California **Water Plan**
Update 2009

Central Coast

INTEGRATED WATER MANAGEMENT

Bulletin 160-09 • Department of Water Resources

Volume 3
Regional Reports

South Central Region Office

The Division of Integrated Regional Water Management assists public and private agencies and the general public with water issues throughout the state. Four regional offices are located throughout California to maintain close contact with local interests to facilitate communication and to work on water-related matters. The offices are:

- Northern Region in Red Bluff,
- North Central Region in West Sacramento,
- South Central Region in Fresno, and
- Southern Region in Glendale.

Each of the regional offices offers technical guidance and assistance in water resource engineering, project management, hydrology, groundwater, water quality, environmental analysis and restoration, surveying, mapping, water conservation, and other related areas within the boundaries of their offices. Because of the regional offices' close ties with local interests, DWR regional coordinators in each office facilitate overall communication between DWR divisions and local partners to ensure coordinated efforts throughout all DWR programs and projects.

For more information on DWR and DWR projects, please contact the Regional Coordinators at:
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Central Coast Hydrologic Region

The Central Coast Hydrologic Region (region) is divided by the Monterey County and San Luis Obispo County line into two planning areas, Northern and Southern. This report presents a general description of the area, water supplies and demands, and water resources management issues.

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. Many attributes define the Central Coast region including the diverse topography, microclimates, and the picturesque coastline, valleys, and communities that drive a thriving agricultural and tourism economy. The unique microclimates across the region are found in redwood forests, foggy coastal terraces, and chaparral-covered hills, green cultivated valley floors, stands of oak, warm and cool vineyards, and semi-arid grasslands. Most of the Central Coast region is within the southern Coast Range, extending from Monterey Bay in the north to Santa Barbara in the south.

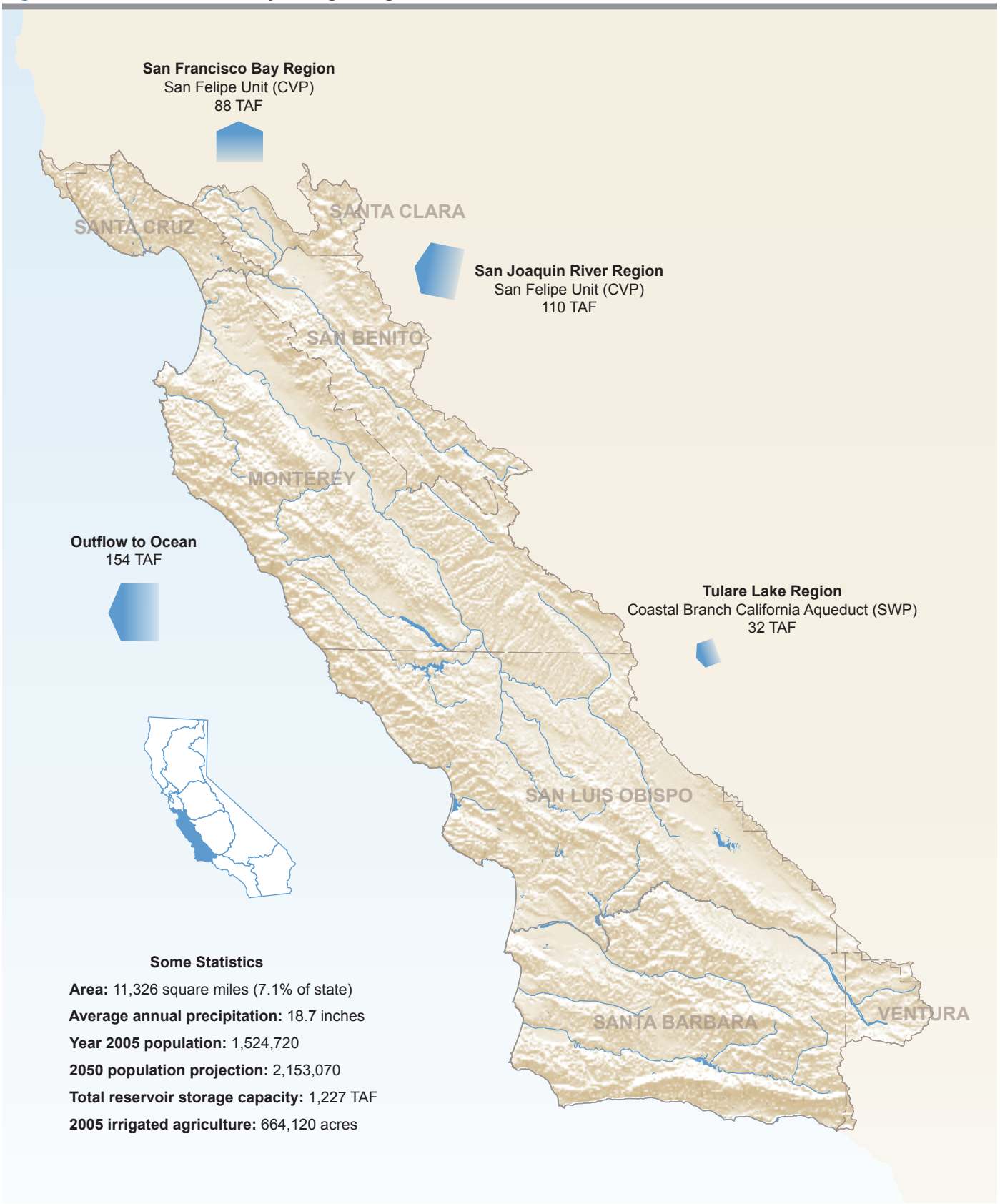
The coastal part of the region begins in the north near the San Mateo-Santa Cruz county line and extends along the Pacific Ocean to the Santa Barbara-Ventura county line in the south. The coastline is dramatic, with prominent sea cliffs, bays, and coves, some of which merge into large, flat, coastal terraces that grade eastward into stream-cut canyons and craggy mountains. The region is full of oak-dotted, grass-covered hills and valleys.

The interior hydrologic boundary runs northwest to southeast, bound by and subparallel to the hilly topography created by the active San Andreas Fault Zone. Topographically, the extent of the Central Coast region is largely controlled by the northwest-trending southern Coast Range with peaks that attain elevations of 4,000 to 7,000 feet. These mountains include the Santa Cruz Mountains; the Diablo and Gabilan ranges; the coastal Santa Lucia range; the Temblor, La Panza, and Caliente ranges; and the Sierra Madre, San Rafael, and Santa Ynez mountains. The Santa Ynez Mountains in the southernmost part of Santa Barbara County are also part of the east-west trending Transverse Ranges.

Watersheds

The Central Coast Northern and Southern planning areas have geographic collections of individual and shared watersheds. The Monterey-San Luis Obispo county line serves as the boundary between these two planning areas, which are both further subdivided into hydrologically based detailed analysis units. All rivers within the region drain into the Pacific Ocean. Following is a summary of the descriptions of each planning area.

Figure CC-1 Central Coast Hydrologic Region 2005 inflows and outflows



Box CC-1 Acronyms and Abbreviations Used in this Report

ABAG	Association of Bay Area Governments
Ag Program	Agricultural Regulatory Program
AHPS	Advanced Hydrologic Prediction Service
API	antecedent precipitation index
Cal EMA	California Emergency Management Agency
CAL FIRE	California Department of Forestry and Fire Protection
CAWD	Carmel Area Wastewater District
CDEC	California Data Exchange Center
CRS	Community Rating System
CVP	Central Valley Project
DWR	California Department of Water Resources
FCWCD	Flood Control and Water Conservation District
FEMA	Federal Emergency Management Agency
FIRMS	Flood Insurance Rate Maps
IRWM	Integrated Regional Water Management
LID	Low Impact Development
MRWPCA	Monterey Regional Water Pollution Control Agency
NFIP	National Flood Insurance Program
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
RAP	regional acceptance process
Regional Water Board	Central Coast Regional Water Quality Control Board
State Water Board	State Water Resources Control Board
SWP	State Water Project
USACE	US Army Corps of Engineers
USBR	US Bureau of Reclamation
USGS	US Geological Survey

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 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. The river enters Monterey Bay and the Pacific Ocean west of Watsonville. The Pajaro River watershed is one of the Central Coast region's 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, which drains 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 Salinas River 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.

The Carmel River watershed begins on the western slopes of the Sierra de Salinas. Numerous creeks join the Carmel River, which flows through Carmel Valley and into the Monterey Bay National Marine Sanctuary at Carmel Bay.

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. They range in size from 162 acres to 30,572 acres.

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 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 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.

Ecosystems

Within the Central Coast region, the flora and fauna are varied and often unique, supported by ecosystems that reflect each area's hydrology, climate, and geology. 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.

Watersheds in the Northern Planning Area contain a high level of habitat, climate, and geological variation. The Santa Cruz Mountains bioregion, best known for its redwood and Douglas fir forests, supports one of the highest concentrations of endangered species in California, including coho salmon. This bioregion is also home to 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 found nowhere else in the world.

This biological diversity also characterizes the San Lorenzo River watershed. Human disturbance over the last 200 years has created significant, chronic impacts to plant communities, wildlife, and fisheries habitats.

Scientists recognize Santa Cruz County as an important center for biological diversity. Seven animal species are listed as being in danger of extinction, and at least three of these species are endemic to Santa Cruz. Eight plant species are federally listed as endangered, and six of the species considered to be rare or endangered are endemic. 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, which are federally listed as threatened on California's Central Coast. In addition, coastal watershed areas in the county have been designated as critical habitat for the California red-legged frog, listed as federally threatened.

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.

The Pajaro River watershed supports a multitude of biotic habitats and special status plant and animal species, including 22 species that occur or potentially occur in the region and are listed as threatened or endangered under State or federal law.

The Salinas River watershed's riparian habitat is widely distributed in narrow strands along the banks of the Salinas River but rarely exists as extensive, mature stands. The 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.

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 Santa Lucia Range contains canyons populated by Douglas fir and some redwood and stands of a variety of oaks and mixed conifers, including the Monterey pine; California sagebrush, chaparral, and manzanita shrubs are prevalent. The Monterey Peninsula includes a diverse assemblage of plant and animal species. A preliminary assessment in the region shows 121 special status species. Of these, 15 plant species and 10 animal species are formally listed as threatened or endangered under State or federal endangered species laws.

Watersheds in the Southern Planning Area in San Luis Obispo and Santa Barbara counties support a wide variety of landscapes including coastal chaparral; woodlands

of Valley, Coast live, and Blue oak; mixed conifers; willows; and sycamores in riparian areas; manzanita; and grasslands.

San Luis Obispo County's size and geographic diversity support a wide variety of landscapes including maritime chaparral, pine forests, semi-arid mountains, serpentine habitats, grasslands, and juniper and oak woodlands that 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. To date, the area has 24 special status plants, three of which are federally listed as endangered.

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. Of these, 54 are federally or State-listed as threatened or endangered species (22 plant and 32 animal species), and another 60 species are considered rare or of special concern.

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.

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 of the region is dominated by the Pacific Ocean and 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 humidities. For example, on a summer day, the maritime influence on climate can be felt by traveling from Cambria to Shandon.

Naturally occurring 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 2005 and 2008, the average annual precipitation—usually rain—in the region ranged from about 12 to 42 inches. Most of the rain occurs between late November and mid-April. The average annual precipitation near Salinas is about 14 inches; Santa Cruz and Big Sur receive almost double that amount. Average annual precipitation in most of the Santa Cruz Mountains can exceed 50 inches. The southern interior basins usually receive 5 to 10 inches per year. The mountain areas receive more rainfall than the valley floors.

Population

The Central Coast Hydrologic Region had 1.5 million people in 2005. About 4 percent of the state's total population lives in this region, and 65 percent of the region's population lives in incorporated cities. Between 2000 and 2005, the region grew by 65,515 people, a growth of 5 percent over the 5-year period. For historical population data, 1960–2005, see Volume 5, The Technical Guide.

In Water Plan Update 2009, population growth projections are based on future scenario assumptions. Discussion of the three scenarios used in this Water Plan and how the region's population may change through 2050 can be found later in this report under Looking to the Future.

Senate Bill 18 (Chapter 905, Statutes of 2004) requires cities and counties to consult with Native American Indian Tribes during the adoption or amendment of local general plans or specific plans. A contact list of appropriate Tribes and representatives within a region is maintained by the Native American Heritage Commission. See also Box CC-2. A Tribal Consultation Guideline, prepared by the Governor's Office of Planning and Research, is available online at http://www.opr.ca.gov/programs/docs/09_14_05%20Updated%20Guidelines%20(922).pdf

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, and government and service-sector employment.

Agriculture is a major contributor to both the economic and cultural identity of this region, distinguished by climates and rich soils that allow for specialty food and nursery crops as well as range pasture and dry-farmed grain. Irrigated crop acreage in the Northern Planning Area was 446,870 acres in 2005; crop acreage in the Southern Planning Area was 217,250 acres in 2005.

