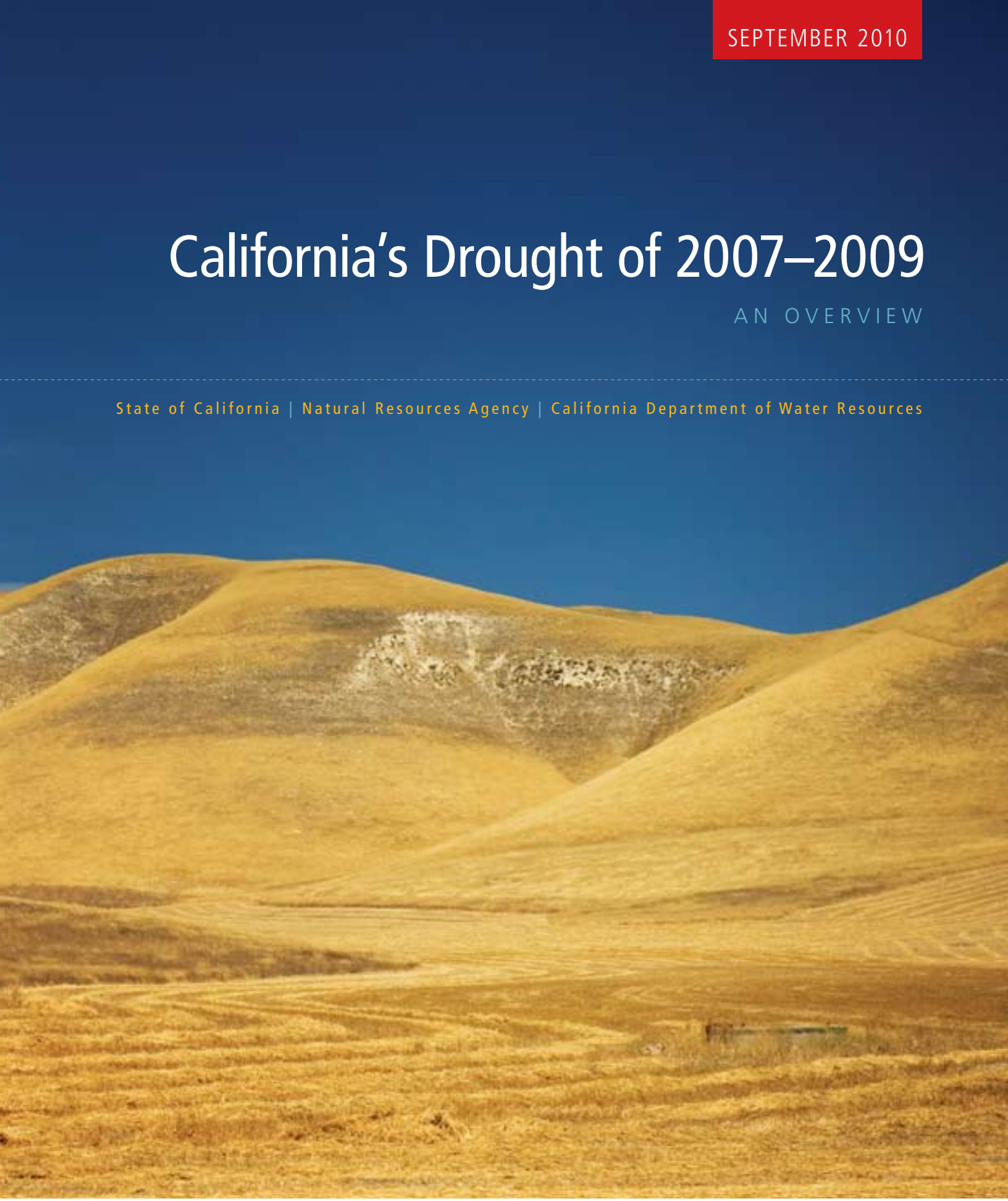
SEPTEMBER 2010

California's Drought of 2007–2009

AN OVERVIEW

State of California | Natural Resources Agency | California Department of Water Resources



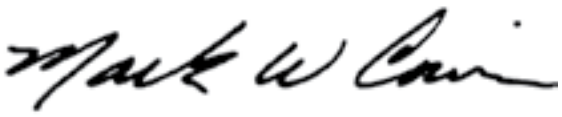
Foreword

This summary report was prepared to document drought conditions and impacts experienced during 2007–2009. Earlier versions of the report were prepared as web-published documents to assess drought conditions and status, in response to a commitment made to the Governor's Office as part of implementation of a February 2009 proclamation of a state of emergency for statewide water shortage. The focus of this report is on water supply conditions and related information, together with review of drought impacts.

California experienced three consecutive dry years during 2007–09. These years also marked a period of unprecedented restrictions in State Water Project (SWP) and federal Central Valley Project (CVP) diversions from the Sacramento-San Joaquin Delta to protect listed fish species. Statewide hydrologic conditions overall were not as severe during 2007–09 as compared to prior droughts of statewide significance — the major difference between 2007–09 and prior droughts was the severity of SWP and CVP delivery reductions, which began immediately in the first year of the drought.

The 2007–09 drought was California's first drought for which a statewide proclamation of drought emergency was issued. Drought impacts were most severe on the west side of the San Joaquin Valley. CVP deliveries for that area were at 10 percent of contractors' allocations in 2009, following deliveries of 40 percent in 2008 and 50 percent in 2007. The resulting water shortages caused significant economic impacts to agriculture and to rural communities dependent on agriculture for employment. Demands for social services there — food banks and unemployment assistance programs — stretched the ability of local agencies to respond, and resulted in a first-ever state emergency proclamation (for Fresno County) linking drought with provision of social services.

This review of the 2007–09 drought illustrates several important points — the need for continued drought preparedness planning, the importance of ongoing hydroclimate monitoring, and the need to develop data and methodologies for quantifying drought socioeconomic impacts. Also clearly evident is the fact that drought preparedness for California must include managing the problems confronting the Bay-Delta. Sustainability — for water diverters and for the ecosystem — is a necessity. Until Delta water management conditions can be improved, California's vulnerability to drought will remain elevated.



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Acronyms

ACWA ..... Association of California Water Agencies
AF ..... Acre-Feet
AWIFS ..... Advanced Wide Field Sensor
Bay-Delta ..... San Francisco Bay Sacramento-San Joaquin River Delta
BLM ..... U.S. Bureau of Land Management
CAL FIRE ..... California Department of Forestry and Fire Protection
CALEMA ..... California Emergency Management Agency
CAT ..... Climate Action Team (State of California)
CDPH ..... California Department of Public Health
CIMIS ..... California Irrigation Management Information System
CVP ..... Central Valley Project
CVPIA ..... Central Valley Project Improvement Act
DFG ..... Department of Fish and Game
ENSO ..... El Niño-Southern Oscillation
FERC ..... Federal Energy Regulatory Commission
GRACE ..... NASA's Gravity Recovery and Climate Experiment
IRWM ..... Integrated Regional Water Management
MAF ..... Million Acre-Feet
MWD ..... Metropolitan Water District
NASA ..... National Aeronautics and Space Administration
NASS ..... National Agricultural Statistics Service
NMFS ..... National Marine Fisheries Service
NWS ..... National Weather Service
OCAP ..... Operational Criteria and Plan
PFMC ..... Pacific Fishery Management Council
SCWA ..... Sonoma County Water Agency
SDWA ..... Safe Drinking Water Act
SWP ..... State Water Project
SWRCB ..... State Water Resources Control Board
TAF ..... Thousand Acre-Feet
USACE ..... U.S. Army Corps of Engineers
USBR ..... U.S. Bureau of Reclamation
USDA ..... U.S. Department of Agriculture
USFWS ..... U.S. Fish and Wildlife Service
USGS ..... U.S. Geological Survey
UTC ..... Coordinated Universal Time
UWMP ..... Urban Water Management Plan
WWD ..... Westlands Water District

1 Introduction

The purpose of this report is to document drought conditions and impacts experienced during 2007–2009. Earlier versions of the report were prepared as web-published documents to assess drought conditions and status, in response to a commitment made to the Governor's Office as part of implementation of a February 2009 proclamation of a state of emergency for statewide water shortage. The focus of this report is on water supply conditions and related information for 2007–09, together with review of drought impacts, where that information is available.

Water years 2007–09 were the 12th driest three-year period in the state's measured hydrologic record, based on the Department's 8-station precipitation index. Water years 2007–09 also marked a period of unprecedented restrictions in State Water Project (SWP) and federal Central Valley Project (CVP) diversions from the Sacramento-San Joaquin River Delta (Delta) to protect listed fish species, a regulatory circumstance that significantly exacerbated the impacts of hydrologic drought for customers of those water projects.

Water supply impacts of a single dry year such as 2007 would typically be minimal from a statewide perspective (see CDWR, 2008); however, Delta export restrictions resulted in reduced CVP and SWP deliveries. Moreover, the devastating wildfires that laid siege to Southern California in 2007—characterized as some of the costliest and most damaging in U.S. history—were a reminder that vulnerability to drought extends beyond impacts to developed water supplies. Subsequently, a dry 2008 combined with restrictions in SWP and CVP Delta diversions

Low San Luis Reservoir levels in summer 2008 reflect the use of stored water to compensate for reduced ability to export water from the Delta.

from the Delta led to issuance of Executive Order S-06-08 and a Governor's emergency proclamation for selected Central Valley counties (see Appendix) in June 2008.

Next, a U.S. Fish and Wildlife Service (USFWS) biological opinion for Delta smelt released in December 2008 called for measures that would result in an estimated 20 to 30 percent reduction in SWP and CVP Delta diversions on average. Observed precipitation in January 2009 was only about one-third of average, indicating that the threat of a third dry year was already a possibility. These conditions, coupled with statewide reservoir storage approximately 65 percent of average, led to the Governor's proclamation of a statewide water shortage state of emergency in February 2009 (see Appendix).

The 2007–09 drought was the first in California's water history for which a statewide proclamation of emergency was issued. It was also the first (excluding consideration of the so-called Dustbowl Drought of 1929–34) during which observed locally significant socioeconomic impacts resulted in emergency response actions related to social services programs (food banks and unemployment assistance). The greatest impacts of the 2007–09 drought were observed in the Central Valley Project (CVP) service area on the west side of the San Joaquin Valley, where hydrologic conditions combined with reduced CVP exports resulted in substantially reduced water supplies — 50 percent supplies in 2007, 40 percent in 2008, and 10 percent in 2009 — for CVP south-of-Delta agricultural contractors. Small communities

Water Year 2010 Comparison

By summer 2010 (well into water year 2010), hydrologic conditions had improved significantly in comparison to the three prior dry years. Late spring storms in 2010 brought statewide precipitation to slightly above average levels and resulted in above average runoff forecasts for all major Sierra Nevada watersheds. By the end of June 2010, statewide runoff was forecasted to be 121 percent of average. Storage in most major in-state reservoirs had rebounded; among major CVP and SWP reservoirs only two had storage capacities of less than 90 percent of historical average: Trinity Lake (83 percent), and San Luis Reservoir (88 percent). Storage in the SWP's Lake Oroville, which had lagged substantially behind that of other large Sierran reservoirs, had increased to 92 percent of average.

Long-term drought is continuing and reservoir storage remains well below normal in the interstate Colorado River system; however, there are no shortages to Lower Basin water contractors. Water project allocations remain substantially below normal for the SWP (50 percent of contractors' requested deliveries) and for parts of the CVP (45 percent for south of Delta agricultural contractors and 75 percent for south-of-Delta municipal contractors), reflecting Delta export restrictions to protect listed fish species. Shortfalls are also expected in USBR's Klamath Project, with California irrigators that receive water from Upper Klamath Lake expected to see about half of their historical supplies through a combination of lake releases and water bank groundwater pumping. The Upper Klamath Basin remains in hydrologic drought and faces Endangered Species Act-related diversion restrictions to protected listed fish species.

TABLE 1 – Drought Severity in the Sacramento and San Joaquin Valleys

	Sacramento Valley Runoff		San Joaquin Valley Runoff	
Drought Period	(MAF/yr)	(% average 1901–2009)	(MAF/yr)	(% average 1901–2009)
1929 – 34	9.8	56	3.3	56
1976 – 77	6.6	38	1.5	26
1887 – 92	10.0	57	2.8	48
2007 – 09	11.2	64	3.7	63

on the west side highly dependent on agricultural employment were affected by land fallowing due to lack of irrigation supplies, as well as by factors associated with current economic recession.

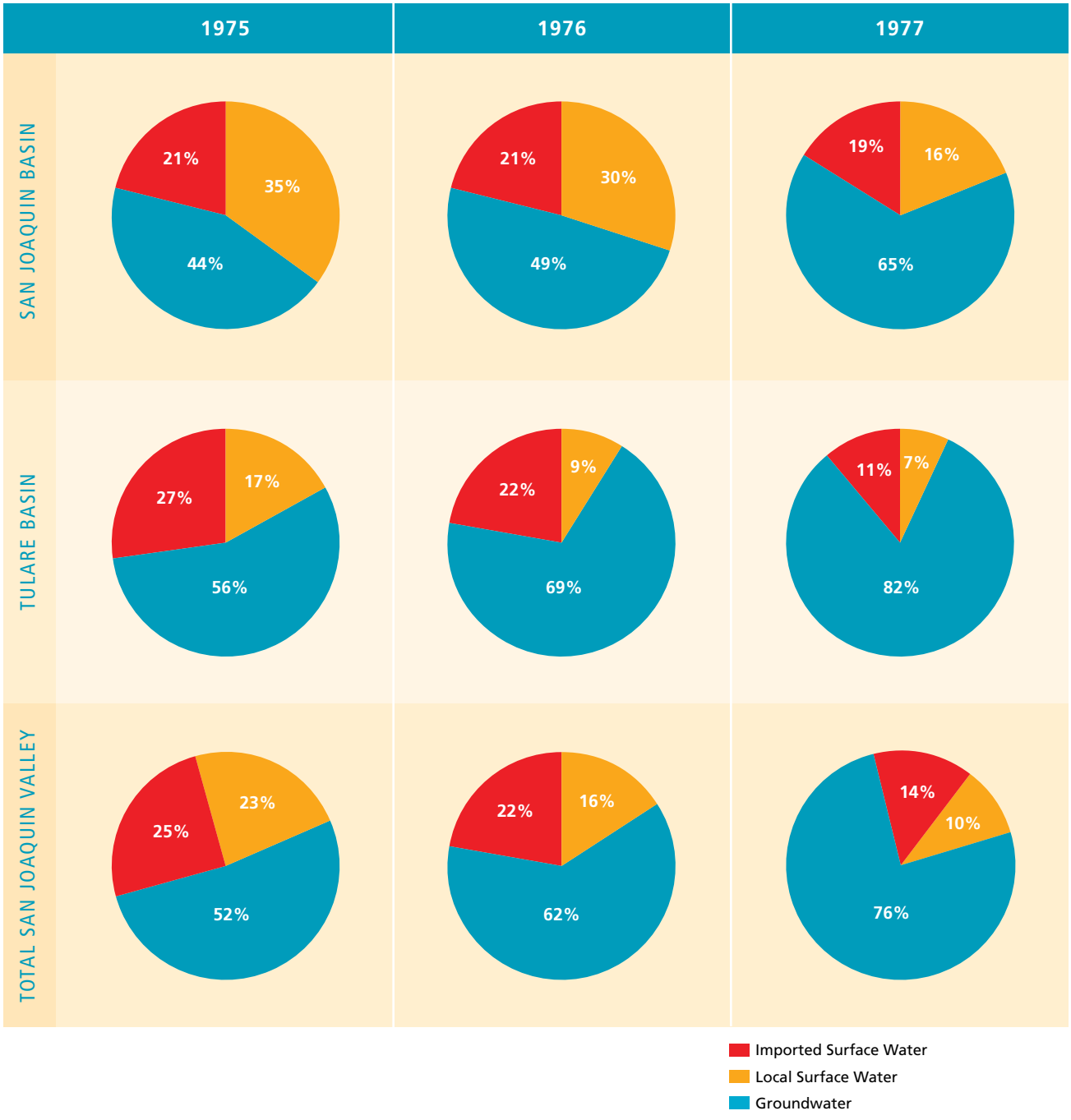
Estimating socioeconomic impacts of drought is difficult — there are no standardized methodologies, and data are often lacking. Unlike other weather-related disasters such as floods or hurricanes, droughts cause diffuse impacts to multiple sectors of a community or region over a period of time, rather than immediate impacts to facilities and infrastructure that can be easily and objectively quantified. This report provides impact information where such material may be available, but readily available data are limited.

COMPARISON WITH PREVIOUS DROUGHT PERIODS

Three twentieth century droughts were of particular importance from a water supply standpoint — the droughts of 1929–34, 1976–77, and 1987–92. **TABLE 1** compares these droughts with 2007–09 for the Sacramento and San Joaquin Valleys. The 1929–34 drought established criteria widely used in used in designing storage capacity and yield of large Northern California reservoirs, but California's land use characteristics and economic development at the time were so different from those of the present that comparison of impacts would not be meaningful. The 1976–77 drought, when statewide runoff in 1977 hit a record low of 15 million acre-feet (MAF), served as a wake-up call for California water agencies that were unprepared for major cut-backs in their supplies. Forty-seven of the State's 58 counties declared local drought-related emergencies at that time. It was estimated (DWR, 1978) that about 125,000 acres of irrigated cropland were fallowed due to water shortages in 1977, mostly in Fresno and Kern Counties, despite a significant increase in groundwater extraction to compensate for reduced surface water supplies **(FIGURE 1)**. Probably the most iconic symbol of the 1976–77 drought was

The emergency pipeline constructed across the San Rafael Bridge to bring water to southern Marin County. (see following page)

FIGURE 1 – Example of San Joaquin Valley Water Source Shift During 1976–77 Drought



construction of an emergency pipeline across the San Rafael Bridge to bring water obtained through a complex system of exchanges to Marin Municipal Water District in southern Marin County, the urban area hardest hit by the drought.

The 1987–92 drought was notable for its six-year duration and the statewide nature of its impacts. Water users served by most of the State's larger suppliers did not begin to experience shortages until the third or fourth year of the drought. The CVP and

USBR's empty 240 thousand acre-foot (TAF) capacity Twitchell Reservoir on the Cuyama River in San Luis Obispo County, shown in 1990. Until DWR's Coastal Aqueduct linked the southern part of the central coast region to outside sources, the region had no access to potential water transfers as a drought response measure.

SWP fully met contractors' delivery requests during the first four years of the drought, but were then forced by declining reservoir storage to cut back deliveries. In 1991, the single driest year of the drought, the SWP terminated deliveries to agricultural contractors and provided 30 percent of requested urban deliveries; the CVP provided 25–50 percent supplies to urban contractors and 25 percent to agricultural contractors. Twenty three counties had declared local drought emergencies at that time. Among larger urban areas, Santa Barbara experienced the greatest water supply reductions; its limited local resources (prior to construction of the SWP's Coastal Aqueduct) were insufficient to support residents' needs. In addition to adoption of measures such as a 14-month ban on all lawn watering, the City of Santa Barbara installed a temporary emergency desalination plant and an emergency pipeline was constructed to make SWP water available to southern Santa Barbara County. Shortages requiring external or emergency assistance were experienced by a number of small water systems in rural areas, especially in the north and central coast regions and in foothill/Sierra Nevada communities.

Changed CVP and SWP regulatory conditions in the Delta represent a major difference between 1987–92 (when the State Water Resources Control Board's (SWRCB's) Decision 1485 governed the projects' Delta operations) and 2007–09. In addition to operating under different SWRCB water right decisions, there were significant changes in ESA biological opinion requirements even within the 2007–09 drought years (see Appendix). The Central Valley Project Improvement Act of 1992, which reallocated 800 TAF of CVP yield for environmental purposes and affected other aspects of project operations was also not in force during the earlier drought. Changed Delta operational conditions affect not only CVP and SWP deliveries to project contractors but also the ability to use water transfers as a drought response tool.

The Department had established a drought water bank for the first time in 1991, in response to a

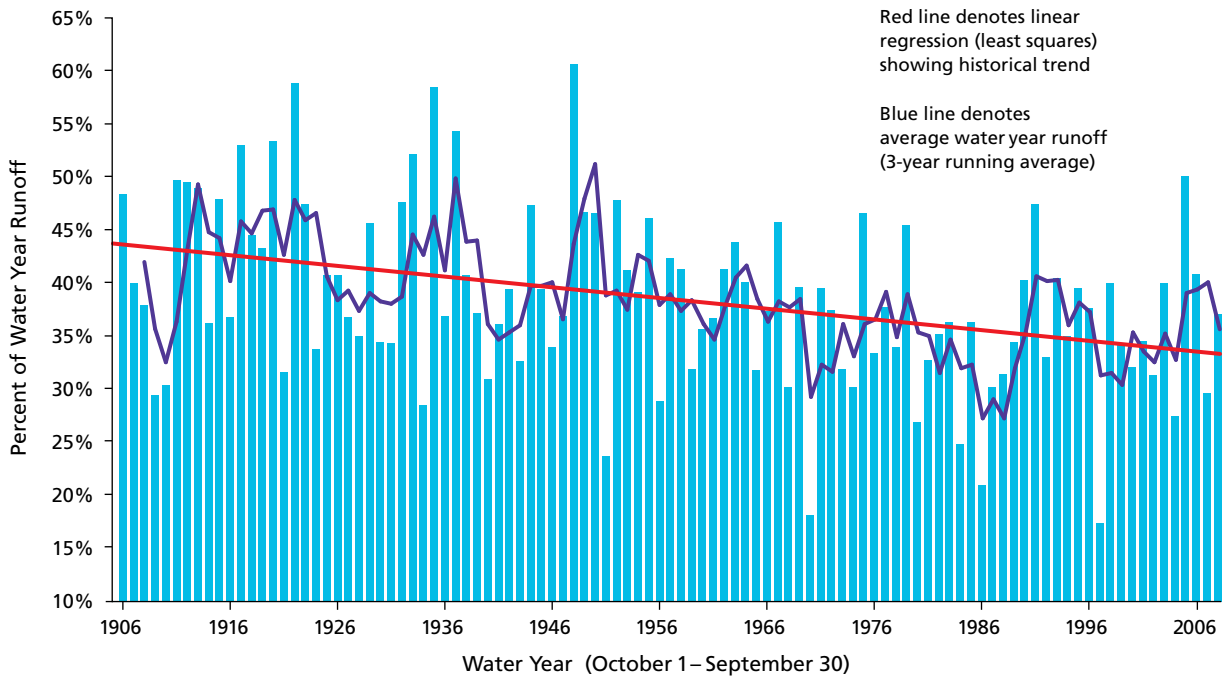


FIGURE 2 — Sacramento River April – July Runoff as Percent of Water Year Runoff

Governor's Executive Order. Development of a large-scale water transfers market highlighted the need for conveyance infrastructure and interconnections to be able to take advantage of transfers. It was necessary for the City and County of San Francisco, for example, (whose stored water supplies were at only about 25 percent of capacity in 1991) to construct turnouts on the SWP's California Aqueduct to be able receive drought water bank transfers.

Additional drought preparedness and response lessons were learned from the 1987–92 drought. Drought impacts experienced by local water suppliers highlighted the need to emphasize better drought planning; the Urban Water Management and Planning Act was amended in 1991 to require preparation of water shortage contingency plans. Drought preparedness improvements brought about through lessons learned on topics such as emergency system interconnections and water shortage contingency planning helped lessen urban sector impacts that might otherwise occurred in years such as 2007–09.

A CHANGING CLIMATE BACKGROUND

The 2007–09 drought occurred at a time when effects of anthropogenic climate change, such as the shift in timing of spring Sierra Nevada runoff, are becoming increasingly discernible in analysis of hydroclimate data (see **FIGURE 2**). Much past water resources planning and management in California was based on the assumption, implicitly or explicitly, that observed hydroclimate conditions from historical records of less than 100 years in length were generally representative of future climate variability. It is now understood that natural variability — evidenced by paleoclimate

When is a Shortage of Water a Drought?

Drought is a gradual phenomenon. There is no universal definition of when a drought begins or ends. Impacts of drought are typically felt first by those most dependent on annual rainfall — ranchers engaged in dryland grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable water source. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in ground water basins decline. Hydrologic impacts of drought may be exacerbated by regulatory or administrative requirements that place restrictions on a water purveyor's operations to protect environmental resources or to satisfy the rights of senior water right holders.

Defining when drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users in a different part of the state or with a different water supply. California's extensive system of water

supply infrastructure — its reservoirs, managed groundwater basins, and inter-regional conveyance facilities — mitigates the effect of short-term (e.g. single year) dry periods. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, decline in groundwater levels, or expected supply from a water wholesaler to define their water supply conditions. Criteria used to identify statewide drought conditions — such as statewide runoff and reservoir storage — do not address these localized impacts.

information such as streamflows reconstructed from tree ring data — can be far greater than that observed in the historical record. Paleoclimate information has been especially useful in identifying droughts prior to the historical record that were far more severe than today's water institutions and infrastructure were designed to manage, emphasizing the potentially large range of natural climate variability. The addition of human-caused climate forcings on top of natural variability highlights the need for robust drought preparedness efforts and for monitoring programs that can shed light on trends and help provide early warning indicators at the seasonal to interannual time scales important to water project operations.

While it is difficult if not impossible to say with certainty which aspects of the 2007–09 drought could be attributable to natural variability and which could be enhanced by human-caused climate forcings, this time period can be looked at in the context of trends (or lack of) in observed data. As discussed in the next chapter, the past decade stands out as being one of record warmth at the global level. **FIGURES 3, 4, and 5** *(pages 8 & 9)* show long-term trends in selected temperature-related observations, illustrating observed recent relative warmth. **FIGURE 6** *(page 9)* shows long-term California observed precipitation, in which no trend is apparent. With respect to prediction of future conditions, modeling performed by California's Climate Action Team (CAT, 2009) predicts a clear warming trend throughout the State (and hence substantially reduced future Sierran snowpack). Predictions for total precipitation (rainfall and snow) are less clear, although models show agreement on drying in the southern part of the state.

