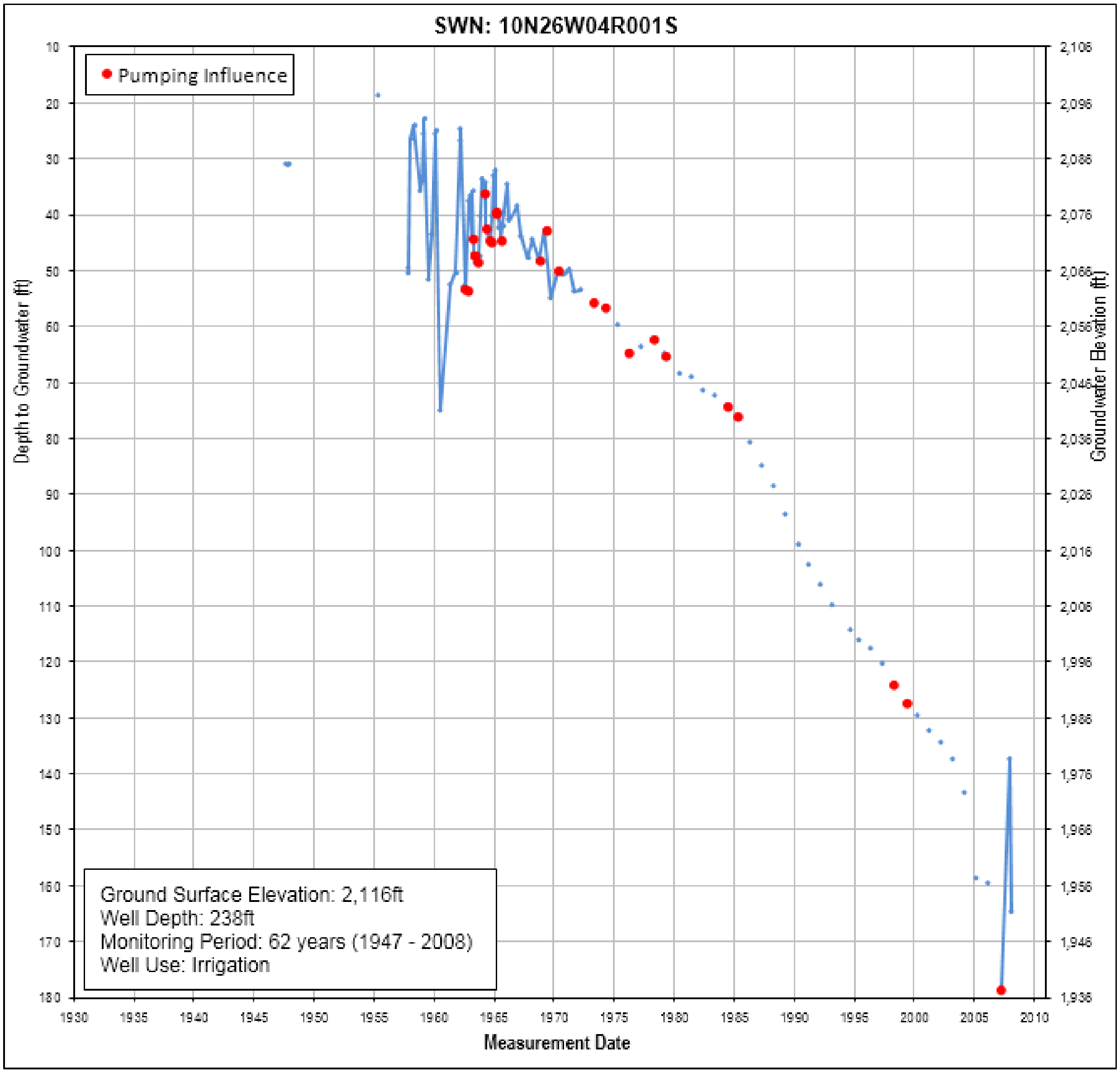


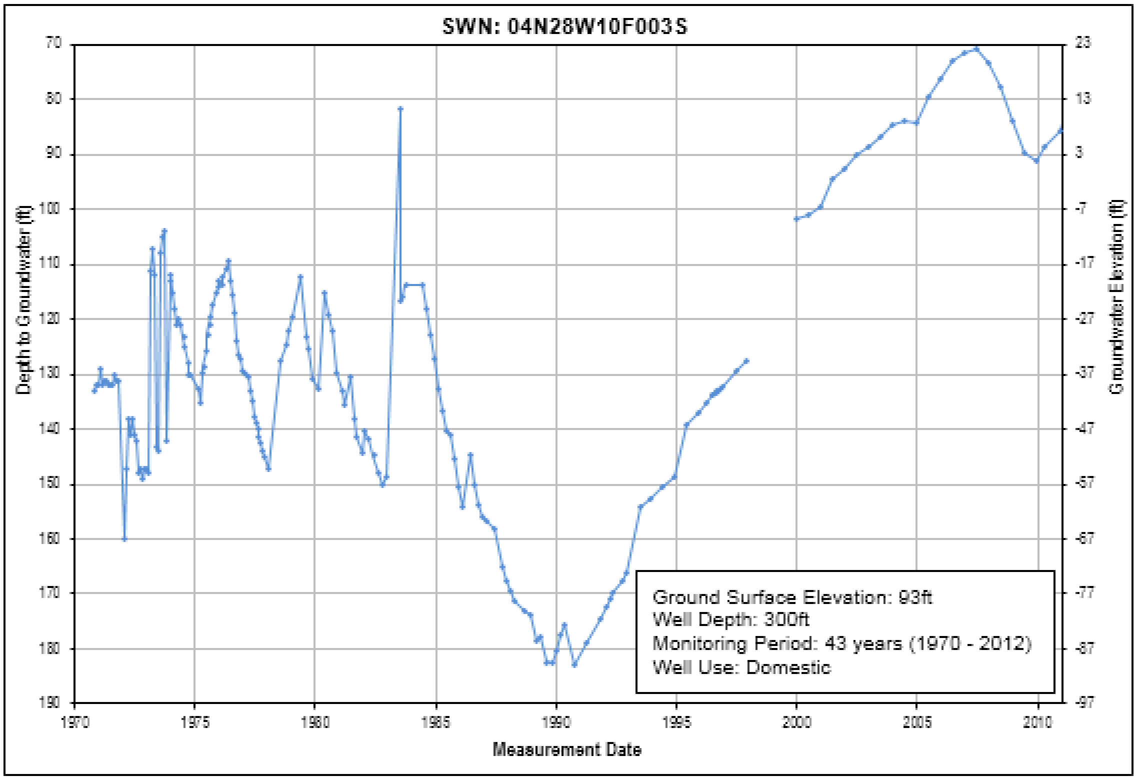
Note: Hydrograph provided by Pajaro Valley Water Management Agency.





Note: Hydrograph provided by Monterey Peninsula Water Management District.


SWN: 10N26W04R001S
Pumping Influence
Depth to Groundwater (ft)
Groundwater Elevation (ft)
Measurement Date
Ground Surface Elevation: 2,116ft
Well Depth: 238ft
Monitoring Period: 62 years (1947 - 2008)
Well Use: Irrigation


SWN: 04N28W10F003S
Depth to Groundwater (ft)
Groundwater Elevation (ft)
Measurement Date
Ground Surface Elevation: 93ft
Well Depth: 300ft
Monitoring Period: 43 years (1970 - 2012)
Well Use: Domestic