Federal lands in the region total more than 2 million acres and include Los Padres National Forest, Pinnacles National Monument, Channel Islands National Park, Carrizo Plain National Monument, Monterey Bay National Marine Sanctuary, Guadalupe-Nipomo Dunes National Wildlife Refuge, and the Salinas River National Wildlife

Box CC-2 California Native American Tribal information, Central Coast Hydrologic Region

Demographics:

- Tribes with historic or cultural ties to the Central Coast region are primarily the different bands of the Chumash, Esselen, Ohlone and Coastanoan (previously referred to collectively as the Mission Indians): Amah Mutsun Tribal Band, Amah Mutsun Band of Ohlone/Coastanoan, Coastal Band of Chumash, Coastanoan Ohlone Rumsen-Mutsen, Indian Canyon Mutsun Band of Costanoan, 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 Indian Canyon community and Santa Ynez reservation.

Collaborative Efforts:

- The Santa Ynez Chumash Tribe is working with several federal, State, and local agencies and non-profit organizations to ensure the success of their Environmental Office programs. These agencies include the United States Environmental Protection Agency, the US Bureau of Reclamation, the Community Environmental Council and the Cachuma Operations and Maintenance Board.

Concerns and Priorities:

- Establishing/restoring federal recognition of Central Coast Tribes.

Accomplishments:

- The Santa Ynez Environmental Office is conducting riparian habitat assessments, biological assessments, surface and ground water quality monitoring, identifying potential pollution sources, identifying and removing invasive plant species, and developing a Water Quality Control Plan, a Fish, Wildlife, and Habitat Management Plan, and an Integrated Weed Management Plan. They are working with the Chumash Cultural Department to host a workshop at the annual Camp Kalawa Shaq that shares the importance of natural resource protection with children.

NOTE: Above information was gathered from Tribal input at the California Water Plan Update regional workshops and the Tribal water plenary sessions that are supporting the California Tribal Water Summit.

Refuge. Military installations include Vandenburg Air Force Base, Fort Liggett, Camp Roberts, Camp San Luis Obispo, and Presidio of Monterey. State facilities include California Polytechnic State University and 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.

The rate of urban change, or the conversion of farm and grazing land to urban or nonagricultural use, in the region between 2004 to 2006 varied from county to county, but as with the rest of California, the conversion trend steadily continues. (Table CC-1 Land use conversion of farm and grazing land to nonagricultural from 2004 to 2006).

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

Table CC-1 Land use conversion of farm and grazing land to nonagricultural, 2004 to 2006

County	Acres changed from agricultural to non-agricultural use	Total acres in region changed from 2004 to 2006
Santa Cruz	1,152	Approximately 35,146
Santa Clara	4,563	
San Benito	6,395	
Monterey	5,850	
San Luis Obispo	12,567	
Santa Barbara	4,619	

Data from California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program.

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 largely dependent upon tourism and recreation, which generate roughly $525 million annually. Agriculture is the county's second largest industry, with a production value of $491 million in 2007. The top five crops for Santa Cruz County in 2007 were strawberries, raspberries, miscellaneous vegetables, indoor cut flowers, and landscape plants. The southern area of the county, including Watsonville Sloughs, is a productive agricultural district yielding strawberries, raspberries, landscape plants, flowers, and vegetables. Northern coast agriculture includes brussel sprouts, strawberries, lettuce, and other specialty crops.

The agricultural production value of Monterey County in 2007 was $3.8 billion; and the prominent crops grown were leaf lettuce, strawberries, head lettuce, nursery plants, broccoli, and grapes. 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. The highest density areas of urban development are clustered to the north in the vicinity of Monterey Bay. Along the Salinas River are several urban and residential centers, including the City of Salinas in which resides more than 60 percent of the valley's population. 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.

The portion of the region in Santa Clara and San Benito counties includes agricultural, rural residential, and urban land uses. In San Benito County, the total agricultural production value of 2007 was $293 million; the top five crops were nursery stock, miscellaneous vegetables, wine grapes, bell peppers, and salad lettuce. For 2007, the total agricultural production value of Santa Clara County was $254 million; the top five crops were nursery plants, mushrooms, bell peppers, wine grapes, and grazing for steers and heifers.

According to county annual crop reports, more than 48,000 acres in the northern region are devoted to wine grapes, almost 90 percent of which are grown in Monterey County.

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 2008, 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 value of agricultural production in 2008 was $606 million, and the top five economic crops were wine grapes, broccoli, strawberries, cattle and calves, and vegetable transplants. As of 2007, planted vineyards covered about 36,000 acres, and harvested wine grapes increased to more than 20 percent of the county's total agricultural production. 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 2007 was $1.1 billion. The top five crops were strawberries, broccoli, wine grapes, head lettuce, and cauliflower; lemons and avocados are also important crops for Santa Barbara. As of 2008, the county has more than 21,000 active vineyard acres, generating more than $100 million annually in wine grapes. Oil production continues offshore, but onshore production continues to decline.

Tribal Lands

Native American Tribal Communities may be federally recognized or otherwise. The federal government may set aside public lands for these tribes as reservations. In

California these reservations are often named "Rancherias." One interpretation of the Spanish term "Rancheria" is small Indian settlement.

In the Central Coast region, there is only the Santa Ynez Reservation, owned by the Santa Ynez Band of Chumash Indians and composed of less than 140 acres in Santa Barbara County. A resort casino was added to the reservation in 2004 and has since become a major source of tourism to the Santa Ynez Valley area.

Regional Water Conditions

The regional water conditions revolve around water supply and water quality, conditions which concern all of California. However, the Central Coast region does have unique water supply and quality challenges due to its geology, hydrology, and geography.

Environmental Water

Environmental water in the region consists primarily of minimum instream requirements for the Carmel River and the Nacimiento River. As of 2005, the Carmel River below the San Clemente Dam and Reservoir has an annual minimum instream flow of 3,620 acre-feet. Annual instream flow requirements for the Nacimiento River below the Nacimiento Dam are 18,099 acre-feet.

In San Luis Obispo County, a Habitat Conservation Plan has been developed for the upper watershed of the Arroyo Grande Creek. Once implemented, the plan 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.

Segments of the Big Sur River and the Sisquoc River have been designated as part of the national Wild and Scenic River system. For the Big Sur River, 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. In 2005, the runoff for that reach was more than 121,000 acre-feet. In Santa Barbara County, the Sisquoc River segment (mostly within the San Rafael Wilderness) has unimpaired runoff along a 33-mile stretch. The runoff in 2005 was more than 47,000 acre-feet.

Recent collaborative efforts organized by the Central Coast Wetlands Group (at Moss Landing Marine Labs) have initiated the development of a much-needed and comprehensive mapping and database program. Over time, this program may provide the data needed to better quantify the wetland and riparian water requirements in the Central Coast region.

The Central Coast Resource Conservation and Development Council continues to develop and participate in collaborative environmental water projects aimed at waterway

and habitat restoration. Recent projects include Toro Creek, Pajaro River Watershed, and Sanborn Creek.

The Monterey County Water Resources Agency releases water from the San Antonio and Nacimiento reservoirs in routine, seasonal conservation releases to maintain flows on the Salinas River and recharge the river basin. Spillway modification construction has begun and upon completion will allow greater release of water from the dam during heavy-rain times and more flow on the Salinas River during dry times.

The San Lorenzo River Watershed Management Plan, adopted in 1979, established minimum streamflow requirements for salmonid migration, spawning, and rearing. The water rights for most surface water diversions include requirements for minimum bypass flows, including a year-round release (1 cubic foot per second) to Newell Creek from Loch Lomond reservoir. The City of Santa Cruz Water Department is working with the California Department of Fish and Game and the National Marine Fisheries Service to develop a habitat conservation plan to minimize any adverse impacts of aquatic habitat from operation of its water supply facilities.

Water Supplies

In California, both water supply and land-use planning are local responsibilities of utilities and city and county governments. Given its limited access to imported water, the Central Coast region has long-standing concerns over water supply issues. Water supply sources and conditions differ considerably across the rural counties.

Northern Planning Area

For the Santa Cruz area, streams provide supply for agricultural users, the town of Davenport and the City of Santa Cruz. Groundwater in the area also supplies individual wells and small water companies for rural residents in Bonny Doon and other areas of the basin. Surface water from the San Lorenzo River watershed contributes to the supply for the City of Santa Cruz and for the communities of the San Lorenzo Valley. Groundwater from the Santa Margarita Groundwater Basin provides the water supply for the Scotts Valley Water District and to the San Lorenzo Valley Water District. All of the water supply for the coastal urban areas of Soquel and Aptos in this subbasin is provided by groundwater. 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 at this time for the area and recently has been supplemented by recycled water and surface water that has been captured and recharged to the groundwater basin.

In the Monterey area, nearly all of the region's 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 Basin. About 70 to 80 percent of the surface runoff in the Carmel River watershed is generated from rainfall within the Los Padres National Forest and Ventana Wilderness. 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 Water 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. A legal decision issued March 2006 reduced the amount of water California American Water can obtain from the Seaside Groundwater Basin. A 15 to 20 percent reduction in overall customer demand, or an increase in supply, is currently envisioned in order to meet the legal order by 2021. For the interior part of this region, groundwater supplies are dependent upon recharge from the Salinas River and its tributaries, as well as recharge from the Pajaro River.

Portions of San Benito and Santa Clara counties in the region rely on imported water from the Central Valley Project's San Felipe Unit, groundwater, recycled water, and local surface water. Reliability of the CVP supply is a concern. 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.

Other watersheds in the area (about 92 square miles) do not currently provide municipal water from surface runoff; however, these watersheds do provide groundwater recharge to basins that are relied upon for municipal supply.

For improved water supplies in Monterey area, two projects are under consideration: the Coastal Water Project, developed by the privately owned California American Water Company, and an alternatively developed Regional Water Project. Both propose addressing water supply and water quality needs through desalination and aquifer storage and recovery.

Southern Planning Area

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

Groundwater is an important source of water supply to the region, and 28 specific groundwater basins underlie the southern part the Central Coast region. Groundwater production is concentrated mainly along the coast, though a few prominent inland valleys have high groundwater production. 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.

US Bureau of Reclamation (USBR) projects in the area include the Santa Maria Project and the Cachuma Project. The Santa Maria Project constructed Twitchell Dam and Reservoir in 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 groundwater 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 US Army Corps of Engineers' (USACE) 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 saltwater 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 acre-feet of water from Lake Nacimiento.

Conjunctive use of surface water and groundwater is a long-standing practice throughout the Central Coast region. Several reservoirs, including Twitchell, Lopez, and Nacimiento, are operated for the purpose of groundwater recharge in the downstream river systems of both Northern and Southern planning areas.

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 that is 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.

Water Uses

Agricultural Water

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 is consumed by irrigation; and the remainder is consumed for domestic, municipal, industrial purposes, and for groundwater recharge. In southern Santa Clara County, San Felipe water is used for agricultural irrigation and groundwater recharge

The US Department of Agriculture, with the passage of the 2008 Farm Bill, seeks to improve water quality and quantity with the new Agricultural Water Enhancement Program. The Central Coast Resource Conservation and Development Council was awarded a $1.810 million grant in 2009 to improve Central Coast water quality through reduction of agricultural runoff, leaching of nutrients, and water usage.

Urban Water

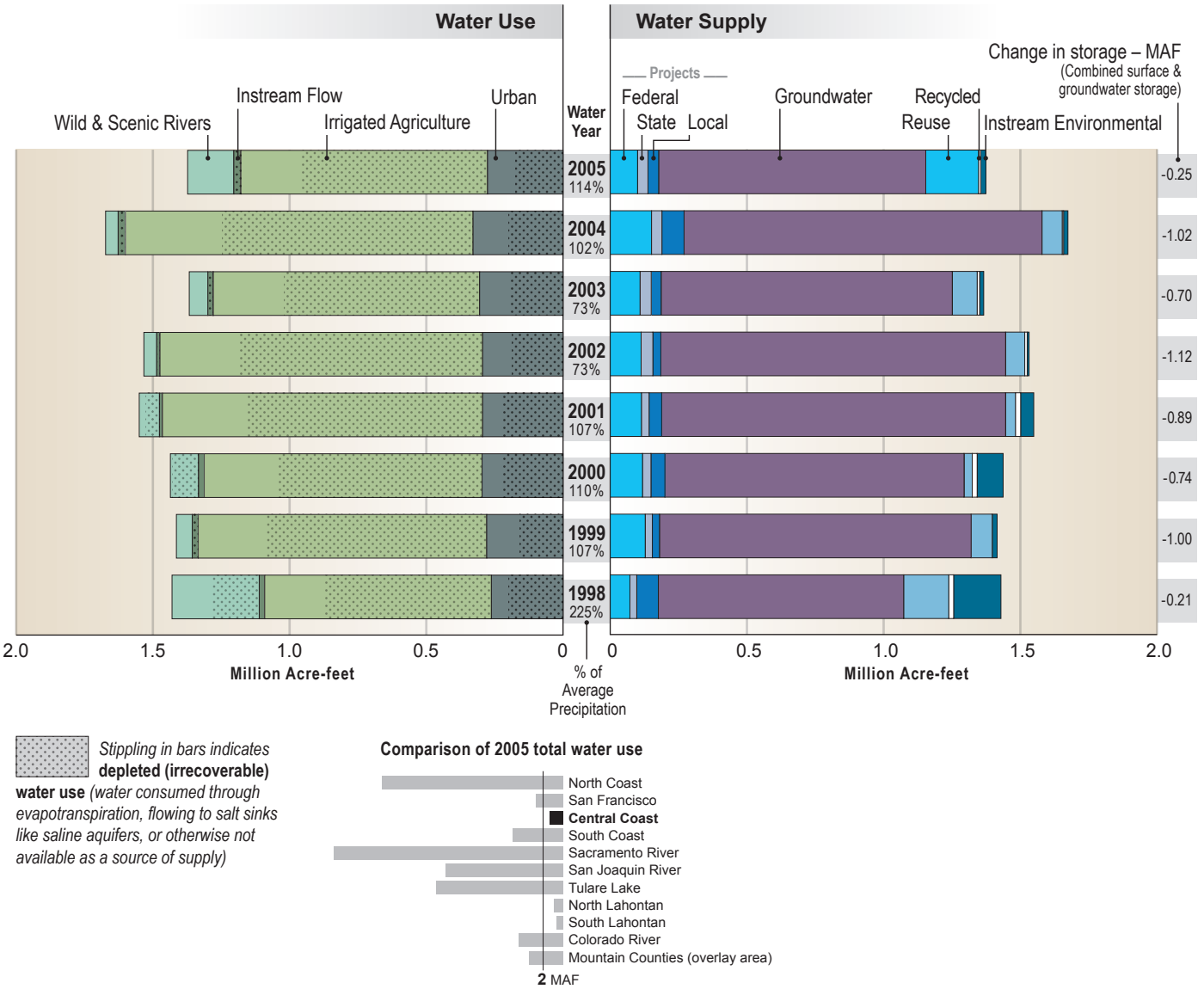
Most of the region's urban water demands occur in the coastal zones of San Luis Obispo and Santa Barbara counties. These demands are clustered into corridors bounded by (1) San Luis Obispo and Santa Maria and (2) Goleta and Carpintaria. The latter is the most significant and includes the City of Santa Barbara. In the warmer interior of the region, one major corridor exists. This is bounded by the cities of Paso Robles and Templeton. Outside of these centers, urban land use activities and demands decrease significantly. The demands come from small communities, widely scattered residential housing and farmsteads, and a few commercial establishments.