FIGURE 3 — California Statewide Mean Temperature Departure

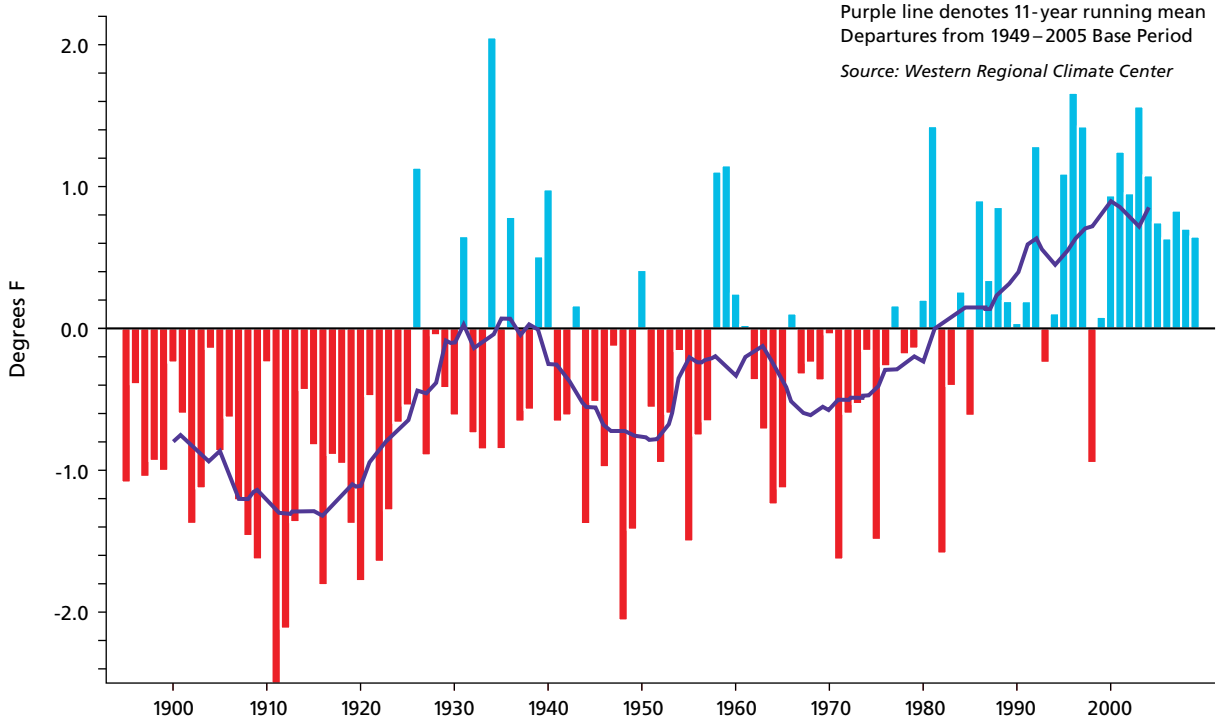


FIGURE 4 — Percent of Precipitation as Snow at Lake Tahoe, March–April

Departure from Mean

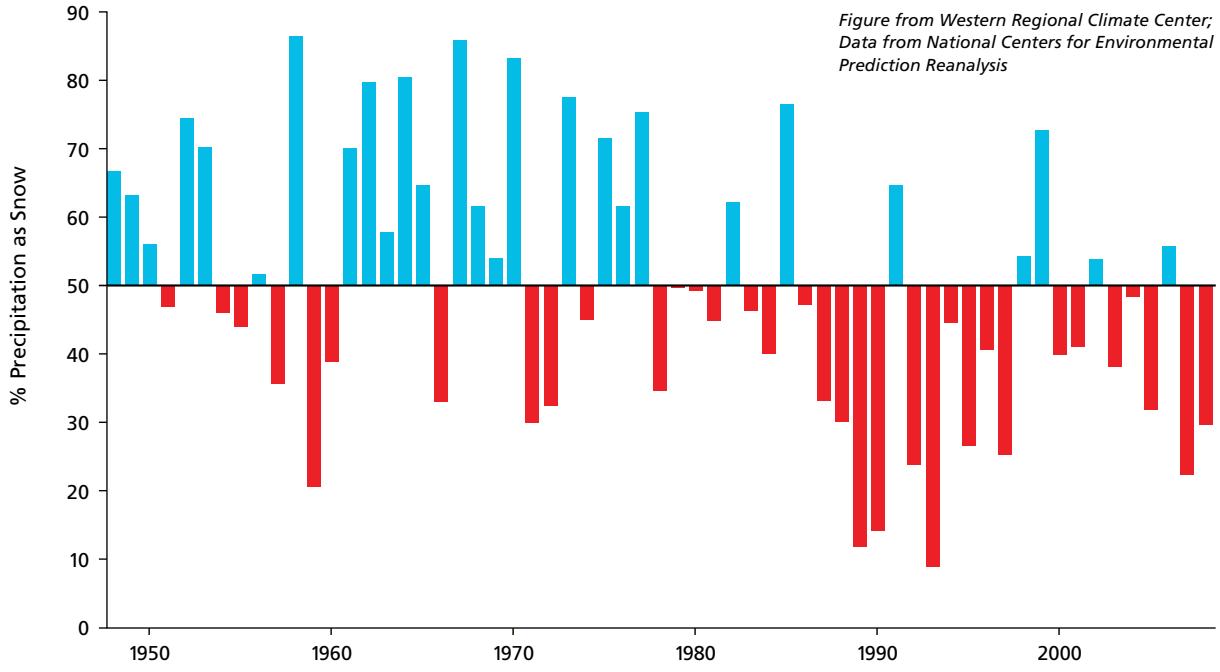


FIGURE 5 — Annual Elevation of Freezing Level over Lake Tahoe

Departure from Mean

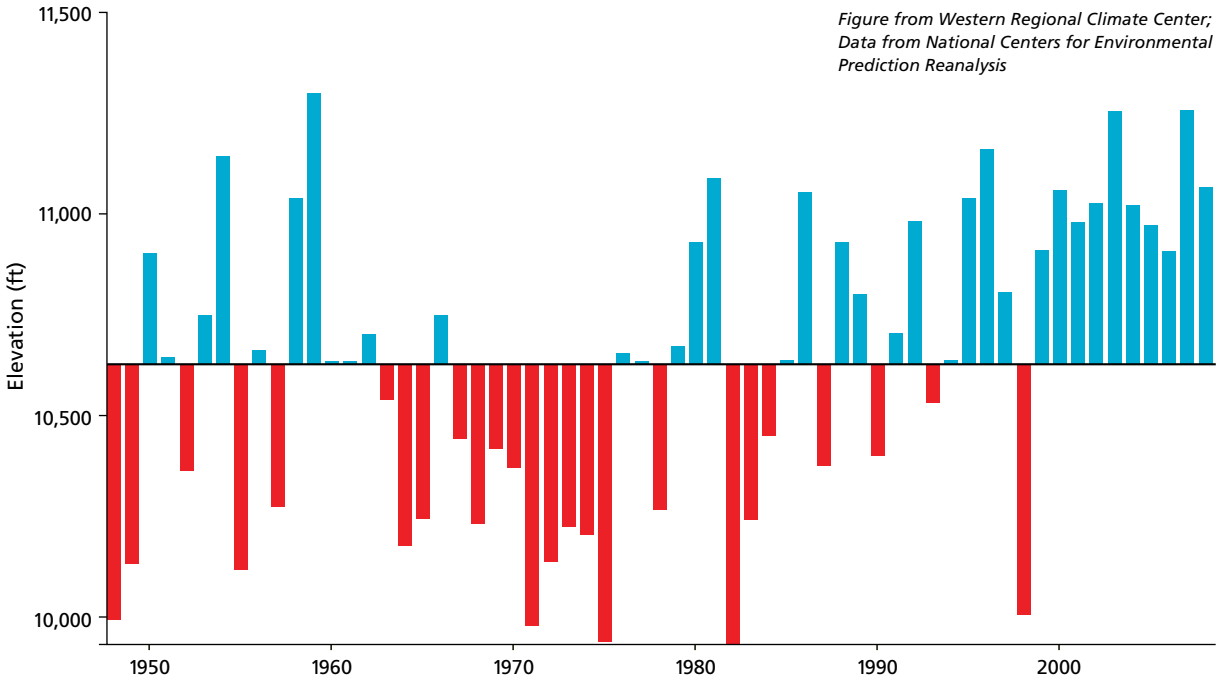
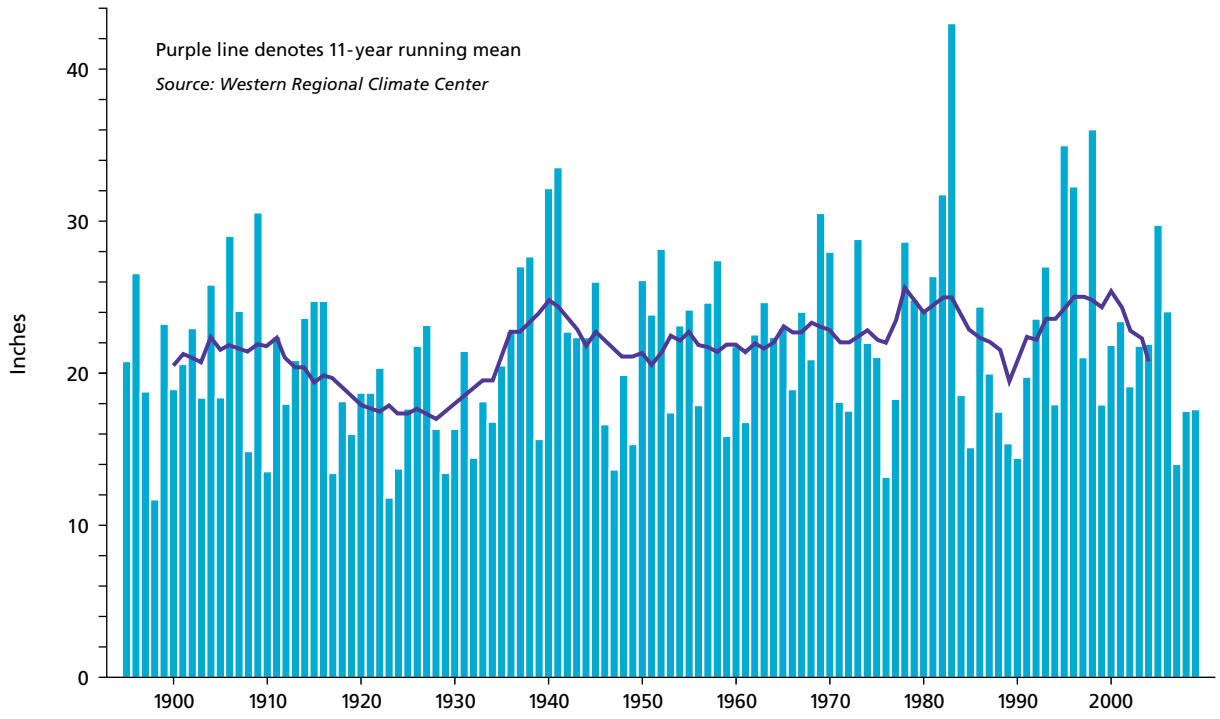


FIGURE 6 — California Annual Statewide Precipitation



2

Hydrologic Conditions & Water Supplies

CLIMATE AND WEATHER BACKGROUND

Calendar years 2007–09 were characterized by relatively warm and dry conditions. During most of this time period, El Niño-Southern Oscillation (ENSO) conditions in the equatorial Pacific Ocean alternated between La Niña and neutral status. ENSO, a periodic shifting of ocean-atmosphere conditions in the tropical Pacific that ranges from El Niño (warm phase) to La Niña (cold phase), is the only climate phenomenon thus far identified that offers predictive capabilities (although limited) for precipitation in California. La Niña conditions tend to favor a drier outlook for Southern California, but do not typically show significant correlation with water year type for Northern and Central California. The predictive capabilities provided by ENSO events are related to the strength of an event; stronger events yield better predictive signals. Additionally, conditions experienced during any individual El Niño or La Niña event may be affected by interactions with climate teleconnections such as the North Atlantic Oscillation or the Arctic Oscillation.

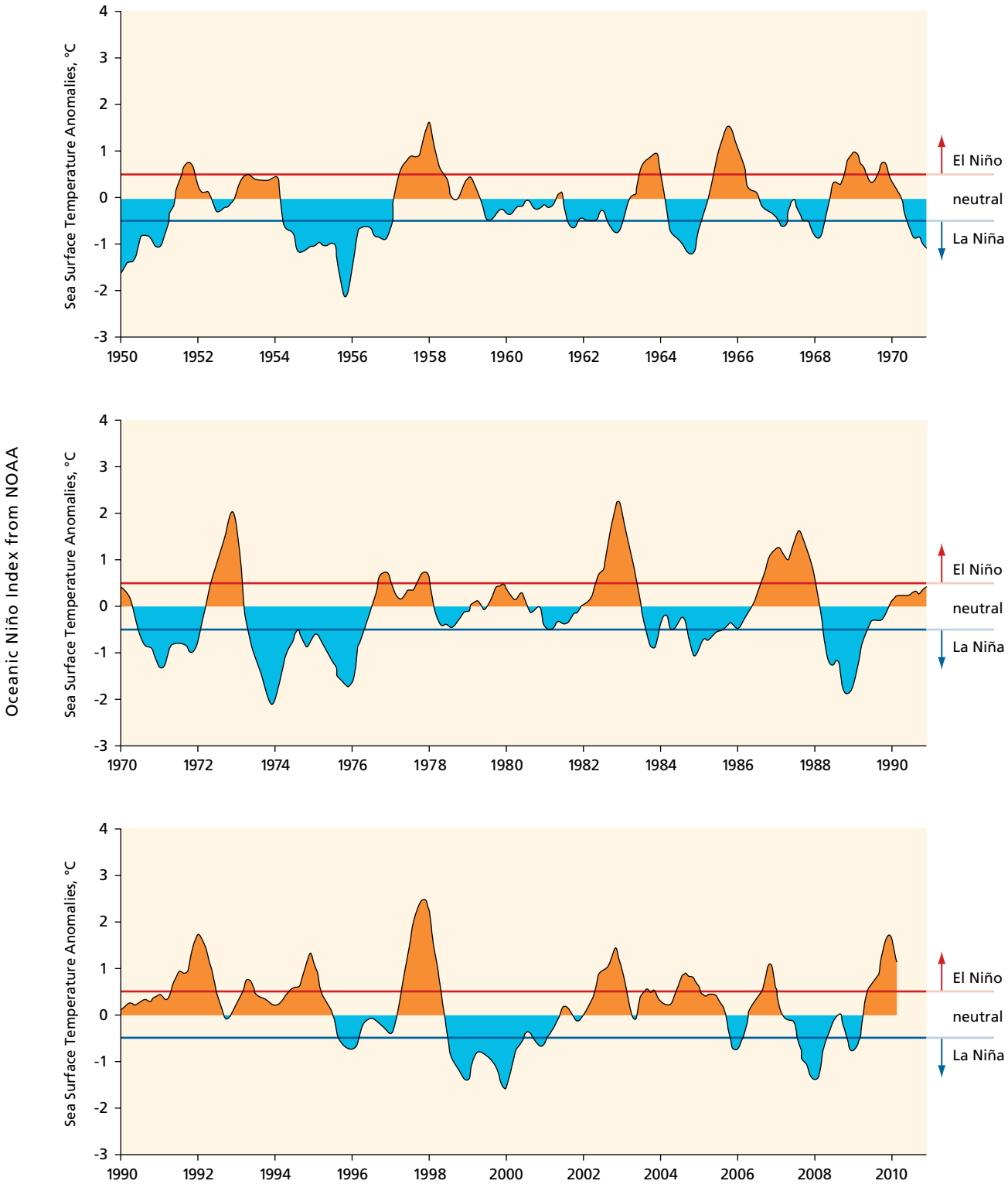
FIGURE 7 *(page 12)* provides a long-term illustration of the cyclical nature of ENSO events. The most recent La Niña, ending in spring 2009, was not a strong event. By fall 2009, ocean and atmospheric conditions were shifting to an El Niño pattern.

At the global level, the past decade has been characterized by above-average warmth **(TABLE 2)**. California maximum temperatures, averaged over the three-year period of 2007–09, ranked 7th out of 114 years of data; mean temperatures ranked 11th; and minimum temperatures ranked 12th. Six of California's top ten three-year temperature averages have occurred since the 2000–02 period. These warmer conditions have significant hydrologic, water use, and ecological implications, affecting factors such as timing of spring snowmelt runoff, crop water use, and water temperature suitability for fish spawning.

TABLE 2
Source: National Climate Data Center

Global-Level Top 10 Warmest Years Since 1880
1. 2005
2. 1998
3. 2003
4. 2002
5. 2009
6. 2006
7. 2007
8. 2004
9. 2001
10. 2008

Figure 7 — Historical El Niño and La Niña Episodes



NOAA data, http://www.cpc.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

Mount Shasta in September, 2008, at the end of the water year. The date of historical maximum snowpack accumulation is considered to be April 1st for watersheds draining to the Central Valley. Photo taken from Mount Shasta City looking east. Photo courtesy of Jack Trout.

Most of California's moisture originates in the Pacific Ocean. During the wet season, the atmospheric high pressure belt that sits off western North America shifts southward, allowing Pacific storms to bring moisture to California. On average, 75 percent of the state's average annual precipitation occurs between November and March, with half of it occurring between December and February. A few major storms more or less shift the balance between a wet year and a dry one. A persistent high pressure zone over California during the peak winter water production months — as occurred in January 2009 — predisposes the water year to be dry.

FIGURE 8 *(page 14)* illustrates the importance of a relatively small number of storms to the water year's outcome, showing the top ten storm periods for water year 2009 and their incoming storm tracks off the Pacific. These ten periods represent 86 percent of the total accumulated precipitation averaged over eight representative Northern Sierra locations in California (Mt. Shasta City, Shasta Dam, Mineral, Brush Creek, Quincy, Sierraville, Pacific House, and Blue Canyon) whose collective average annual precipitation is 50 inches.

Lake Tahoe Dam is operated by the U.S. Bureau of Reclamation as part of its Newlands Project to supply water for uses in Nevada. The upper 6.1 feet of Lake Tahoe amounts to a usable storage capacity of 744,600 acre-feet (AF).

FIGURE 8 — Significant Storms in Water Year 2009

Water year 2009 storm tracks. Northern Sierra precipitation amounts for the top ten storm periods from October 1, 2008 through May, 2009. These ten periods represent 86 percent of the total accumulated precipitation averaged over eight representative Northern Sierra locations in California.

PRECIPITATION, SNOWPACK, AND RUNOFF

TABLE 3 shows precipitation observed at selected cities in 2007–09, based on the NWS reporting period *(see sidebar)*. **FIGURE 9** *(page 16)* shows precipitation for the three water years expressed as percent of average for the state's major hydrologic regions. The driest year of this period was 2007, when the southern part of the state in particular experienced about half or less of its average annual precipitation. The very dry conditions experienced in the South Coast region in 2007 helped set the stage for the massive outbreak of wildfires in that area described in Chapter 3.

FIGURE 10 *(page 17)* shows observed runoff for water years 2007–2009 in river basins that provide much of the state's developed water supplies. These basins, with the exception of the Trinity River Basin (located in the Coast Range), are Sierran basins where winter snowpack is an important component of annual runoff. **FIGURE 11** *(page 18)* shows estimated statewide runoff for the same time period. (To put the values in Figure 4 in perspective, statewide runoff in 1977, the single driest year in California's period of measured record, was about 21 percent of average.) Successive dry years affect watershed runoff patterns, as dry antecedent conditions mean that a larger percentage of total precipitation will be partitioned to replenishing soil moisture instead of resulting in streamflow.

continued on pg. 18 >>

TABLE 3 — Precipitation at Selected Cities

City	2007	2008	2009	Average
Eureka	35.48	33.95	29.75	37.30
Redding	22.73	24.00	23.71	32.80
San Francisco	16.89	15.55	14.62	19.93
Sacramento	15.00	13.71	16.47	18.00
Fresno	6.03	8.40	7.77	10.88
Salinas	8.43	10.53	10.99	12.91
Bakersfield	3.06	2.38	4.95	6.43
Santa Barbara	5.97	15.33	10.07	16.93
Los Angeles	3.21	10.29	9.08	13.00
Riverside	1.67	5.39	5.58	10.21
San Diego	3.85	7.23	9.15	10.63

The Water Year

Agencies such as the Department or the U.S. Geological Survey (USGS) report hydrologic data on a water year basis. The water year extends from October 1 through September 30. Water year 2009, for example, spans from October 1, 2008 through September 30, 2009. The (water year) 1987–92 drought corresponds to the calendar period of fall 1986 through summer 1992. Hydrologic data contained in this report are presented in terms of water years. Water project delivery data (e.g. State Water Project deliveries) are presented on a calendar year basis. Precipitation data are reported by the National Weather Service (NWS) based on an annual season of July 1 to June 30. When this report refers to annual precipitation amounts, it is implicit that the data are based on the NWS reporting season unless otherwise indicated.

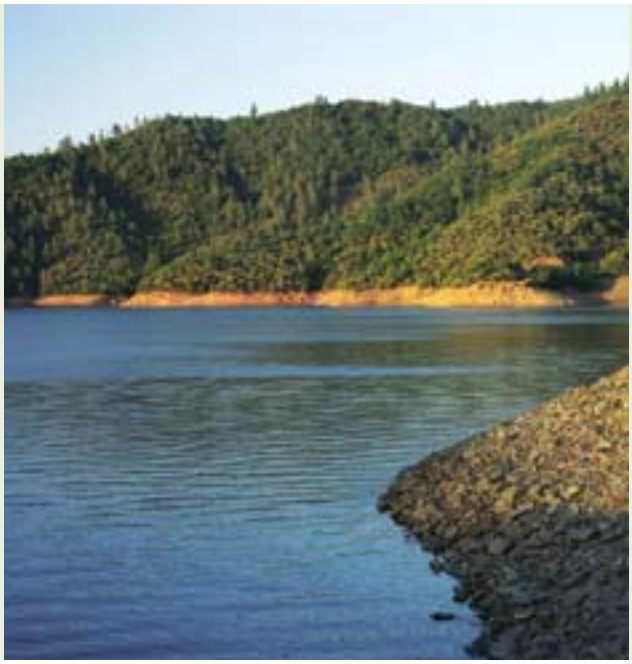


FIGURE 9 — Precipitation by Hydrologic Region

Water year precipitation in percent of average for 2007, 2008 and 2009. Water year is October 1 through September 30.

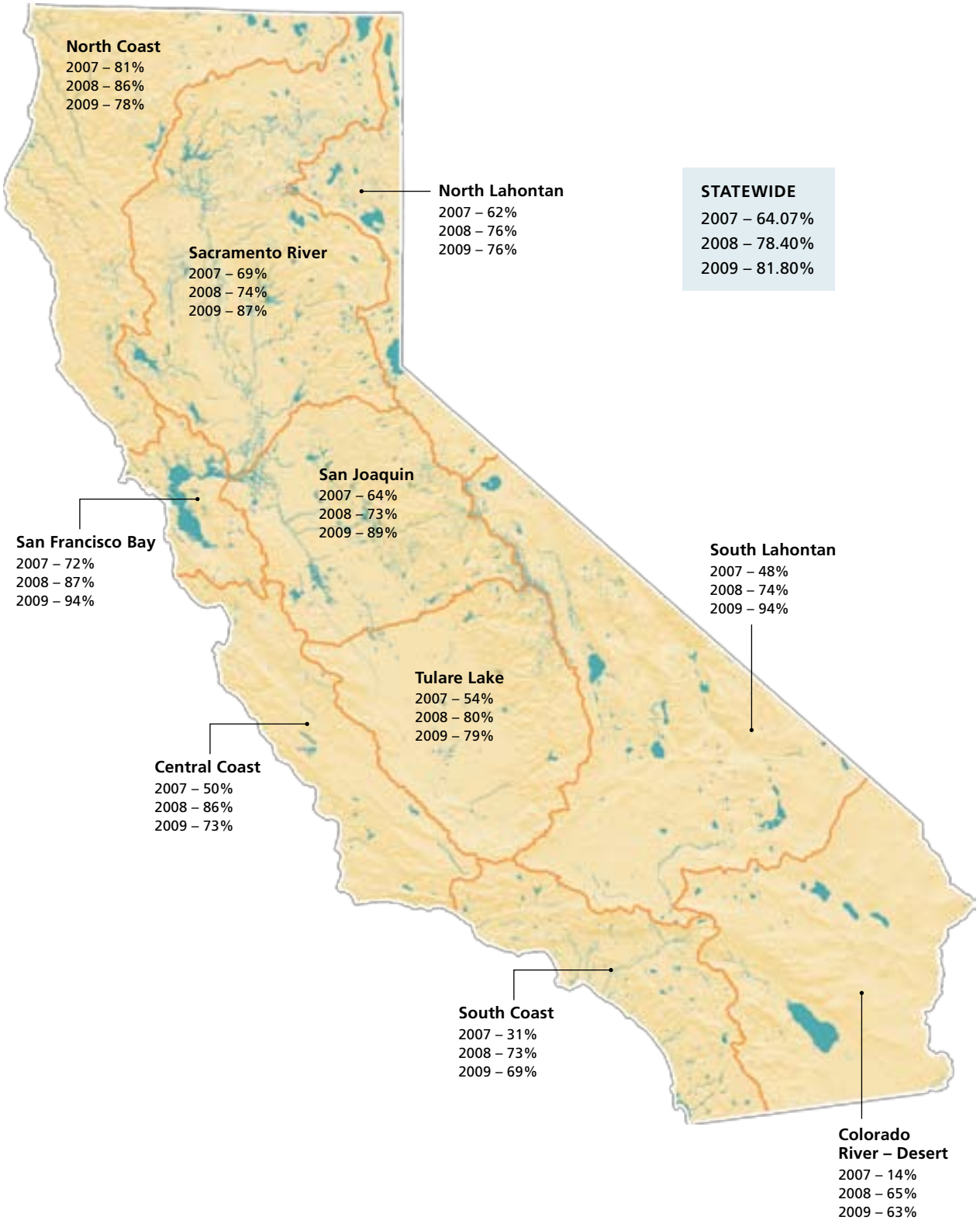
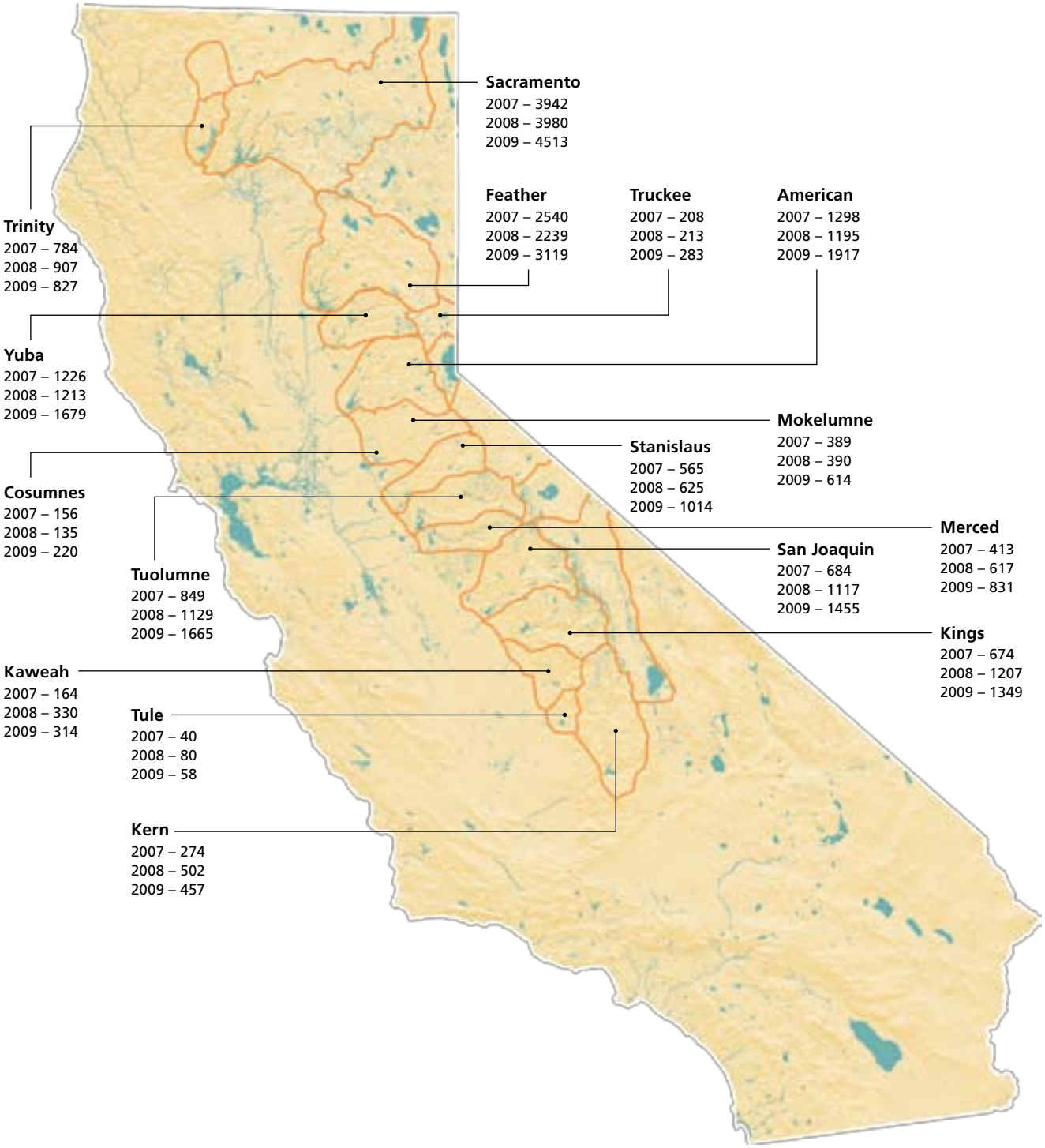
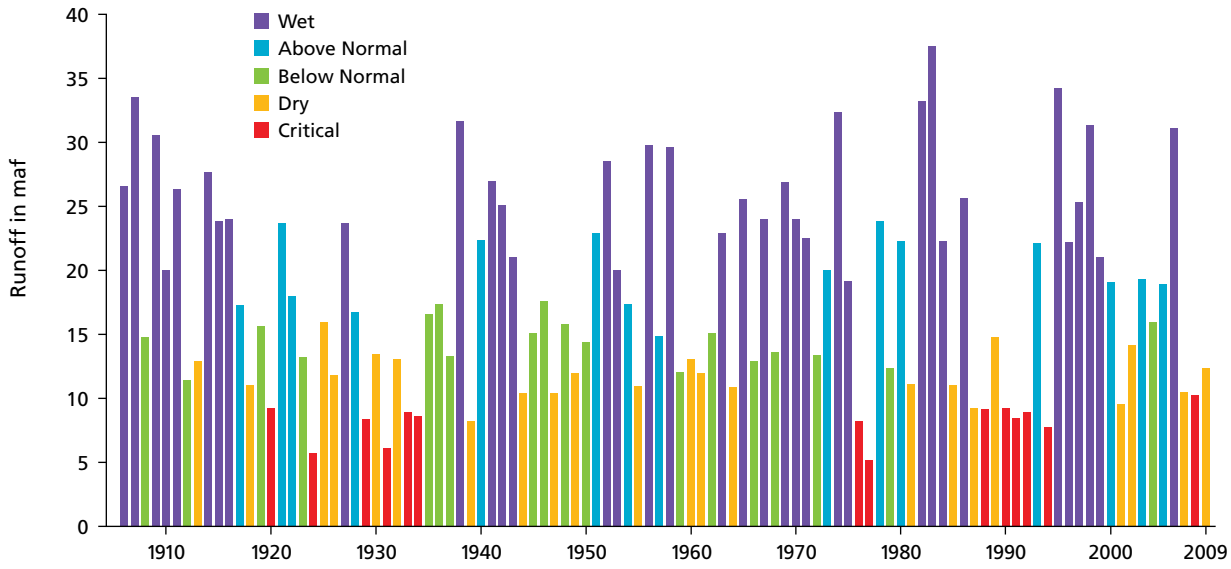


