Challenges

The region faces many water quality and water supply challenges. The North Coast Regional Water Quality Control Board's water quality priorities highlight the need for control of nonpoint source runoff from logging, rural roads, agriculture, and urban areas. In fact, sediment, temperature, and nutrients are the primary focus of the RWQCB's 303(d) list of impaired water bodies. Along the coast, nonpoint-source pollution can cause microbial contamination of shellfish growing areas, especially oysters. Much of the region is characterized by rugged, steep, forested lands, with highly erodable, loosely consolidated soils; taken together with wildfires, extensive timber harvesting, and heavy precipitation primarily in the form of rain, the watershed is highly susceptible to erosion and landslides. Such heavy runoff in turn causes stream sedimentation that impacts habitat for spawning and rearing of anadromous fish. Channel modifications and water diversions have radically changed water-quality conditions in many water bodies in the region, reducing natural flows that dilute contaminant concentrations and lessen their impacts. In the southern portion of the region, the development of new hillside vineyards is an increasing source of erosion and pesticides.

Fisheries can be adversely affected by a number of factors related to both water quality and water quantity. The Eel, Mad, Trinity, Klamath and Russian rivers, as well as many other streams, suffer from sedimentation, which can smother salmonid spawning areas. The North Coast region's basin plan sets turbidity restrictions to control erosion impacts from logging and related activities, such as road building. Timber harvests can also decrease the canopy shading rivers and streams, thereby increasing water temperatures to levels that are detrimental to cold water fisheries. The basin plan also specifically establishes temperature objectives for the Trinity River, in which reduced flows have disrupted temperature and physical cues for anadromous fish runs. Because of water diversions, summer temperatures in the Trinity as well as the Klamath can be lethal to salmonids. Fisheries can be further affected by the lack of woody debris for pool habitat and sediment metering.

The North Coast RWQCB's basin plan requires tertiary treatment of wastewater discharges to the Russian River, a major source of domestic water, and establishes limits on bacteriological contamination of shellfish-growing areas along the coast. The plan also prohibits or strictly limits waste discharges to the Klamath, Trinity, Smith, Mad, and Eel rivers, as well as estuaries and other coastal waters. Nonpoint source runoff, especially after heavy precipitation, has resulted in contamination and closure of shellfish harvesting beds in Humboldt Bay. In the lower Russian River watershed storm water runoff also might be contributing to high ammonia and low dissolved oxygen levels in Laguna de Santa Rosa, which is threatening aquatic life. Mercury in fish tissue is a water quality concern in Lakes Pillsbury, Mendocino, and Sonoma; a health advisory for mercury has been issued for Lake Pillsbury.

Groundwater quality problems in the North Coast region include contamination from seawater intrusion and nitrates in shallow coastal groundwater aquifers; high total dissolved solids and alkalinity in groundwater associated with the lake sediments of the Modoc Plateau basins; and iron, boron, and manganese in the inland groundwater basins of Mendocino and Sonoma counties. Septic tank failures in western Sonoma County, at Monte Rio and Camp Meeker, and along the Trinity below Lewiston Dam, are a concern because of potential impacts to groundwater wells and recreational water quality.

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Wetlands and Watershed Management

Although there are serious problems facing San Francisco Bay, its wetlands, and watershed, there has been a concerted effort over the last 20 years to restore the Bay. Some of the major planning and implementation efforts are described here. Expenditures to date on ecosystem restoration include $32 million in Bay-Delta Program funding, along with significant local, state and federal funding.

The Comprehensive Conservation and Management Plan, completed by the San Francisco Estuary Project in 1993, presents a blueprint of 145 specific actions to restore and maintain the chemical, physical, and biological integrity of the bay and Delta. The CCMP has been implemented over time by a wide variety of local, state and federal partners including the CALFED Bay-Delta Program. The Estuary Project regularly updates the priorities for CCMP implementation and prepares a report on the state of the estuary. In addition, the Estuary Project prepares Bay-Delta Report card that identifies many of the restoration projects under way to track progress implementing the CCMP. The most recent list of priorities identified by Estuary Project is:

- Reduce the impact of invasive species on the estuary through prevention, control, eradication, and education.
- Expand, restore, and protect bay and Delta wetlands and contiguous habitats. (These two items were both identified as top priorities.)
- Protect and restore watersheds, including promoting creek restoration, throughout the estuary.
- Create "incentives" that motivate governments, landowners, businesses and communities to protect and restore the estuary.
- Minimize or eliminate pollution of the estuary from all sources.

other coastal areas such as the mouth of the Salinas River, seawater intrusion into the groundwater aquifer is a major threat to water quality.