Water Balance Summary

Figure CC-2 summarizes the total developed water supplies and distribution of the dedicated water uses within this hydrologic region for the eight years from 1998 through 2005. As indicated by the variation in the horizontal bars for wet (1998) and dry (2002) years, the distribution of the dedicated supply to various uses can change significantly based on the wetness or dryness of the water year. Detailed numerical information about the developed water supplies and uses and Water Portfolio data are presented in Volume 5 Technical Guide, which provides a breakdown of the components of developed supplies used for agricultural, urban, and environmental purposes.

For the Central Coast region, agricultural water uses are the largest component of the developed water supply. Urban water use is a smaller but significant portion of the total. There is very little dedicated water required for instream flows within this region. The

Figure CC-2 Central Coast Hydrologic Region water balance for water years 1998-2005



water supply portion of Figure CC-2 also shows that groundwater is the region's primary source for water supply. Surface streams generally have smaller intermittent flows in this region. The Central Coast region also imports a smaller amount of surface water through both the federal and State water project facilities.

Table CC-2 presents information about the total water supply available to this region for the eight years from 1998 through 2005 and the estimated distribution of these water supplies to all uses. The annual change in the region's surface and groundwater storage is also estimated as part of the balance between supplies and uses. In wetter water years, water will usually be added to storage, but during drier water years, storage volumes may be reduced. Of the total water supply to the region, more than half is used by native vegetation; evaporates to the atmosphere; provides some of the water for agricultural

Table CC-2 Central Coast Hydrologic Region water balance for 1998-2005 (thousand acre-feet)

Central Coast	Water Year (Percent of Normal Precipitation)							
	1998 (225%)	1999 (107%)	2000 (110%)	2001 (107%)	2002 (73%)	2003 (73%)	2004 (102%)	2005 (114%)
Water Entering the Region								
Precipitation*	25,202	12,815	12,596	11,848	8,741	8,822	12,308	13,737
Inflow from Oregon/Mexico	0	0	0	0	0	0	0	0
Inflow from Colorado River	0	0	0	0	0	0	0	0
Imports from Other Regions	108	166	144	180	181	168	198	142
Total	**25,310**	**12,981**	**12,740**	**12,028**	**8,922**	**8,990**	**12,506**	**13,879**
Water Leaving the Region								
Consumptive Use of Applied Water ** (Ag, M&I, Wetlands)	622	809	754	860	872	756	935	708
Outflow to Oregon/Nevada/Mexico	0	0	0	0	0	4	0	0
Exports to Other Regions	66	118	89	133	127	110	135	88
Statutory Required Outflow to Salt Sink	174	18	95	49	7	15	20	20
Additional Outflow to Salt Sink	154	135	181	183	193	133	163	134
Evaporation, Evapotranspiration of Native Vegetation, Groundwater Subsurface Outflows, Natural and Incidental Runoff, Ag Effective Precipitation & Other Outflows	24,502	12,904	12,362	11,688	8,846	8,670	12,277	13,183
Total	**25,518**	**13,984**	**13,481**	**12,913**	**10,045**	**9,688**	**13,530**	**14,133**
Storage Changes in the Region [+] Water added to storage [–] Water removed from storage								
Change in Surface Reservoir Storage	401	-220	8	-14	-235	21	-175	422
Change in Groundwater Storage ***	-609	-783	-749	-871	-888	-719	-849	-676
Total	**-208**	**-1,003**	**-741**	**-885**	**-1,123**	**-698**	**-1,024**	**-254**
Applied Water ** (compare with Consumptive Use).	1,074	1,314	1,291	1,442	1,468	1,267	1,565	1,170

* The percent precipitation is based upon a running 30 year average of precipitation for the region and discrepancies can occur between information calculated for Update 2009 and earlier published data.

** 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

*** Change in Groundwater Storage is based upon best available information. Basins in the north part of the state (North Coast, San Francisco, Sacramento River and North Lahontan regions and parts of Central Coast and San Joaquin River Regions) were modeled - spring 1997 to spring 1998 for the 1998 water year and spring 1999 to spring 2000 for the 2000 water year. All other regions and years were calculated using the following equation:

GW change in storage = intentional recharge + deep percolation of applied water + conveyance deep percolation and seepage - withdrawals

This equation does not include the unknown factors such as natural recharge and subsurface inflow and outflow.

crops and managed wetlands (effective precipitation); or flows to other states, the Pacific Ocean, and salt sinks like saline groundwater aquifers. The remaining portion, identified as consumptive use of applied water, is distributed among urban and agricultural uses and for diversions to managed wetlands. For some of the data values presented in Table CC-2, the numerical values were developed by estimation techniques because actual measured data are not available for all categories of water supply and use.

Water Quality

The Central Coast Regional Water Quality Control Board (Regional Water Board) is responsible for working with local agencies, landowners, and businesses for the protection and enhancement of all the waters in the Central Coast region. The Regional Water Board's Central Coast region and the hydrologic region's boundaries share similar boundaries.

Central Coast Vision

The Regional Water Board is moving in a fundamentally new strategic direction, based upon the Vision for Healthy Watersheds[1] and measurable goals[2] including healthy aquatic habitat, sustainably managed land, and clean groundwater. The Regional Water Board has identified some of the critical tasks necessary to achieve its goals. Some examples include:

Groundwater Recharge Area Protection. Prioritize groundwater protection efforts to achieve the measurable goal for clean groundwater rather than rely simply on cleaning up contamination. Groundwater recharge area protection provides effective prevention from groundwater degradation, especially where groundwater is the primary source of drinking water. Preservation of groundwater quality in source areas will be accomplished by identifying and protecting groundwater recharge locations.

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. To protect and maintain the beneficial character and function of riparian areas in the Central Coast region, the Regional Water Board is implementing specifications for the establishment, protection, and maintenance of riparian vegetation.

1 Healthy Watersheds function well ecologically and are sustainable; support healthy, diverse aquatic habitat; have healthy riparian areas and corridors; and have near natural levels of sediment transport and near natural levels and quality of groundwater. A Healthy Watershed sustains these characteristics through measures that ensure the dynamics that provide these healthy factors and functions are protected. Additional information is available at http://www.waterboards.ca.gov/centralcoast/publications_forms/publications/vision/index.shtml.

2 Three Measurable Goals: (1) Healthy Aquatic Habitat - By 2025, 80 percent of Aquatic Habitat is healthy, and the remaining 20 percent exhibits positive trends in key parameters. (2) Proper Land Management - By 2025, 80 percent of lands within any watershed will be managed to maintain proper watershed functions, and the remaining 20 percent will exhibit positive trends in key watershed parameters. (3) Clean Groundwater - By 2025, 80 percent of groundwater will be clean, and the remaining 20 percent will exhibit positive trends in key parameters.

Low Impact Development. One of the most important issues in the Central Coast region is watershed degradation due to urban sprawl. The Regional Water Board has made implementation of Low Impact Development design standards and the development of effective and long-term institutional capacity for LID top priorities to reduce urban pollutant loading, erosion, sedimentation, and stream modifications, and to maintain the natural recharge of groundwater. Additional information is available at: http://www.waterboards.ca.gov/water_issues/programs/low_impact_development/index.shtml

Irrigation Efficiency and Nutrient Management. The Central Coast region has ubiquitous nutrient and toxicity water quality problems. Farming practices contribute much of this pollution within the Central Coast region. As funds become available, the Regional Water Board will administer a grant program designed to help the region's farmers implement better irrigation and nutrient application practices, with the intent of reducing nonpoint source pollution into surface waters.

Agricultural Regulatory Program (Ag Program). The Regional Water Board endeavors to align the Ag Program within the context of its Vision for Healthy Watersheds. This requires the identification and prioritization of the most significant agricultural water quality problems facing the Central Coast region. These problems include pollutants in agricultural runoff, fertilizer-sourced nitrate infiltration of groundwater, the deleterious effects of pesticides and nutrients to surface waters, excessive sediment discharge, and the loss of riparian and aquatic habitat. Because each watershed is unique, the approach for addressing agricultural water quality issues will be on a watershed-scale basis, with a focus on systematically tracking tangible water quality improvements and operational measures.

Ongoing Focused Efforts to Improve Water Quality

Some of the Regional Water Board's ongoing efforts to improve water quality on a regional scale and meet measurable goals are summarized in Appendix B Water Quality. These programs include:

- Agricultural Regulatory Program
- Central Coast Ambient Monitoring Program
- Storm Water Management
- 303 (d) Investigations and Total Maximum Daily Load Projects
- Basin Planning and Permitting Waste Discharges
- Land Disposal
- US Department of Defense
- Underground Storage Tanks and Site Cleanup
- Grants
- 401 Certifications
- Salt and Nutrient Management Plans

Water Governance

More complete information on water governance will be developed for California Water Plan Update 2013. This will include identification of local, State, Tribal, and federal government agencies and institutions that are responsible for managing the region's water resources, flood protection, and wastewater. A list of regional flood management participants is included in Appendix A Flood Management; and Integrated Regional Water Management plans provide information about water planning organizations in this region.

Flood Management

Flood Hazards

Streams draining the mountains of the Central Coast are subject to short, intense floods, causing frequent flood damage in agricultural and urban areas. Steep slopes in the upper watersheds undergo severe erosion during storm runoff, depositing large amounts of sediment on floodplains. Wildfires exacerbate sediment loading to rivers in upper watersheds by increasing rainsplash erosion rates and sheet flow velocities.

Other aspects of flood protection also need improvement in the Central Coast area. Significant flood problems still exist in the Pajaro, Salinas, and Carmel river basins, streams in the Santa Barbara area, and in many populated downstream sections of various coastal streams. Flood hazards in the region include these representative situations (for specific instances, see Challenges):

- Population growth and the ensuing development increases the area of impervious surface without sufficient mitigation, increasing peak runoff.
- Development occurs in the floodplain of the 1 percent event without sufficient mitigation, causing increased flood damage risk.
- A lack of topographical maps based on digital elevation model data limits the precision to which floodplain boundaries can be delineated. Inadequate topographic information limits the accuracy of floodplain mapping.
- Wildfires may denude steep slopes, which are then vulnerable to increased runoff and debris flow during ensuing storms.
- Lack of agreement among flood control stakeholders has delayed development of flood infrastructure improvements.

Record-keeping on most streams in the Central Coast area show that the 100-year floodplain boundaries delineated on Flood Insurance Rate Maps (FIRMS) by the Federal Emergency Management Agency (FEMA) do not represent true 100-year floodplains. Additionally, not demarcating 100-year floodplains within the context of climate change promises to underestimate the area inundated by 100-year floodflows. As a result, planning and managing based on such projections will only result in higher maintenance and rehabilitation costs over the long term. Thus, protection provided by flood control infrastructure should be raised to at least the 200-year level in order to accommodate the inherent inaccuracies in floodplain delineation and the challenges put forth by climate change.