FIGURE 10 — Observed Runoff in Selected River Basins (thousand acre-feet)





The Sacramento Four Rivers are: Sacramento River above Bend Bridge, near Red Bluff; Feather River inflow to Oroville; Yuba River at Smartville; American River inflow to Folsom

FIGURE 12 — Sacramento Four Rivers Unimpaired Runoff

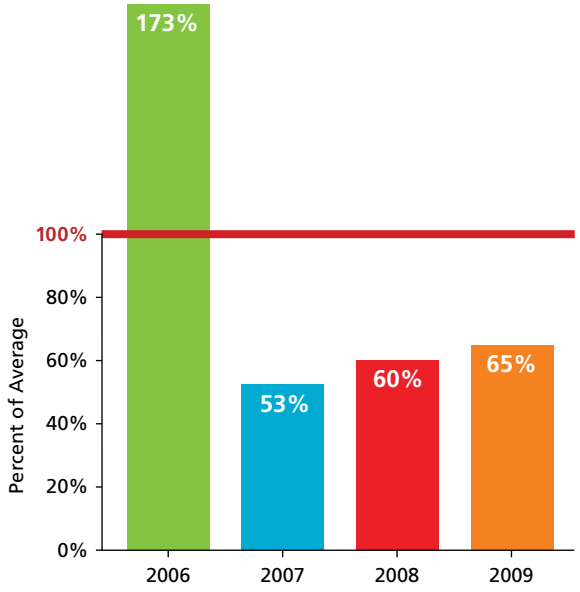
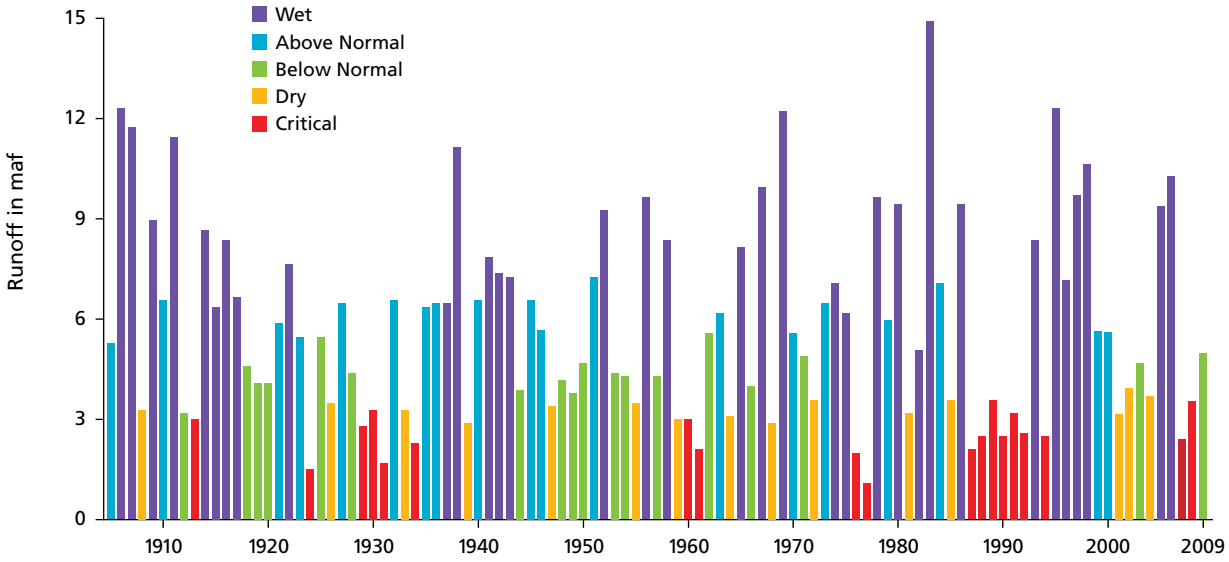


FIGURE 11 — Statewide Runoff Comparison

FIGURES 12 and 13 show historical values of unimpaired runoff for the four rivers used to compute the Sacramento Valley and San Joaquin Valley water year type indices. The water year types are color-coded on the figures. The year types, originally developed as part of State Water Resources Control Board (SWRCB) water rights regulatory actions in the Bay-Delta, serve as general indicators of conditions in watersheds draining the west slope of the Sierra Nevada. The Sacramento Valley 40-30-30 Index is computed as a weighted average of the current water year's April–July unimpaired runoff forecast (40 percent), the current water year's October–March unimpaired runoff forecast (30 percent), and the previous year's index (30 percent). The San Joaquin Valley 60-20-20 Index is computed as a weighted average of the current water year's April–July unimpaired runoff forecast (60 percent), the



The San Joaquin Four Rivers are: Stanislaus River inflow to New Melones, Tuolumne River inflow to New Don Pedro, Merced River inflow to New Exchequer, San Joaquin River inflow to Millerton

FIGURE 13 — San Joaquin Four Rivers Unimpaired Runoff

current water year's October–March unimpaired runoff forecast (20 percent), and the previous year's index (20 percent). (The inclusion of a previous year's index in the calculation of the index for the current year is an indirect way of reflecting likely reservoir storage conditions.)

RESERVOIR STORAGE

TABLE 4 *(page 20)* provides an overview of end of water year 2009 storage conditions by river basin. The locations of California's larger water facilities are shown in FIGURE 14 *(page 21)*. Of interest, the low storage conditions for the Truckee River Basin reflect conditions at Lake Tahoe, which is controlled by a small dam. As has occurred during past droughts, Lake Tahoe dropped slightly below its natural rim in the fall of 2009, but lake levels subsequently rebounded due to an unusually wet October storm.

Also notable was the low storage in the Klamath River Basin, reflecting low lake levels in USBR's Clear Lake Reservoir (in California) and Upper Klamath Lake (in Oregon), main storage facilities of the Klamath Project.

FIGURE 15 *(page 22)* graphically shows December 2009 reservoir storage at a few selected facilities. TABLE 5 *(page 23)* provides data for additional facilities. As can be inferred from the figure, storage at some larger CVP and SWP reservoirs — particularly Shasta Lake, Lake Oroville, and San Luis Reservoir — did not recover from the impacts of the two previous dry years. Low storage amounts in San Luis Reservoir and in Metropolitan Water District's (MWD's) Diamond Valley Lake (see Chapter 3), both of which are offstream facilities relying on water exported from the Delta for filling, reflect impacts of regulatory restrictions on Delta pumping.

continued on pg. 24 >>

Table 4 — Reservoir Storage Summary By River Basin
Storage as of September 30, 2009

Basin	# of Reservoirs	Total Capacity (1000 AF)	Hist Ave (1000 AF)	2008 (1000 AF)	2009 (1000 AF)	% Ave	% Cap
Klamath R	3	1107.9	475.2	281.3	187.2	39	17
Shasta R	1	50.0	11.9	1.4	2.9	24	6
Trinity R	2	2462.4	1714.2	1151.3	932.6	54	38
Eel R	1	80.5	42.7	26.3	36.0	84	45
Russian R	2	503.4	252.6	244.4	244.5	97	49
North Bay	5	105.8	71.5	68.7	67.5	94	64
South/East Bay	6	357.3	179.8	192.0	181.2	101	51
Peninsula	2	77.4	54.5	60.5	69.0	127	89
Salinas R	3	730.9	355.9	336.3	162.7	46	22
Santa Ynez R	2	198.7	156.3	178.7	145.3	93	73
Old Cr	1	40.7	32.9	27.6	21.7	66	53
Ventura R/S Clara R	5	834.2	656.4	692.0	586.2	89	70
S Gabriel R/S Ana R	8	505.2	322.0	290.2	302.5	94	60
S Mrgrta/S Luis Rey	3	147.6	73.7	66.4	64.3	87	44
S Dgto R/S Diego R	8	296.1	150.5	152.1	130.8	87	44
Swtwtr R/Otay R	5	190.7	117.2	83.3	86.9	74	46
Sacramento R	8	4967.4	3178.6	1769.4	2143.9	67	43
Feather R	11	5264.1	3418.5	2182.6	2471.6	72	47
Yuba R/Bear R	9	1550.7	927.4	805.6	929.6	100	60
American R	9	1768.0	1022.9	708.6	922.0	90	52
Stony Cr	3	236.9	75.4	92.5	97.2	129	41
Cache Cr	2	614.0	234.3	74.7	47.3	20	8
Putah Cr	1	1600.0	1210.4	1151.0	1001.5	83	63
East Contra Costa	1	104.8	85.9	90.3	78.8	92	75
Mokelumne/Cosumnes R	5	850.0	558.8	455.6	635.6	114	75
Calaveras R	1	317.1	125.8	87.4	61.2	49	19
Stanislaus R	7	2873.0	1609.6	1338.5	1421.7	88	49
Tuolumne R	6	2762.5	1822.7	1608.8	2041.9	112	74
Merced R	1	1024.6	508.6	279.5	432.0	85	42
Chowchilla R/Fresno R	2	240.0	77.2	16.0	31.2	40	13
San Joaquin R	8	1137.9	547.1	465.8	643.7	118	57
San Luis Cr	3	2130.0	1057.9	305.6	489.7	46	23
Kings R	3	1251.5	473.1	225.0	347.0	73	28
Kern R	1	568.0	184.2	121.8	102.2	55	18
Kaweah R/Tule R	2	267.9	25.7	15.4	14.6	57	5
Truckee R	4	1029.4	519.4	246.2	165.5	32	16
E Walker R	1	42.6	13.4	6.0	9.4	70	22
Mono Lake	3	75.9	51.6	35.2	58.0	112	76
Owens R	4	253.6	164.2	114.2	151.6	92	60
Mojave R	1	73.0	65.1	70.9	70.0	108	96
Colorado R (1)	4	52910.4	41474.6	28690.8	28461.4	69	54
Total	**157**	**91602.1**	**64099.7**	**44809.9**	**46049.9**	**72**	**50**

Notes: 1 – Includes Lake Powell and Lake Mead

FIGURE 14 — California's Major Water Projects

FIGURE 15 — Reservoir Storage at Selected Facilities
Reservoir status, data as of December 7, 2009.

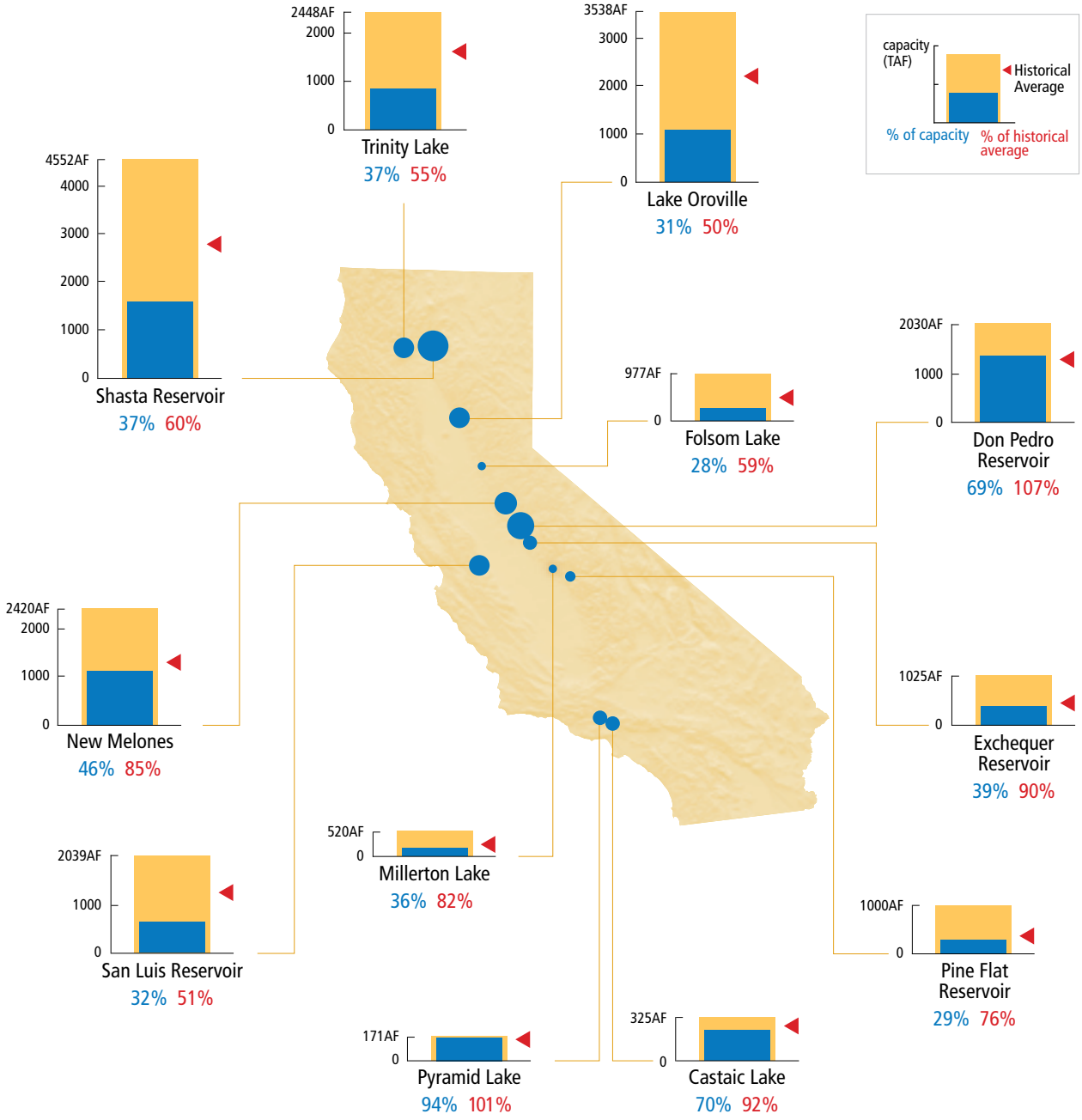


TABLE 5 — Reservoir Storage for Selected Water Projects
(data as of September 30, 2009)

Reservoir	Capacity (1000 AF)	Average Storage (1000 AF)	2008 (1000 AF)	2009 (1000 AF)	Percent Average
STATE WATER PROJECT					
Lake Oroville	3538	2252	1097	1337	59%
San Luis Reservoir	2039	993	237	421	42%
Lake Del Valle	77	33	38	37	112%
Lake Silverwood	73	65	71	70	108%
Pyramid Lake	171	160	164	166	104%
Castaic Lake	325	249	268	200	80%
Perris Lake	132	106	69	62	59%
CENTRAL VALLEY PROJECT					
Trinity Lake	2448	1700	1137	919	54%
Lake Shasta	4552	2810	1385	1774	63%
Whiskeytown Lake	241	231	232	229	99%
Folsom Lake	977	558	270	412	74%
New Melones Reservoir	2420	1331	1099	1108	83%
Millerton Lake	520	203	199	350	173%
San Luis Reservoir	2039	993	237	421	42%
COLORADO RIVER BASIN					
Lake Mead	26159	20025	12013	10933	55%
Lake Powell	24322	19410	14509	15463	80%
Lake Mohave	1810	1476	1586	1501	102%
Lake Havasu	619	564	584	564	100%
EAST BAY MUNICIPAL UTILITY DISTRICT					
Pardee Res	198	180	163	168	94%
Camanche Reservoir	417	252	146	322	128%
CITY AND COUNTY OF SAN FRANCISCO					
Hetch-Hetchy Reservoir	360	255	276	292	114%
Cherry Lake	268	158	224	245	155%
CITY OF LOS ANGELES					
Lake Crowley	183	122	85	115	94%
Grant Lake	48	33	15	36	109%

Silver Lake, a playa lake at the terminus of the Mojave River. An adjudication of the Mojave groundwater basin upstream (Barstow/Adelanto area) was wrapped up in 2002, after more than a decade of litigation. Part of the litigation's resolution entailed bringing in imported SWP water supplies to help replenish the overdrafted groundwater basin. Recharge with imported surface water supplies is common among many of Southern California's managed basins.

GROUNDWATER CONDITIONS

The Department has historically monitored groundwater levels semiannually in a limited number of wells located in predominantly rural areas, largely in the Central Valley. **FIGURE 16** shows locations of wells measured by the Department and by cooperating agencies in spring 2009. (Budget limitations have precluded the Department from collecting water level data in urbanized areas where larger local agencies have the capability to conduct their own long-term monitoring programs. Thus, as seen on the figure, the Department does no water level monitoring in Southern California.) Data from the Department's monitoring program and from cooperating local agencies were used to generate **FIGURE 17** *(page 26)* a preliminary effort to illustrate the influence of drought conditions on water levels. The figure shows change in water levels between spring 2006 (a wet year) and spring 2009. Not unexpectedly, groundwater levels declined in many of the wells monitored, as is typical during drought conditions (CDWR, 2000). It should be emphasized, however, that the analysis performed for Figure 10 was based only on a quick review of readily available water level data and was only intended to be illustrative of apparent trends. Comprehensive analysis of drought impacts to individual groundwater basins is beyond the scope of this report.

In Southern California most of the largest, intensively used groundwater basins in the south coastal plain and in some adjoining areas are under an active groundwater management program, whether in the form of a court adjudication or management by a local agency with specific statutory authorities. Groundwater levels in these basins are affected by basin-specific management objectives as well as by annual hydrology. **FIGURE 18** *(page 27)* shows the locations of the hydrographs presented in **FIGURE 19** *(page 28)* for a few sample wells in larger Southern California basins. With the exception of Antelope Valley (where a groundwater adjudication is ongoing in court), the selected wells are located in basins under active management.

The Governor's February 2009 water shortage emergency proclamation provided that *DWR shall continue to monitor the state's groundwater conditions, and shall collect groundwater-level data and other relevant information from water agencies, counties, and cities. It is requested that water agencies, counties and cities cooperate with DWR by providing the information needed to comply with this Proclamation.* The Department has been collecting and compiling groundwater-level data from local agencies in response to this directive, and is integrating this information with existing monitoring data.

FIGURE 16 — Location of Groundwater Wells Having Monitoring Data
Water wells with measurements collected in Spring 2009 by DWR and Cooperators.

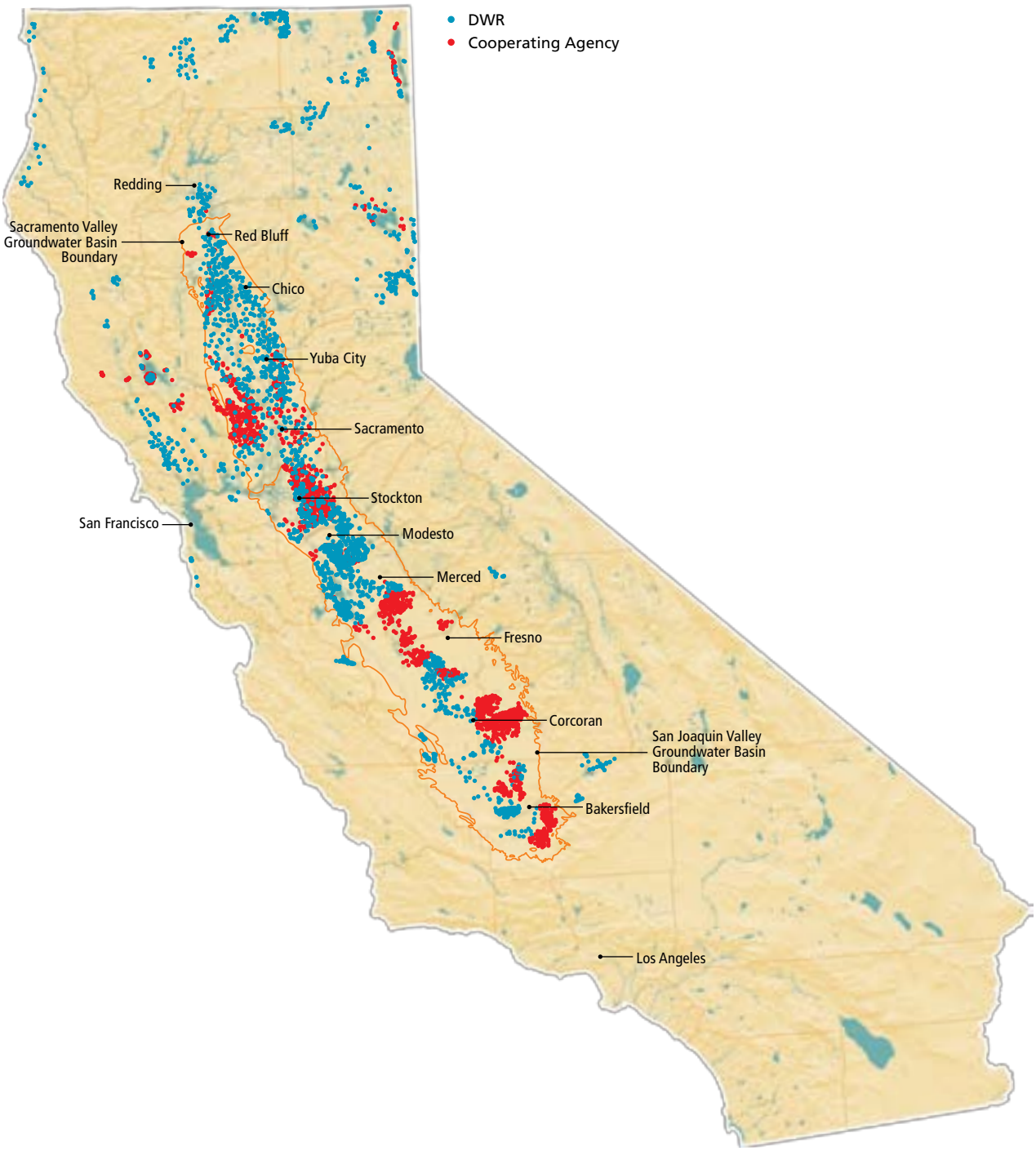


FIGURE 17 — Impacts of Drought on Groundwater Levels
Groundwater Level Change from Spring 2006 to Spring 2009.