Unique coastal resources, such as Morro Bay and Monterey Bay, as well as the Salinas Valley, are the focus of water quality issues. Sedimentation poses the greatest water quality threat to Morro Bay, one of 28 estuaries in the National Estuary Program. The bay is also contaminated by pathogens from agriculture, boats, and urban runoff; nutrients from fertilizers, animal wastes, and urban runoff; heavy metals from abandoned mines in the upper watershed; and offshore boatyards that contaminate sediment. Elevated levels of bacteria have closed many of the shellfish growing beds in Morro Bay, and have occasionally closed beaches in Santa Cruz County and southern Santa Barbara County. To protect special areas of biological significance, waste discharges are prohibited or limited in portions of Monterey Bay, a National Marine Sanctuary, and other specific coastal and ocean waters of the region. In its triennial review, the Central Coast Regional Water Quality Control Board also identified the need to incorporate new microbiological standards for water-contact recreation in this region.

In the southern portion of Santa Clara County, elevated concentrations of nitrate and perchlorate have been detected. The Santa Clara Valley Water District continues to implement a Nitrate Management Program to monitor nitrate occurrence, reduce nitrate exposure, and reduce nitrate loading throughout Santa Clara County. The district also provides in-field technical assistance to the regions agricultural growers about nitrate and irrigation management. In late 2002, perchlorate (a chemical used in the manufacture of rocket fuel, road flares, and fireworks), emerged as a significant groundwater contaminant in the southern end of Santa Clara County. The known extent of this groundwater chemical plume extends 10 miles, and more than 800 water supply wells have been affected. The Santa Clara Valley Water District is working with the Regional Water Quality Control Board, local agencies, and affected communities to develop and implement a long-term corrective action plan.

The Salinas River watershed has significant nitrate contamination related to agriculture, the valley's main land use. Groundwater overdraft is also a problem in the area, and seawater has now intruded 6 miles inland into the shallow groundwater aquifer around Castroville. The nearby Pajaro River watershed faces a variety of water quality threats, such as erosion (primarily from agricultural practices), urban runoff, sand and gravel mining, flood control projects, off-road vehicles, and historical mercury mining in the Hernandez Lake area. Coastal wetlands in Elkhorn Slough, a tributary to Monterey Bay between the Salinas and Pajaro rivers, suffer from erosion on strawberry and other cropped lands in its watershed. Elevated bacterial levels in the slough may be associated with a large dairy and waste operation in the watershed as well as septic tanks. In addition, more than 600 year-round vessels use the Moss Landing Harbor, which increases the waste load to the slough. The accumulated effects of these water quality problems, along with the resuspension of pesticides in sediments, have restricted shellfish growing in Elkhorn Slough.

Other regional water quality concerns include one of the nation's worst oil spills at Unocal's Guadalupe Oil Field in the Santa Maria River watershed. Nutrients and pathogens impact the San Lorenzo River Basin, from septic systems, horse corrals, and urban runoff, as well as erosion from logging, urban development, and road maintenance. Groundwater basins that are impacted by salinity include the Hollister area, the Carrizo Plain, the Santa Maria and Cuyama valleys, San Antonio Creek Valley, portions of the Santa Ynez Valley, and the Goleta and Santa Barbara areas.

California American Water is the primary water supplier to most of the Monterey Peninsula, and the Carmel River is its primary source of water. In 1995, a major State Water Resources Control Board order ruled that the company did not have a legal right to roughly 70 percent of the surface water it had been diverting from the Carmel River. As a result, California American Water has been forced to take more water from wells that draw from groundwater below the lower valley, in order to keep as much water as possible in the river. Essentially no surface water is now taken from the river's two reservoirs behind the San Clemente and Los Padres dams for municipal supply purposes. To offset this lack of surface water, California American Water and the Monterey Peninsula Water Management District have each made separate proposals for seawater desalination plants that would produce enough water to satisfy the state order and put a minimum of 8,000 acre-feet of water a year back into the Carmel River. However, as proposed neither project will be able to supply water for future urban growth and in-fill housing needs.

Accomplishments

Many water districts have programs to monitor, evaluate, and better manage their groundwater resources. Watershed programs are under way to reduce nonpoint pollution, reduce stream erosion, and improve riparian vegetation. For example, the Coastal Watershed Council was formed in response to

other regions are of concern, because such programs have the potential to aggravate overuse of the groundwater resources. Before new out-of-basin water transfers are considered, local water interests would like to ensure that their existing surface water rights are protected, and that equitable use of groundwater supplies are established to sustain the local agricultural economy and natural resource needs.

With a growing demand for high quality water throughout the state, water transfers are being evaluated more closely as a means to move water out of the Sacramento River region to other parts of the state. In response, several counties in the region have passed laws that regulate or impede water transfers that would move water outside of their county, especially when a proposed transfer program has a groundwater component. In some counties, for instance, transferees are required to mitigate for third-party impacts associated with this type of water transfer and transfers require a permit approved by the Board of Supervisors or its designee. In other counties, transferring groundwater outside of the county is prohibited by local ordinances.