Box CC-3 Flood Management Agencies

Federal

- Federal Emergency Management Agency
- National Weather Service
- Natural Resources Conservation Service
- US Geological Survey
- US Army Corps of Engineers
- US Bureau of Reclamation

Tribal

- Tribal governments of the region

State

- California Conservation Corps
- California Emergency Management Agency (Cal EMA)
- Department of Corrections
- Department of Forestry and Fire Protection (CAL FIRE)
- Department of Water Resources

Local

- Pajaro River Watershed Flood Prevention Authority
- San Mateo County Flood Control District
- Santa Clara Valley Water District
- Santa Cruz County Flood Control and Water Conservation District
- Ventura County Watershed Protection District
- County and city emergency services units
- County and city planning departments
- County and city building departments
- Local flood maintenance organizations
- Local conservation corps
- Local emergency response agencies
- Local initial responders to emergencies

Historic Floods

Major floods occurred in 1907, 1914, February and March 1938, January 1952, December 1955, April 1958, December 1969, January 1970, January 1974, January and February 1978, and January and February 1980. The 1938, 1955, 1970, and 1978 floods were the most significant and widespread; the 1970 flood was the most severe. Additional floods occurred in 1995, 1998, and 2001.

For more information on these floods see Appendix A, Flood Management. Flood records for selected flood-producing streams are listed in Appendix A in Table CCA-1 Record floods for selected streams.

Flood Governance

Flood management is a cooperative effort in which federal, Tribal, State, and local governments all play significant parts. The principal participants are listed in Box CC-3, Flood Management Agencies. For more information on the agencies' roles, see Table CCA-2 Flood management participants in Appendix A.

Flood Risk Management

Flood risk management includes a wide variety of projects and programs that can be grouped as Structural Approaches (constructed facilities, coordination and reservoir

operations, and maintenance), Land Use Management (regulation and insurance), and Disaster Preparedness, Response, and Recovery (information and education, event management).

Structural Approaches

Constructed Facilities. The Central Coast region is the site of many flood control works, including floodwater storage facilities, debris basins, levees, and channel improvements.

Existing flood control infrastructure includes two Monterey County Water Agency multipurpose reservoirs with flood control reservations: Nacimiento Reservoir on the Nacimiento River and San Antonio Reservoir on the San Antonio River. The USBR Twitchell Reservoir on the Cuyama River is operated only for flood control.

Other flood-control works include projects to reduce flooding on individual streams using levees, floodwalls, debris basins, and channel construction or improvement. USACE projects are in place on the Pajaro River and tributaries at Watsonville, Uvas Creek near Gilroy, the San Lorenzo River and Branciforte Creek at Santa Cruz, the Santa Maria River and Bradley Creek at Santa Maria, and Mission Creek at Santa Barbara.

The Natural Resources Conservation Service (NRCS) has provided construction funding for Santa Barbara County Flood Control and Water Conservation District (FCWCD) projects including: debris basins and channel work on Franklin and Santa Monica creeks at Carpinteria; debris basins and channel work on Rodeo, San Pasqual, and San Miguelito creeks; a diversion pipeline in Cemetery Canyon; and channel improvements and spillways at Cebada, Purisima, Hoag, and Santa Rita creeks, all in the vicinity of Lompoc. For San Luis Obispo County FCWCD, projects include channel and levee construction on Arroyo Grande Creek at Arroyo Grande; in Santa Clara County; there is a Santa Clara Valley Water District channel improvement project on Llagas Creek near Gilroy.

Local sponsors and descriptions for reservoirs and nonstorage flood control facilities in the region are listed in Appendix A in Table CCA-3 Flood control facilities.

Coordination and Reservoir Operations. There are no formal agreements for operation of flood protection facilities in the region. However, Nacimiento Reservoir and San Antonio Reservoir, protecting the Salinas Valley, are operated by Monterey County Water Resources Agency.

The reserved space in multipurpose reservoirs is most often defined by a trapezoidal diagram of volume required versus date, modified by conditions in the latter part of flood season. Generally, the diagrams require a flood space reservation increasing from zero from the beginning of the flood season, invariant with date during mid-season, and decreasing to zero again at season's end. Superimposed on these diagrams

Table CC-3 Strategies of Integrated Regional Water Management efforts, Central Coast Hydrologic Region

Strategy	Pajaro River Watershed IRWMP	Northern Santa Cruz Co. Prelim IRWMP	Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWMP	Greater Monterey County IRWMP	San Luis Obispo IRWMP	Santa Barbara Countywide IRWMP
	Jun 2006	Oct 2005	Nov 2007	May 2006	Jul 2007	May 2007
Conjunctive use	✓	✓	✓	✓	✓	✓
Desalination	✓	✓	✓	✓	✓	✓
Ecosystem restoration			✓	✓	✓	✓
Environmental and habitat protection and improvement	✓	✓	✓	✓	✓	✓
Flood management	✓	✓	✓	✓	✓	✓
Groundwater management	✓	✓	✓	✓	✓	✓
Imported water	✓	✓				
Land use planning	✓	✓	✓	✓	✓	✓
Nonpoint source pollution control	✓	✓	✓			
Recreation and public access		✓	✓	✓	✓	✓
Storm water capture and management	✓	✓	✓	✓	✓	✓
Surface storage	✓	✓	✓	✓	✓	✓
Water and wastewater treatment	✓	✓	✓	✓	✓	✓
Water conservation	✓	✓	✓	✓	✓	✓
Water quality and protection improvement	✓		✓	✓	✓	✓
Water recycling	✓	✓	✓	✓	✓	✓
Water supply reliability	✓	✓	✓	✓	✓	✓
Water transfers		✓			✓	✓
Watershed planning	✓	✓	✓	✓	✓	✓
Wetlands enhancement and creation		✓	✓	✓	✓	✓

Note: The summary information contained in these tables was obtained from various IRWM plans. For additional details or information related to a specific plan, please consult the current version of the plan or its authors.

are modifications based on either an antecedent precipitation index (API) or a runoff forecast. The index-controlled diagrams are usually decreased from the trapezoid and shortened in time during drier years, beginning in mid-season. The runoff-controlled diagrams increase the trapezoid and extend it in time for the greater runoff forecasts. Single-purpose flood control reservoirs are kept as low as possible. For any reservoir, there are usually downstream controls of various kinds on evacuation rates.

Maintenance. Maintenance of flood control works is a critical activity which preserves the integrity of the facilities, ensuring continued protection for the public. This effort is made more difficult by two factors: (1) Lack of adequate financing for many installations

is the result of tax-management efforts of the late 20th century, which have placed controls on former sources of revenue, and (2) Heightened public awareness of the environment has resulted in new regulations making the permitting process lengthy and expensive. Compounding the problem, deferred maintenance can cause establishment of new habitat which then must be protected.

Maintenance of flood control facilities is usually the responsibility of the local maintaining agency, which is usually the local sponsor; or if there is none, the constructing agency. USACE projects in the region are maintained by the sponsoring local maintaining agencies. NRCS projects follow a pattern of close cooperation with a local sponsor, with NRCS providing maintenance standards and the local sponsor performing the maintenance. Twitchell Reservoir is a USBR project and is maintained by USBR. Nonfederal projects are maintained by the local constructing agencies.

Land Use Management

Regulation. Counties are the main agencies responsible for regulating floodways. Santa Barbara County has adopted a flood-hazard zoning ordinance and uses building permits and subdivision restrictions to control development in flood-prone areas. Santa Clara County has a water district ordinance for establishing a floodplain management program, and Monterey County has a floodplain zoning ordinance and subdivision review process. San Luis Obispo County's ordinance defines zones of flood hazard and severely regulates building in flood-prone areas. Santa Cruz County has building codes and an attending permit system regulating development in flood-hazard areas. San Benito County regulates development in floodways via a county zoning ordinance and building permit process. All local land use jurisdictions must adopt a floodplain management ordinance identifying 1 percent floodplains and floodways, in order to qualify for FEMA flood insurance.

Flood Insurance. The National Flood Insurance Program (NFIP) is administered by FEMA. It enables property owners in participating communities to purchase insurance as protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. About 97 percent of California communities participate in NFIP. Of those, approximately 12 percent participate in the Community Rating System (CRS) Program, which encourages communities to go beyond minimum NFIP requirements in return for reduced insurance rates. Quality mapping of floodplain boundaries and development of an accurate hydrologic and hydraulic database is critical to administering an effective flood insurance program and allocating flood protection project funds.

FEMA has provided FIRMs for all areas within the region. As of June 2009, FIRMs in seven of the region's nine counties are new since 2005; two more are scheduled to be updated by 2010.

CRS rates communities from 1 to 10 on the effectiveness of flood protection activities. The lower ratings bring larger discounts on flood insurance. Of the 9 counties and

34 cities in the hydrologic region, 4 counties and 6 cities participate in CRS. As of May 2009, Monterey County is in CRS Class 5; Santa Barbara County, Class 6; Morgan Hill, Salinas, Santa Cruz, and Watsonville, Class 7; Kern County, Gilroy, and San Luis Obispo, Class 8; and Santa Clara County, Class 10. See http://www.fema.gov/business/nfip/crs.shtm for more information on the CRS system.

Disaster Preparedness, Response, and Recovery

Information and Education. The California Data Exchange Center (CDEC) provides real-time and historical hydrometeorological data for hundreds of stations statewide, as well as real-time data on releases, spill rates, and elevations of many reservoirs. For this region, CDEC provides gage data from California Department of Forestry and Fire Protection (12 gages), Monterey County (11), National Weather Service (14), Santa Cruz County (17), the US Geological Survey (13), and several other federal, State, and local agencies, a total of 93 gages, and real-time flow and stage data for the San Benito, San Lorenzo, Pajaro, Salinas, Carmel, Sisquoc, and Santa Ynez rivers and Soquel Creek. For access to CDEC data, see cdec.water.ca.gov.

The US Geological Survey (USGS) maintains and publishes statistics for stream gages nationwide. USGS gages are the source of data for the 19 stations listed in Appendix A, Table CCA-1 Flood parameters for principal streams. For access to USGS gage data, see waterdata.usgs.gov/nwis.

The Department of Water Resources' (DWR) Awareness Floodplain Mapping program provides an easy-to-use computer interface for viewing areas vulnerable to flooding by the flood event having a 1 percent probability of occurrence. The program applies to areas not already covered by FEMA FIRMs. For this region, maps have been drawn for all counties, but coverage of some areas may have been deferred. By 2015, all areas expected to develop over the next 25 years will have mapped floodplains.

Accurate hydrologic and hydraulic models inform the design of effective flood control structures and emergency actions before, during, and after floods. The National Weather Service's Advanced Hydrologic Prediction Service uses historical hydrologic data, current river and watershed conditions, and near-term meteorological outlooks to forecast river flows. The service is publicly available for certain streams of the Central Coast region. Locations are given in Appendix A, Table CCA-5 Advanced Hydrologic Prediction Service stream forecast points.

Event Management. Under the Standardized Emergency Management System and the National Incident Management System, initial flood emergency response is made by the responsible party at the site. When its resources are exhausted, the county emergency management organization (Operational Area) provides support. If necessary, additional support is coordinated by the Coastal Region of the California Emergency Management Agency (Cal EMA). Through the Cal EMA region and Cal EMA headquarters, help can be obtained from any State agency. Cal EMA coordinates with federal agencies and private organizations as well. The State-federal Flood Operations Center (a joint

facility of DWR and the Sacramento Weather Office and California-Nevada River Forecast Center, both units of National Weather Service) is normally called early in the event to provide weather and river forecasts, facilitate information flow, provide field situation analysis, and give flood fight expertise. Severe situations that require Cal EMA involvement may also require emergency response by USACE, which is obtained by request of DWR. Table CCA-4 Flood emergency response organizations in Appendix A is a listing of specific response organizations.

Recovery after a flood event may involve the funding and construction services of USACE if the facilities are parts of federal projects. Availability of resources to repair local and private facilities, remove floodwaters, and restore housing, businesses, and infrastructure often depends on the severity of the event and the allocation of event-specific federal or State funds.

Flood preparedness and mitigation efforts are promoted and funded by many organizations, including city and county governments, Cal EMA, DWR, NWS, and USACE.