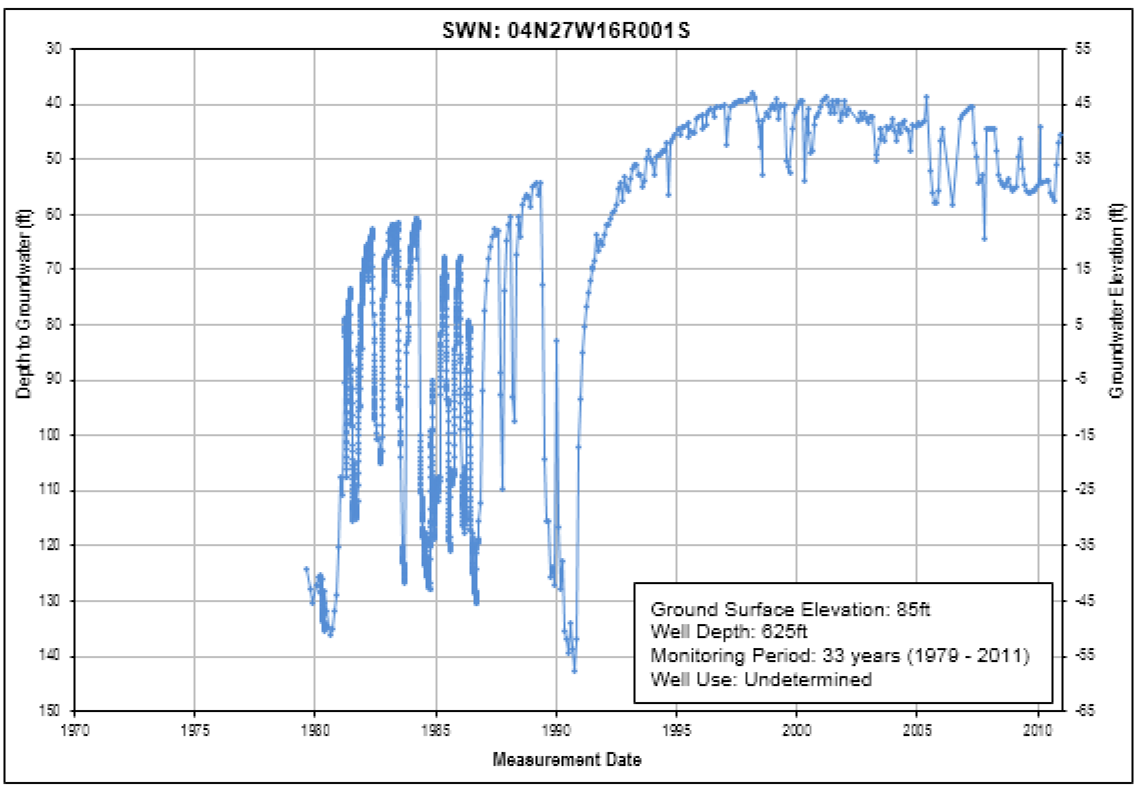

SWN: 04N27W16R001S
Depth to Groundwater (ft)
Groundwater Elevation (ft)
Measurement Date
Ground Surface Elevation: 85ft
Well Depth: 625ft
Monitoring Period: 33 years (1979 - 2011)
Well Use: Undetermined

Figure CC-26 Flood Hazard Exposure to the 100-Year Floodplain in the Central Coast Region

Central Coast Key Results

Total Population:	1,447,400	Transportation Facilities:	466
Population Exposed:	92,700	Transportation Segments (miles):	275
Percent of Population Exposed:	6	Essential Facilities:	50
Exposed Structures:	31,600	Lifeline Utilities:	23
Value of Exposed Structure and Contents:	$10.3 Billion	Dept. of Defense Facilities:	5
Total Area (acres)	7.2 Million	Dept. of Defense Facilities (acres):	13,480
Exposed Area (acres)	336,000	High Potential Loss Facilities:	24
Percent of Area Exposed:	5	Native American Tribes:	-
Exposed Ag.Crops (acres):	123,600	Native American Tribal Lands (acres):	-
Percent of Ag. Crops Exposed:	18	Sensitive Animal Species Exposed:	111
Value of Exposed Ag. Crops:	$564.6 Million	Sensitive Plant Species Exposed:	202

Statewide Flood Hazard Exposure Summary for the Central Coast Hydrologic Region 100-year Floodplain

STATEWIDE FLOOD MANAGEMENT PLANNING PROGRAM

FloodSAFE CALIFORNIA

Jan 28, 2013

Figure CC-27 **Flood Hazard Exposure to the 500-Year Floodplain in the Central Coast Region**

Central Coast Key Results

Total Population:	1,447,400	Transportation Facilities:	624
Population Exposed:	426,900	Transportation Segments (miles):	412
Percent of Population Exposed:	29	Essential Facilities:	230
Exposed Structures:	125,400	Lifeline Utilities:	33
Value of Exposed Structure and Contents:	$36.3 Billion	Dept. of Defense Facilities:	5
Total Area (acres)	7.2 Million	Dept. of Defense Facilities (acres):	15,322
Exposed Area (acres)	393,500	High Potential Loss Facilities:	32
Percent of Area Exposed:	5	Native American Tribes:	-
Exposed Ag.Crops (acres):	146,300	Native American Tribal Lands (acres):	-
Percent of Ag. Crops Exposed:	21	Sensitive Animal Species Exposed:	112
Value of Exposed Ag. Crops:	$689.3 Million	Sensitive Plant Species Exposed:	204