Water Quality

Surface water quality in the watershed is generally good, making the Sacramento River one of the most desirable water sources in the state. Nonetheless, turbidity, rice pesticides, and organophosphate pesticides such as diazinon affect fisheries and drinking water supplies. The decline of fisheries in the Sacramento River is in part related to water quality problems on the river's main stem: unsuitable water temperature, toxic heavy metals, such as mercury, copper, zinc, and cadmium from acid mine drainage, pesticides and fertilizer in agricultural runoff, and degraded spawning gravels. Holding of rice field drainage, allowing for degradation or rice herbicides, has effectively addressed this water quality concern among downstream water users, in particular, the city of Sacramento. In the Cache Creek watershed, Clear Lake suffers from large mercury, sediment, and nutrient loadings, the latter leading to nuisance algae blooms. Along with a few select other water bodies, the basin plan specifically prohibits direct discharges of wastes into Folsom Lake and the lower American River downstream to its confluence with the Sacramento; waste discharges from houseboats on Shasta, Clear Lake, and in the Delta are also banned. High density recreation use of Whiskeytown and Shasta lakes may be contributing to high bacteria levels in these two reservoirs.

In its triennial review, the Central Valley Regional Board identified mercury loads, a legacy of California's gold mining heritage, as one of the most significant water quality problems in the region. In particular, the Cache Creek watershed is the major source of mercury to the Delta; to a lesser extent, mercury is also a concern in Lake Berryessa and Marsh Creek Reservoir. An organic form of mercury, methylmercury, is a neurotoxin that is especially dangerous to fetuses and infants, attacking the central nervous system and causing an array of developmental and other problems. Because of methylmercury's bioaccumulative properties, several water bodies in the Sacramento River region have fish consumption advisories. Pesticide management and agricultural water discharge has recently come into the limelight with the Central Valley Regional Water Quality Control Board's decision to eliminate waivers associated with agricultural discharge. Coalitions in the region are forming partnerships to address this issue through a watershed approach as provided for by the Regional Board and affirmed by the State Water Resources Control Board in their review of the Irrigated Lands Conditional Waiver. Stakeholders in the region are working to find a solution that encompasses the protection of public health, meets current and future water quality regulations, and allows for a sustainable agricultural economy.

Groundwater quality in the Sacramento River Region is generally good, though there are local groundwater problems. Naturally occurring salinity impairs wells at the north end of the Sacramento Valley. Groundwater near the Sutter Buttes is impaired because of local volcanic geology, and hydrogen sulfide is a problem in wells in the geothermal areas in the western part of the region. Human-induced impairments, like nitrate, are generally associated with agriculture and septic tanks; the latter is especially an issue in Butte County, where 150,000 of its 200,000 residents rely upon individual septic systems. Septic tanks are often inappropriately sited in shallow, unconfined or fractured hard rock aquifers, where insufficient soil depth is available for necessary leaching. Heavy metals from historical burn dumps also contaminate groundwater locally. In the Sierra foothills there is potential for encountering uranium- and radon-bearing rock or sulfide mineral deposits containing heavy metals. Perchlorate, previously used as an oxidizer or booster for solid rocket fuel and now a human health concern in domestic water, has contaminated wells in Rancho Cordova, near Sacramento.

Accomplishments

The goals and objectives of the CBDA program play a prominent role in regional efforts to improve water supply reliability, water quality and ecosystem restoration. Current activities and accomplishments are summarized in the following sections.

Water Supply Reliability

Past concerns with potential groundwater exports have spurred numerous counties to enact groundwater ordinances to regu-

Challenges

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quality water from the Delta to migrate underground toward eastern San Joaquin County. Several municipal wells in western Stockton have been abandoned because of the resulting decline in groundwater quality. Several existing and proposed measures can help counteract potentially serious overdraft conditions in some areas of the region, such as groundwater spreading basins and recharge programs. In some situations, the over-irrigation of crops with extra surface water in wet years and seepage from unlined canal systems can aid in groundwater recharge.

The major water quality problems of the San Joaquin River region are a result of many factors, including depleted freshwater flows, municipal and industrial wastewater discharges, salt loads from agricultural drainage and runoff, and other pollutants associated with long-term agricultural irrigation and production, including nutrients, selenium, boron, and organophosphate pesticides. The entire Central Valley, which includes the San Joaquin River, as well as the Sacramento River and Tulare Lake basins, has 40 water bodies that are impaired due to agriculture, including 800 miles of waterways, and 40,000 acres in the Delta. In its most recent triennial review of its basin plan, the Central Valley Regional Water Quality Control Board identified high priority problems as salinity and boron discharges to the San Joaquin River, low dissolved oxygen problems in the lower San Joaquin River, control of organophosphorous pesticides, and the need for stronger policies to protect Delta drinking water quality.