Regional Water and Flood Planning and Management

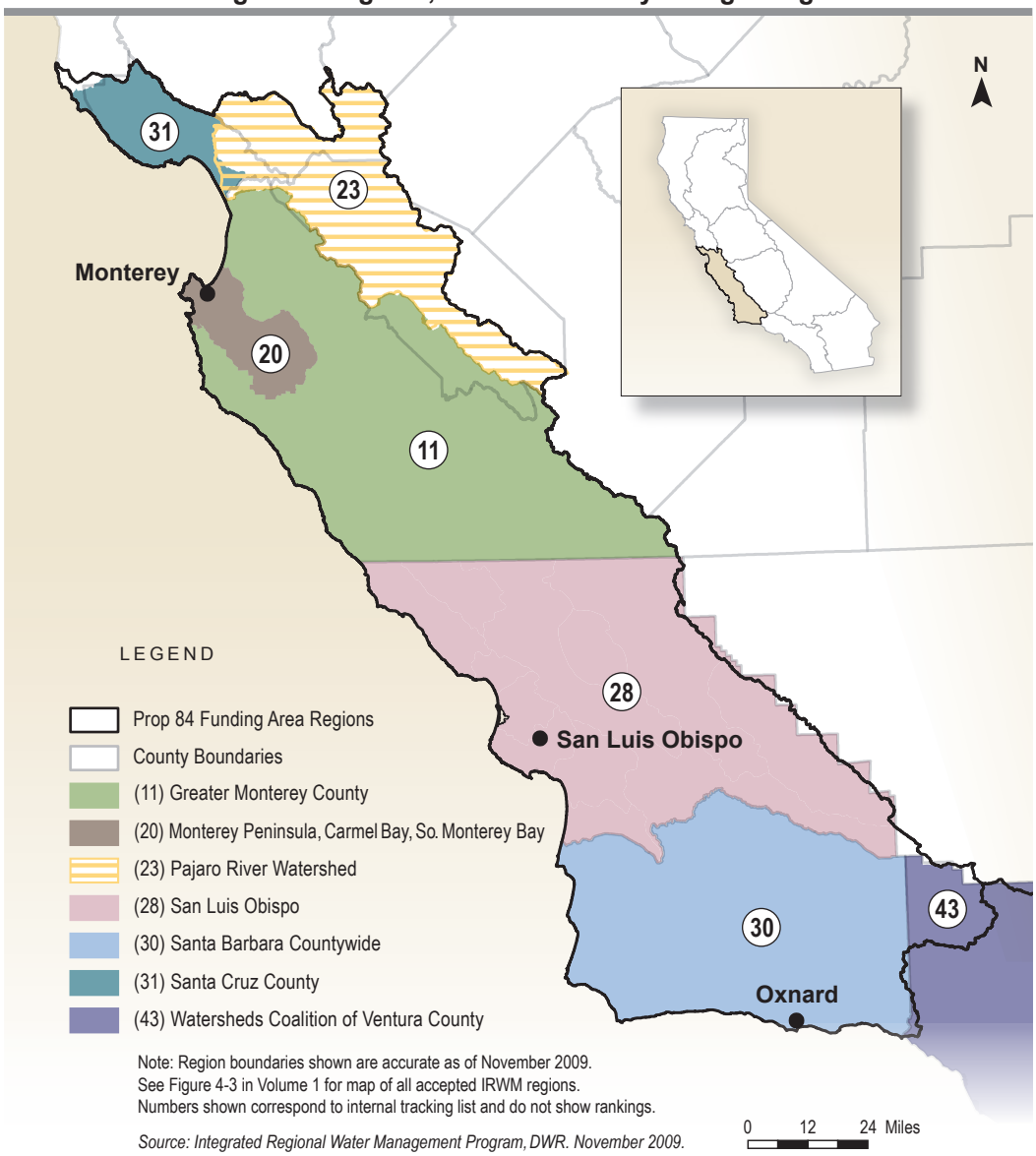
Integrated Regional Water Management

The Central Coast region is engaged in Integrated Regional Water Management (IRWM) planning. 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 Web site, www.water.ca.gov/irwm/.

IRWM planning regions within this hydrologic region cover the major watersheds and geopolitical boundaries of the hydrologic region. Table CC-3 shows recent strategies in integrated regional water management efforts in the Central Coast region.

The IRWM Planning Act, signed by the Governor as part of SB 1 in 2008 (CWC Sec 10530 et seq), provides a general definition of an IRWM plan as well as guidance to DWR as to what IRWM program guidelines must contain. The Act states that the guidelines shall include standards for identifying a region for the purposes of developing or modifying an IRWM plan. The first regional acceptance process (RAP) spanned 2008-2009. Final decisions were released in fall 2009. The region acceptance process is used to evaluate and accept an IRWM region into the IRWM grant program. Figure CC-3 shows boundaries of proposed IRWM regions as part of the regional

Figure CC-3 Regional acceptance process, Integrated Regional Water Management regions, Central Coast Hydrologic Region



acceptance process in 2009. (Go to DWR Web page http://www.water.ca.gov/irwm/integregio_rap2.cfm.)

Some examples of regional projects in the Central Coast regions are listed here.

Carmel Area Wastewater District treatment plant and recycled water. Located at the mouth of Carmel Valley, the plant supplied recycled water (approximately 790 acre-feet per year) to irrigate turf at several Monterey Peninsula golf courses and at a local school. Use of this reclaimed water has resulted in a one-for-one decrease in CAWD system demand.

City of Watsonville Recycled Water Facility and Pajaro Valley Water Management Agency Coastal Distribution System. The City of Watsonville Recycled Water Facility and Pajaro Valley Water Management Agency Coastal Distribution System deliver a local, sustainable water supply for the Pajaro Valley agriculture. The joint project exemplifies municipal and agricultural cooperation to protect the valuable water resources and the unique agricultural environment of the Pajaro Valley.

Groundwater Recharge Enhancement. Santa Cruz County Environmental Health Services is implementing a group of projects for groundwater recharge enhancement. This group of projects includes pilot projects to demonstrate restoration of groundwater recharge functions in urbanized areas, update of development policies to provide for protection and restoration recharge for new development and redevelopment projects, and promotion of conjunctive use and water exchanges to increase capture and storage of groundwater during wet periods.

Groundwater Banking. A recent study led by the San Luis Obispo County FCWCD examined the feasibility of future groundwater banking in the Paso Robles Groundwater Basin. The groundwater banking project could potentially store the county's unused allocation of SWP water in the county's largest groundwater basin.

Hazard mitigation. County of San Luis Obispo Hazard Mitigation Plan 2005; Multi-Jurisdictional Hazard Mitigation Plan, Monterey County 2007; Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan 2004; Multi-Jurisdictional Hazard Mitigation Plan for Ventura County, California 2005.

Los Osos Wastewater Project. Although the Los Osos Wastewater project is required by the Regional Water Board as a result of septic discharges and degradation of water quality, the project is also a critical first-step toward solving the community's water supply and groundwater management deficiencies and, therefore, maximizes long-term sustainable integrated water management benefits.

Monterey Regional Water Pollution Control Agency. MRWPCA treats up to 25,000 acre-feet of municipal wastewater annually. A portion of this treated water is used outside of the region to retard seawater intrusion in the Salinas River watershed and to irrigate agricultural land in the northern Salinas Valley.

Nacimiento Water Project. The San Luis Obispo County FCWCD is constructing a 45-mile pipeline from Lake Nacimiento southward to communities in San Luis Obispo County at a cost of roughly $140 million. When completed in year 2010 this will facilitate delivery of the county's 17,500 acre-foot water entitlement from Lake Nacimiento.

Salinas Valley Water Project. Monterey County Water Resources Agency's Salinas Valley Water Project addresses a variety of water resource management issues. The Nacimiento Dam spillway height reduction and replacement with inflatable Obermeyer

gates improves flood protection and increases water storage. Downstream, a diversion facility with fish passage stops coastal seawater intrusion by providing an alternative water source to groundwater pumping for irrigation. The new facility supplements existing recycled water treatment and distribution systems.

San Jerardo farmworker cooperative. By fall 2010, residents of the farmworker cooperative in San Jerardo will have a permanent source of clean drinking water.

Santa Maria Wastewater Treatment Plant Expansion. The Santa Maria Wastewater Treatment Plant Expansion project increases the plant's capacity as well as facilitates the recharge of SWP water into the Santa Maria Groundwater Basin.

Santa Ynez Band of Chumash Indians. The reservation's Environmental Office has a Natural Resource Protection program that includes monitoring of surface and groundwater quality, non-point source pollution, and riparian habitat assessments for the restoration of the Zanja de Cota, a perennial stream and tributary to the Santa Ynez River.

South County Recycled Water Program. Santa Clara Valley Water District, South County Regional Wastewater Authority, Gilroy, and Morgan Hill are partners in this program. Existing customers use approximately 1,000 acre-feet per year of recycled water for landscape irrigation, crop irrigation and industrial use within the Gilroy area.

Challenges

Regional

Coastal Aquifers and Groundwater Basins. Seawater intrusion into groundwater basins continues to be a major challenge for all coastal communities in the region because they rely primarily on groundwater for their water supply. Decades of groundwater pumping have, in some basins, lowered the groundwater table to below sea-level.

Salinas Groundwater Aquifer. Groundwater extraction has historically exceeded groundwater recharge in the Salinas River Basin, resulting in declining groundwater levels and seawater intrusion; the Castroville Seawater Intrusion Project and the Salinas Valley Water Project were both designed to remediate the intrusion problem.

Former Fort Ord Army Base as Superfund Site. An ongoing yet managed challenge, the 28,000-acre military facility, officially closed in 1994, has since been subject to major environmental clean-up efforts resulting from its identification in 1991 as US Environment Protection Agency Superfund site. Groundwater treatment systems were installed to eventually remediate plumes of contaminated groundwater that affect two distinct groundwater basins: the Salinas and Seaside basins. The groundwater quality problems have been compounded by historical seawater intrusion into the

Salinas basin and the potential for seawater intrusion into the Seaside basin. Today, the land is under the jurisdiction of the cities of Marina, Seaside, Del Rey Oaks, and Monterey and Monterey County; however, 5 percent of the former base was retained by the US Department of Defense.

Water Reliability in Northern Santa Cruz County. Development of system interties, water exchanges, desalination, and comprehensive conjunctive use strategies is necessary in order to halt groundwater overdraft and provide water supply reliability.

Pajaro Groundwater Basin. Development of supplemental water supplies and modification of pumping practices and locations are needed to halt seawater intrusion. The Pajaro River was designated as America's most endangered river by the American Rivers organization in 2006.

Invasive Species. The proliferation of both aquatic and terrestrial invasive species will continue to challenge healthy watersheds and will require maintenance, restoration, and enhancement of existing watersheds.

Recovery Planning under Endangered Species Act – Coho and Steelhead Recovery Strategy. The coho salmon range for California is coincident with coastal draining watersheds from the Oregon border to northern Monterey Bay; steelhead trout are listed as threatened along the entire Central Coast region. Both coho and steelhead populations have been significantly diminished as a result of sedimentation, reduced streamflow, and channel modifications.

Flood Management

Vulnerability to Flooding. Recurrent flooding is a problem in many places in the Central Coast region. At many locations, lives, homes, businesses, farm lands, and infrastructure are frequently at risk. Providing better protection for lives and property remains the definitive flood management challenge. Solutions may include regulation of occupancy and building in flood-prone areas, and watershed-based, nonstructural development of infrastructure such as levees and reservoirs constructed with consideration of environmental needs. Development of a discharge-based standard such as protection from the flood having an 0.5 percent, 1 percent, or 2 percent probability of occurrence (or such a standard in conjunction with land use type or other pertinent factor) would facilitate equitable distribution of State and federal support funding.

Effects of Urbanization on Flooding. Throughout the state, including this region, urbanization continues. It brings greater runoff due to the increases of impervious or impermeable area, which often leads to increases in erosion and sedimentation. The changing landscape challenges established flood protection measures and construction of flood infrastructure or changes in land use may cause subsequent undesirable vegetation growth, whether of native or invasive species. Regulation of occupancy and land use is critical for reducing the number and severity of flood damage occurrences in an era

of population growth. In this region, a problem area is Santa Barbara County, where some homes have sustained repeated damage, yet there is little economic justification for infrastructure improvement and the likelihood of public acceptance of retrofit grants is low. Elsewhere in developed areas, sea level rise, tidal floods, and storm surges are special concerns, as are hillside flooding and flooding of low areas.

Preparedness for and Response to Flood Events. Effective preparedness for flood events depends on accurate evaluation of the risk, adequate measures for mitigation of flood damage, sufficient preparation for response and recovery activities and coordination among local, State, and federal agencies. Completion of floodplain mapping, both the FEMA FIRMs and the State's complementary Awareness Floodplain Mapping, will provide much needed information for evaluating flood risk. Mitigation may take many forms, including restriction of use, floodproofing, or structural protection of vulnerable sites. Some actions that help meet the challenge of response and recovery preparedness are organization for emergency management, formal agreement on responsibilities for emergency actions and funding, and use of warning systems. In the Central Coast region, some current needs are measures to increase public awareness and foster cooperation between landowners and flood control agencies, increased cooperation among local agencies for flood project development, development of better topographic maps for use in determining floodplain boundaries, and planning for flood protection along the Pajaro River.

Flood Infrastructure Maintenance and Construction Funding. Local funding for flood maintenance and construction projects has become less effective in recent years as projects must meet the physical and scheduling requirements of modern environmental and species protection laws and programs, as well as function in an era when measures to reduce taxation, especially on property, have rendered revenue increases difficult to achieve, and inflation has increased costs. Meeting the requirements of these new restraints has become a high-profile local challenge. Other maintenance-related concerns are control of invasive species, restoring capacity of silted reservoirs, and correction of deficiencies in dams.

Landslides and Debris Flows. Wildfires tend to denude steep erodible slopes in canyons and upland areas, often above urban development below. Ensuing winter rains, combined with local geology, may threaten these areas not only with high water but also with debris flows and activation of new or ancient landslides. In these situations, flooding can exacerbate damages to structures and other installations, leaving behind large amounts of sediment and other detritus. Debris of this type is also a concern at the outlets of rocky canyons regardless of previous occurrence of fires.

Drought and Flood Planning

Five of the nine counties in this region have adopted hazard mitigation plans, and two have annexed to the Association of Bay Area Governments (ABAG) Multi-Jurisdictional Local Hazard Mitigation Plan. All the area's major water agencies have prepared urban

water management plans that include provisions for drought. For more information, see Challenges in this report and also Accomplishments in Appendix A Flood Management.