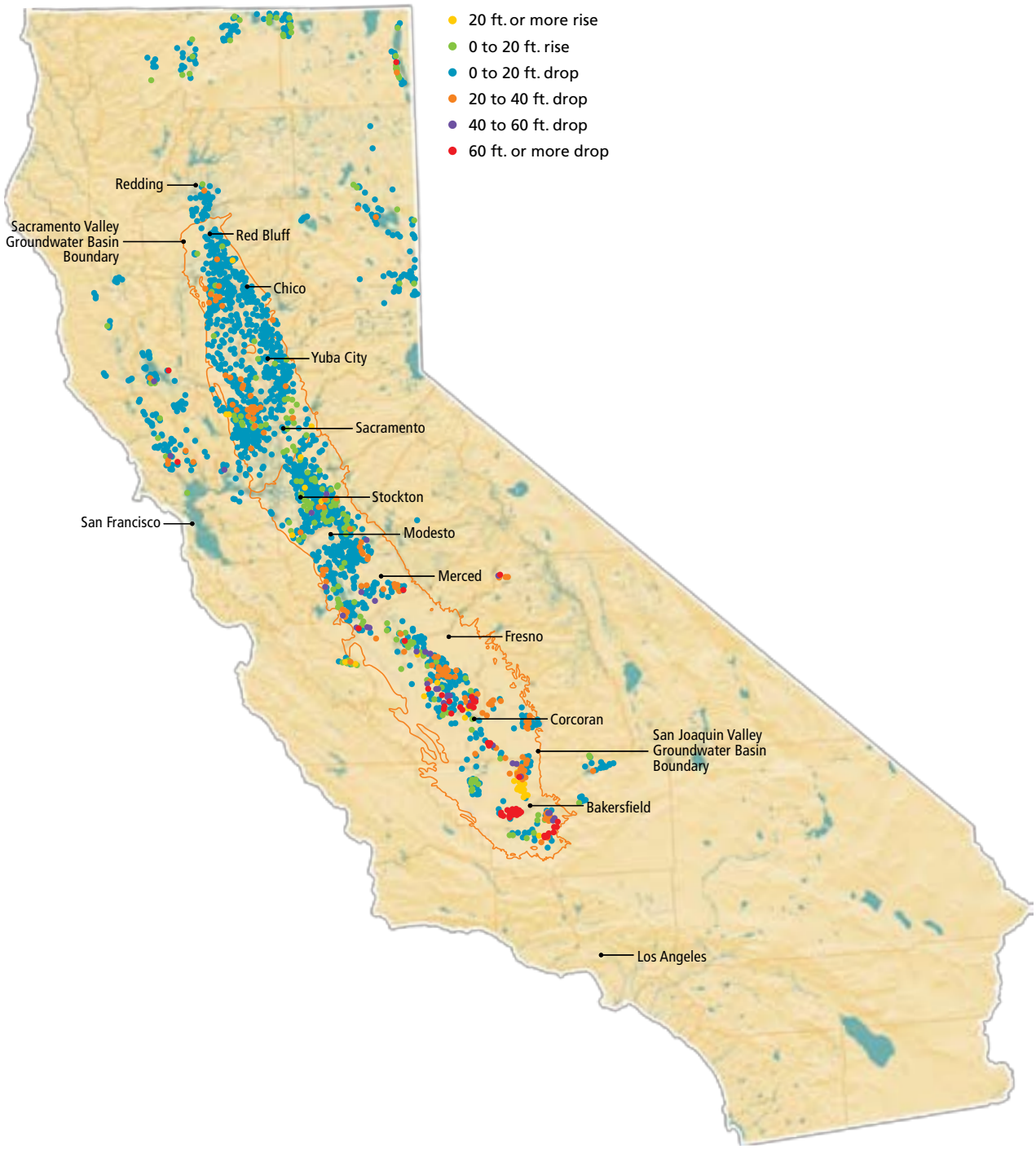


FIGURE 18 — Location of Southern California Hydrographs

Reliance on groundwater increases during droughts when water users with reduced surface supplies turn to groundwater to help mitigate shortages; the increased groundwater usage is typically reflected by decreased groundwater levels. **FIGURE 20** *(page 29)* shows typical seasonal fluctuations in groundwater levels, and longer-term trends associated with drought — a pattern of water level drawdown during dry conditions and recovery during wet conditions — for sample wells from the Department's monitoring program in the Sacramento and San Joaquin Valleys. (The long-term overall decline in water levels for the San Joaquin Valley well is indicative of overdraft conditions.) An increase in the number of new wells being drilled or existing wells being deepened is also typical during droughts.

In evaluating drought impacts on groundwater, it is important to acknowledge that there is an important difference between surface water and groundwater that must be taken into consideration — the availability of data quantifying the resource. Surface water reservoirs, for instance, have known storage capacities, reservoir inflows and outflows can be measured, and stream gages provide direct measurements of flows in surface water systems. Groundwater basins, in comparison, have comparatively indeterminate dimensions, inflow to an entire basin cannot be directly measured, and total basin extractions and/or discharges are not commonly measured. There are no statewide requirements related to quantification of groundwater extraction and use; an important share of California's ground-

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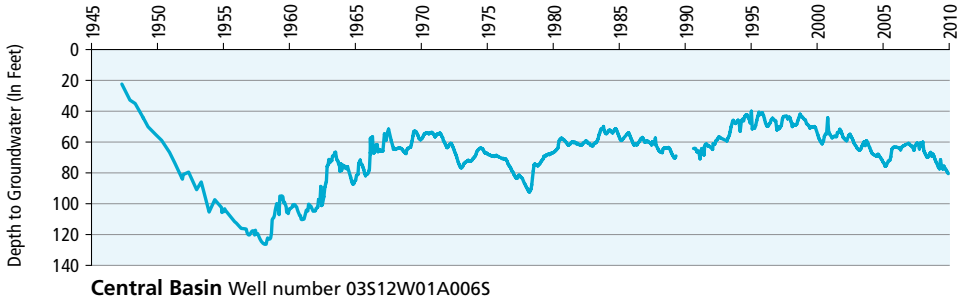
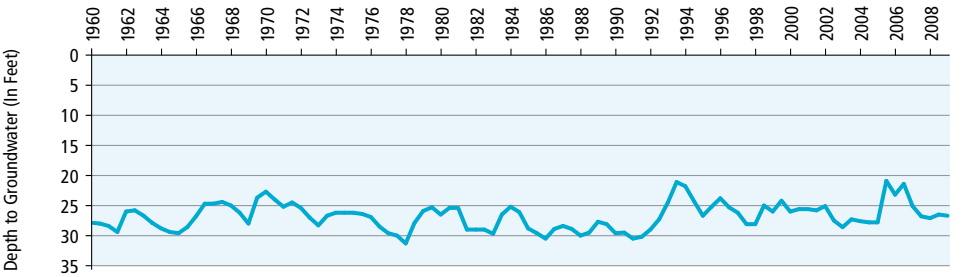
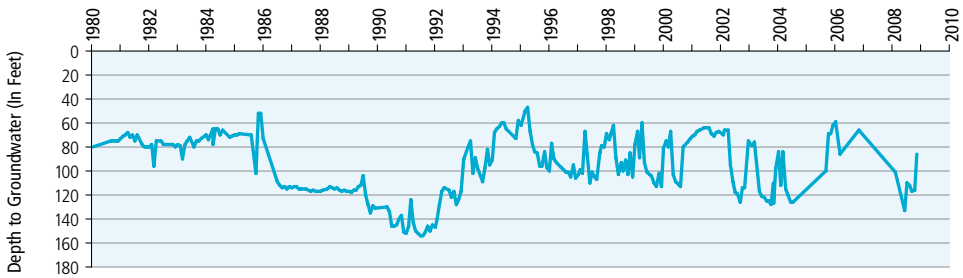
FIGURE 19 — Sample Hydrographs from Selected Southern California Groundwater Basins



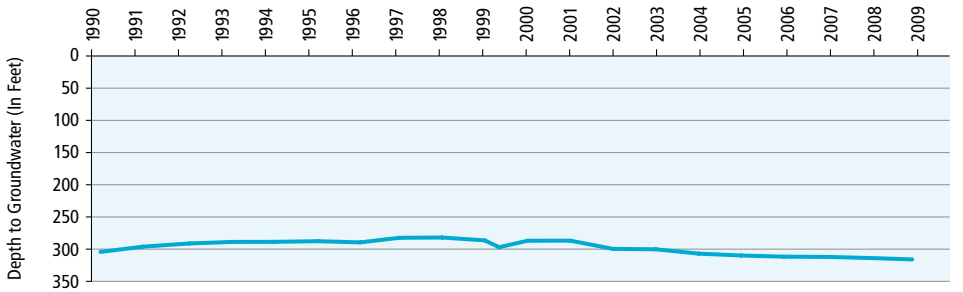
Central Basin Well number 03S12W01A006S



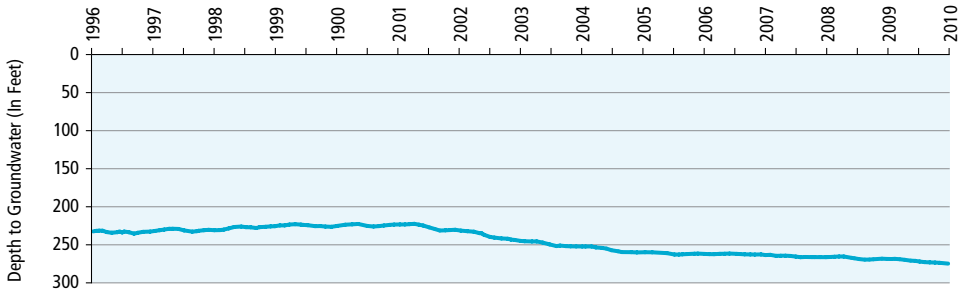
San Fernando Basin Well number 01N16W15K01



Orange County Basin Well number 03S11W25D001S

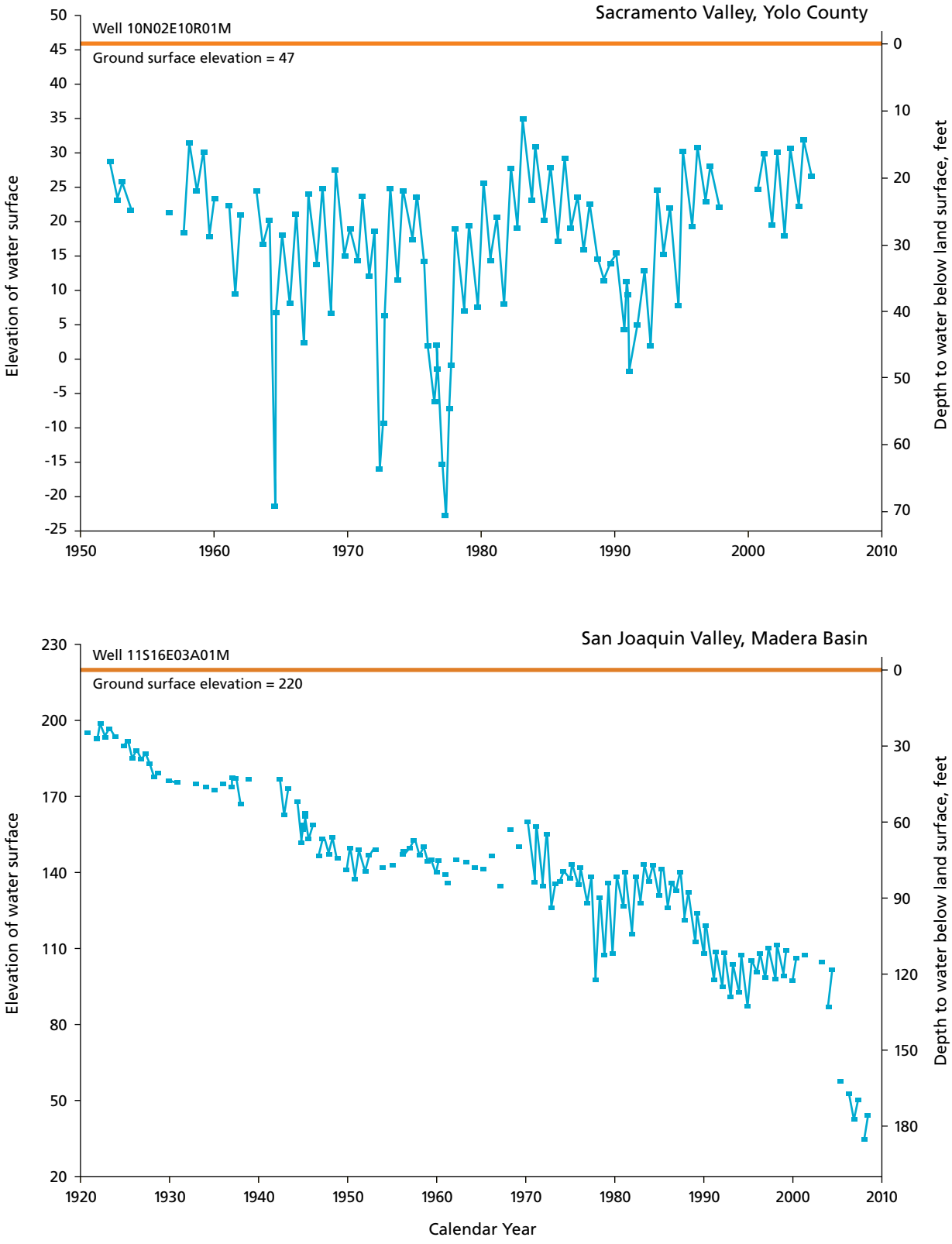


Antelope Valley Basin Well number 007N010W19Q001S



Rialto-Carlton Basin Well number 001S005W11F004S

FIGURE 20 — Sample Hydrographs of Wells in the San Joaquin and Sacramento Valleys



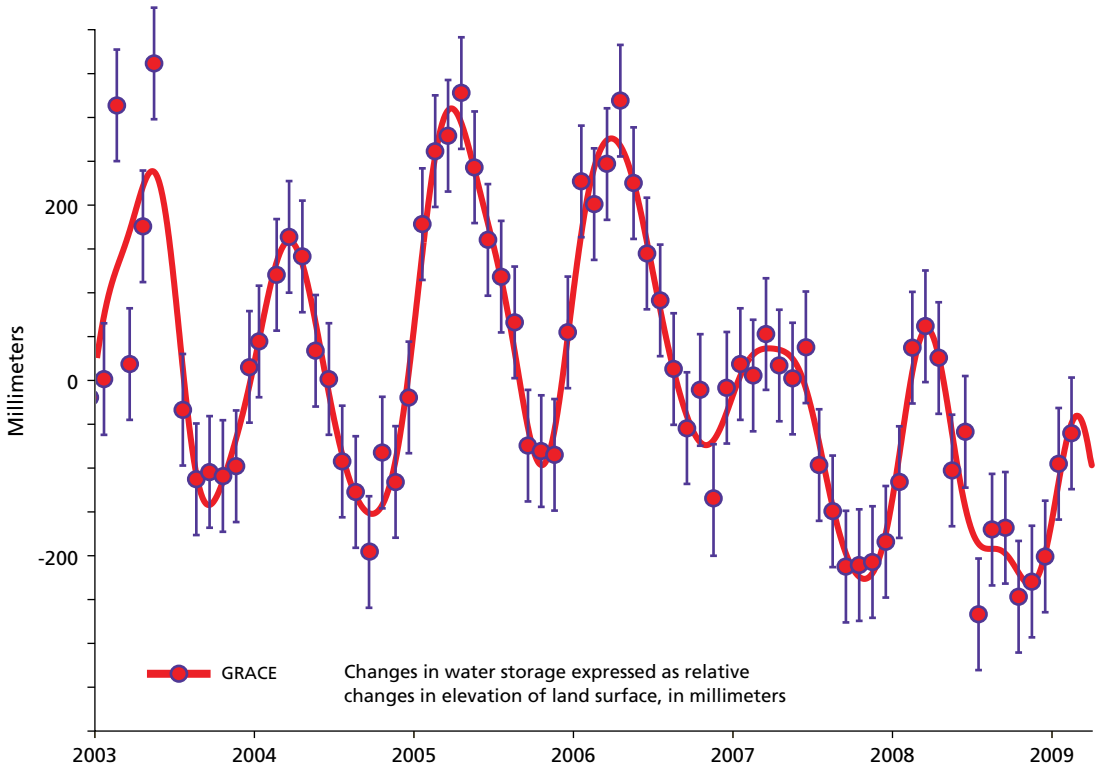


FIGURE 21 — GRACE Observation of Changes in Central Valley Water Storage
Figure courtesy of Jay Famiglietti, University of California Irvine

water production is self-supplied, and is not managed or quantified by local agencies. Data availability limitations associated with assessing drought impacts on groundwater conditions make it difficult to generalize impacts at a statewide or large-scale regional level.

Information from advanced remote sensing techniques still in the research domain is being investigated to determine if these techniques could help shed light on such large-scale groundwater level and soil moisture trends. **FIGURE 21** shows information from one such research project — NASA's Gravity Recovery and Climate Experiment (GRACE) mission, in which space-based observations can be used to assess the change in terrestrial water storage (water in biomass, soil moisture, surface water storage, and groundwater). GRACE information is able to provide this integration of changes in terrestrial water storage only over large-scale areas, such as the scale of the entire Central Valley, via highly sensitive calculations of gravitational changes. In the figure, these calculations integrated over the Sacramento and San Joaquin River Basins show not only seasonal fluctuation (winter-summer) in moisture storage but also the influence of recent dry conditions and long-term overdraft in parts of the valley. Other ongoing NASA-funded research is investigating the ability of additional sensing techniques, such as laser altimetry, to measure land surface deformation and correlate it with changes in groundwater volumes in storage.

TABLE 6 — Central Valley Project Water Supply Allocations – Long-Term Contractors

	PERCENT SUPPLY						
Year	North of Delta Agricultural	Urban	South of Delta Agricultural	Urban	Friant Class 1	Friant Class 2	East Side
1998	100	100	100	100	100	10	32
1999	100	95	70	95	100	20	39
2000	100	100	65	90	100	17	58
2001	60	85	49	77	100	5	22
2002	100	100	70	95	100	8	8
2003	100	100	75	100	100	5	6
2004	100	100	70	95	100	8	0
2005	100	100	85	100	100	uncontrolled season	28
2006	100	100	100	100	100	uncontrolled season	100
2007	100	100	50	75	65	0	29
2008	40	75	40	75	100	5	23
2009	40	75 –100	10	60	100	18	12

Notes:
1. USBR may adjust allocations as the year progresses, in response to changes in hydrologic conditions. Values shown are the final allocations for the year.
2. In all years shown, Sacramento River water rights contractors, San Joaquin River Exchange contractors, and wildlife refuges received 100 percent allocations (Level 2 supplies).

SUPPLIES FROM MAJOR WATER PROJECTS

Central Valley Project and State Water Project

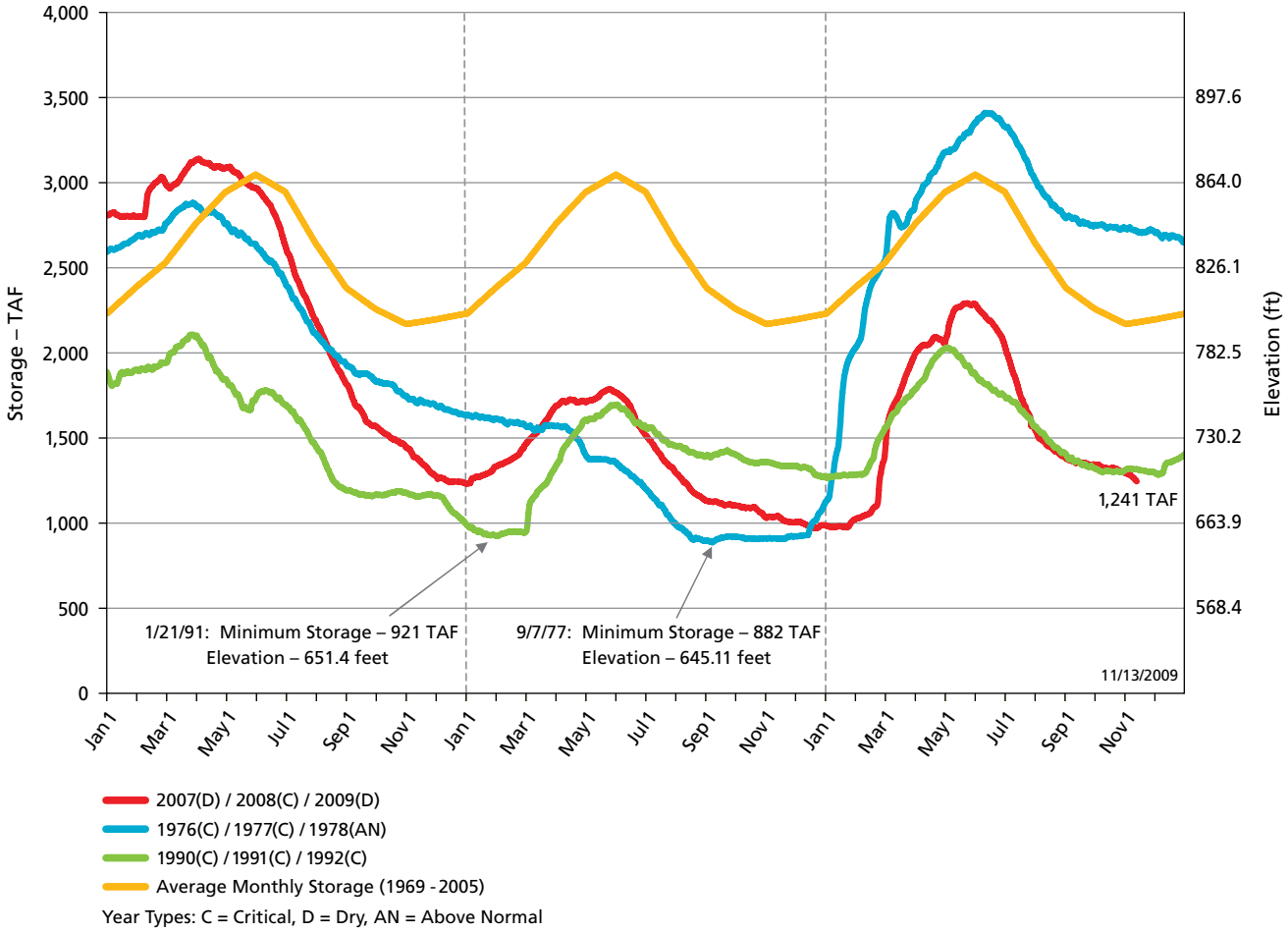
TABLES 6 and 7 show allocations for the CVP and SWP in recent years. The largest reductions in CVP water deliveries went to contractors for project water (as opposed to the water rights settlement and exchange contractors) located south of the Delta. Prior to the current drought, the only comparable water delivery reductions to south-of-Delta CVP contractors occurred during 1977 (the single driest year of the state's hydrologic record) when all project water agricultural contractors received 25 percent supplies. South-of-Delta project contractors had no subsequent water delivery deficiencies until 1990 and 1991 (the fifth and sixth years of the 1987–92 drought) when they received 50 percent and 25 percent deliveries, respectively.

The 2009 SWP allocation of 40 percent can be compared with its 1991 allocation of 30 percent urban and zero agricultural, which represents the project's lowest historical percentage of requested deliveries. **FIGURE 22** *(page 32)* shows how the present three-year drought compares to other three-year dry

TABLE 7 – State Water Project Allocations

Year	Allocation (% of requested contractual Table A quantity)
1998	100
1999	100
2000	90
2001	39
2002	70
2003	90
2004	65
2005	90
2006	100
2007	60
2008	35
2009	40

FIGURE 22 — Comparison of Lake Oroville Storage During Three-Year Dry Periods



cycles in terms of Lake Oroville storage. However, direct comparison of SWP and CVP delivery capabilities under present hydrologic conditions to deliveries during historical drought events does not reflect changes in statutory (the Central Valley Project Improvement Act of 1992), administrative, and judicial requirements for protection of fish species migrating through or residing in the Delta, and for meeting other environmental goals that have been put in place since prior droughts (see examples of changed conditions in appendix).

Colorado River

TABLE 8 shows unregulated inflow into Lake Powell (used as an indicator of water supply conditions) in recent years. As indicated in the table, inflow into Lake Powell has been below average in all but two years from 2000 onward. According to USBR, provisional calculations for natural flow of the Colorado River at the Lee's Ferry Compact point show that the average natural flow since calendar year 2000 (2000–2009 inclusive) was the lowest ten-year average in the river's historical record (USBR, 2010).

TABLE 8 — Unregulated Inflow to Lake Powell
(percent of 30-year average)

Water Year	Percent
2000	62
2001	59
2002	25
2003	51
2004	49
2005	105
2006	71
2007	69
2008	102
2009	88

Among California's major Sierran reservoirs, DWR's Lake Oroville was particularly hard-hit by drought.

Although flow in the Colorado River has historically been highly variable (**FIGURE 23**, *page 34*), the river has historically been a reliable water supply thanks to the large storage capacity in the basin. The river basin is distinguished from many others in the West by its reservoir storage capacity — equivalent to about four times the river's average annual flow of 15 million acre-feet (MAF). Users of river water in the United States and Mexico have not experienced shortages during the ongoing drought thanks to this storage capacity. Total reservoir system storage in the basin dropped to as low as 52 percent of capacity in 2004; total system storage at the end of water year 2009 was at 57 percent of capacity.

USBR's recent adoption of interim (through 2026) guidelines for reservoir management will help reduce the frequency/severity of potential future shortages. However, as illustrated in **FIGURES 24 and 25** (*page 35*), taken from USBR's final environmental impact statement for Colorado River interim guidelines for Lower Basin shortages and coordinated operations of Lakes Mead and Powell (USBR, 2007), the probability of Lower Basin (California, Arizona, Nevada) shortages does become increasingly likely in the future. But, the probability of shortage to California during the interim period covered in the guidelines is low, owing to the relative seniority of water rights in California.

SUPPLIES FROM OTHER WATER PROJECTS AND WATER TRANSFERS

Drought impacts on water project supplies throughout the state were not uniform; impacts varied with factors such as reservoir size and refill rate, elevation and size of watershed areas, and location of watershed areas with respect to storm tracks. Supplies from California's largest intrastate water projects — the CVP and the SWP — were particularly affected by the cumulative impacts of three years of dry hydrologic conditions, while some smaller projects did not see similar impacts. (The SWRCB sent out a notice in February 2009 (see Appendix) warning surface water diverters statewide that the full supplies allowed in their permits or licenses might not be available.) The bullets below highlight a few water projects where drought impacts on water supplies were of particular interest, and also include a brief review of water transfer activity.