High salinity is a problem in the San Joaquin River basin because of the greatly altered flows of the river, most of which is diverted from its natural course at Friant Dam. In addition, imported irrigation water from State and federal projects annually transport more than a half million tons of salts into the west side of the San Joaquin River region. Water released from New Melones Reservoir on the Stanislaus River is used to help meet the salinity and dissolved oxygen requirements at Vernalis on the lower San Joaquin River. Agricultural drainage and discharges from managed wetlands are already regulated in the 370,000 acre Grasslands watershed, which contributes high levels of salts, selenium, boron, and nutrients to Mud and Salt Sloughs. These sloughs are some of the primary contributors of selenium to the San Joaquin River. Dairies, stockyards, and poultry ranches are also a concern in the region because they generate waste products including pathogens, nutrients, salts, and emerging contaminants that enter the waterways. Some dairies and other agricultural operations are already subject to regulatory review. Water releases from managed wetlands, part of State and federal wildlife refuge system, also can discharge salts and nutrients. The erosion of westside streams is the primary source of organochlorine pesticides in the San Joaquin River.

Migrating and spawning salmonids face high temperatures in the Stanislaus, Tuolumne, and Merced rivers downstream from dams during certain times of the year, depending on hydrologic and water supply conditions. Contamination of fish is also a concern in these three rivers as well as the main stem of the San Joaquin River. For example, the Central Valley Regional Water Quality Control Board cites one study of a 43-mile reach of the San Joaquin River (between the confluences with the Merced and the Stanislaus rivers) to be toxic to fish about half the time. In the lower San Joaquin River, low dissolved oxygen levels in the Stockton Deepwater Ship Channel are attributable to warm temperatures, low flows, nutrients, and channel configuration. This portion of the river with low dissolved oxygen is potentially a barrier to fall-run Chinook salmon migrating upstream to the Merced, Tuolumne, and Stanislaus rivers to spawn.

Groundwater quality throughout the region is generally adequate for most urban and agricultural uses. However there are roughly 1,000 square miles overlying groundwater along the western edge of the valley floor that is contaminated with high salinity from naturally occurring marine sediments of the Coast Range. The salinity of groundwater in the region can increase as a result of agricultural practices in which the evapotranspiration of crops and wetlands leaves behind the majority of salts contained in the imported water. In addition, high water-table conditions underlying marginal lands along the west side of the San Joaquin River region contribute to subsurface drainage problems. In order to maintain a salt balance in the root zone, much of this salt is leached into the groundwater. For aesthetic purposes, such as taste, Department of Health Services regulations recommend that drinking water contain less than 500 mg/L of salinity as measured by total dissolved solids. For agricultural uses, water with a salinity of less than 450 mg/L total dissolved solids is generally considered acceptable. While the above Department of Health Services recommendation is adopted by reference into the Regional Water Quality Control Board's basin plan to protect domestic use of groundwater, the basin plan contains no numerical salinity objectives for protection of agricultural beneficial uses.

Nitrates that are generated from the disposal of human and animal waste products or from the inefficient application of fertilizer and irrigation water have contaminated 200 square miles of groundwater in the region and do threaten some domestic water supplies. Pesticides have contaminated 500 square miles of groundwater basins, primarily in agricultural areas on the east side of the San Joaquin Valley, where soil permeability is higher and the depth to groundwater is more shallow. The entire Central Valley is home to about 500,000

single-family residential septic systems, each with leach fields that discharge to the groundwater. The most notable agricultural contaminant detected in groundwater samples from this region is dibromochloropropane, DBCP, which is a banned nematocide that has been found mostly along the State Route 99 highway corridor. There are also roughly 200 square miles of groundwater basins that are contaminated by naturally occurring selenium.

As of January 1, 2003, the passage of Senate Bill 390 ended the previously used conditional waivers for waste discharge requirements for 23 types of waste discharges, including irrigated agriculture and logging. A previously submitted petition from three environmental groups had requested that these waivers be rescinded because of concerns about pesticides in discharges. Unlike the federal Clean Water Act, which specifically exempts agricultural discharges from regulation, California's Porter-Cologne Water Quality Control Act allows a waiver from regulation only if it does not conflict with the public interest. The Central Valley Regional Water Quality Control Board granted such a waiver to irrigated lands in 1982, exempting the agricultural discharges using the waste discharge requirements process. That waiver did have conditions imposed, but because of a lack of staff resources, the regional board did not monitor or review compliance. Senate Bill 390 still allows the continuation of waivers, but only when specifically renewed by the regional board and when subject to a five-year review.