FloodSAFE is a strategic initiative of DWR that seeks a sustainable integrated flood management and emergency response system throughout California that improves public safety, protects and enhances environmental and cultural resources, and supports economic growth by reducing the probability of destructive floods, promoting beneficial floodplain processes, and lowering the damages caused by flooding. FloodSAFE is guiding development of regional flood management plans. These plans will encourage regional cooperation in identifying and addressing flood hazards and will include flood-hazard identification, risk analyses, review of existing measures, and identification of potential projects and funding strategies. The plans will emphasize multiple objectives, system resiliency, and compatibility with State goals and IRWM plans.

Looking to the Future

With the Central Coast's limited surface supply and few surface water storage facilities, the growing demand for water is causing an increased dependence on the region's groundwater resources. Decisions are needed on water management options that will make up shortfalls in supplies and move to protect water quality. Some water districts have implemented studies and projects that could provide partial or complete solutions. Water conservation programs, water recycling, and groundwater recovery as well as water marketing and other water supply augmentation responses are being examined and implemented.

Water management planning in the region, at all scales, is more likely to be successful if it continues to acknowledge and use solutions that are hydrologically integrated. Successful management of groundwater extraction is based on the identification and quantification of the sustainable yields of the groundwater basins in the region. The most effective solutions will be based on a combination of aquifer recharge and recovery, water banking, watershed restoration, desalination (see Table CC-4), recycling, new supplies, and conjunctive water use.

New Reservoirs and Conveyance Facilities. San Luis Obispo County FCWCD has an annual 17.5 thousand acre-feet entitlement from Nacimiento Reservoir. When the Nacimiento pipeline project is completed in 2010, it is expected to convey as much as 15,750 acre-feet of entitlement water to communities that include Paso Robles, Atascadero, Templeton, and the City of San Luis Obispo, which will be available for urban water uses when completed in year 2010.

Modify Existing Reservoirs Operations. There is one proposal for reservoir enlargement in the southern area. In Santa Barbara County, local water users propose surcharging USBR's Bradbury Dam (Cachuma Reservoir) up to three feet for additional water supply to enhance downstream fish habitat.

Table CC-4 Proposed desalination plants, Central Coast Hydrologic Region (status update July 2009)

Operator	Location	Co-located?	Maximum capacity (mgd)	Maximum capacity (m^3/d)	Intake	Discharge	Status
Montara Water and Sanitary District	Montara	No	Unknown	Unknown	Unknown	Unknown	Feasibility study completed 2008
City of Santa Cruz and Soquel Creek Water District	Santa Cruz	No	2.5, possible expansion to 4.5	9,500, possible expansion to 17,000	Surface	Mixed with waste water	Competed testing of pilot plant; have begun offshore geophysical surveys
California American Water Company	Moss Landing	Yes	10	38,000	Surface	Surface	Released Draft EIR to public; final EIR expected 2009
Pajaro-Sunny Mesa	Moss Landing	Yes	5 to 9	19,000 to 34,200	Surface	Surface	Current plan has revised maximum capacity; will re-apply for permits
California American Water Company	Sand City	No	0.3	1,100	Subsurface	Subsurface	Plant completed; awaiting Dept. Public Health final acceptance permits; normal operations expected to begin by late 2009
Monterey Peninsula Water Management District	Fort Ord Dunes State Park	No	Unknown	Unknown	Subsurface	Surface	Currently performing geotechnical field investigations
Marina Coast Water District	Marina	No	0.3	1,100	Subsurface	Subsurface	Non-operational since 2003; however is an "active source" and water quality monitoring of intake well continues
Ocean View Plaza	Cannery Row	No	0.05	190	Surface	Surface	Unknown
Cambria Community Services District	Cambria	No	1	3,800	Subsurface	Unknown	Continuing geotechnical field investigations
Arroyo Grande/ Grover Beach/ Oceano Community Services District	Oceano	No	2	7,600	Subsurface	Mixed with waste water	Feasibility and funding studies completed for pilot plant

From: Heather Cooley, Peter Gleick, Gary Wolff. June 2006. Desalination, With a Grain of Salt: A California Perspective. Pacific Institute.
Note: Updated information obtained through personal communication with operating and/or planning agencies.
mgd: million gallons per day
m^3/d: cubic meters per day

Conjunctive Management of Surface and Groundwater Supplies. When the Nacimiento Water Project is completed into San Luis Obispo County, it will create new opportunities to manage the existing groundwater basins in conjunction with the availability of new surface water supplies, which may result in more efficient overall water supply availability.

Water Marketing. In the Salinas Valley, SWP water from the Coastal Branch could be purchased and either traded with San Luis Obispo County for that county's existing entitlement to Nacimiento reservoir water or delivered directly through a pipeline constructed at the aqueduct's crossing of the Salinas River.

Water Recycling. For the southern area, recycled water projects have been proposed in conjunction with construction of new or expanded municipal wastewater treatment plants. Both Scotts Valley and the City of Watsonville will be seeking to expand use of their existing recycling facilities through water exchange, conjunctive use, and possible groundwater storage.

Precipitation Enhancement. San Luis Obispo began a three-year cloud seeding program in January 1991 to produce more runoff in the Salinas and Lopez watersheds. This program has ended, but future programs may be a possibility.

Climate Change

The effects of climate change on floods could be significant. With less total rainfall and higher mean annual temperatures, watersheds could become more susceptible to wildfires. The consequent loss of vegetative cover would lower capacity and interception rate, allowing more runoff of a higher velocity to enter watercourses earlier in a storm event.

Sea level rise will also present new challenges to the Central Coast Hydrologic Region. Seawater intrusion into groundwater basins will be exacerbated by a sea level rise because the freshwater/saltwater transition zone would move inland under the increased pressure from the sea. Floods from tidal surges would become more frequent as the ocean moves farther inland and closer to residences and businesses.

Seawater Intrusion

Seawater intrusion was first identified in the Pajaro groundwater basin in the 1940s. and current pumping now exceeds estimates of sustainable yield by more than 20,000 acre-feet per year.

Seawater intrusion in the northern Salinas Valley was first documented in 1933 by the California State Water Commission. Seasonal groundwater withdrawals for agriculture in Santa Cruz and Monterey counties were recognized in the early 1940s as a contributing factor to seawater intrusion.

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.

Box CC-4 Scenario Descriptions

Update 2009 uses three baseline scenarios to better understand the implications of future conditions on water management decisions. The scenarios are referred to as baseline because they represent changes that are plausible and could occur without additional management intervention beyond those currently planned. Each scenario affects water demands and supplies differently.

- **Scenario 1 – Current Trends.** For this scenario, recent trends are assumed to continue into the future. In 2050, nearly 60 million people live in California. Affordable housing has drawn families to the interior valleys. Commuters take longer trips in distance and time. In some areas where urban development and natural resources restoration has increased, irrigated crop land has decreased. The state continues to face lawsuits: from flood damages to water quality and endangered species protections. Regulations are not comprehensive or coordinated, creating uncertainty for local planners and water managers.
- **Scenario 2 – Slow & Strategic Growth.** Private, public, and governmental institutions form alliances to provide for more efficient planning and development that is less resources intensive than current conditions. Population growth is slower than currently projected—about 45 million people live here. Compact urban development has eased commuter travel. Californians embrace water and energy conservation. Conversion of agricultural land to urban development has slowed and occurs mostly for environmental restoration and flood protection. State government implements comprehensive and coordinated regulatory programs to improve water quality, protect fish and wildlife, and protect communities from flooding.
- **Scenario 3 – Expansive Growth.** Future conditions are more resource intensive than existing conditions. Population growth is faster than currently projected with 70 million people living in California in 2050. Families prefer low-density housing, and many seek rural residential properties, expanding urban areas. Some water and energy conservation programs are offered but at a slower rate than trends in the early century. Irrigated crop land has decreased significantly where urban development and natural restoration have increased. Protection of water quality and endangered species is driven mostly by lawsuits, creating uncertainty.

Several of the Santa Barbara County's groundwater basins are in a state of potential overdraft, notably, the Cuyama Groundwater Basin and the San Antonio Groundwater Basin. 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.

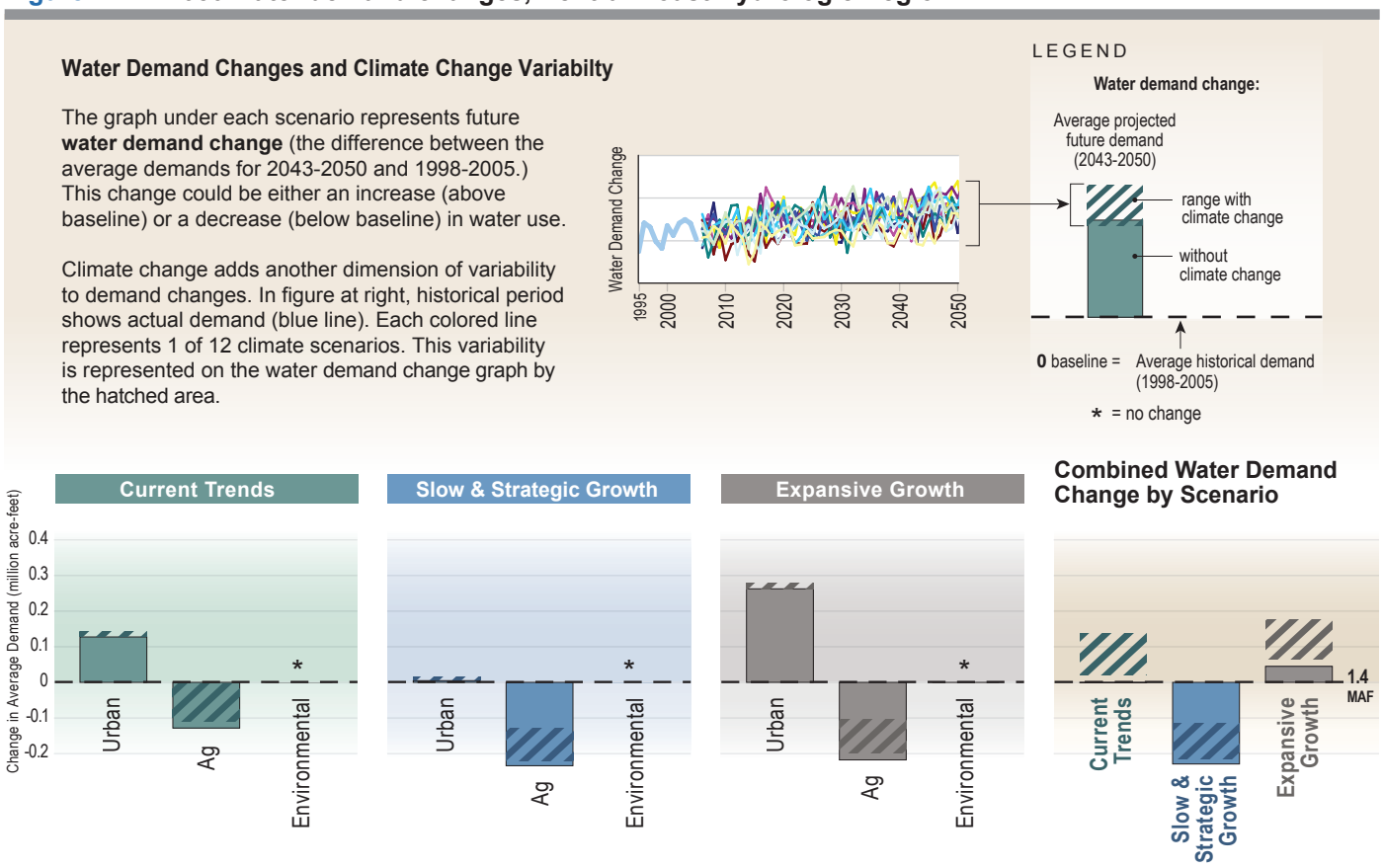
Future Scenarios

For Update 2009, we evaluated 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 2, 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. See Box CC-4 for scenario descriptions.

Total Demand Change

Change in total water demand in the Central Coast hydrologic region for each scenario is shown in Figure CC-4. The change in water demand is based on the difference between the historical average (1998–2005) and future average (2043–2050) water demands.

Figure CC-4 2050 water demand changes, Central Coast Hydrologic Region



Future demand is shown with and without climate change. The change in water demand without climate change is shown with solid bars and with climate change is shown with hatched bars. As shown in the figure, only Expansive Growth shows an increase in average water demand without climate change (solid bar), by about 45 thousand acre-feet. Current Trends shows no change, and Slow & Strategic Growth shows a reduction in water demand by about 230 thousand acre-feet. Considering the 12 alternative climate change scenarios studied (hatched bar) on water demands, again both Current Trends and Expansive Growth show higher demands. Slow & Strategic Growth shows less reduction in demand than when climate change is not considered.

Urban Demand Change

Figure CC-4 shows urban water demand change for the Central Coast region with and without climate change under the Current Trends, Slow & Strategic Growth, and Expansive Growth scenarios. Without climate change, Current Trends shows an increase in water demand of about 130 thousand acre-feet, and Expansive Growth shows an increase of twice as much, about 265 thousand acre-feet. Slow & Strategic Growth shows a modest increase in water demand of about 5 thousand acre-feet when compared with historical average. When climate change is considered, all three scenarios show an

increase in urban demand. The range in water demands with climate change is slightly higher than under the historical climate.