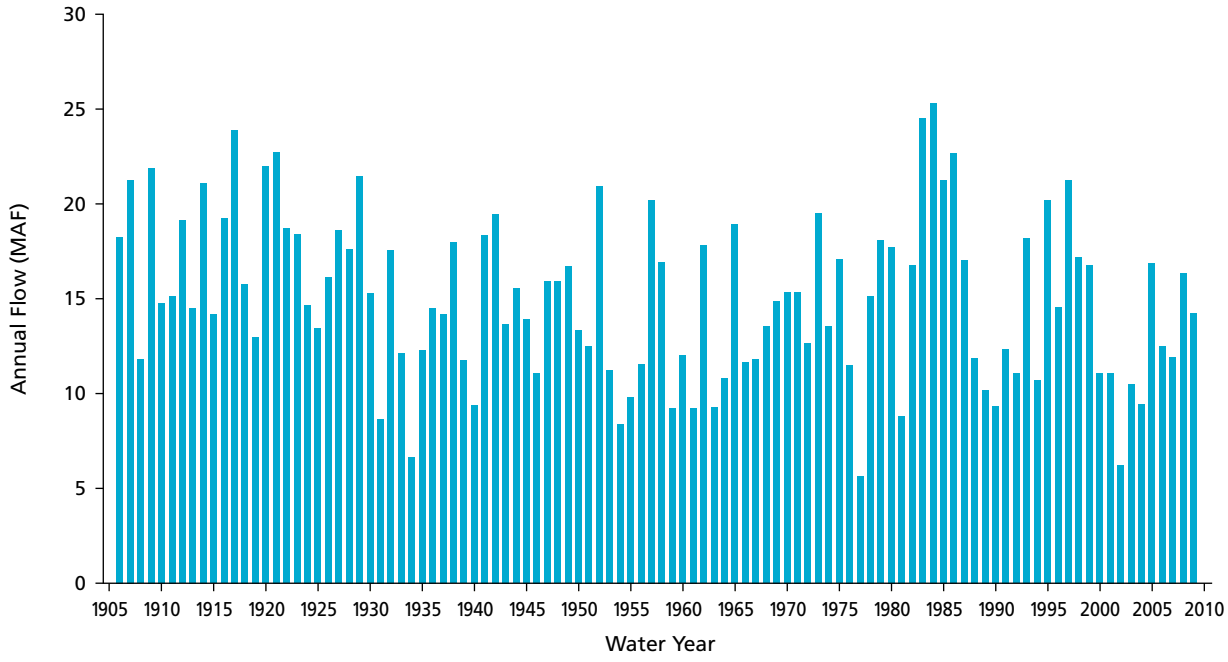


FIGURE 23 — Historical Colorado River Natural Flow at Lee's Ferry

» **The Russian River system** — the U.S. Army Corps of Engineers' (USACE) Russian River Project (Lakes Mendocino and Sonoma on the Russian River) and PG&E's Potter Valley Project diversion of Eel River water into the Russian — supply parts of Sonoma, Mendocino, and Marin Counties. Availability of Russian River water was significantly affected by a combination of drought and regulatory conditions. Storage in Lake Mendocino was well below average in 2009 (**FIGURE 26**, *page 36*), and water supplies were additionally constrained by three factors: a revised Federal Energy Regulatory Commission (FERC) license for the Potter Valley Project reducing Eel River imports, a 2008 NMFS biological opinion for salmon, and SWRCB's Decision 1610 setting instream flow requirements. (The 1986 SWRCB decision was based on assumed Eel River imports which are not now possible under the revised FERC license.)

Sonoma County Water Agency (SCWA), the largest contractor for Russian River water and the wholesaler for Santa Rosa and nearby municipalities, submitted a petition to SWRCB in April 2009 to reduce the required instream flows in the Russian River below Lake Mendocino. The petition included a projection showing the potential dewatering of Lake Mendocino in September. SWRCB approved the petition, held a workshop to receive comments, and issued an amended order on May 28, 2009. The order included conditions requiring a 25% reduction in SCWA summer diversions, restrictions on commercial turf irrigation, a plan for Russian River water users to reach water conservation goals of 50% in Mendocino County and 25% in Sonoma County, and increased monitoring.

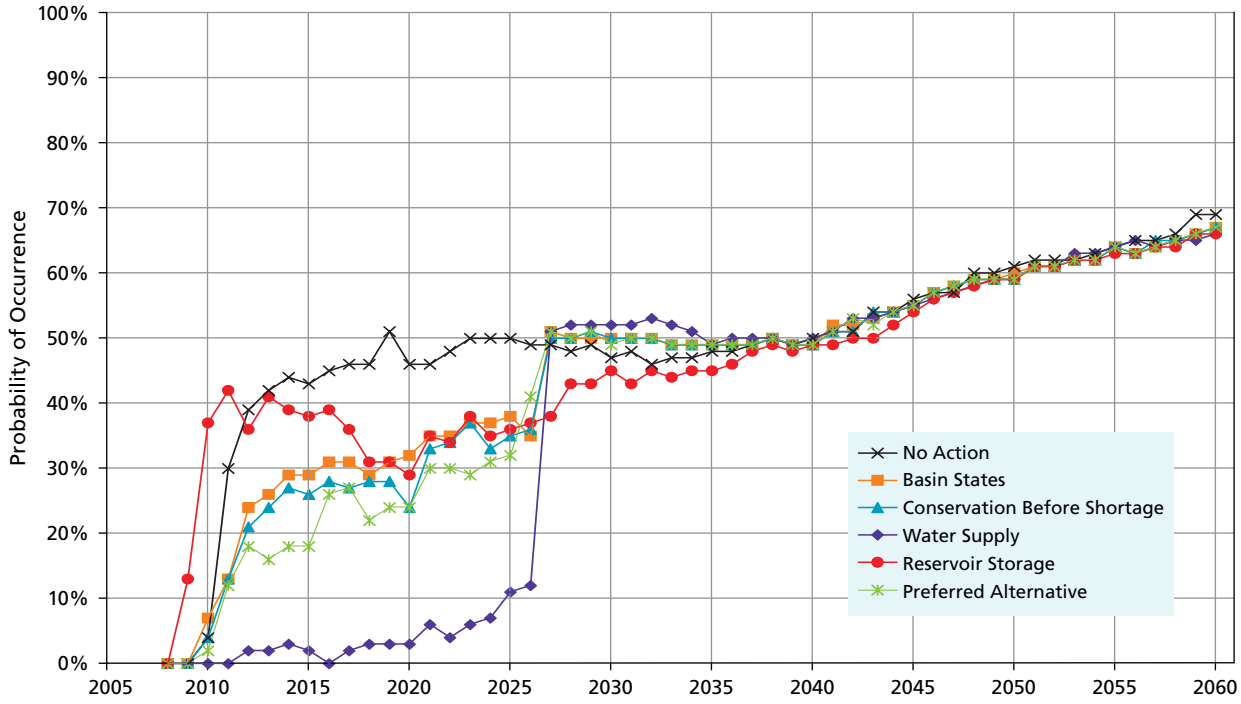


FIGURE 24 — Involuntary and Voluntary Lower Basin Shortages, Comparison of Action Alternatives to No Action Alternative, Probability of Occurrence of any Shortage Volume

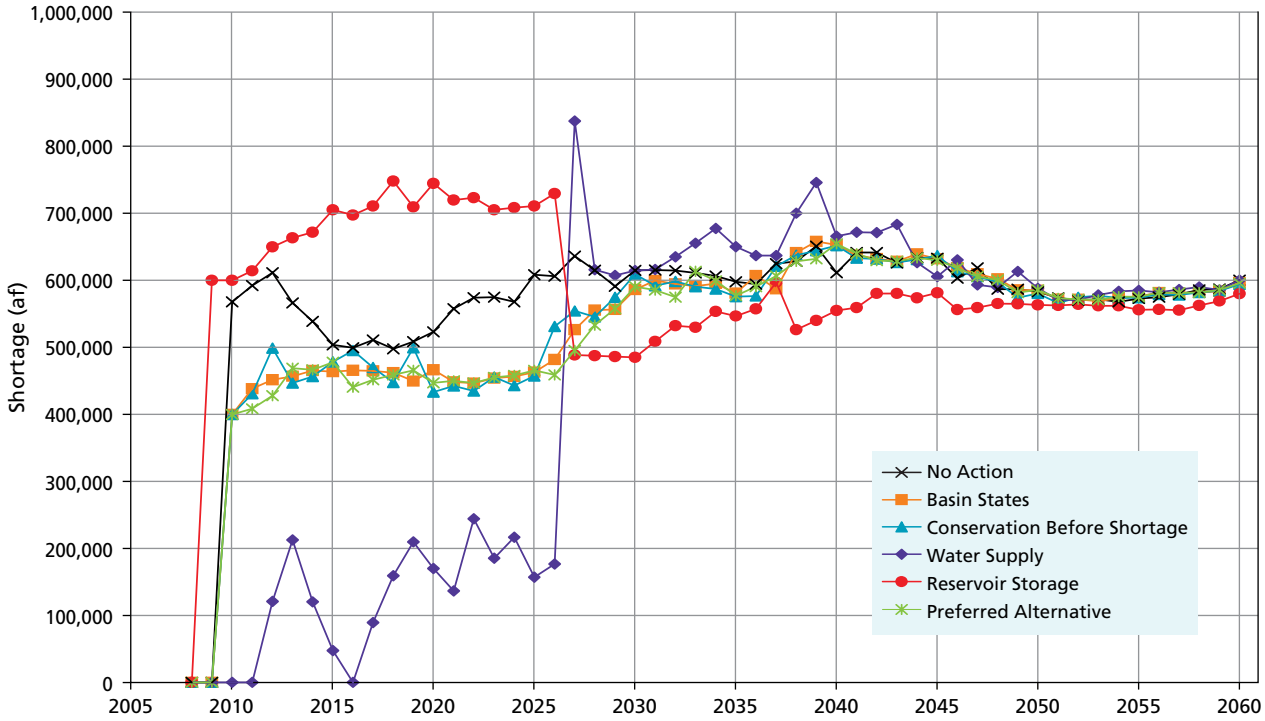


FIGURE 25 — Involuntary and Voluntary Lower Basin Shortages, Comparison of Action Alternatives to No Action Alternative, Average Shortage Volumes

Figures 24 and 25 are from USBR's final environmental impact statement for Colorado River interim guidelines for Lower Basin shortages and coordinated operations of Lakes Mead and Powell (USBR, 2007)

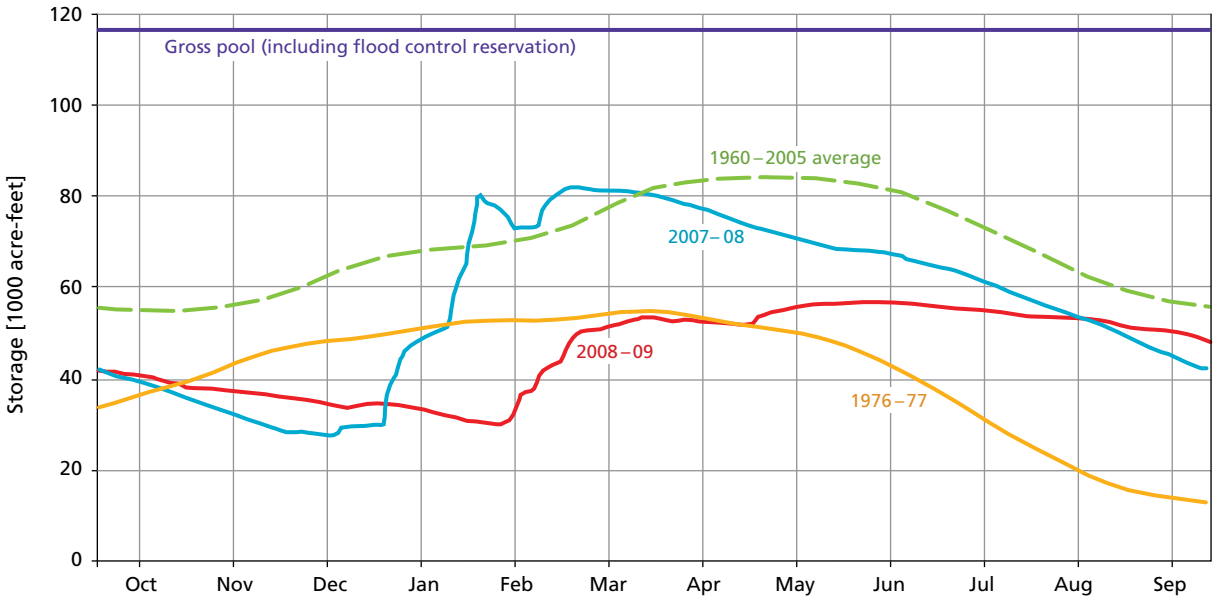


FIGURE 26 — Lake Mendocino Storage
Data courtesy of Sonoma County Water Agency

» **The Klamath Project** on the California-Oregon border was the site of a 2001 drought emergency declaration when dry hydrologic conditions and USBR's compliance with USFWS and National Marine Fisheries Service (NMFS) biological opinions for three listed fish species resulted in suspension of irrigation deliveries for lands supplied from Upper Klamath Lake. Subsequently, USBR operated a pilot water banking program (managed land idling and ground-water pumping) from 2001–2008 to acquire water help support fishery and tribal trust requirements; the banking program was taken over by the Klamath Water and Power Authority in 2009. Project deliveries to agricultural lands in California in recent years were within historical ranges, although below average hydrology has recurred. (In water year 2010, however, low storage levels in Upper Klamath Lake and Clear Lake Reservoir combined with fishery protection requirements are resulting in significantly reduced project allocations.) Recent years' project agricultural deliveries in California were:

2006 = 115 TAF
2007 = 128 TAF
2008 = 139 TAF
2009 = 137 TAF

» **The City of Los Angeles' Owens River Aqueduct** is the smallest of the three sources of imported supply for urban Southern California. As with Southern California's imported SWP supplies, deliveries from the Owens River system have been affected by both environmental regulatory requirements and dry hydrologic conditions. Availability of Owens River system water for export to Los Angeles has been reduced by two requirements not in effect during the prior droughts — provision of water for shallow flooding for dust control on parts of the dry Owens

USBR's Upper Klamath Lake in winter. The lake is the Klamath Project's largest storage facility. (Photo courtesy of USBR)

Lake bed beginning in the early 2000s, and provision of a 40 cubic foot per second permanent base flow for the lower river beginning in early 2007. Eastern Sierra snowpack (**FIGURE 27**, *page 38*) and runoff were below average for 2007–09. According to the Los Angeles Department of Water and Power, Owens Valley runoff was 60 percent of normal in its 2007–08 runoff year (April–March) and 74 percent of normal in 2008–09. Owens Valley runoff for its 2009–10 runoff year is expected to be 71 percent of normal, representing 23 percent of the city's projected 2009–10 total demand. Los Angeles compensates for reduced Owens River supplies by purchasing a greater proportion of its supplies from MWD.

» **Water transfers** are a common tool for responding to drought impacts. The 2008 executive order directed the Department to implement a dry year purchasing program (which became the 2009 drought water bank) to assist water users if conditions were dry. The Department solicited interest in bank participation from potential buyers and sellers, receiving significantly greater interest in purchasing water from the bank than could be supported through the quantity of water offered for sale. Limiting factors in water bank participation included relatively high prices for rice in the Sacramento Valley, which made sales of water to the bank less economically attractive to growers, and constraints on being able to move purchased water across the Delta. Due to these constraints, buyers would lose about 40 percent of the purchased rice growers' water, effectively increasing the cost of the water to the point that it was uneconomical. The majority of the water purchased was made available through groundwater substitution. The Department purchased water from

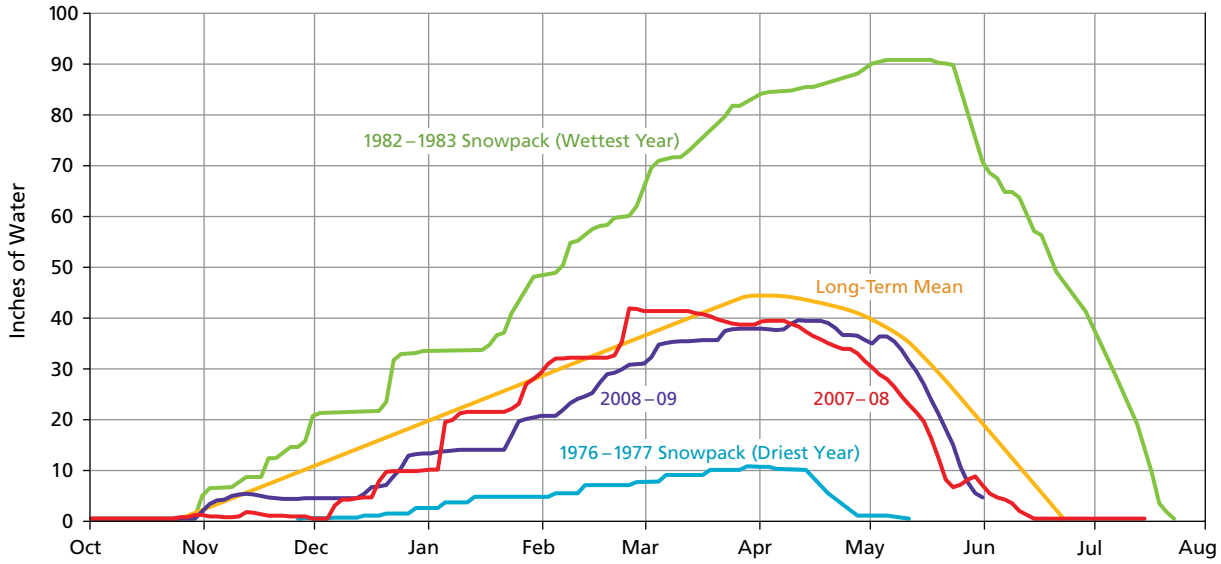


FIGURE 27— Historical Comparison of Mammoth Lake Snowpack
Figure courtesy of Los Angeles Department of Water and Power

Some growers on the west side of the San Joaquin Valley were not able to maintain their high-value permanent plantings in the face of greatly reduced agricultural water supplies.

sellers at $275/AF; buyers of the water from the Department paid this amount plus administrative and transportation costs, and were responsible for carriage and other losses associated with conveying the water to their place of use. The Department provided about 74 TAF through the water bank in 2009. Deliveries of water to buyers occurred only from July through September due to Delta fishery regulatory requirements. Operation of the bank was facilitated by SWRCB's issuance of Order WR 2009–0033, which allowed DWR and USBR to transfer up to 16 TAF of bank water to the places of use of either the SWP or the CVP south of the Delta.

The CVP and SWP were also involved in conveyance of water for transfers initiated by local water agencies, and in approval of internal exchanges or transfers among each project's contractors. Conveyance of water for others in 2009, for example, amounted to approximately 210 TAF of water being moved from sellers upstream of the Delta to buyers in the San Joaquin Valley and Southern California, not counting the internal reallocations among CVP and SWP contractors.

3 Drought Impacts

WILDFIRES

Damages associated with wildfires and loss of timber resources can be one of the largest economic impacts of drought. California faces an increasing risk of damages from wildfires as urban development encroaches on the urban/wildland interface. A joint position adopted by the League of California Cities and the California State Association of Counties following Southern California's devastating wildfires in 2003 notes that: "Catastrophic wildfires are one of the most significant threats to communities, forests, and wildlands in California today" (League, 2004). The devastating Southern California wildfires of 2003 — reported to be the then-costliest in U.S. history, and which followed a multi-year regional drought in Southern California — were mirrored in October 2007, when a combination of dry vegetation and Santa Ana winds created conditions favorable for another massive outbreak of fires in Southern California (**FIGURE 28**, *page 40*). Earlier that same year, dry conditions in Northern California had facilitated the spread of another damaging fire — the Angora Fire near Lake Tahoe, estimated by the California Department of Forestry and Fire Protection (CAL FIRE) to incur more than $11 million in fire fighting costs.

TABLE 9 provides CAL FIRE information on estimated damages and fire suppression costs for recent years. Dry conditions, combined with warmer than average annual temperatures over much of the past decade, are leading to an almost year-round wildfire risk in Southern California — which experienced a regional drought in water years 1999–2002 in addition to the 2007–09 dry conditions. In 2009, for example, a major fire occurred as early as May in the Santa Barbara area. Reflecting the cumulative impacts of a third successive dry year to wildland vegetation, Governor's Executive Order S-05-09, issued in May 2009, directed CAL FIRE to mobilize additional fire fighting resources in expectation of an early and potentially severe wildfire season.

TABLE 9 — Estimated Wildfire Damages
CAL FIRE Wildland Fire Summary Data

Fire Season	CAL FIRE Fire Suppression Cost Estimate ($M)	Damage Cost Estimate ($M)	Structures Destroyed
2000	124	30	130
2001	109	87	389
2002	135	174	327
2003	253	974	5394
2004	166	127	1016
2005	105	49	102
2006	206	60	431
2007	298	254	3079
2008	460	899	1027
2009	256	34	121

Notes:
1. *CAL FIRE fire suppression costs are reported on its seasonal, not calendar year, basis.*
2. *Damage cost estimates and structures destroyed are only for CAL FIRE jurisdictional area (wildlands)*

FIGURE 28 — 2007 Southern California Wildfires

Source: California Office of Emergency Services, November 2007

Costs of fighting the May 2009 Jesusita Fire in the Santa Barbara area were estimated at about $20 million.

URBAN AREAS

Urban water suppliers, particularly those serving larger metropolitan areas, normally provide highly reliable supplies for their customers, as they have the resources and the revenue base to prepare for and respond to drought impacts. The majority of serious water to supply problems during droughts (e.g. inability to maintain fire flows, need for truck haulage of water) are experienced by small water systems, discussed below. The urban water management plans (UWMPs) that Water Code Sections 10601 et seq require urban suppliers prepare and update every five years serve as a drought preparedness planning tool for the state's larger water systems.

The statutory requirement for UWMP preparation applies to public water systems (both retailers and wholesalers) providing water for municipal purposes to more than 3,000 customers or serving more than 3,000 AF annually. As part of UWMP preparation, systems must provide a water shortage contingency analysis that addresses how they would respond to supply reductions of up to 50 percent, and must estimate supplies available to their systems in a single dry year and in multiple dry years. UWMPs must also address systems' responses to catastrophic interruptions of their supplies, such as those caused by earthquakes or power outages. The plans also provide information for water supply assessments required in Water Code Sections 10613 et seq. and for written verifications of water supply called for in Water Code Section 66473.7. Eligibility for receiving certain types of State financial assistance is conditioned upon water suppliers submitting complete UWMPs to the Department. Moreover, legislation enacted in 2007 required, beginning in 2008, that urban water suppliers implement the demand management measures described in their UWMPs in order to be eligible for specified state financial assistance.

Five-year updates of UWMPs were due to the Department in 2005. The Department estimates that 453 suppliers were required to file plans in 2005; 410 plans were received. Beginning in 2007, the Department

FIGURE 29 — Locations of Local Agencies with Conservation Program Information

Urban water agencies are increasingly considering drought-proof water sources such as desalination for part of their water supply portfolios. In 2009 there were 29 operating desalination plants (brackish groundwater and sea water) in California.

held 18 UWMP workshops in response to the drought to encourage water systems to review and update their water shortage contingency plans, and additionally funded preparation of an updated urban drought guidebook in coordination with USBR and the California Urban Water Conservation Council (CDWR 2008b).

Implementing enhanced water conservation programs and calling for customers to achieve either voluntary or mandatory water use reduction targets are common urban agency drought response actions. Increases in customers' water rates — either to encourage conservation or to react to increased costs associated with acquiring supplemental water sources or implementing conservation programs — are another common drought outcome, and rate increases were widespread by 2009. In Southern California, for example, MWD imposed mandatory reductions on its member agencies for the first time in 18 years, together with a rate increase of 8.8 percent in the base wholesale rate and a $69/AF Delta surcharge. **TABLE A-1** *(page 113)* in the Appendix, compiled from information collected by the Association of California Water Agencies (ACWA), summarizes conservation actions and water use reduction targets of its member agencies. Locations of agencies for which information has been compiled are shown in **FIGURE 29**.

Many of the local agency water conservation campaigns targeted reductions in outdoor water use; relatedly, the Department completed development of a model water efficient landscape ordinance. A "Save Our Water" public education campaign was launched in April 2009 as a joint effort of the Department and ACWA; it offered consumer-oriented information for understanding long-term issues facing the state's water systems and tips for reducing indoor and outdoor water use. In support of local water recycling programs, the Department additionally completed proposed dual plumbing standards for adoption by the California Building Standards Commission.

Reductions in imported supplies from the SWP and from the Owens Valley Aqueduct to urban Southern California led to water operations impacts, especially with regard to water storage reserves. Southern California — where about half of the state's population lives within the MWD service area — is highly dependent on imported supplies. Historically, about 60 percent of annual service area needs have been met with imports, with more than half of that amount coming from the Colorado River. Surface water storage capacity within Southern California is limited compared to the northern part of the state; one reason for the construction of MWD's Diamond Valley Lake in the late

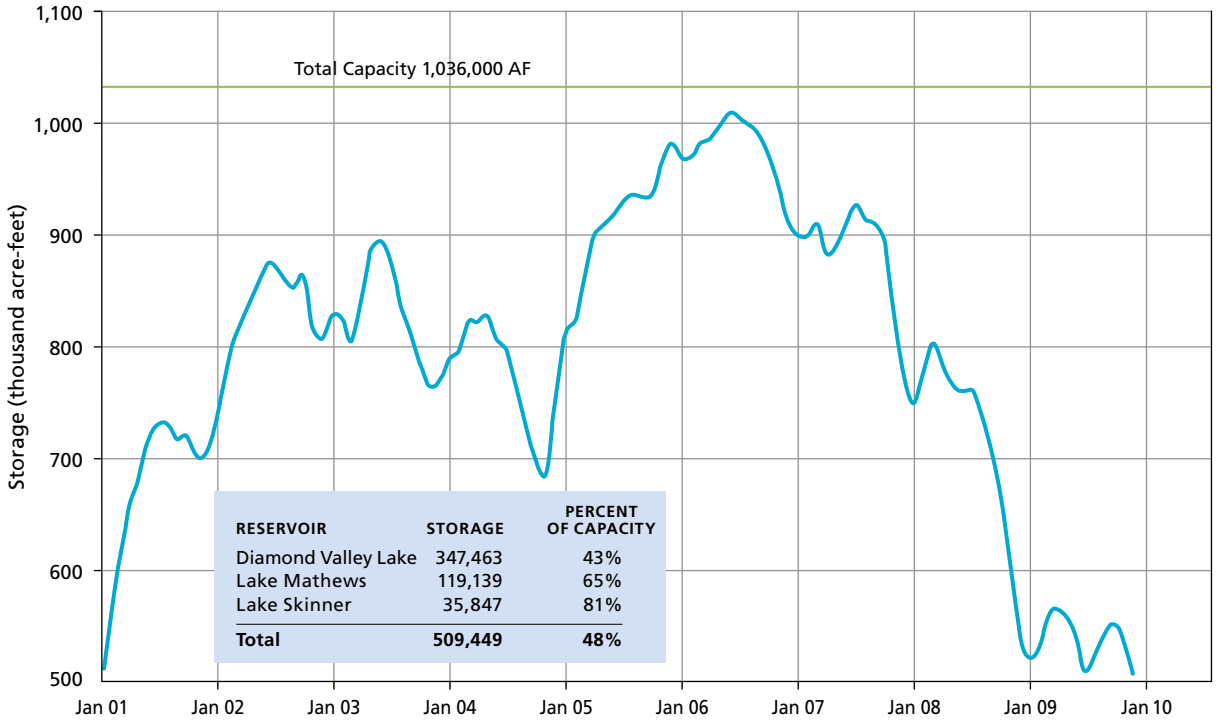


FIGURE 30 — MWD In-Service Area Storage
Figure courtesy of Metropolitan Water District of Southern California

1990s was to provide in-service area emergency storage. MWD's in-service area reserves were drawn down to compensate for reduced imports, as illustrated in FIGURE 30.