In relation to other regions of the State, water discharges from irrigated lands have their greatest impact to water quality in the Central Valley, which covers 40 percent of California's land area and contains 7-million irrigated acres and more than 25,000 individual agricultural dischargers. As an interim measure in July 2003, the Central Valley regional board adopted two types of conditional waivers for such discharges into surface water, one for "coalition groups" and the other for individuals. These waivers applied to surface runoff or tailwater, excess water diverted but not used, subsurface drainage to lower the water table for growing, and storm water runoff. Additional commodity-specific and low-threat waivers are also under consideration. The requirements contained in these new waivers include water quality monitoring and implementation of best management practices or management measures to control pollution. This new waiver program, which focuses on data collection, monitoring for toxicity, and drinking water constituents will expire on December 31, 2005. Subsequently, a 10-year implementation program is envisioned that would fully protect the state's waters from quality problems associated with discharges from irrigated lands in order to meet water quality objectives.

Although existing agricultural land use practices affect water quality now, the expanding urbanization of Central Valley cities will generate new and different water quality problems in the future. In anticipation of these problems, the Central Valley regional board has recently started requiring many municipal wastewater discharge systems to construct and operate more costly tertiary wastewater treatment facilities.

Accomplishments

The Reclamation Board of California and the U.S. Army Corps of Engineers in coordination with a broad array of stakeholders, have recently developed a new Comprehensive Plan for the flood management system of the Sacramento and San Joaquin River regions. Rather than a physical plan for flood facilities and systems, this Comprehensive Plan recommends an approach to design and implement projects in the future in ways that would reduce damage from flooding and restore the ecosystem.

The Millerton Area Watershed Coalition is conducting a comprehensive assessment of the San Joaquin River watershed and will evaluate activities that need to be changed to better protect and care for the watershed. The information and recommendations from this study will be developed into an outreach program to promote the protection and enhancement of the watershed, including the economic and environmental well-being of the communities within it. This comprehensive assessment is sponsored by the CALFED Watershed Program and coordinated through the U.S. Bureau of Reclamation.

The San Joaquin River Group Authority was formed in the 1990s in response to the development of the Sacramento – San Joaquin Bay Delta Water Quality Control Plan by the State Water Resources Control Board. The water quality control plan was adopted in 1995 and included significant water quality and flow standards for the lower San Joaquin River. The goals of the authority are to investigate fishery and water quality issues on the San Joaquin River and develop solutions that will protect the salmon fishery and improve water quality. To respond to water quality issues, the regional board is studying agricultural discharge quality controls, and may consider the use of agriculture waivers at a watershed level. Additional water quality monitoring will be necessary to address the various water quality problems on the Lower San Joaquin River. Landowners will have the choice of participating in water quality monitoring and improvement programs on a watershed level or on an individual basis. The watershed approach can be used to identify and address "hot spots" by working directly with individual landowners or encouraging individuals to work together to find solutions.

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In general, groundwater quality throughout most of the region is suitable for most urban and agricultural uses with only local impairments, such as leaking underground storage tanks. Groundwater in the Livermore Valley and Niles Cone (southern Alameda County) basins has high levels of total dissolved solids, chloride, boron, and hardness; such that both Zone 7 and ACWD are implementing wellhead demineralization projects to improve the quality of this groundwater supply. In the Santa Clara Valley region, some of the underlying groundwater supplies are threatened by pollutants from various industrial activities and historical agriculture. SCVWD works to protect the quality of these supplies by aggressively responding to pollution threats such as MTBE, PCE, TCE, and prechlorate. These pollution threats are individually identified and evaluated in order to prevent or mitigate groundwater contamination. Elsewhere, groundwater in Petaluma Valley and the Gilroy-Hollister Valley has high levels of nitrate, which adversely impacts the ability to use domestic wells for drinking water purposes. Groundwater recharge projects and the use of imported water have effectively halted land subsidence in most areas, and have successfully stopped or reversed seawater intrusion into aquifers around the bay.

Wetlands and Watershed Management

Although there are serious problems facing San Francisco Bay, its wetlands, and watershed, there has been a concerted effort over the last 20 years to restore the Bay. Some of the major planning and implementation efforts are described here. Expenditures to date on ecosystem restoration include $32 million in Bay-Delta Program funding, along with significant local, state and federal funding.

The Comprehensive Conservation and Management Plan, completed by the San Francisco Estuary Project in 1993, presents a blueprint of 145 specific actions to restore and maintain the chemical, physical, and biological integrity of the bay and Delta. The CCMP has been implemented over time by a wide variety of local, state and federal partners including the CALFED Bay-Delta Program. The Estuary Project regularly updates the priorities for CCMP implementation and prepares a report on the state of the estuary. In addition, the Estuary Project prepares Bay-Delta Report card that identifies many of the restoration projects under way to track progress implementing the CCMP. The most recent list of priorities identified by Estuary Project is:

- Reduce the impact of invasive species on the estuary through prevention, control, eradication, and education.
- Expand, restore, and protect bay and Delta wetlands and contiguous habitats. (These two items were both identified as top priorities.)
- Protect and restore watersheds, including promoting creek restoration, throughout the estuary.
- Create "incentives" that motivate governments, landowners, businesses and communities to protect and restore the estuary.
- Minimize or eliminate pollution of the estuary from all sources.