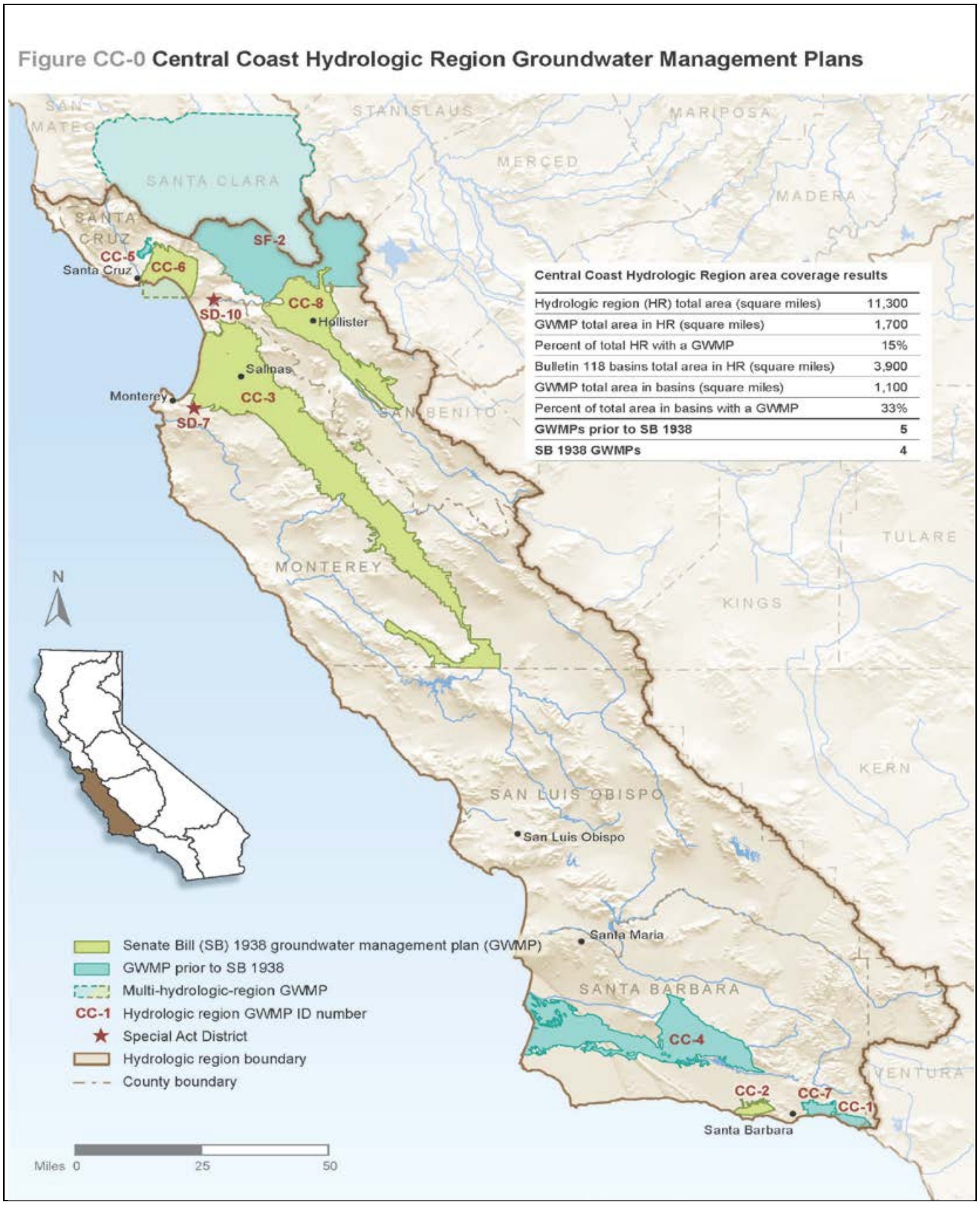
Statewide Flood Hazard Exposure Summary for the Central Coast Hydrologic Region 500-year Floodplain

STATEWIDE FLOOD MANAGEMENT PLANNING PROGRAM

FloodSAFE CALIFORNIA

Jan 28, 2013

Figure CC-28 Location of Groundwater Management Plans in the Central Coast Hydrologic Region



Central Coast Hydrologic Region area coverage results

Hydrologic region (HR) total area (square miles)	11,300
GWMP total area in HR (square miles)	1,700
Percent of total HR with a GWMP	15%
Bulletin 118 basins total area in HR (square miles)	3,900
GWMP total area in basins (square miles)	1,100
Percent of total area in basins with a GWMP	33%
GWMPs prior to SB 1938	**5**
SB 1938 GWMPs	**4**