Water quality impacts of reductions in imported Sierra Nevada water to urbanized Southern California were another consequence of drought. (Sierran water is used within the MWD service area to balance the relatively saltier Colorado River imported supplies.) Consequences of increased salt loading in the region include economic impacts, long-term salt build-up in the region's groundwater basins, and complications for water reuse and recycling programs. Recognition of the need to manage salinity on a regional basis in Southern California had earlier led to creation of the Southern California Salinity Coalition in 2002 to help coordinate salinity management activities among Southern California water and wastewater agencies.

SMALL WATER SYSTEMS AND PRIVATE WELL OWNERS

Small water systems have historically experienced the bulk of health and safety impacts, as well as the majority of water shortage emergencies — regardless of water year type. TABLE 10 shows recent emergency response grants made by the California Department of Public Health (CDPH) to water systems, all of which are small systems. Although small systems serve a low percentage of California's total population, they constitute the majority of the state's public water systems, as illustrated in TABLE 11. Small systems tend to be located outside the state's major metropolitan areas, often in lightly populated rural areas where opportunities for interconnections with another system or water transfers are nonexistent. Small systems also have limited financial resources and rate bases that constrain their ability to under-

TABLE 10 — CDPH Proposition 84 Emergency Grants

System	Description	Date Approved	Amount
County of Lake (Mt. Hannah)	Storage tank failure	11/26/2007	250,000.00
Tooleville Mutual Water Assn.	Main well pump failure	6/25/2007	10,592.57
Ducor Community SD	Mechanical problems with main well pump	7/19/2007	16,524.86
Inyo County	Storage tank damaged by wildfire	7/11/2007	5,000.00
PureSource	Tank failure	8/21/2007	25,787.15
Rosamond CSD	Main well pump failure	10/5/2007	93,500.00
Lanare CSD	New well piping required to bring online	11/6/2007	5,000.00
West Goshen MWC	Mechanical problems with main well pump	11/13/2007	48,312.88
PureSource	Tank failure	4/4/2008	220,000.00
Verderame Castlewood LLC	High levels of methane	4/15/2008	143,200.00
Feather River Canyon CSD	Fire damage to pipelines	7/16/2008	8,525.81
Esalen Institute	Fire damage to pipelines	8/1/2008	7,505.27
Coastlands MWC	Fire damage to intake and transmission lines	8/1/2008	6,770.94
Partington MWC	Fire damage to pipelines	8/13/2008	10,000.00
Latrobe Elementary School	Water outage	8/13/2008	10,000.00
Rainbird Valley MWC	Pump failure	9/24/2008	28,181.00
Madera County Maintenance District No. 85 – Valeta	Water outage	9/12/2008	20,000.00
Verderame Castlewood LLC / Castlewood Mobile Home Park	High levels of methane	10/6/2008	50,700.00
		Total	**$959,600.48**

take major capital improvements. Most small system drought problems stem from dependence on an unreliable water source, commonly groundwater in fractured rock systems or in small coastal terrace groundwater basins. Historically, particularly at-risk geographic areas have been foothills of the Sierra Nevada and Coast Range and inland Southern California, and the North and Central Coast regions.

The Department held a 2007 small system drought preparedness workshop to raise awareness of the need for developing drought assistance programs targeted to small systems, and held three drought workshops in 2009 specifically targeted to small systems. In 2008, as part of response to the executive order's provision calling for expediting disbursement of available financial assistance, the Department awarded Proposition 50 grants totaling $984,800

TABLE 11 — Size Distribution of California Public Water Systems

Number of Systems	System Type & Size (by number of connections)
CWS, Large (3300+/Wholesaler)	405
CWS, Large (1000 – 3300)	278
CWS, Large (500 – 999)	157
CWS, Small (100 – 499)	609
CWS, Small (25 – 99)	1043
CWS, Small (<25)	613
Non-Transient NCWS	1529
Transient NCWS	3184
Total	**7818**

Key:

CWS = Community Water System

NCWS = Non-community Water System

Non-transient NCWS = serves 25 or more of the same non-resident individuals, at least 6-month out of the year; e.g. schools, places of employment, etc.

Transient NCWS = serves 25 or transient individuals per day, for any 60-days out of the year; e.g rest stops, campgrounds, etc.

Note: Information from CDPH as of May 2009

Small water systems in the Coast Range and Sierra Nevada foothills typically experience drought impacts. Impacts are less frequently reported from small systems in California's southeastern desert areas, as these systems tend to have already been designed based on low precipitation rates and annual recharge.

to the California Rural Water Association for leak detection training and onsite technical assistance, drought preparedness training, and water conservation assistance for small systems. CDPH conducted a statewide evaluation to identify water systems vulnerable to drought, developing a list dominated by small systems. CDPH additionally sent a letter (see Appendix) to all public water systems, although targeted especially for small systems, urging them to prepare for water shortages. The sheer number of small water systems and their dispersed locations in rural areas mean that improving their water supply reliability and compliance with Safe Drinking Water Act requirements will be a long-term challenge.

It is estimated that perhaps one million people in California rely on self-supplied groundwater (i.e. private residential wells). Significant increases in the number of rural residents reporting problems with their wells are typical during drought conditions, especially in areas such as the Sierra Nevada foothills that rely on fractured rock groundwater sources. The majority of new water supply well construction or deepening of existing wells during droughts is for private residential wells. The Department received anecdotal information of scattered areas in the Sierra foothills where private residential wells experienced problems in 2008 and 2009.

AGRICULTURAL AREAS

The agricultural sector clearly illustrates the site-specific nature of drought impacts. Agricultural drought impacts are normally felt earliest by those relying on unmanaged water supplies — entities carrying out dryland grazing and non-irrigated crop production (usually grain crops). Impacts to irrigated agriculture depend on the source and nature of the irrigation water supply — local groundwater, local surface water, or imported surface water — and any water rights or contractual provisions that may be associated with the source. The extent to which producers may mitigate water shortage impacts depends on multiple factors, but is heavily influenced by economic considerations. Factors involved in making decisions about mitigating irrigation water shortages include availability and costs of pumping groundwater, price of alternative surface water sources, capital investments associated with maintaining permanent plantings, and status of national and international crop markets.

Impacts of drought on dryland grazing are difficult to capture due to the absence of standardized metrics that provide comparable information across differing agency jurisdictions [e.g. county agricultural commissioners, U.S. Forest Service, U.S. Bureau of Land Management (BLM)] and industry programs.

The California State Office of the BLM, for example, estimated that animal unit months (an indirect measure of forage) on lands under its jurisdiction dropped about eight percent from 2006 to 2008, although drought may be only one of several reasons for the decline (e.g. economic recession could result in permittees stocking less than the maximum number of allowed livestock). Some information on rangeland drought impacts may be included in county-level requests for U.S. Department of Agriculture (USDA) disaster declarations used to authorize provision of financial assistance (see sidebar on page 48). Often, declarations for foothill and mountain counties outside of major agricultural areas such as the Central Valley are driven by rangeland impacts. A sample county request for a USDA disaster declaration based on rangeland drought impacts is contained in the Appendix. TABLE 12 shows USDA financial assistance to California livestock operators under two USDA programs that link directly to drought impacts. (These two programs were newly authorized in the 2008 Farm Bill; there are thus no 2007 payments under the programs.)

With respect to irrigated agriculture, drought impacts varied with location and water source. Some areas of the state had essentially full supplies — whether from groundwater, surface water, or a combination of the two — while others were affected by reduced availability of surface water supplies. TABLE 13 shows statewide harvested acreage data through 2007, the latest date for which information is presently available. It is important to emphasize that harvested acreage is influenced by multiple variables (with crop markets being one of the most important ones), and that additional information is needed to quantify drought-specific agricultural impacts. Available harvested acreage data is presented here primarily to illustrate annual variability in the values.

Areas of the state experiencing the greatest irrigation water shortages or drought-related impacts in 2009 were the west side of the San Joaquin Valley and the San Diego/Riverside County avocado/citrus growing area. Lesser impacts or drought-related water use issues also occurred in the Russian River service area (vineyard water supplies) and the Tehama-Colusa Canal service area on the west side of the Sacramento Valley (reduced CVP deliveries). TABLE A-2 *(page 117)* in the Appendix shows USDA drought-related crop insurance payments,

TABLE 12 — USDA Payments, Drought-Related Livestock Programs

Year	LIP Payments ($)	LFDP Payments ($)
2008	69,876	8,981,986
2009	38,347	12,315,582

LIP = Livestock Indemnity Program
(payments for livestock deaths related to severe weather)

LFDP = Livestock Forage Disaster Program
(financial assistance for grazing losses)

TABLE 13 — Statewide Harvested Acreage by DWR Crop Type

Crop type	2005	2006	2007
Grain	1,592,291	1,620,887	1,637,559
Rice	556,963	550,540	575,998
Cotton	754,732	603,064	470,661
Sugar beets	46,997	43,244	37,724
Corn	619,620	598,797	694,886
Dry beans	80,455	92,973	70,210
Safflower	53,813	51,913	47,934
Other field	399,215	297,845	273,709
Alfalfa	1,118,415	1,202,640	1,119,032
Pasture	998,543	989,397	907,184
Processing tomatoes	309,283	320,506	326,159
Fresh market tomatoes	35,782	39,085	34,317
Cucurbits	89,103	85,067	76,978
Onion, garlic	81,163	80,563	77,780
Potatoes	40,290	46,392	35,857
Other truck	890,093	920,975	850,709
Almond, pistachio	727,072	763,705	841,483
Other deciduous	613,413	594,758	582,353
Subtropical	378,564	370,642	370,522
Vineyards	833,644	816,911	815,465
Total	**10,219,451**	**10,089,904**	**9,846,520**

Notes:

1. *Data from Department of Food and Agriculture, compiled from County Agricultural Commissioner information, and grouped by DWR into major crop types*
2. *2008 data not yet available*
3. *Harvested acreage includes both irrigated and non-irrigated lands.*

FIGURE 31 — California Counties with USDA Disaster Designations
As of December 31, 2009. Information courtesy of USDA/Federal Emergency Management Agency.

USDA Disaster Assistance

USDA's Farm Services Agency administers an emergency farm loan program that helps farmers and ranchers recover from losses due to drought, floods, other natural disasters, and quarantines. To be eligible for the emergency loans, applicants' operations must be located in a county declared by the President or designated by the Secretary of Agriculture as a disaster area. Criteria for a secretarial designation include a finding that a minimum 30 percent production loss of at least one crop has occurred in the designated county. The timeframe USDA uses for making designations is typically brief from a water management viewpoint — often just a few months. This brevity reflects both the importance of seasonal rainfall to activities such as livestock grazing on non-irrigated rangeland and the emergency loan program's intent of providing farmers and ranchers with operational capital. As described in USDA's 2007 fact sheet (USDA, 2007) for its emergency designation and declaration process:

Agricultural-related disasters are quite common. One-half to two-thirds of the counties in the United States have been designated as disaster areas in each of the past several years. FIGURE 31 shows that USDA disaster declarations for drought were in effect for most of California's counties in late 2009. Such declarations can be a prerequisite for other USDA financial assistance programs in addition to its emergency farm loan program. In summer 2008, for example, agricultural producers in 53 of California's 58 counties were eligible for assistance under USDA's Supplemental Revenue Assistance Payments program, based on disaster declarations then in effect. Losses reported by the counties shown in Figure 21 requesting disaster declarations were approaching $900 million in 2009; however, it must be emphasized that some of the reported losses covered multiple years, or were projected rather than observed losses, and that not all counties provided dollar values for estimated losses.

by county. USDA's Risk Management Agency offers a variety of crop insurance plans that producers may consider as part of their risk management strategies. Policies may protect, for example, against crop yield loss due to causes such as drought, excessive moisture, hail, wind, frost, or insects and disease. Crop insurance payments are not by themselves a tool for quantifying drought impacts to agriculture, but they can serve as one indicator of affected regions and crop types.

Shortages in 2009 surface water deliveries on the west side of the San Joaquin Valley caused some growers to abandon orchards.

Reduced CVP Delta exports resulted in deliveries to the San Joaquin Valley's west side being only a fraction of contractual allocations — 50 percent in 2007, 40 percent in 2008, and 10 percent in 2009. The availability of groundwater in this area to make up these shortfalls is limited, with water quality (too saline) being a significant constraint on availability. Water transfers, discussed in the previous chapter, were used to provide limited supplemental supplies. Finding sufficient water to protect capital investments in permanent plantings (orchards and vineyards) was a priority for growers on the Westside. Based on Westlands Water District (WWD) 2009 crop acreage report, for example, roughly 127,000 acres of its 568,652 cropped acres were in permanent plantings.

Land fallowing on the west side of the San Joaquin valley was a clear outcome of reduced irrigation supplies. Looking at the extent of fallowing at the individual water district scale, WWD's crop acreage reports show an increase in fallowed land on the order of 100,000 acres in the district between 2006 and 2009. At the regional level, USDA's National Agricultural Statistics Service (NASS) uses satellite imagery to develop research-level geospatial estimates of cropping patterns. California State University, Monterey Bay researchers used NASS data products to estimate the difference in San Joaquin Valley fallowed land between 2007–2009, arriving at a value of about 170,000 acres (**FIGURES 32A and 32B**, *pages 50–51*). (Similar NASS data sets are not available for 2006 and 2008.) The NASS cropping pattern estimates are research, not operational, products, and NASS characterizes the accuracy of its 2007 and 2009 data sets as having commission errors (classifying non-fallowed land as fallow) and omission errors (classifying fallowed land as something else) in the range of 32 to 48 percent. The fallowed areas identified on the processed NASS data (acquired from an instrument known on as the Advanced Wide Field Sensor flown on an Indian satellite) shown in Figure 32 appear to be in general geographic agreement with areas of fallowing identified from other space-born sensors (**FIGURES 33A-C and 34A-C,** *pages 52-57*). The images in Figures 33 and 34 were acquired from the National Aeronautics and Space Administration's (NASA's) Landsat program. Figures 33A–C provide an overview of the contrast in San Joaquin Valley irrigated acreage in pre-drought (2006) and drought (2008 and 2009) years, while Figures 34A–C show a close-up of that information for the CVP south-of-Delta export area.

FIGURE 32A — Estimated 2007 San Joaquin Valley Fallowed Acreage from NASS Data

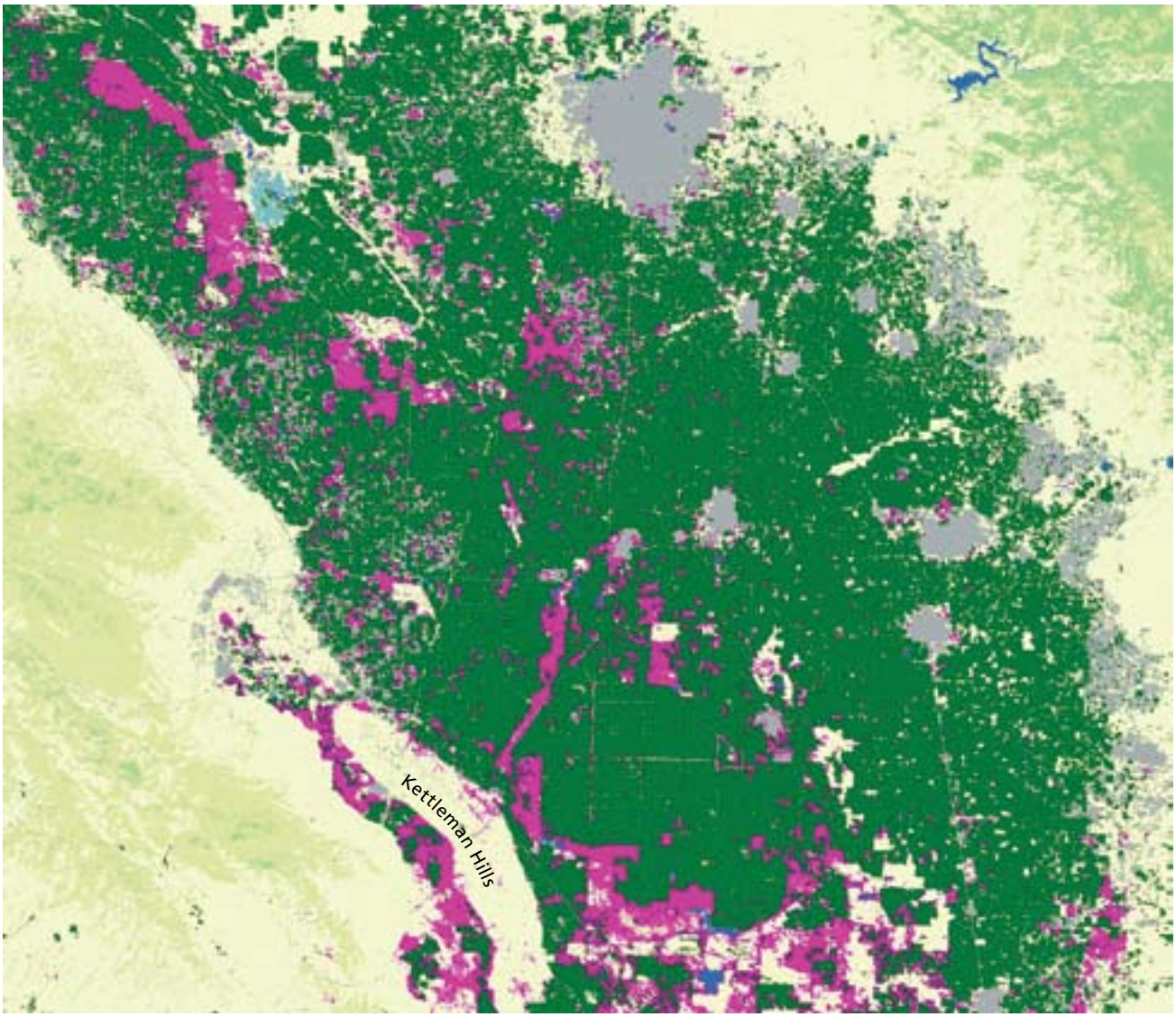


Figure courtesy of Lee Johnson, CSU Monterey Bay.

Socioeconomic impacts of water shortages on the west side of the San Joaquin Valley are exacerbated by the region's high dependence on agriculture for employment. The University of California, Davis performed economic modeling to estimate water shortage impacts to Central Valley irrigated agriculture (Howitt et al., 2009). It was estimated that the incremental impact in the San Joaquin Valley resulting from reductions in Delta exports was a loss of 21,000 jobs (16,000 jobs due to drought alone and 5,000 due to environmental pumping restrictions). **FIGURE 35** (*page 58*) contrasts unemployment data for selected communities in western Fresno County, in the area affected by reduced CVP south-of-Delta exports, with unemployment information for communities in similarly agriculturally-dominated Imperial County, where there have been no shortages in Colorado River agricultural supplies. All areas shown clearly have high unemployment rates;

FIGURE 32B — Estimated 2009 San Joaquin Valley Fallowed Acreage from NASS Data

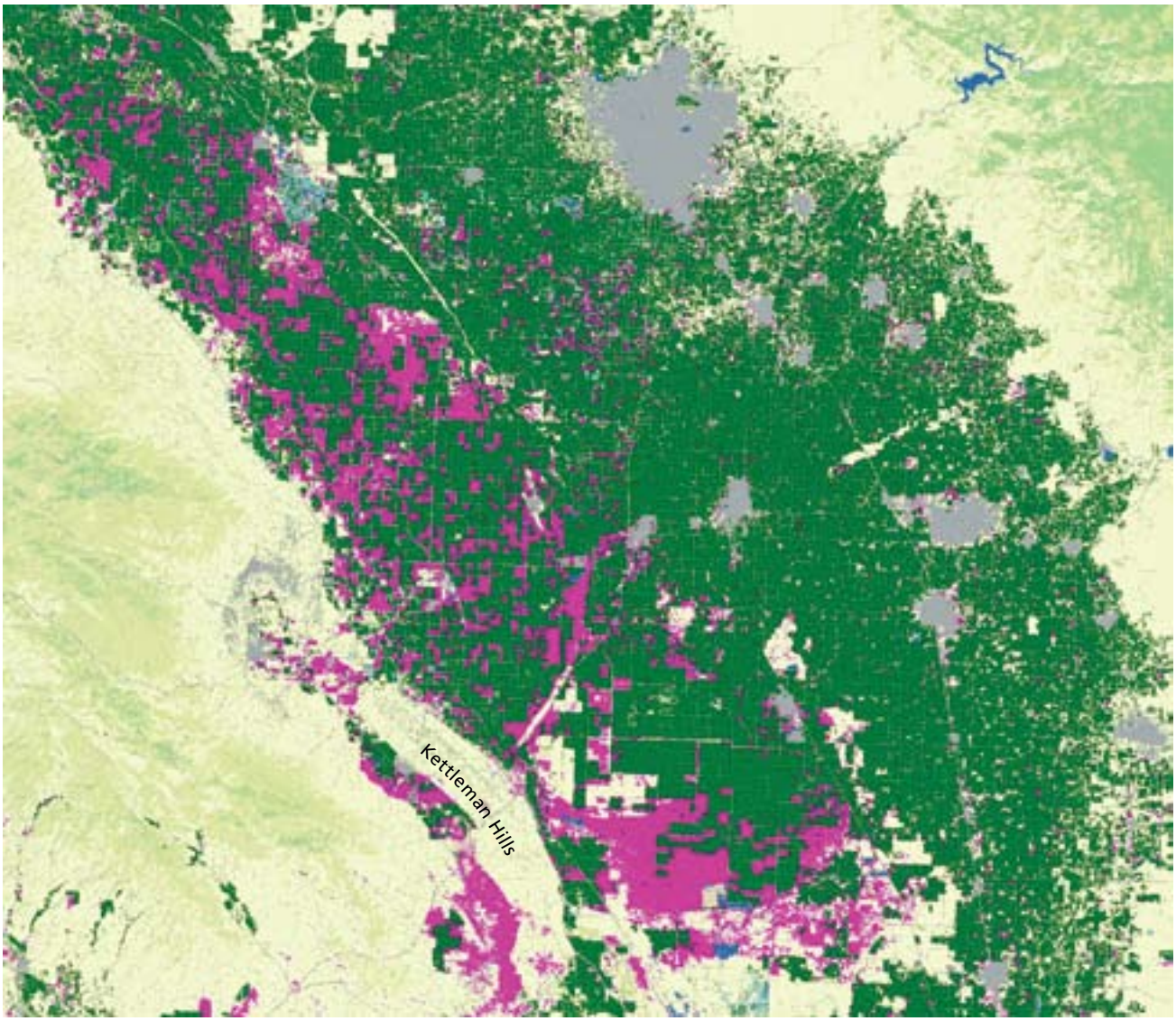


Figure courtesy of Lee Johnson, CSU Monterey Bay.

however, speculating about locality-specific causes of unemployment and the influence of the economic recession is outside of the Department's expertise.

Social services agencies on the west side of the San Joaquin Valley experienced dramatic increases in requests for assistance, leading Fresno County to proclaim a local state of emergency in April 2009 for drought-related unemployment food crisis. The County described its situation in that proclamation as:

…the demand on the local Community Food Bank continues to increase, where, they have provided food to residents on multiple occasions, only to run short each time. Thousands of people have been turned away during giveaways as supplies are not ample enough to meet the local need. During the Community Food bank's most recent neighborhood market distribution in the City of Mendota on February 2, 2009, 3,248 people were served.