Agricultural runoff and drainage are also the main sources of nitrate, pesticides, and selenium that endanger groundwater and surface water beneficial uses. The basin also has a relatively large concentration of dairies that contribute microbes, salinity, and nutrients to both surface water and groundwater. Nitrate has contaminated more than 400 square miles of groundwater in the Tulare Lake Basin. In addition, oilfield waste has impacted water quality. According to the Regional Water Quality Control Board's basin plan, there are more than 800 oilfield waste dischargers, of which 250 are regulated under waste discharge requirements.

Naturally occurring arsenic as well as pesticides and industrial chemicals have contaminated some groundwater supplies that are used for domestic water in the region. For example, the lone well that provides water for city of Alpaugh's 760 residents (40 percent of whom are defined as living at poverty levels) contains unsafe levels of naturally occurring arsenic. By 2006, new federal and State rules will force more than 50 central San Joaquin Valley communities, including Hanford, Pixley, and Tranquility, to cut arsenic levels to one-fifth the current allowable levels. The contamination of 40 wells in Fresno due to high levels of dibromochloropropane (DBCP), trichloroethylene (TCE), and other organic compounds resulted in the installation of activated charcoal filtration systems to remove these contaminants.

The quality of local surface water from the Kings River and the San Joaquin River (diverted south through the Friant-Kern Canal) is generally considered excellent for irrigation, municipal, and industrial uses. However the Central Valley Regional Water Quality Control Board has specifically identified salinity in the lower Kings River as a water quality priority in its 2002 Triennial Review. On the west side of the region, the California Department of Water Resouces (DWR) has sought solutions to the flooding on the Arroyo Pasajero, which threatens the California Aqueduct. The aqueduct, which forms a barrier to arroyo floodwaters and sediment flow, is at risk of failure during major rainstorms in the watershed. Also, the naturally occurring asbestos in the arroyo sediments that enter the aqueduct during floods has raised questions of possible health risks. Both Panoche and Silver creeks contribute large sediment loads to the valley floor, and Panoche Creek also contains elevated levels of selenium.

For many years, portions of the Tulare Lake region have experienced significant drainage problems. The need for proper drainage of agricultural return flows has long been recognized by federal and State agencies. Planning for drainage facilities to serve the San Joaquin Valley began in the mid-1950s. The poorly drained area is concentrated along the western side of the San Joaquin Valley from Kern County north into the San Joaquin River Hydrologic Region. Although the San Joaquin Valley has some of the most productive agricultural lands in the world, much of the west side of the valley is plagued by poor subsurface drainage that adversely effects crop productivity. Between 1977 and 1991, the area affected by saline shallow groundwater on the west side doubled to about 750,000 acres. At present, a substantial portion of the valley, about 2.5 million acres, is threatened by saline shallow groundwater resulting from the lack of proper drainage.

In addition, drainage water is sometimes contaminated with naturally occurring, but elevated, levels of selenium, boron, and other toxic trace elements that threaten the water quality, environment, and fish and wildlife. Water planners had originally envisioned a master surface water drain to remove this poor quality water, but that proposal was never implemented. The U.S. Bureau of Reclamation has an obligation to provide agricultural drainage service to farm lands served by the CVP on the west side of the valley. To convey this sometimes contaminated drainwater more directly to the San Joaquin River and away from the sensitive San Luis National Wildlife Refuge Complex, a portion of the San Luis Drain was reopened in September 1996 as part of the Grassland Bypass Project. The San Luis Drain was modified to allow drainage through six miles of Mud Slough, a natural waterway that passes through the San Luis National Wildlife Refuge Complex and a section of the North Grassland Wildlife Area.

Monitoring the quality of San Joaquin Valley agricultural drainage water began in 1959 as a cooperative agreement between the DWR and the University of California. In 1984, the San Joaquin Valley Drainage Program was established as a joint federal and State effort to investigate drainage and drainage-related problems and identify possible solutions. In September 1990 the San Joaquin Valley Drainage Program summarized its findings and presented a plan to manage drainage problems in a report titled "A Management Plan For Agricultural Subsurface Drainage and Related Problems in the Westside San Joaquin Valley." In December 1991 several federal and State agencies signed a memorandum of understanding and released an implementation strategy titled "The San Joaquin Valley Drainage Implementation Program." The purpose of the 1991 MOU and its strategy document was to coordinate various programs in implementing the 1990 recommendations.