Figure CC-29 Groundwater Adjudications in the Central Coast Hydrologic Region

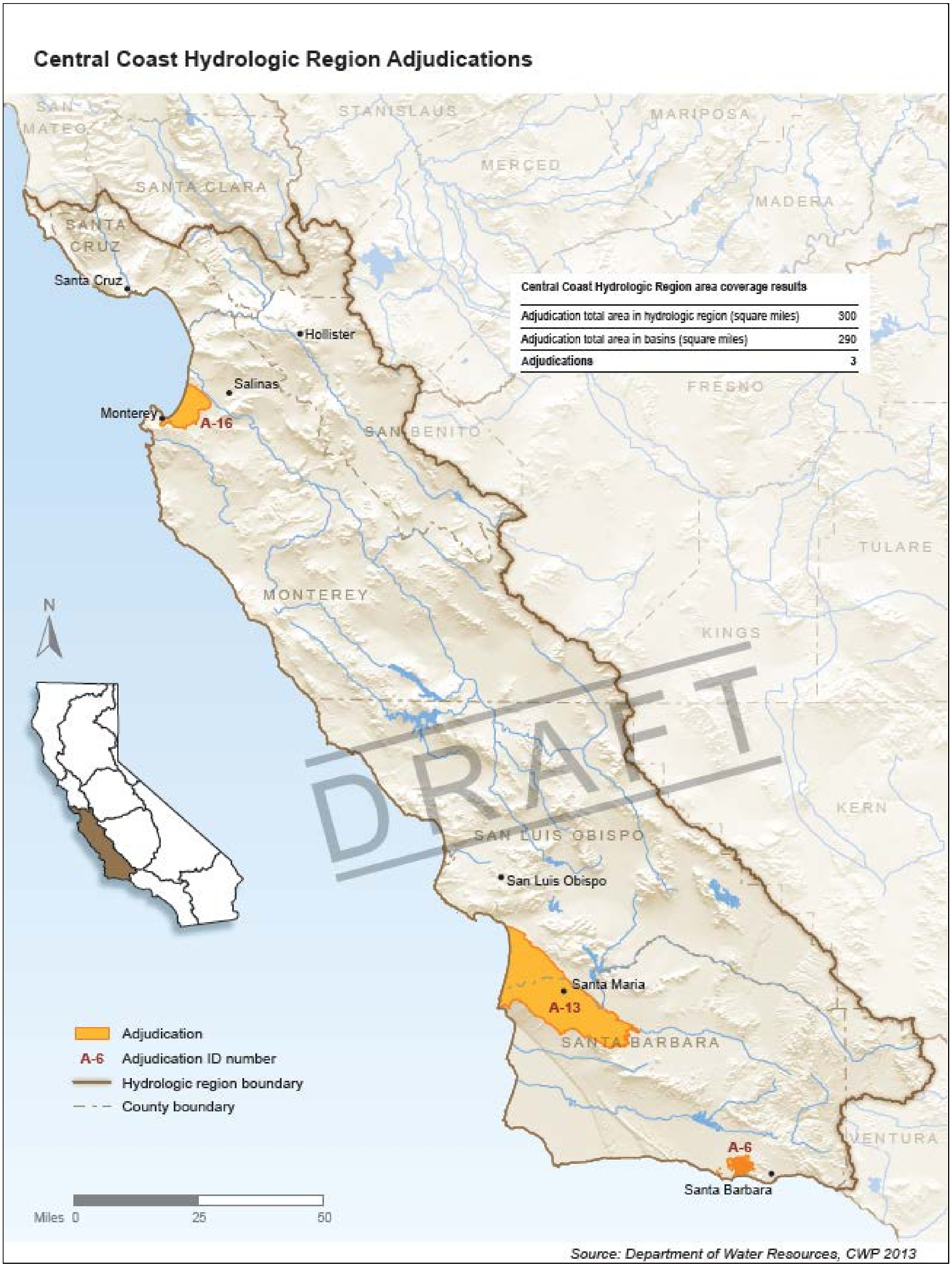


Figure CC-30 Change in Central Coast Agricultural and Urban Water Demands for 117 Scenarios from 2006-2050