Agricultural Demand Change

Change in agricultural water demand in the Central Coast region is shown in Figure CC-4. Agricultural water demand is generally reduced due to decreases in irrigated acreage and increases in background water conservation. Without climate change (solid bar), Slow & Strategic Growth shows the largest reduction (235 thousand acre-feet), followed by Expansive Growth (220 thousand acre-feet) and Current Trends (130 thousand acre-feet). When climate change is considered (hatched bar), all scenarios show either an increase or a smaller reduction in water demands.

Environmental Demand Change

Figure CC-4 shows a base environmental water demand of about 140 thousand acre-feet. No additional environmental water demands are assumed for the Central Coast region beyond current commitments. For Update 2009, we were not able to estimate additional environmental objectives for every region. Please refer to Volume 1, Chapter 5 Managing an Uncertain Future, for more information.

Appendix A. Flood Management

Historic Floods

Flood Parameters

Table CCA-1 Record floods for selected streams is based on US Geological Survey records. The stations were selected from all USGS gaging stations in the hydrologic region, according to the criteria in Box CCA-1 Selection Criteria.

Box CCA-1 Selection Criteria

- The watercourse must be a natural stream with a watershed of at least 100 square miles.
- The station must have a reasonably continuous record of discharge from 1996 to the present.
- The station must be far enough from other stations on the same river to reasonably represent a separate condition.
- Stations in well defined watercourse locations such as deep canyons are omitted, unless particularly important to the overall flood situation.

Flood Descriptions

Early Floods. Flooding along the Pajaro River is a major concern in the region. The City of Watsonville, the unincorporated town of Pajaro, and surrounding agricultural areas in Monterey and Santa Cruz counties are all subject to flooding from the Pajaro River. In addition, the City of Watsonville and surrounding agricultural areas in Santa Cruz County are also subject to separate and independent flooding from Salsipuedes and Corralitos creeks. Upper Llagas Creek is subject to flooding, causing recurring damage to residences and businesses in the Morgan Hill area. Throughout the region, major floods occurred in 1907, 1914, February and March 1938, January 1952, March and December 1955, and April 1958. The 1938 and 1955 floods were the most significant and widespread. The 1938 flood extended throughout the area; damages totaled $1.2 million, a considerable sum for the small amount of development in the region at that time. The December 1955 flood inundated 14,400 acres in the northern portion of the Central Coastal region and caused $16 million in damage, 80 percent of which was agricultural, residential, and commercial.

Recent Floods. Significant flooding occurred in the Central Coast region in December 1969, January 1970, January 1974, January and February 1978, January and February 1980, January 1982, January and March 1983, February 1986, March 1995, and 2001. Descriptions of some of these floods follow.

January 1970. The 1970 floods were caused by a series of Pacific storms which brought severe, widespread damage to the Central Coast and the rest of California. Damage was most severe in the Salinas River Basin, in the Santa Ynez River Group, and in the Carpenteria-Montecito area. Flooding on the Salinas River and its tributaries was estimated to equal a 1-in-100 year flood. Farms and cities both sustained heavy damage.

March 1995. In March 1995, agricultural crop damages along the Pajaro River were estimated at $67 million for the 3,280 acres that were flooded, and urban damages in the unincorporated town of Pajaro were estimated at $28 million.

2001. Arroyo Grande Creek breached in 2001, flooding many acres of high-value coastal farmland.

Table CCA-1 Record floods for selected streams, Central Coast Hydrologic Region

Stream	Location	Mean annual runoff (taf)	Peak stage of record (ft)	Peak discharge of record (cfs)
Santa Ynez R.	at Narrows	94	24.2	80,000
Santa Ynez R.	below Gibraltar Dam, near Santa Barbara	48	25.8	54,200
Cuyama R.	below Buckhorn Canyon, near Santa Maria	18[2]	14.8	26,200
Huasna R.	near Arroyo Grande	15	15.9	21,000
Sisquoc R.	near Garey	38	23.5[1]	33,600
Carmel R.	near Carmel	77	20.9	16,000
Salinas R	near Spreckels	272[2]	30.3	95,000
Salinas R.	near Bradley	378[2]	23.4	120,000
Salinas R.	at Paso Robles	76	23.8[1]	28,400
Arroyo Seco	near Soledad	123	16.4[1]	28,300
San Lorenzo Cr.	below Bitterwater Creek, near King City	11	16.2	11,500
San Antonio R.	near Lockwood	78	14.3	23,600
Nacimiento R.	below Nacimiento Dam, near Bradley	200	10.9	7,340
Pajaro R.	at Chittenden	121	33.7	25,100
San Benito R.	at State Highway 156, near Hollister	26	13.5	34,500
Tres Piños Cr.	near Tres Piños	12	16.0	27,200
San Benito R.	near Willow Creek School	20	14.6	9,660
Pacheco Cr.	near Dunneville	24	21.0	12,600
San Lorenzo R.	at Santa Cruz	94	23.1	30,400

Note: taf=thousand acre-feet; ft=feet; cfs=cubic feet per second

1 Different date than peak discharge

2 Most recent but less than period of record

Flood Governance

Many federal, State, and local agencies have responsibilities in the overall effort to manage floods. The principal participants in the Central Coast Hydrologic Region and their activities are listed in Table CCA-2, Flood management participants. Most listed activities are self-explanatory. Descriptions of some are:

- **Flood project development.** Performing feasibility studies, planning, and design of constructed facilities.
- **Encroachment control.** Establishing, financing, and operating a system of permitting and enforcing permits to encroach on constructed facilities.
- **Floodplain conservation or restoration.** Any overt activity causing part of a floodplain to remain in effect or to be reinstated as a watercourse overflow area.

Table CCA-2 Flood management participants, Central Coast Hydrologic Region

	Structural approaches									Land use management					Preparedness, response and recovery										
	Flood projects						Floodplains			Flood insurance			Regulation		Data management			Flood education	Event management						
	Financing	Development	Construction	Operation	Encroachment control	Maintenance	Conservation	Restoration	Delineation	Administration	Participation	FIRM mapping	Building permits	Designated floodways	Data collection	Hydrologic analysis	Data station maintenance		Preparedness	Response management	Response personnel	System administration	Recovery funding	Recovery operations	Mitigation
Federal agencies																									
Federal Emergency Management Agency										●		●											●		●
National Weather Service															●	●	●	●	●	●	●				
Natural Resources Conservation Service	●	●	●															●							
US Geological Survey															●	●	●								
US Army Corps of Engineers	●	●	●	●	●	●									●	●	●	●	●	●	●		●	●	●
US Bureau of Reclamation		●	●	●	●	●												●	●	●	●				
State agencies																									
California Conservation Corps																				●	●				
Department of Corrections																					●				
Department of Forestry and Fire Protection																				●					
Department of Water Resources	●	●	●	●	●	●			●	●		●			●	●	●	●	●	●	●		●	●	
California Emergency Management Agency																			●	●	●	●	●		●
Local agencies																									
County emergency services units																			●	●	●				
County planning departments														●											
County building departments													●												
Local flood maintenance organizations				●	●	●																			
Local conservation corps																				●	●				
Local initial responders to emergencies																			●	●	●				
Pajaró River Watershed Flood Prevention Authority	●	●	●	●	●	●																			
San Mateo County Flood Control District	●																								
Santa Clara Valley Water District	●	●	●	●	●	●	●	●			●							●	●	●	●				
Santa Cruz County Flood Control and Water Conservation District	●	●		●																					
Ventura County Watershed Protection District	●	●	●	●	●	●	●				●								●	●					

- **Flood insurance administration or participation.** Contribution to the management of or acting as a sponsor and cooperator in the National Flood Insurance Program including the Community Rating System.
- **Hydrologic analysis.** Hydrologic or statistical analysis of collected hydrometeorological data.
- **Flood education.** Informing the general public about any aspect of flood management; publishing or broadcasting collected hydrometeorological data or other flood-related material.
- **Recovery operations.** Financing or performing any activity intended to return flood-impacted facilities or persons to normal status.
- **Event management system administration.** Oversight of the National Incident Management System/Standardized Emergency Management System (NIMS/SEMS) as applied to California.

Flood Risk Management

Structural Approaches

The principal reservoirs and non-storage facilities contributing to flood control are listed below in Table CCA-3, Flood control facilities.

Disaster Preparation, Response, and Recovery

Management of flood emergencies is the responsibility of many organizations and individuals. Response is required by law to conform to SEMS, under which action is taken by levels of organization. It is begun by the person or organization on the site. That entity resists personal injury and property damage to the best of its ability, only calling on the next level when its resources become insufficient, and succeeding levels follow the same procedure. Table CCA-4, Flood emergency responders, indicates the responsible entities at successive levels of response.

Table CCA-5 Advanced Hydrologic Prediction System stream forecast points is a list of forecast points that can be used in the National Weather Service's AHPS.

Integrated Regional Water Management

Of the six Integrated Regional Water Management plans (IRWMPs) that include parts of the Central Coast region, four acknowledge the critical role of flood control. The San Luis Obispo County IRWMP identifies flood control as one of five key goals. The Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWMP identifies three flood control projects each on the Pajaro, Salinas, and Carmel rivers. The Santa Barbara County IRWMP mentions flood-control projects that have been implemented on the Carpinteria Salt Marsh. The Pajaro River Watershed IRWMP states that the Pajaro River Flood Prevention Authority, a joint powers authority, is active in the watershed that includes representatives from eight agencies in five counties.

Table CCA-3 Flood control facilities, Central Coast Hydrologic Region

Facility	Stream	Owner (sponsor)	Description	Protects
RESERVOIRS AND LAKES				
Nacimiento Res.	Nacimiento R.	Monterey County WRA	110 taf flood control	Salinas Valley
San Antonio Res.	San Antonia R.	Monterey County WRA	90 taf flood control	Salinas Valley
Twitchell Res. (Santa Maria River Basin Project)	Cuyama R.	USBR (Santa Barbara Co. WA)	224 taf flood control	Santa Maria
NON-STORAGE FLOOD CONTROL FACILITIES				
Pajaro River Basin Project	Pajaro R., Corralitos Cr., Salsipuedes Cr.	USACE (Monterey Co. WRA, Santa Cruz Co. FCWCD)	Levees	Watsonville and ag lands
Uvas Cr.	Uvas Cr.	USACE (Santa Clara Valley WD)	Levee	Gilroy
San Lorenzo R.	San Lorenzo R., Branciforte Ck.	USACE	Levees, floodwalls, and channel work	Santa Cruz
Santa Maria River Basin Project	Santa Maria R., Bradley Cr.	USACE (Santa Barbara Co. FCWCD)	Levees, diversion channel, and channel improvements	Santa Maria, Santa Maria Valley
Rodeo-San Pasqual	Rodeo and San Pasqual Crs.	Santa Barbara Co. FCWCD (NRCS)	Concrete channel with debris basin	Lompoc Valley
San Miguelito	San Miguelito Cr.	Santa Barbara Co. FCWCD (NRCS)	Concrete channel with debris basin	Lompoc
Arroyo Grande Creek	Arroyo Grande Cr.	San Luis Obispo Co. FCWCD (NRCS)	New channel, diversions	Cienega Valley
Santa Barbara Streams Project	Santa Barbara Streams	Santa Barbara Co. FCWCD	Emergency debris basins and channelization	Santa Barbara, Carpinteria, Montecito
Carpinteria Valley	Carpinteria Valley Streams	Santa Barbara Co. FCWCD (NRCS)	Concrete channels, revetted earth levees, debris basins	Carpinteria Valley
Lower Llagas Creek	Lower Llagas Ck., W. Branch Llagas Cr., Miller Slough	Santa Clara Valley WD (NRCS)	Channel improvements	Gilroy
Lower Mission Creek Project	Mission Ck.	USACE (Santa Barbara Co. FCWCD)	Channel relocations, widenings, bridge replacements	Santa Barbara
Cemetery Creek	Cemetery Cr.	Santa Barbara Co. FCWCD (NRCS)	Debris basin	Lompoc
Hoag-Santa Rita		Santa Barbara Co. FCWCD (NRCS)	Channel	Lompoc
Purisima-Cebada	Cebada Cr.	Santa Barbara Co. FCWCD (NRCS)	Channel	Lompoc

Table CCA-4 Flood emergency responders, Central Coast Hydrologic Region

Responder	Level	Comment
Person(s) or organization(s) on the site	0	Any emergency
Emergency services units of the 34 cities in the region	1	Any emergency
Emergency services units of the 9 counties in the region	1 or 2	Any emergency, and by request from level 1 responders
California Emergency Management Agency, Coastal Region	3	Any emergency, Monterey, San Benito, San Mateo, Santa Clara, and Santa Cruz counties, by request of county (operational area)
California Emergency Management Agency, Inland Region	3	Any emergency, Kern County, by request of county (operational area)
California Emergency Management Agency, Southern Region	3	Any emergency, San Luis Obispo, Santa Barbara, and Ventura Counties, by request of county (operational area)
US Army Corps of Engineers	3	Specified water-related emergencies, by request of DWR
Department of Water Resources	2	Flood Operations Center, flood fight and Corps liaison
California Conservation Corps	3	Personnel and equipment for flood fight
Department of Forestry and Fire Protection	3	Personnel and equipment for flood fight
California Emergency Management Agency Headquarters	4	All emergencies, entire hydrologic region, by request of Cal EMA Region