In 1997 member agencies of the San Joaquin Valley Drainage

Crowley Reservoir, on Owens River south of Mono Lake, have contributed to low dissolved oxygen levels in the reservoir. Water quality and quantity are inherently related in the Owens River watershed because of the large exports of surface and groundwater to the city of Los Angeles. Arsenic, a known human carcinogen, is a health concern in the basin, and therefore, in Los Angeles as well, especially with the recently proposed lower drinking water standard for this chemical. The vast majority of public water supply wells do meet drinking water standards. However, in places where these standards are exceeded, it is most often for TDS, fluoride, or boron. Several domestic water supply wells in the Barstow area have been closed due to historical contamination from industrial and domestic wastewater. Three military installations in the southwestern part of the region are on the federal Superfund National Priorities List because of volatile organic compounds and other hazardous contaminants, and the PG&E chromium groundwater contamination site in Hinkley is also within this region. In its triennial review, the Lahontan Regional Water Quality Control Board identified the need for site-specific ammonia objectives for Paiute Ponds and Amargosa Creek in Los Angeles County. Also, the monitoring and cleanup of chromium in groundwater and the cleanup of sites contaminated by mining wastes are additional water quality needs for this region.

In the Owens Valley, a restoration project is in operation to mitigate for dust generated as a result of the City of Los Angeles diverting water from the Owens Lake into its aqueduct. The barren playa on Owens Lake at one time regularly exceeded federal standards for airborne particulate pollution due to the prevailing winds moving across the dry lakebed. After years of litigation, the Los Angeles Department of Water and Power is using water from the aqueduct to irrigate large tracts of lakebed to reduce the dust hazard in the area. To date significant reductions in airborne pollution have dramatically improved conditions at Owens Lake. The full implementation measures are expected to occur by January 2007.

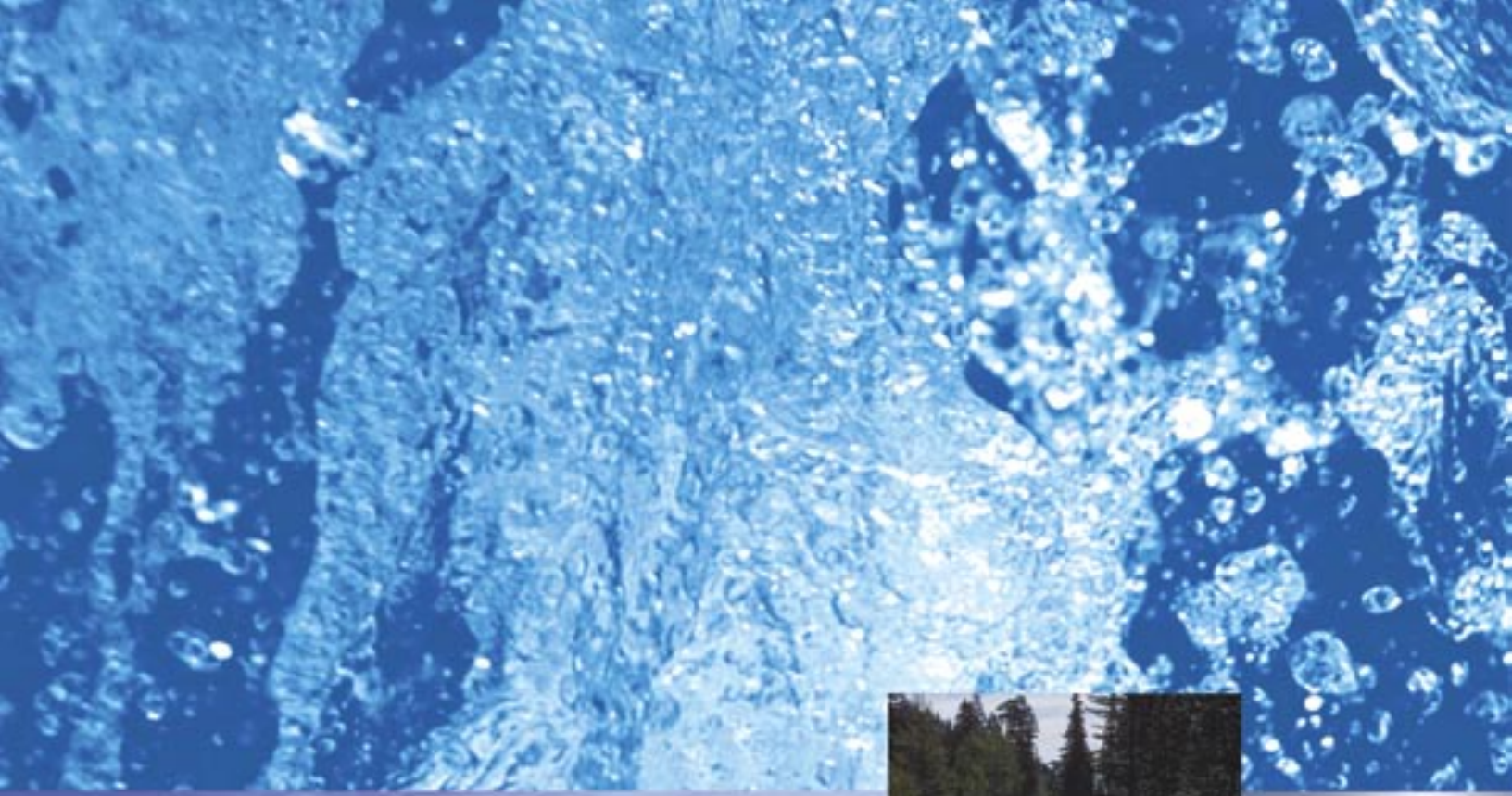
In the vicinity of Ridgecrest, the Indian Wells Valley Water District has been involved in a cooperative study and project to alleviate declining groundwater levels and to manage water quality problems. The proposal is evaluating the availability and use of imported water for groundwater recharge. Studies are being conducted to determine where recharge would be most feasible. Additional studies will also attempt to determine the age and source of deep groundwater aquifers, which may contain higher levels of minerals and potential water quality issues.