Figure CC-31 Integrated Water Management Planning in the Central Coast Region

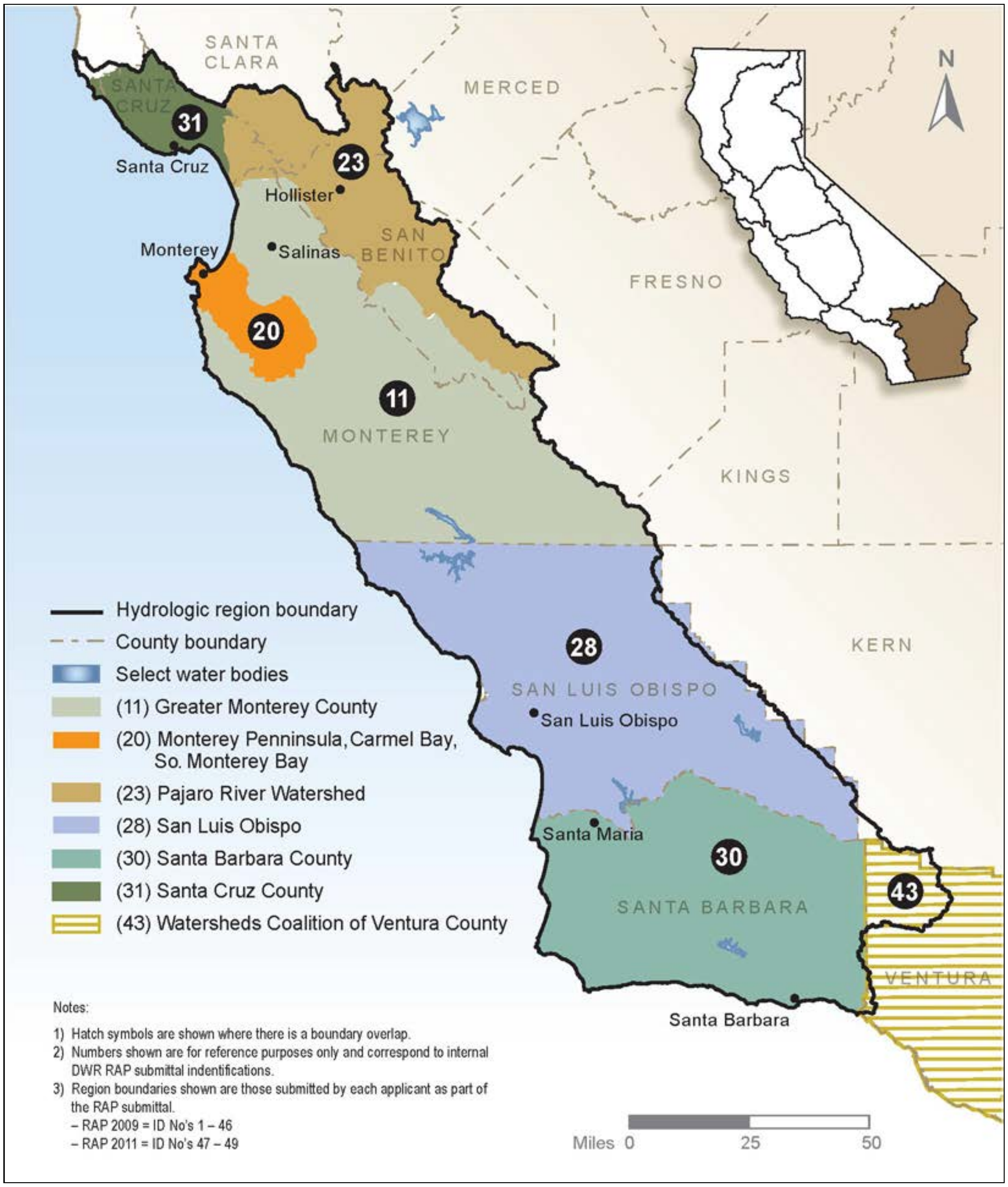
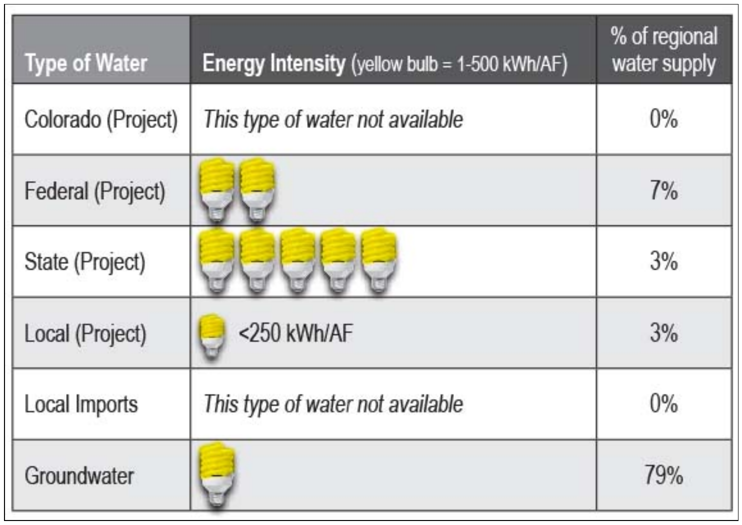


Figure CC-32 Energy Intensity of Raw Water Extraction and Conveyance in the Central Coast Hydrologic Region