Table CCA-5 Advanced Hydrologic Prediction System stream forecast points, Central Coast Hydrologic Region

River Basin	Stream	Location
Pajaro River	San Benito River	Willow Creek
Pajaro River	San Benito River	Hollister
Pajaro River	Pajaro River	Chittenden
Carmel River	Carmel River	Robles del Rio
Big Sur River	Big Sur River	Big Sur
Salinas River	San Antonio River	Lake San Antonio
Salinas River	Nacimiento River	Lake Nacimiento
Salinas River	Salinas River	Paso Robles
Santa Maria River	Sisquoc River	Garey
Santa Maria River	Cuyama River	Buckhorn
Santa Maria River	Cuyama River	Twitchell Reservoir
Santa Ynez River	Salsipuedes Creek	Lompoc
Santa Ynez River	Santa Ynez River	Los Laureles
Santa Ynez River	Santa Ynez River	Lake Cachuma

Accomplishments

- Salinas Valley Water Project Nacimiento Dam Spillway Modifications – 2008
- San Antonio River and Nacimiento Watersheds Management Plan – 2008
- County of San Luis Obispo Hazard Mitigation Plan – 2005
- Multi-Jurisdictional Hazard Mitigation Plan, Monterey County – 2007
- Santa Barbara County Multi-Jurisdictional Hazard Mitigation Plan – 2004
- Multi-Jurisdictional Hazard Mitigation Plan for Ventura County, California – 2005
- Pajaro River Basin Project – pre 1955
- Castroville Seawater Intrusion Project-1998
- San Lorenzo River – 1959
- San Antonio Dam and Reservoir – 1965
- Nacimiento Dam and Reservoir – 1961
- Santa Maria River Basin – 1954
- Santa Maria River Levees – 1963
- Twitchell Dam and Reservoir – 1958
- Santa Ynez River Flood Forecast and Warning System – late 1970's
- Arroyo Grande Creek Watershed – 1956

Appendix B. Water Quality

The Central Coast Regional Water Quality Control Board focus on measurable improvement in water quality begins by incorporating vision goals into programs and day-to-day work. Find information about ongoing efforts to improve water quality on a regional scale and meet measurable goals at the Regional Water Board's Web site (www.swrcb.ca.gov/rwqcb3/)

Requirements for Discharges from Irrigated Lands. In 2004, the Regional Water Board adopted requirements for discharges from irrigated lands. The purpose of the requirements is to regulate discharges from irrigated lands to ensure that such discharges do not cause or contribute to exceedances of regional, State, or federal water quality standards.

Currently, more than 400,000 acres of irrigated farmland are regulated. The Regional Water Board requires all irrigated farming operations to complete 15 hours of water quality education, develop farm plans that focus on implementation of management measures that protect water quality from farm-related discharges, implement practices, and report implementation to the Regional Water Board. Staff works to ensure that all growers comply with the requirements through inspections, technical assistance referrals, and enforcement actions. The enforcement effort is twofold: (1) to enroll the remaining growers who have applied for coverage and (2) to ensure that those who are enrolled meet all requirements, including monitoring obligations (either by conducting individual monitoring or by participating in the Cooperative Monitoring Program). Farmers and the Regional Water Board established the Cooperative Monitoring Program to allow growers an alternative to individual monitoring. The program is run by Central Coast Water Quality Preservation, Inc., a nonprofit group; more information can be found at www.ccwqp.org/.

Regional Water Board staff is in the process of revising the Irrigated Agricultural Requirements. An updated Irrigated Agricultural Order for discharges from irrigated lands is anticipated in 2010.

Central Coast Ambient Monitoring Program. Regional Water Board staff monitors and assesses toxicity conditions throughout surface waters in the region through the Central Coast Ambient Monitoring Program (CCAMP) and through coordination with other monitoring programs and research activities. CCAMP and the Cooperative Monitoring Program have conducted toxicity monitoring in 98 streams and rivers in the region. Toxicity data from CCAMP and the Cooperative Monitoring Program are available at www.ccamp.org (click "Toxicity Findings").

In general, the Central Coast has toxicity problems in many water bodies. The worst problems occur coincident with concentrations of agricultural and urban land uses. The Regional Water Board is taking the following actions to address toxicity problems.

- Continuing to implement the Regional Water Board's conditioned waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, including enrollment in the program, water quality education, farm water quality planning and implementation of management practices to protect water quality, and reporting practice implementation to the Regional Water Board.
- Supporting management practice implementation through an irrigation and nutrient management grant.
- Interacting with Department of Pesticide Regulation (DPR) and county agricultural commissioners.
- Targeting inspections and enforcement actions.
- Incorporating urban pesticide reduction management practices into new municipal storm water management plans and requiring implementation of such management practices in existing storm water management plans.
- Funding and managing grant projects that reduce pesticide use and loading to surface water and groundwater.

Storm Water Management. The Central Coast region has 116 municipal separate storm sewer systems (MS4) subject to the Phase II General Permit for Municipal Stormwater (general permit) within their jurisdiction. The general permit requires MS4 municipalities to prepare, submit, and implement Storm Water Management Programs (SWMPs). Enrolling MS4 municipalities under the General Permit protects surface waters on the Central Coast because improved water quality depends on implementation of management measures that are effective at eliminating pollutants in urban runoff (i.e., retention and detention ponds, biofilters, grassed filter strips, porous pavement, wetlands, and others).

Each SWMP must include best management practices to achieve the following conditions.

- Maximize infiltration of clean storm water, and minimize runoff volume and rate.
- Protect riparian areas, wetlands, and their buffer zones.
- Minimize pollutant loading.
- Provide long-term watershed protection.

In addition, each SWMP must include consideration and prioritization of local conditions, such as existing pollutant loading, water quality, listed impaired waters (per 303(d) listing – see item below), pollutants of concern, habitat degradation, and land management practices, and apply more stringent control measures where necessary to minimize pollutant loading.

303(d) Investigations and Total Maximum Daily Load Projects. Section 303(d) of the federal Clean Water Act requires states to identify waters not attaining applicable water quality standards. California complies with this federal requirement by periodically

assessing the conditions of the rivers, lakes, and bays and identifying them as "impaired" if they do not meet water quality standards. These waters, and the pollutant or condition causing the impairment, are placed on the 303(d) list of impaired waters. The Central Coast 303(d) list is available at www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/.

In addition to creating this list of water bodies that do not meet water quality standards, the Clean Water Act mandates that each state rank each water body by factors, such as the severity of the problem, potential to restore beneficial uses, availability of data, and develop total maximum daily loads for each water body listed. The TMDL equals the amount of a particular material that a water body can assimilate on a regular basis and still remain at levels that protect beneficial uses designated for that water body. A TMDL is approved by the Regional Water Board, the State Water Board, and the US Environmental Protection Agency. Once approved, it establishes (1) an allowable amount of a pollutant to a water body, (2) proportional responsibility for controlling the pollutant, (3) numeric indicators of water quality, and (4) implementation to achieve the allowable amount of pollutant loading. The following includes a list of TMDLs and 303(d) investigations.

TMDL projects (water body and contaminant) with final approval: San Lorenzo River for nitrate; Morro Bay, Chorro Creek and Los Osos Creek for pathogen; Morro Bay Estuary, Chorro Creek, and Los Osos Creek for sediment; San Lorenzo River, Carbonera Creek, Lompico Creek, and Shingle Mill Creek for sediment; Clear Creek and Hernandez Reservoir for mercury; Los Osos Creek, Warden Creek and Lake for nutrient; San Luis Obispo Creek for pathogen; Pajaro River and Llagas Creek for nitrate; Chorro Creek for nutrients and dissolved oxygen; San Luis Obispo Creek for nutrient; Pajaro River, San Benito River, Rider Creek for sediment; Watsonville Slough for pathogens.

TMDL projects with Central Coast Regional Water Board approval: San Lorenzo River Estuary, San Lorenzo River, Branciforte Creek, Camp Evers Creek, Carbonera Creek, and Lompico Creek for pathogens; Soquel Lagoon, Soquel Creek, and Noble Gulch for pathogens; Aptos Creek, Valencia Creek, and Trout Gulch for pathogens.

TMDLs in development: Lower Salinas River, Old Salinas River Estuary, Tembladero Slough, Salinas Reclamation Canal, Alisal Creek, Gabilan Creek, Salinas River Lagoon (North), Santa Rita Creek, Quail Creek, and Towne Creek for fecal coliform; Pajaro River, San Benito River, Llagas Creek, and Tequisquita Slough for fecal coliform, Corralitos Creek and Salsipuedes Creek for pathogen; Lower Salinas River and Elkhorn Slough for pesticides; Santa Barbara County Beaches for bacteria; Santa Maria River and Santa Maria River Estuary for pesticides; Santa Maria River Watershed and Oso Flaco Lake for fecal coliform; Santa Maria River Watershed for nitrate.

303(d) impairment investigations in progress: Elkhorn Slough for pathogens, Elkhorn Slough for sediment, Santa Barbara County Beaches for bacteria, Santa Ynez River for nitrate.

Basin Planning and Permitting Waste Discharges. Regional Water Boards preserve, protect, and enhance the quality of the state's waters through the development of water quality control plans and the issuance of waste discharge requirements (WDRs). WDRs for discharges to surface waters also serve as National Pollutant Discharge Elimination System (NPDES) permits. The waste discharge requirements allow the Water Board to monitor and enforce State and federal plans, policies, and regulations. Currently, the Central Coast Regional Water Board regulates 69 non-storm water facilities under NPDES permits for discharges to surface water, 1,169 facilities with Industrial or Construction storm water NPDES permits, and 237 facilities under WDRs for discharges to land.

Land Disposal. The Central Coast has approximately 100 landfills throughout the region, of which 58 are covered by either individual (35 sites) or general (23 sites) waste discharge requirements (WDRs). Of the 35 facilities covered under individual WDRs, 16 are active landfill sites. These disposal sites range in size from active, hundred acre, multicell, state-of-the-art facilities to small, unpermitted one-to-two-acre closed sites. State and federal landfill regulations require low-permeability liner and leachate collection systems for all new landfill cells. These more protective landfill regulations were borne out of studies, including California's Solid Waste Assessment Test (SWAT) program, which indicated a very high correlation between unlined landfills and groundwater impacts. Greater than 90 percent of the unlined landfills in this region have impacted groundwater, and as a result are in some form of corrective action to address these discharges. The Central Coast Regional Water Board will focus on proper siting of future land disposal facilities, ensuring protective engineering liner designs for expansions at landfills and new landfills, and implementation of best management practices for storm water runoff.

US Department of Defense. The Central Coast region includes the following US Department of Defense sites: Vandenberg Air Force Base, former Fort Ord Army Base, Lompoc Branch US Disciplinary Barracks Federal Correction Facility, Fort Hunter Liggett Army Base, Camp Roberts National Guard Base, and Monterey Peninsula Airport (a former Navy Air Base). The Regional Board works closely with defense contractors on performance-based cleanups to expedite cleanup time frames.

Underground Storage Tanks and Site Cleanup. Leaking underground storage tanks (tanks) pose a significant threat to groundwater and a potential threat to human health, safety, and the environment. Therefore, California started regulating tanks containing hazardous substances in 1983, applying federal and State laws, regulations, and policies. The Central Coast region has 673 active tank cases, predominantly petroleum hydrocarbon related cases; 231 of the 673 active tank cases are methyl tertiary butyl ether (MTBE) cases. The Site Cleanup Program (SCP) focuses on unauthorized releases of nonfuel pollutants (e.g., solvents, perchlorate, oil field contaminants, heavy metals, pesticides, etc.) to soils and groundwater but in some cases also to surface waters or sediments. The Central Coast region has approximately 270 active SCP cases. Sites that are managed within the SCP include sites with pollution from recent or historical surface

spills, subsurface releases (e.g., pipelines, sumps, etc.), and all other unauthorized discharges that pollute or threaten to pollute surface or groundwater. The SCP also includes groundwater cleanup at Brownfields, refineries, and other large industrial facilities.

Grants. The Central Coast Regional Water Board encourages local agencies and organizations to promote healthy functioning watersheds through grant funding opportunities that focus on the Central Coast Regional Water Board's targeted project priorities. Additional information on targeted project priorities is available at www.waterboards.ca.gov/centralcoast/.

401 Certifications. The 401 certification program regulates discharges of fill and dredged material. This program protects all waters in its regulatory scope, but the Regional Water Board focuses on the protection of wetlands, riparian areas, and headwaters because these waterbodies have high resource value, are vulnerable to filling, and other programs do not systematically protect these water bodies.

Salt and Nutrient Management Plans. The State Board Recycled Water Policy calls for the development and implementation of salt and nutrient management plans for each groundwater basin/subbasin.

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The California Water Plan provides a framework for resource managers, legislators, Tribes, other decision-makers, and the public to consider options and make decisions regarding California's water future. Our goal is that this document meet Water Code requirements, receive broad support among those participating in California's water planning, and be a useful document. With its partners, DWR completed the final Update 2009 volumes and Highlights in December 2009.

The first four volumes of the update and the Highlights booklet are contained on the CD attached below. All five volumes of the update and related materials are also available online at *www.waterplan.water.ca.gov.*

Volume 1: The Strategic Plan
Volume 2: Resource Management Strategies
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