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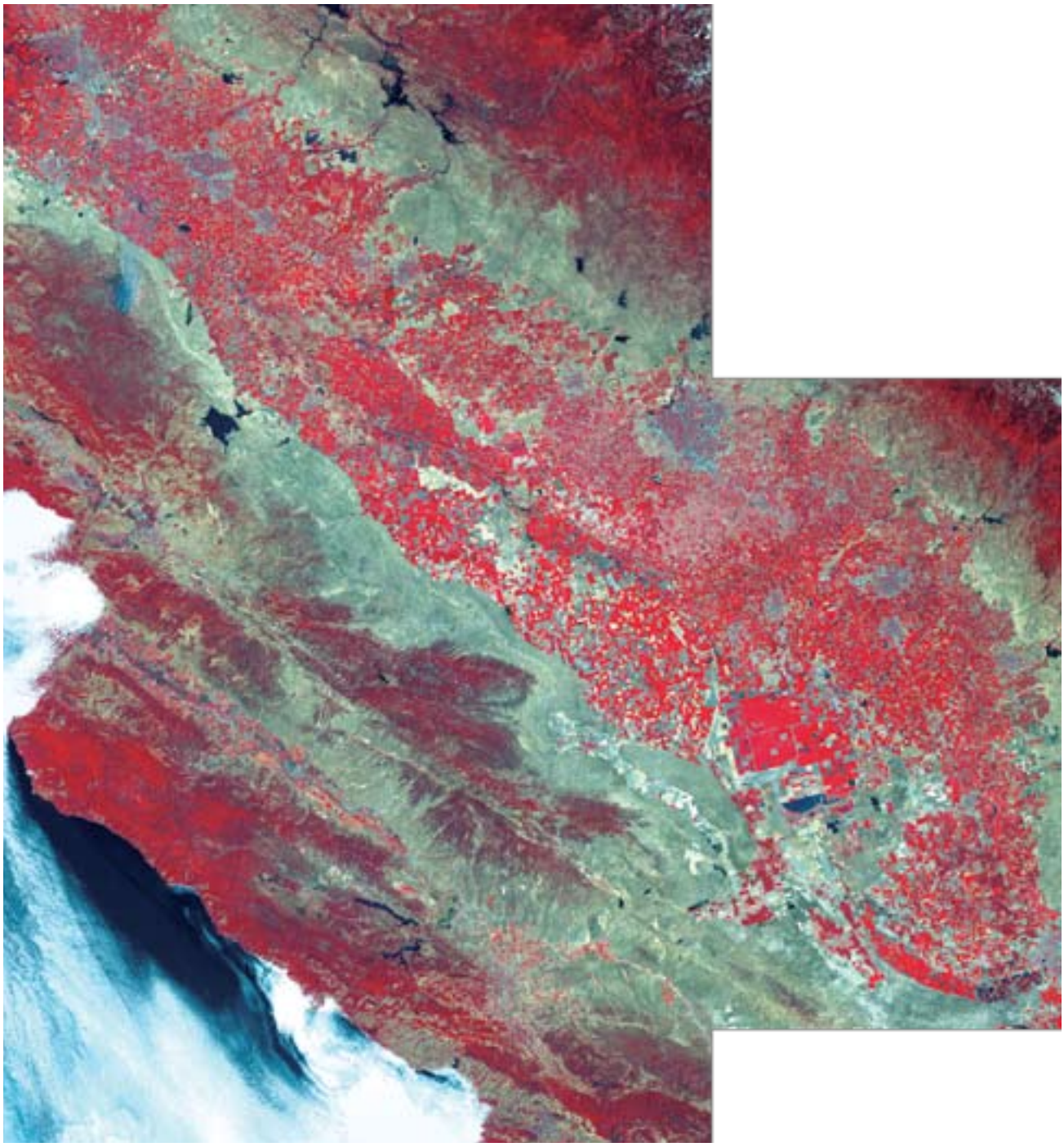
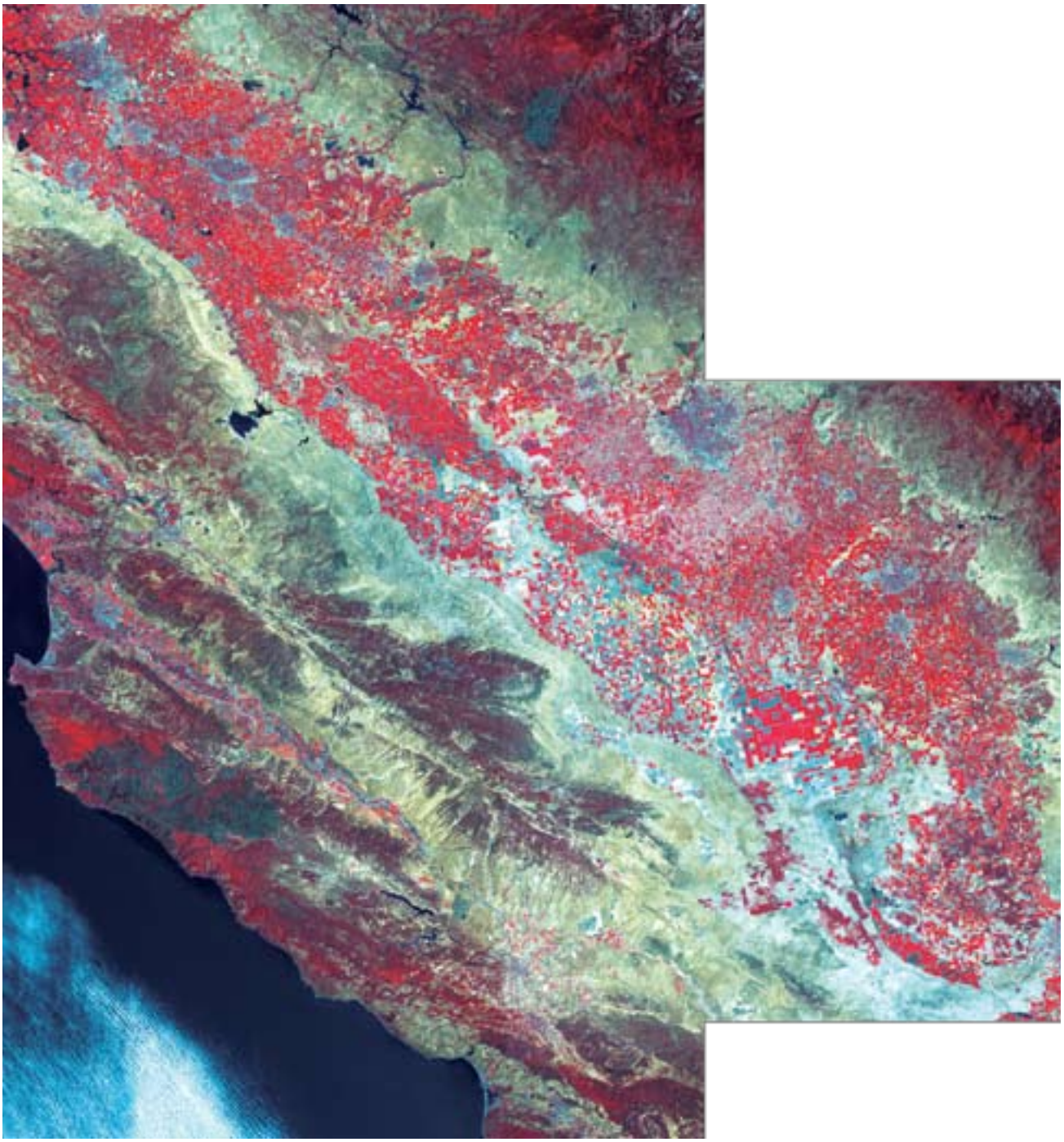
FIGURE 33A — Landsat Images of the San Joaquin Valley in Summer 2006



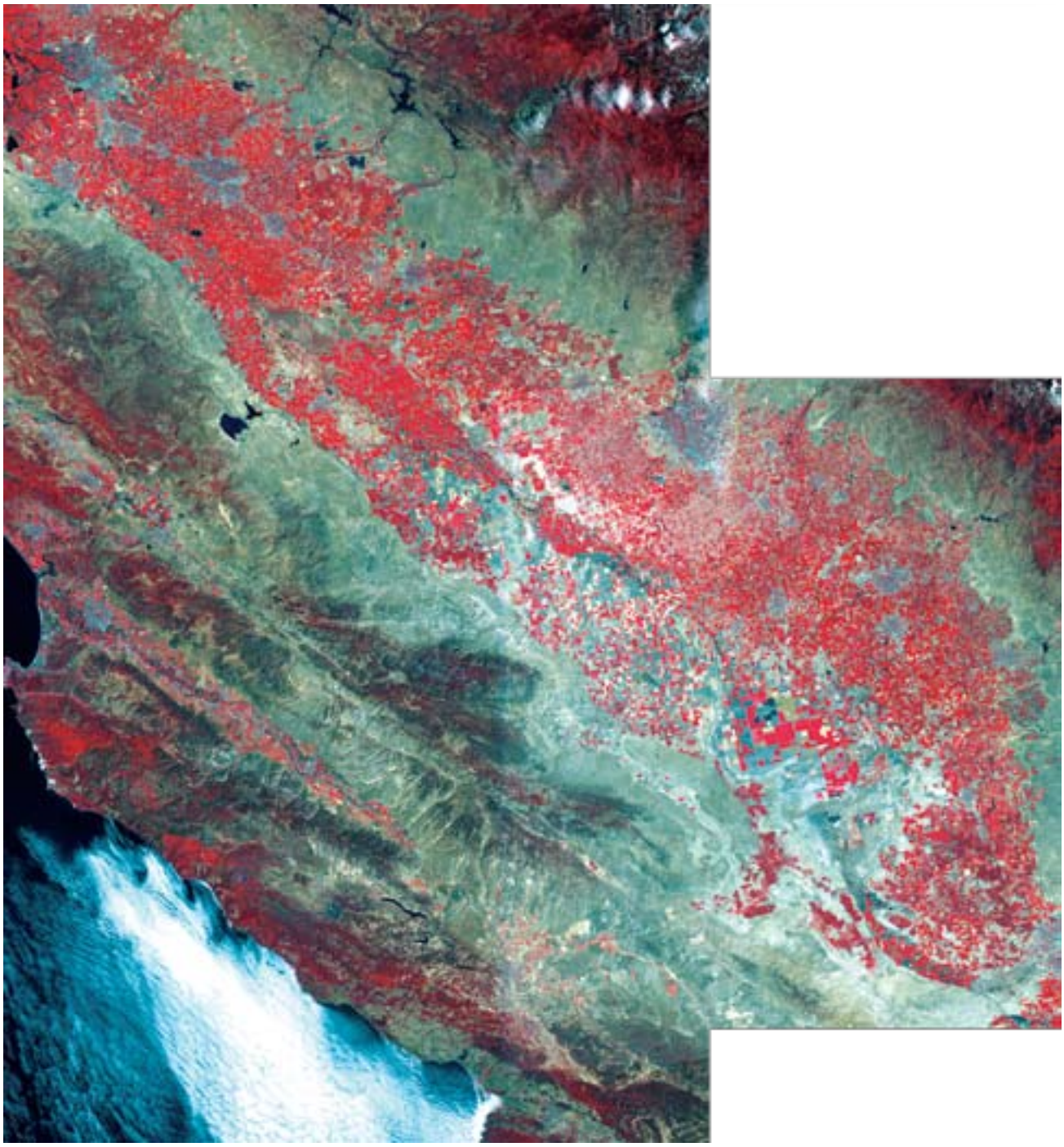
USGS Landsat Image. False-color infrared, irrigated areas in red.

FIGURE 33B — Landsat Images of the San Joaquin Valley in Summer 2008



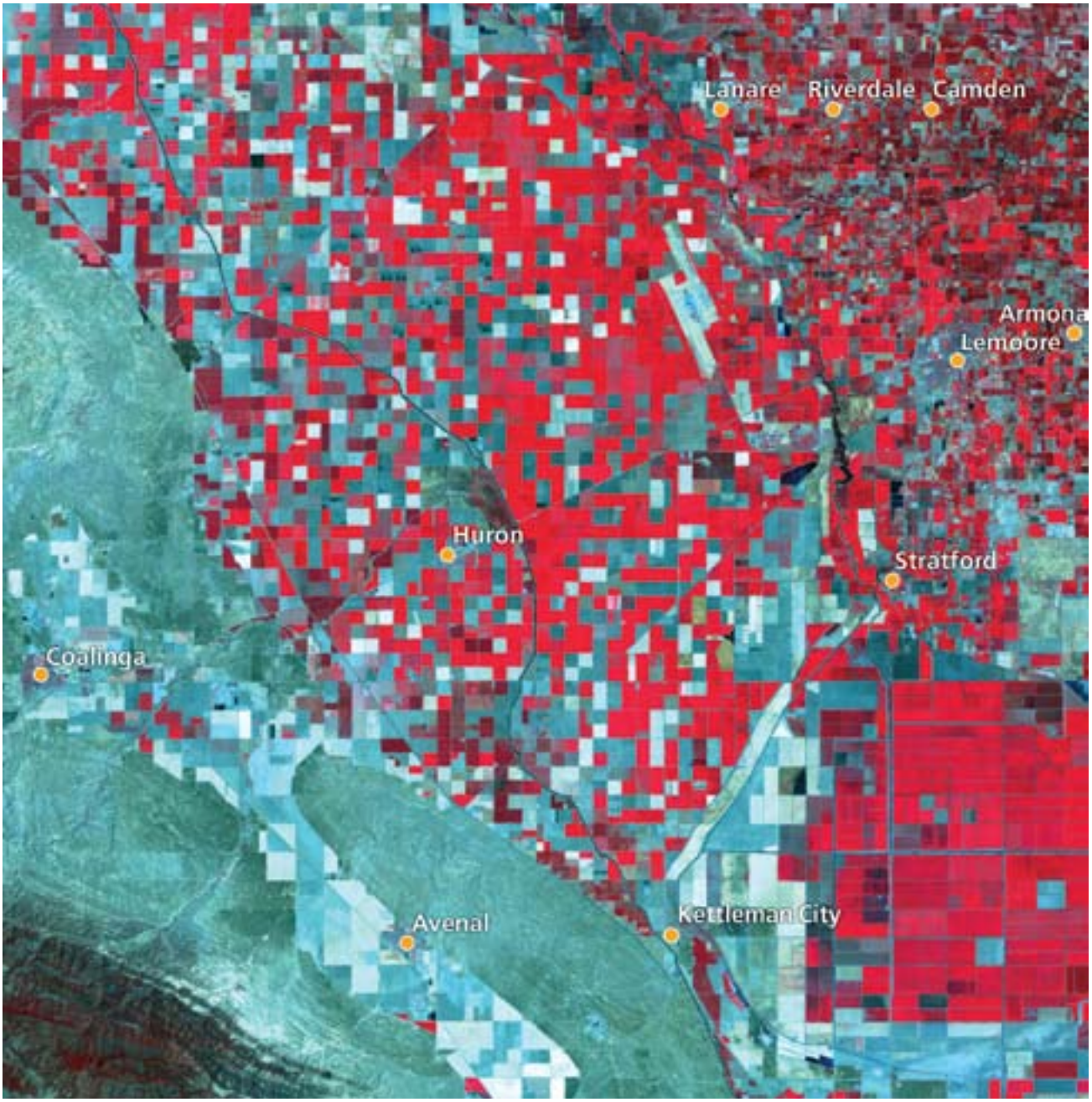
USGS Landsat Image. False-color infrared, irrigated areas in red.

FIGURE 33C — Landsat Images of the San Joaquin Valley in Summer 2009



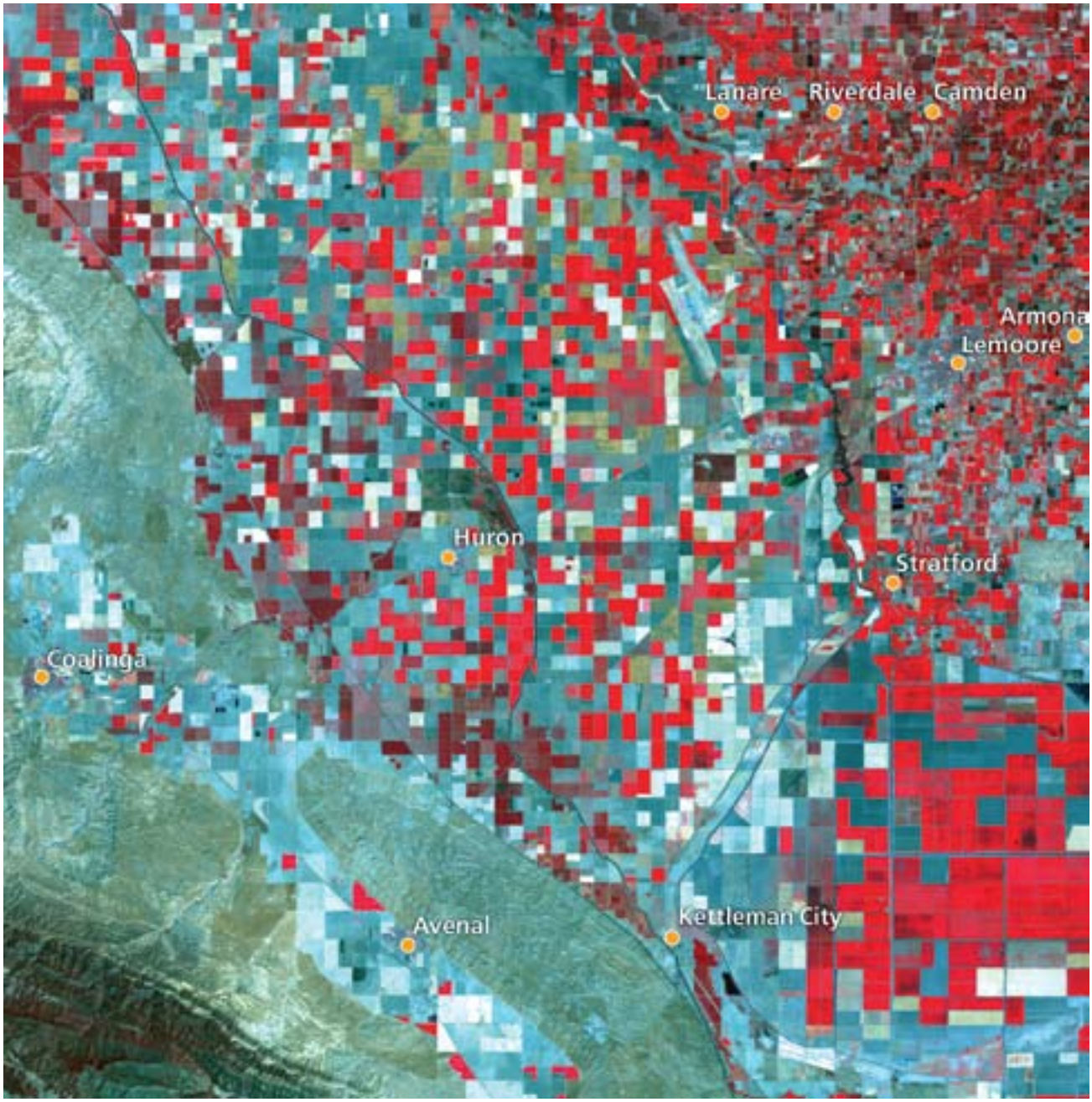
USGS Landsat Image. False-color infrared, irrigated areas in red.

FIGURE 34A — Landsat Images of the West Side of the San Joaquin Valley in Summer 2006



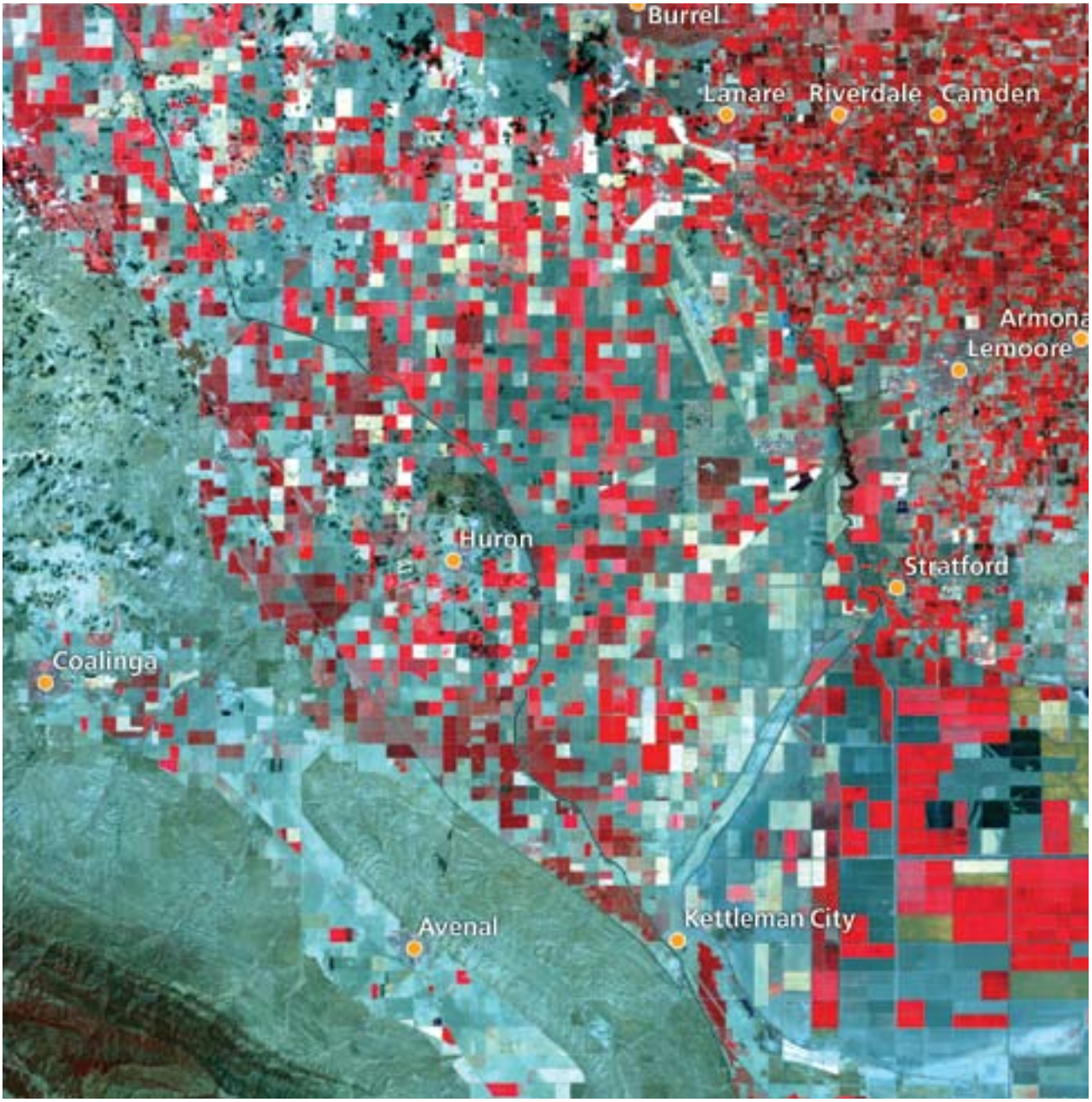
USGS Landsat Image. False-color infrared, irrigated areas in red.

FIGURE 34B — Landsat Images of the West Side of the San Joaquin Valley in Summer 2008



USGS Landsat Image. False-color infrared, irrigated areas in red.

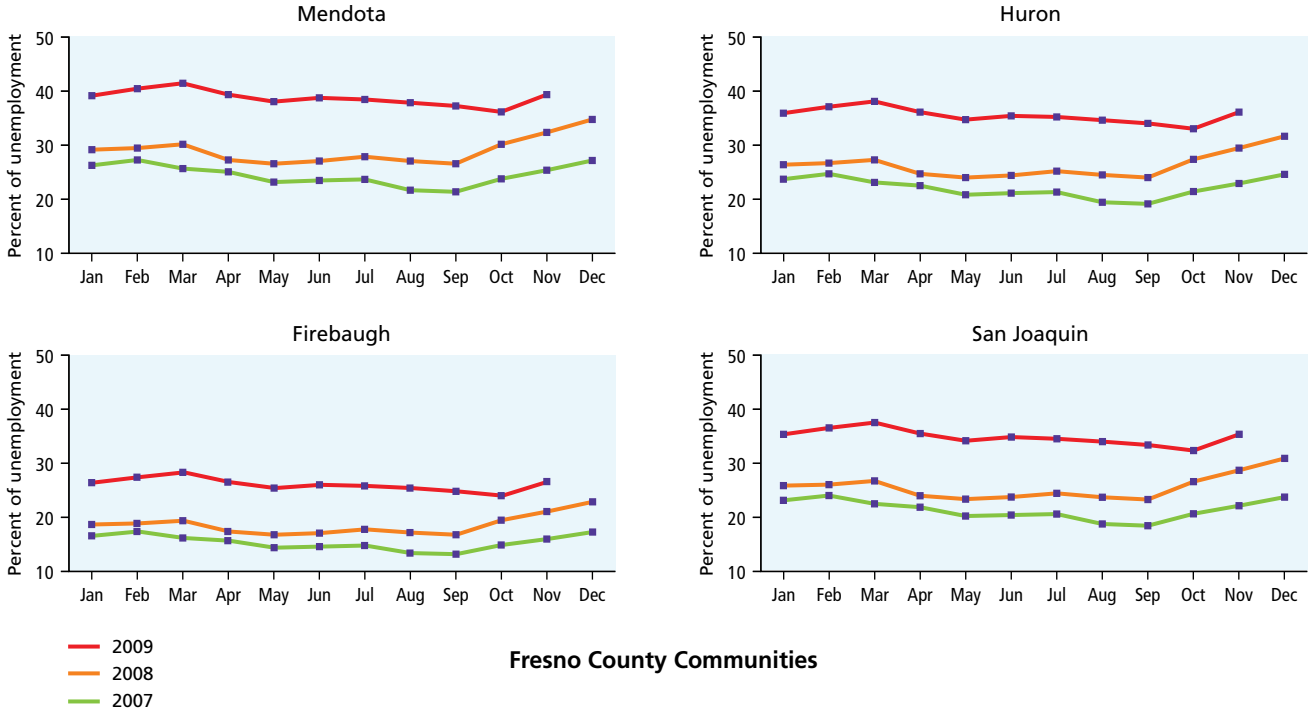
FIGURE 34C — Landsat Images of the West Side of the San Joaquin Valley in Summer 2009



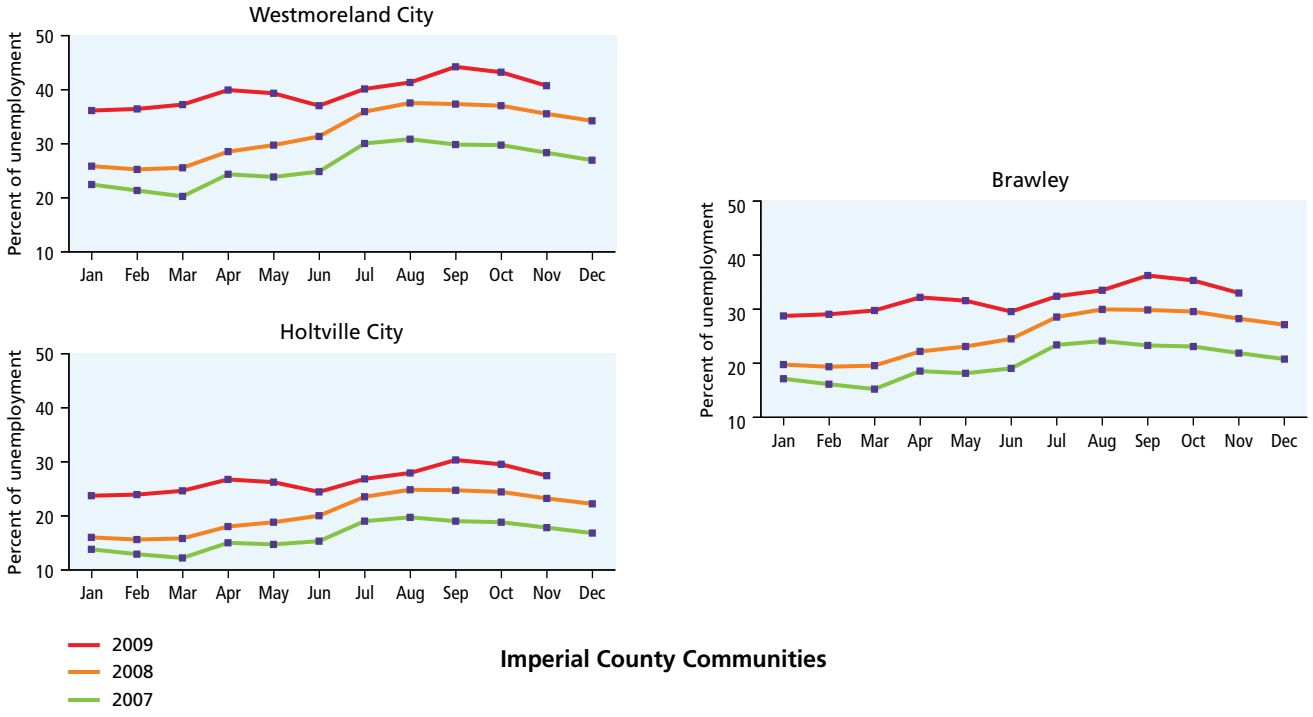
USGS Landsat Image. False-color infrared, irrigated areas in red.