Type of Water	Energy Intensity (yellow bulb = 1-500 kWh/AF)	% of regional water supply
Colorado (Project)	*This type of water not available*	0%
Federal (Project)		7%
State (Project)		3%
Local (Project)	<250 kWh/AF	3%
Local Imports	*This type of water not available*	0%
Groundwater		79%

Energy intensity per acre foot of water

Energy intensity (EI) in this figure is the total amount of energy required for the extraction and conveyance of one acre-foot of water and does not include treatment, distribution to point of use, or end use energy (e.g., water heating). These figures should be seen as ranges within which the EI of different sources of each water type would likely fall i.e., a water type with four bulbs should be interpreted to mean that most sources of that water type in the region would have an EI of between 1,501-2,000 kWh/ acre-ft of water. Smaller light bulbs represent an EI of greater than zero, and less than250 kWh/acre-ft. EI of desalinated and recycled water is not shown, but is covered in Resource Management Strategies #XX and #YY respectively, Volume 3. (For detailed description of the methodology used to calculate EI in this figure, see Technical Guide, Volume 5 or References Guide, Volume 4 (TBD)).

Box CC-1 California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Data Considerations

Senate Bill 7x 6 (SBx7 6; Part 2.11 to Division 6 of the California Water Code § 10920 et seq.) requires, as part of the CASGEM program, DWR to prioritize groundwater basins to help identify, evaluate, and determine the need for additional groundwater level monitoring by considering available data listed below:.

1. The population overlying the basin,

2. The rate of current and projected growth of the population overlying the basin,

3. The number of public supply wells that draw from the basin,

4. The total number of wells that draw from the basin,

5. The irrigated acreage overlying the basin,

6. The degree to which persons overlying the basin rely on groundwater as their primary source of water,

7. Any documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation, and

8. Any other information determined to be relevant by the DWR.

Using groundwater reliance as the leading indicator of basin priority, DWR evaluated California's 515 alluvial groundwater basins and categorized them into five groups:

- Very High
- High
- Medium
- Low
- Very Low

Box CC-2 Explanation of Federal- and State-listed Plant and Wildlife Ranking/Determinations

The Federal Endangered Species Act (ESA) requires all federal agencies to consider listed species in their planning efforts and to take positive actions to further the conservation of these species. The ESA is jointly administered by the U.S. Fish and Wildlife Service (USFWS) for terrestrial and freshwater species, and the National Marine Fisheries Service (NMFS) for marine and anadromous species. It requires Federal agencies to ensure that the actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend.

When evaluating a species for listing, the FWS considers five factors: 1) damage to, or destruction of, a species' habitat; 2) overutilization of the species for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) inadequacy of existing protection; and 5) other natural or manmade factors that affect the continued existence of the species. When one or more of these factors imperils the survival of a species, the FWS takes action to protect it, and is required to base its listing decisions on the best scientific information available. The ESA prohibits the unauthorized taking, possession, sale, and transport of endangered species.

The California Endangered Species Act (CESA) is the most comprehensive of the state acts. Modeled after the federal act, it provides a mechanism for listing species as threatened or endangered, and prohibits the taking of or trafficking in listed plant and animal species. In addition, CESA emphasizes early consultation with the CA Department of Fish and Game 1) to avoid potential impacts to rare, endangered, and threatened species, and 2) to develop appropriate mitigation planning to offset project caused losses of listed species.

CESA states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected, or preserved.

The mission of the **California Native Plant Society (CNPS)** is to conserve and protect California native flora. The CNPS maintains the Inventory of Rare and Endangered Plants of California (http://www.cnps.org/cnps/rareplants/inventory/index.php) to track the conservation status of hundreds of plant species, and the data are widely accepted as the standard for information on the rarity and endangerment status of California flora. The CNPS Inventory is a conservation tool that allows project proponents, local governments, and other agencies to better assess project related impacts on flora. The **California Environmental Quality Act (CEQA)** states that "special emphasis should be placed on environmental resources that are rare or unique to [a] region". The Department of Fish and Game Code mandates that plants listed in the CNPS Inventory as California Rare Plant Ranks 1A, 1B, and 2 be fully considered during preparation of environmental documents related to CEQA.

Box CC-3 Other Groundwater Management Planning Efforts in the Central Coast Hydrologic Region

The Integrated Regional Water Management plans, Urban Water Management plans, and Agriculture Water Management plans in the Central Coast Hydrologic Region that also include components related to groundwater management are briefly discussed below.