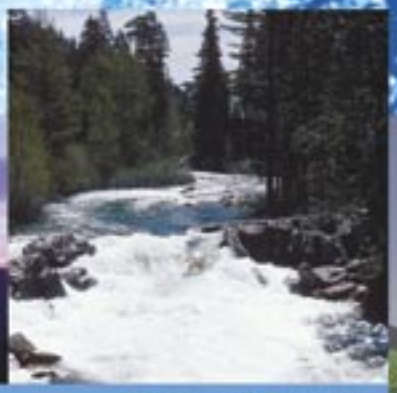
Accomplishments

The region has developed solutions to two major water issues during the past 10 years, which are the overuse of the Mojave River Valley groundwater basin and changes to water diversions from the Owens River/Mono Basin by the city of Los Angeles. The Mojave River groundwater basin was in overdraft since the early 1950s, which led to court adjudication in 1996 and the appointment of the Mojave Water Agency as the basin watermaster (see Box 3-2). The Los Angeles Department of Water and Power is involved with many restoration projects for the Owens River and Mono Basin. In 1993, LADWP began final flow releases to restore Mono Lake to a water surface elevation of 6,392 feet. By 2003, Mono Lake elevation had reached 6,382, a level where LADWP can export 16,000 acre-feet per year. LADWP has developed plans to help ranchers manage grazing practices in the Crowley Lake tributary area. The Owens Gorge Rewatering Project and the Lower Owens River Project are two other significant restoration programs being implemented by LADWP to restore the river after 50 years of dewatering.

In 1994, Mojave Water Agency completed its Morongo Basin project, which is a 70-mile pipeline from the East Branch of the SWP to the Morongo Basin. This system has a capacity of 100 cubic feet per second or nearly 72,300 acre-feet per year to the Mojave River, and then reduces to a capacity of 15,700 acre-feet per year to Morongo Basin and Johnson Valley. The pipeline allows MWA to bring SWP water into part of its almost 5,000-square-mile service area. MWA has been delivering about 3,500 acre-feet per year to the Hi-Desert Water District since completion of the Morongo Basin Pipeline. In 1997, MWA began construction of another 61-mile Mojave River Pipeline with 67,900 acre-feet per year capacity to bring imported water to the Barstow area and neighboring communities downstream to the Newberry Springs area. This 61-mile pipeline has been built to a recharge facility along the river near the community of Daggett. Recharge facilities have also been built along the river near the communities of Hodge and Lenwood. When completed, the final reaches of the pipeline will extend to a groundwater recharge facility in the Newberry Springs area.

Mojave Water Agency has entered into a creative multiyear groundwater banking and exchange agreement with the Solano County Water Agency in northern California. During any wet year, SCWA can bank up to 10,000 acre-feet of its annual SWP water in MWA's groundwater basin, not to exceed a total balance of 20,000 acre-feet. During droughts, SCWA can take part of MWA's SWP water by exchange, using the North Bay Aqueduct to divert the water from the Sacramento-San Joaquin Delta. MWA has developed the ability to store





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Volume 3

California WaterPlan

A FRAMEWORK FOR ACTION Update 2005

Department of Water Resources Bulletin 160-05 December 2005

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The final California Water Plan Update 2005 and the Water Plan Highlights briefing book were completed in December 2005. The five volumes of the update, the Highlights document, and the introductory video, "Water for Tomorrow," are contained on the CD and DVD below and also available online at www.waterplan.water.ca.gov.

Printed copies are available. The Highlights briefing book, which contains the CD and DVD, is available at no charge. Volume 1, 2, and 3 are $15 each. Volume 4 is $50. For printed copies, contact:

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