Integrated Regional Water Management Plans

There are six IRWM regions located within the Central Coast Hydrologic Region, all of which have adopted IRWM plans. Located in the southeast corner of the Central Coast Hydrologic Region, the majority of a seventh IRWM - the Watershed Coalition of Ventura County (Ventura) - is within the South Coast Hydrologic Region; as a result, this IRWM plan will be discussed in the regional report for the South Coast Hydrologic Region.

The Monterey Peninsula IRWM plan highlights groundwater management as one of their strategies as the IRWM region relies on groundwater for nearly all of its urban and agricultural uses. The regional priorities include addressing the court-ordered reduction of groundwater pumping in the Seaside subbasin by 65% to conclude by 2021; reducing flooding and mitigating storm water runoff; and promoting the steelhead trout fishery in the Carmel River.

The Greater Monterey IRWM region also relies heavily on groundwater for its water supplies, and groundwater management has been listed as a key strategy. The IRWM region defers groundwater management to local agencies with existing groundwater management programs. These programs monitor groundwater levels, and evaluate water surface elevations and water quality to establish a hydrologic balance in the groundwater basin.

The Parajo IRWM region works with local groundwater management agencies for planning and on projects that implement groundwater management, such as for meeting municipal, industrial, and agriculture water uses in wet to dry years, providing a variety of water supply sources to meet current and future uses, managing high water table areas, and optimizing the use of groundwater and aquifer storage.

The San Luis Obispo IRWM region obtains nearly 80 percent of its water from groundwater supplies, so the protection of this resource is critical to the sustainability of the area. This IRWM region also relies on local projects and programs to manage their groundwater resources. These local programs focus on reducing salt input into the groundwater system; implementing water system improvement projects; along with other projects, including the installation of a 1.4 million gallon storage tank to address a stored water deficiency. A program has also been initiated to evaluate groundwater basins to establish safe yield, hydrogeologic characteristics, overlying use, water quality, and projected water use for managing the groundwater basin.

The Santa Barbara IRWM region recognizes that groundwater levels and quality are already monitored in most of the county. Although this group defers groundwater management to local entities who are currently practicing it, groundwater management is listed as both a goal and a strategy, citing recharge area protection, conjunctive use, groundwater remediation and aquifer remediation as important components of groundwater management.

The Santa Cruz IRWM region leaves groundwater management to local entities that manage groundwater through their groundwater management plans and related groundwater projects. These entities have installed monitoring wells to collect data on water levels and water quality relative to sea water intrusion, and completed a number of studies with respect to hydrogeology of the groundwater basin, stream and aquifer interactions, sustainable groundwater basin yield and conjunctive use or supplemental supply alternatives.

Urban Water Management Plans

Urban Water Management plans are prepared by California's urban water suppliers to support their long-term resource planning and to ensure adequate water supplies are available to meet existing and future water uses. Urban use of groundwater is one of the few uses that meter and report annual groundwater extraction volumes. The groundwater extraction data is currently submitted with the Urban Water Management plan and then manually translated by DWR staff into a database. Online methods for urban water managers to directly enter their water use along with their plan updates is currently under evaluation and review by DWR. Because of the time-line, the plans could not be reviewed for assessment for Water Plan Update 2013.

Agricultural Water Management Plans

Agricultural Water Management plans are developed by water and irrigation districts to advance the efficiency of farm water management while benefitting the environment. New and updated Agricultural Water Management plans addressing several new requirements were submitted to DWR by December 31, 2012 for review and approval. These new or updated plans provide another avenue for local groundwater management, but because of the time-line, the plans could not be reviewed for assessment for Water Plan Update 2013

Box CC-4 Statewide Conjunctive Management Inventory Effort in California

The effort to inventory and assess conjunctive management projects in California was conducted through literature research, personal communication, and documented summary of the conjunctive management projects. The information obtained was validated through a joint DWR-ACWA survey. The survey requested the following conjunctive use program information:

1. Location of conjunctive use project;

2. Year project was developed;

3. Capital cost to develop the project;

4. Annual operating cost of the project;

5. Administrator/operator of the project; and

6. Capacity of the project in units of acre-feet.

To build on the DWR/ACWA survey, DWR staff contacted by telephone and email the entities identified to gather the following additional information:

7. Source of water received;
8. Put and take capacity of the groundwater bank or conjunctive use project;
9. Type of groundwater bank or conjunctive use project;
10. Program goals and objectives; and
11. Constraints on development of conjunctive management or groundwater banking (recharge) program.

Statewide, a total of 89 conjunctive management and groundwater recharge programs were identified. Conjunctive management and groundwater recharge programs that are in the planning and feasibility stage are not included in the inventory.