FIGURE 35 — Unemployment Data for Selected Rural Communities

Source: California Employment Development Department



Fresno County Communities



Imperial County Communities

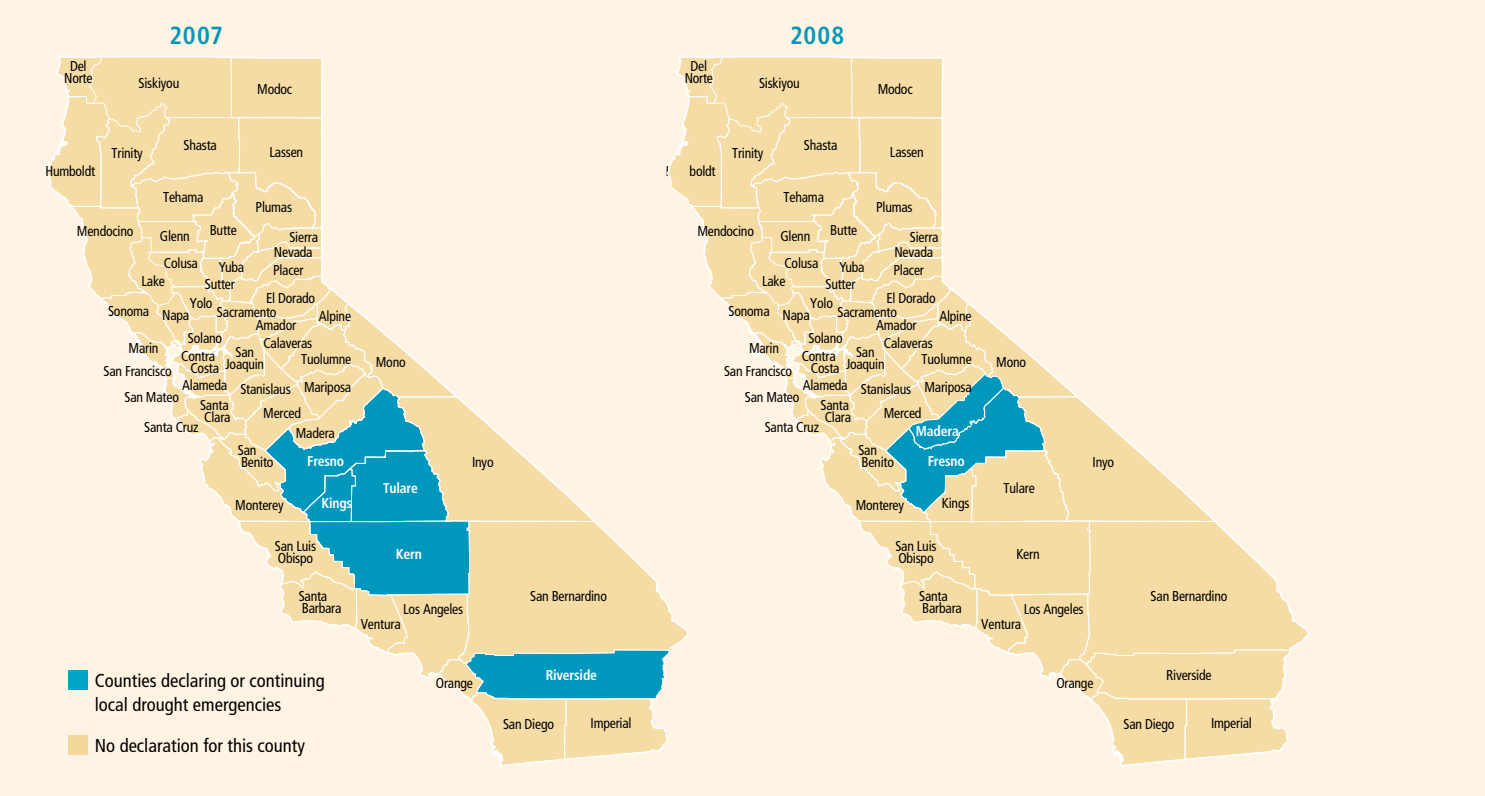
Minimal 2009 CVP water deliveries on the west side of the San Joaquin Valley resulted in widespread concerns about socioeconomic impacts in the region.

Governor's Executive Order S-11-09, issued in June 2009 (see Appendix), called for providing temporary supplemental assistance to local governments and non-profit organizations that provide food and other aid, in recognition of the continuing need for drought-related social services assistance, especially in the San Joaquin Valley. The Governor requested a presidential disaster declaration for Fresno County in June 2009 due to the drought socioeconomic impacts. That request was denied, as was a subsequent appeal of the denial.

In Southern California, the most locally significant agricultural impacts occurred in the avocado/citrus growing region in northern San Diego/southern Riverside counties, where producers participating in MWD's interim agricultural water program were subjected to a 30 percent reduction in deliveries beginning in January 2008. (Producers participating in the program, in effect since 1994, received imported supplies at discounted rates in exchange for supply interruptions during times of shortages.) MWD's Board of Directors subsequently voted in October 2008 to phase out the interim agricultural program over a period of five years; no discounted

Some avocado growers in San Diego County stumped orchards as a short-term measure to reduce water use while keeping the trees alive, in hopes of improved future water supplies. Orange trees in Valley Center were cut down in 2009.

FIGURE 36 – Counties with Emergency Proclamations, 2007–2009



water would be available after December 2012. In San Diego County, the top-ranked U.S. county for avocado production, it is estimated that approximately 26,064 acres of avocados were reduced by as much as 5,000 acres in response to the cutbacks.

LOCALLY DECLARED EMERGENCIES AND EMERGENCY MANAGEMENT PROVISIONS

The California Emergency Services Act, Government Code Sections 8550 et seq, establishes how conditions of emergency are declared and describes the authorities of public agencies to prepare for and respond to emergencies. Pursuant to this Act, a state of emergency may be proclaimed by the Governor or by a city or county. The governing body of a city or county proclaims a local emergency when the conditions of disaster or extreme peril exist. The proclamation enables the city or county to use emergency funds, resources, and powers, and to promulgate emergency orders and regulations. A local proclamation is normally a prerequisite to requesting a gubernatorial proclamation of emergency. The Director of the California Emergency Management Agency (CALEMA) may issue a letter of concurrence to a city or county declaration of local emergency. CALEMA concurrence makes financial assistance available for repair or restoration of damaged public property pursuant to the state's Natural Disaster Assistance Act. The Governor proclaims a state of emergency when local resources are insufficient to control the disaster or emergency, typically in response to a local proclamation of emergency. The Governor's proclamation makes mutual aid from other cities and counties and state agencies mandatory, permits suspension of state statutes or regulations, allows for state reimbursement (on a matching basis) of city and county response costs associated with the emergency, and allows property tax relief for damaged private property.

FIGURE 36 shows counties that submitted drought-related emergency proclamations in 2007–2009. Impacts related to agricultural water shortages were a common theme among the majority of the proclamations. Additional impacts mentioned in the proclamations included the Fresno County unemployment food crisis described above, potential water shortages for the community of Redwood Valley in Mendocino County due to the low level of Lake Mendocino on the Russian River, and wildfire risks.

In addition to broad emergency powers provided under the Emergency Services Act, local water agencies have authority to ban new connections and manage water demands under emergency or shortage conditions. These authorities were in use by some agencies in response to the current dry conditions. Water Code Sections 350 et seq. (see Appendix) define the condition of a water shortage emergency, providing that the governing body of a public water supply (whether publicly or privately owned) may declare a water shortage emergency condition in its service area whenever it finds that *the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.* This declaration allows the water supplier to adopt regulations covering measures to stretch its supplies, such as mandatory rationing or connection bans. Further, Water Code Sections 71640 et seq. (see Appendix) provide authority for water agencies to restrict the usage of water during drought or water shortages.

Special districts often have specific powers in their enabling acts to adopt water rationing and other demand reduction measures. Municipal water districts, for example, have specific authority to adopt a drought ordinance restricting use of water, including the authority to restrict use of water for any purpose other than household use. Additionally, CDPH has the authority to impose terms and conditions on permits for public water systems to assure that sufficient water is available, including the authority to require a supplier to continue a moratorium on new connections adopted pursuant to Water Code Sections 350 et seq.

OTHER IMPACTS

Hydroelectric Power Generation

TABLE 14 illustrates the role played by in-state hydroelectric power generation in relation to total in-state electricity generation. Hydropower is particularly

TABLE 14 — Hydroelectric Power Generation in California
(Expressed as a Percentage of Total Generation)

Source: California Energy Commission

Year	Percent
2000	15.0
2001	9.4
2002	11.5
2003	13.0
2004	11.9
2005	13.9
2006	16.6
2007	8.9
2008	8.1
2009	14.2

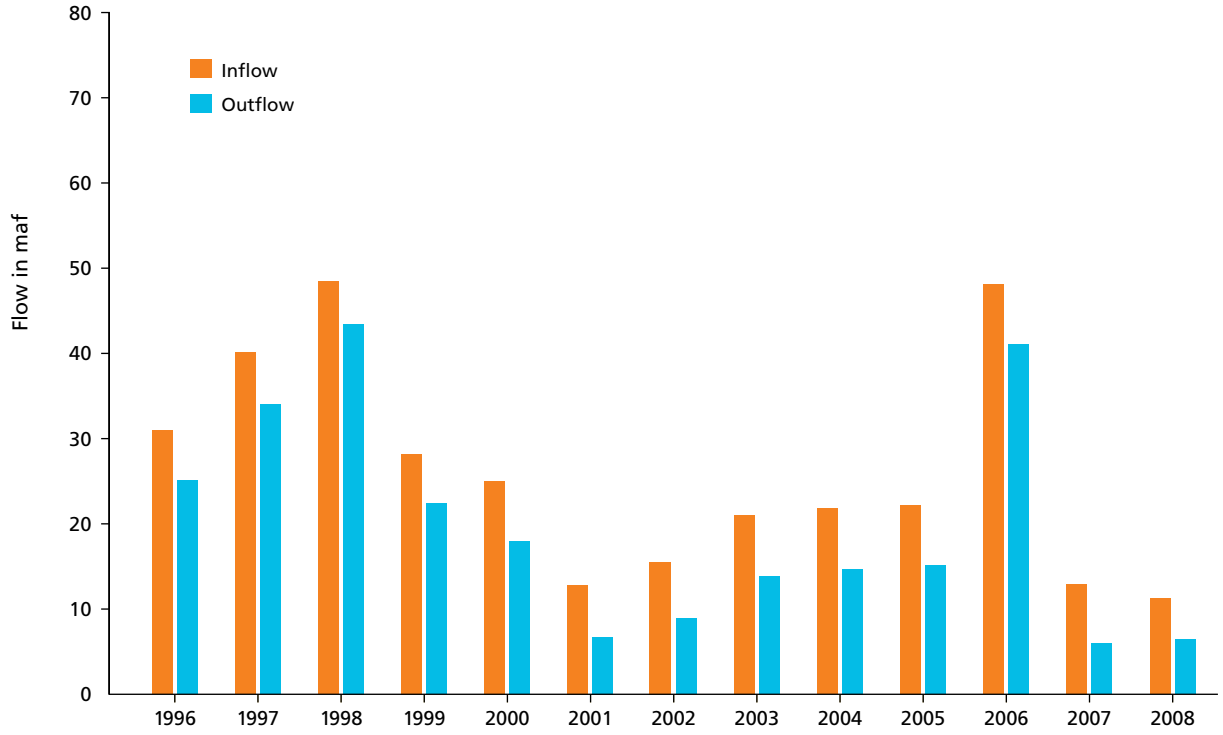


FIGURE 37 — Annual Delta Inflow and Outflow

TABLE 15 — CVP and SWP Hydroelectric Power Generation in MWh

Year	CVP	SWP
2006	7,447,017	5,659,120
2007	4,535,719	4,246,441
2008	3,522,371	2,556,768
2009	3,406,797	3,193,573

valued for its peaking capability, as compared to the operation of thermal power plants for base loads. Large water supply projects such as the CVP and SWP are also large generators of electric power, although power generation is an incidental purpose to operation of the projects for water supply. Drought impacts on CVP and SWP power generation are illustrated in **TABLE 15**.

Fisheries

Information on specific fishery impacts — such as fish kills or fish stranding — directly attributable to drought conditions is largely sparse and anecdotal. The most widely cited drought-related impacts were reported for the Russian River system, where several fish kills in spring 2008 and 2009 that included Endangered Species Act-listed species (coho salmon and steelhead) were attributed to grape growers' water use for grapevine frost protection. The National Marine Fisheries Service formed a Russian River frost protection task force in 2008, and in February 2009 requested emergency regulations from SWRCB. SWRCB held an informational workshop in April 2009 on water use for frost protection, followed by a January 2010 workshop to take comments on draft regulations on that subject. Fish passage concerns for salmonids were also reported in the Scott River system (a Klamath River tributary), where the Scott River Water Trust purchased irrigation water to improve late fall fish passage in 2009.

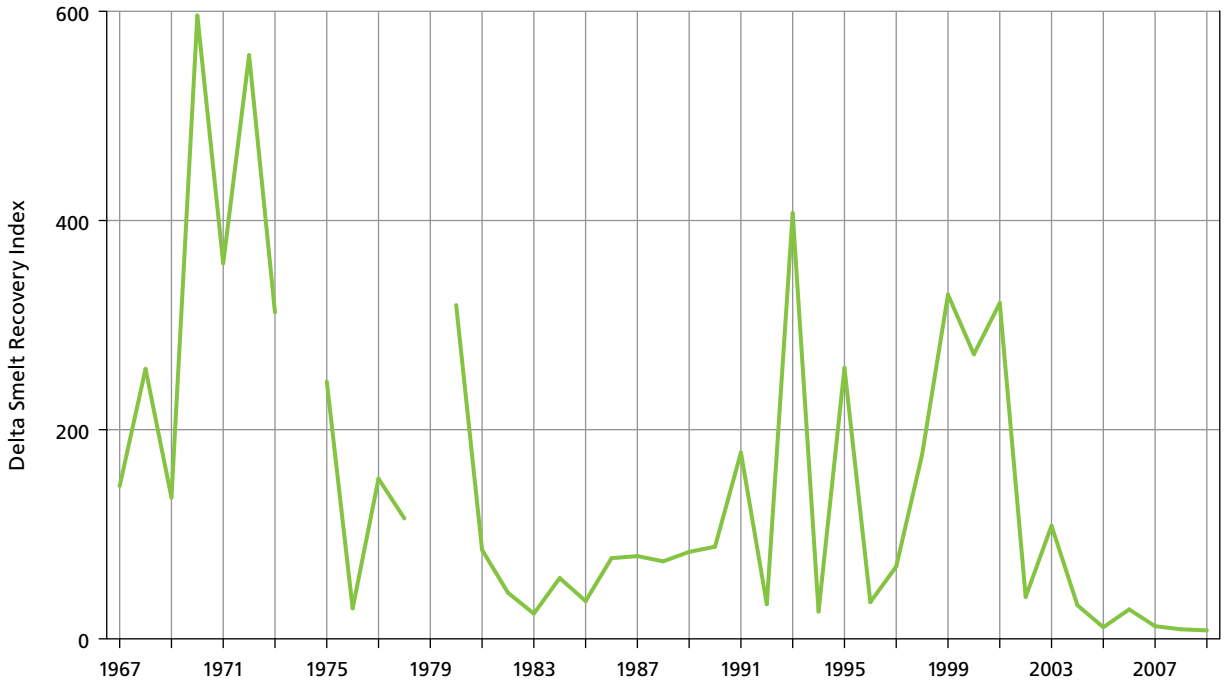


FIGURE 38 — Annual Delta Smelt Observations, DFG Fall Mid-Water Trawl Survey

Drought is more commonly an additional stressor for fish populations that may already be experiencing long-term declines for multiple reasons including loss of habitat, competition from introduced species, and water quality degradation. The status of, and factors affecting, declines in fish populations migrating through or resident in the Delta, for example, are being extensively considered in several on-going planning and regulatory forums; it is not clear what role hydrologic drought alone might play in the context of the Delta's complex and highly managed ecosystem. **FIGURE 37** summarizes annual Delta inflow and outflow in recent years, to illustrate hydrologic variability experienced in the estuary. **FIGURE 38** plots the Delta smelt recovery index, calculated from the Department of Fish and Game's (DFG's) fall mid-water trawl survey (a sampling program with a long period of record), showing the decline of smelt populations in recent years.

Anadromous fish species (e.g. coho and Chinook salmon) are affected by climate-driven ocean conditions and ocean predation in addition to fresh water conditions. In 2008 and 2009 the Pacific Fishery Management Council (PFMC) closed commercial salmon fishing off the coast of California and limited ocean recreational fishing, in reaction to depleted salmon stocks attributed primarily to unfavorable ocean temperature and food availability conditions, not to drought. (The Klamath River Basin and Sacramento Valley rivers are California's major contributors to the commercial ocean salmon fishery.) **TABLE 16** *(page 64)* provides PFMC historical data on California's ocean salmon fishery. As with the agricultural acreage data provided earlier in this chapter, the purpose of providing this information is to illustrate year-to-year variability.

TABLE 16 — California's Ocean Salmon Fisheries

Year	Commercial Ocean Fishery Salmon Catch ($M)	Recreational Fishery (# of angler trips)
2004	18.4	218,700
2005	13.7	171,900
2006	5.5	126,500
2007	7.9	105,700
2008	(fishery closed)	391
2009	(fishery closed)	5,400

Notes:
1. *Data Source: PFMC annual review of ocean salmon fisheries*
2. *Commercial catch value expressed as ex-vessel value, for non-Indian commercial ocean fishery*
3. *According to PFMC, a limited commercial season will be permitted off the California coast in 2010.*

Wildlife Refuges

Central Valley state and federal wildlife refuges covered under the Central Valley Project Improvement Act (CVPIA) received full supplies (100 percent of the amounts USBR identifies as Level 2 refuge supplies, the water dedicated from CVP yield for refuges) from the CVP in 2007–2009. CVPIA further directed USBR to purchase additional supplemental water for wildlife refuges (the amounts USBR identifies as Level 4 refuge supplies). (If no Level 4 refuge water supplies were purchased, full Level 2 supplies would represent about 71 percent of the amount of water USBR believes is needed pursuant to CVPIA.) In 2008, USBR purchased 30 TAF for Level 4 supplies and 31.7 TAF in 2009.

Recreation

Impacts of the 2007–09 drought on recreation are not readily discernable at the statewide level, especially when considering the confounding impacts of the economic recession and recent high gasoline prices. (Poor economic conditions may actually increase attendance at local facilities such as reservoirs, when people choose to curtail longer trips in favor of nearby recreational destinations.) Recreational sectors that may be impacted by drought include ski resorts, reservoir-based activities, and river-based activities (e.g. rafting). Some recreational facilities within these sectors are able to take adaptive measures such as snowmaking, relocating floating boat docks, extending boat ramps, or changing rafting locations to mitigate drought impacts.

Drought impacts on water-based recreation are highly localized, depending not only upon the adaptive capacity of recreational facilities, but also upon the magnitude of site-specific impacts. Taking reservoir-based recreation as an example, only some of the

TABLE 17 — Visitor Attendance at Selected State Recreation Areas (California State Parks)

Year	Auburn	Benbow Lake	Bethany Reservoir	Brannan Island	Folsom Lake	Kings Beach	Lake Oroville
2000	1,081,390	37,195	28,326	132,620	1,738,324	63,449	438,587
2001	998,931	36,874	15,392	142,013	1,578,402	25,744	711,386
2002	1,066,077	27,283	24,845	153,458	1,410,347	33,239	1,346,056
2003	867,515	39,404	31,570	125,838	1,182,383	30,986	1,251,810
2004	1,076,845	40,319	27,684	114,771	1,004,602	53,541	1,268,470
2005	679,640	15,305	26,761	105,763	998,194	44,338	1,277,995
2006	601,470	23,695	25,963	92,756	1,214,500	67,357	934,434
2007	518,406	39,720	44,801	114,371	1,062,452	64,202	973,060
2008	709,420	26,853	25,612	127,943	813,888	53,602	786,318
2009	889,753	19,348	21,292	134,392	1,340,362	77,432	1,034,882

Note: Water storage in Lake Perris was reduced in fall 2005 due to seismic safety improvements to Perris Dam. Although boat launch ramps remain open, the lake's surface area was reduced by about 20 percent.

In response to falling lake levels in 2008, boaters at Folsom Lake Marina at Brown's Ravine were required to remove their boats from the marina in early July. (However, access to the lake then was still available via boat launch ramps.)

Sierran reservoirs popular with boaters experienced significantly lower water elevations. At sites such as USBR's Folsom Lake — where low water levels forced restrictions on boat operations and early curtailment of marina operations in 2007 and 2008 — the reservoir's proximity to a major urban area still resulted in high levels of visitor usage for other activities at the site. TABLE 17 shows attendance data at sample state recreation areas that feature reservoir-based or river-based activities. Many factors influence attendance at these facilities, but drought does not stand out as a causal factor.

Lake Perris	Millerton Lake	Picacho	San Luis Reservoir	Silverwood Lake	Tahoe	Woodson Bridge
1,050,672	412,051	67,605	835,187	379,416	14,113	80,920
1,115,996	711,215	68,920	560,264	426,571	13,244	88,962
1,296,118	594,087	73,916	628,308	512,693	9,737	79,680
1,206,149	593,425	68,222	613,925	441,987	5,990	85,006
1,175,599	328,492	74,352	531,981	243,620	11,077	72,067
1,020,739	424,534	57,295	428,597	245,690	8,798	19,676
649,122	319,994	77,367	465,575	306,354	8,400	18,143
678,886	280,750	102,319	471,566	436,733	9,115	27,366
623,393	309,230	111,919	407,522	357,986	6,961	35,047
672,491	391,161	180,647	174,058	310,933	9,091	14,004

4
Discussion & Conclusions

Water year 2007 was California's first dry year following a wet 2006, which left the state with generally good storage conditions in surface reservoirs and groundwater basins. Water year 2007 was also the single driest year of the 2007–2009 drought, especially in Southern California. Parts of Southern California, including the City of Los Angeles, experienced record low precipitation in 2007, setting the stage for the massive outbreak of wildfires that fall. Impacts of a single dry year are normally minimal for most of California's water users; the most immediate impacts are typically expressed in the form of heightened wildfire risks and loss of rangeland grazing opportunities. Atypically, immediate impacts of a dry 2007 were seen in significantly reduced CVP and SWP deliveries affected by new Delta fishery protection requirements.

The overall hydrology of the 2007–09 drought, looked at from a statewide perspective, was not particularly severe in comparison to that of prior multi-year droughts. Central Valley runoff was wetter than that during the 1987–92 drought, but impacts experienced during 2007–09 were relatively more severe than those experienced during prior dry conditions — such as the first three years of the 1987–92 drought. The increased severity reflected increased restrictions on conveying water across the Delta and changed water projections operations criteria to protected listed fish species. The region most affected by these changed conditions was the CVP agricultural service area on the San Joaquin Valley's Westside, where project deliveries were only a fraction of contractual allocations — 50 percent in 2007, 40 percent in 2008, and 10 percent in 2009 — and where expansion of the acreage of permanent plantings has occurred since the prior drought. An additional area of agricultural impacts was the citrus and avocado growing region in northern San Diego/southern Riverside Counties, where growers receiving interruptible MWD water supplies saw substantial reductions due to the cutbacks in SWP deliveries.

The 1935 barley harvest at the Mouren Farm in the Huron area. Prior to construction of the CVP to bring imported surface water to the San Joaquin Valley's Westside, dry-farmed grain crops were a staple there. In the WWD service area where Huron is located, grains (barley, field corn, grain hay, sorghum, oats, and wheat) represented about 11 percent of the District's total cropped acreage in 2009. Most of the grain acreage was in wheat. (Photo courtesy of Coalinga Huron Library District)

Low water conditions at Lake Mead. The ten-year period from 2000 through 2009 is the driest period in the observed record of Colorado River natural flow at Lee's Ferry, although paleoclimate records indicate that there were longer dry periods prior to the time of historical record-keeping. Improved scientific capabilities in seasonal to annual weather forecasting would be a useful drought response tool for water management decision support. (Photo courtesy of USBR)

The 2007–09 drought was California's first drought for which a statewide proclamation of drought emergency was issued, and also the first drought in modern memory (excluding consideration of 1929–34 drought, which coincided with the Great Depression) where water shortage was explicitly linked to social services impacts. This unexpected linkage highlighted the need for better understanding and quantification of drought-related socioeconomic impacts and for establishment of methodologies and metrics for assessing socio-economic impacts. Also highlighted was the clear need for better overall understanding of the status of statewide groundwater resources during drought conditions. Historically, assessment of statewide drought conditions has been driven by surface water runoff forecasts and reservoir storage, an approach that cannot capture the important role played by groundwater storage in some areas of the state.

DROUGHT RESPONSE INFORMATION NEEDS

Public agencies with drought response and emergency management responsibilities rely on information available at appropriate geographic scales and in real-time or near real-time to make decisions about responding to observed or expected drought impacts. Some information — precipitation, streamflow, surface reservoir storage — is readily available in real-time. Other information — groundwater storage characterization, agricultural impact statistics, socioeconomic impact characterization — is not. The 2007–09 drought illustrated the difficulties in attempting to quantify socioeconomic impacts, impacts which may serve as a trigger for public agency decisions under a variety of financial assistance or emergency response programs. The types of metrics used by agencies to characterize response needs to rapid onset emergencies such as wildfires or floods fail to capture the more slowly evolving and subtle impacts of drought, which are often difficult to parse from confounding circumstances such as economic recession or international crop market status. Drought impacts are also typically locality and sector specific — as illustrated by the example of socio-economic impacts on the west side of the San Joaquin Valley — and their estimation requires acquisition of detailed information that may not be readily available in decision-making timeframes. Limited availability of directly observable metrics, or lack of application methodologies for statistics such as local community unemployment rates, crop insurance payments, or food bank distribution statistics, may force public agencies to turn to impact models that can only provide indirect estimates of socioeconomic conditions.

FIGURE 39 — Contribution of Atmospheric Rivers to California Precipitation

Contributions to total precipitation of precipitation on days when atmospheric rivers made landfall on the California coast (or day after, to allow for differences between Coordinated Universal Time (UTC) reporting of satellite data and local reporting of cooperative time series) at NWS cooperative weather stations, with atmospheric river days as identified by Neiman et al. (2008) between October 1997 and September 2006.

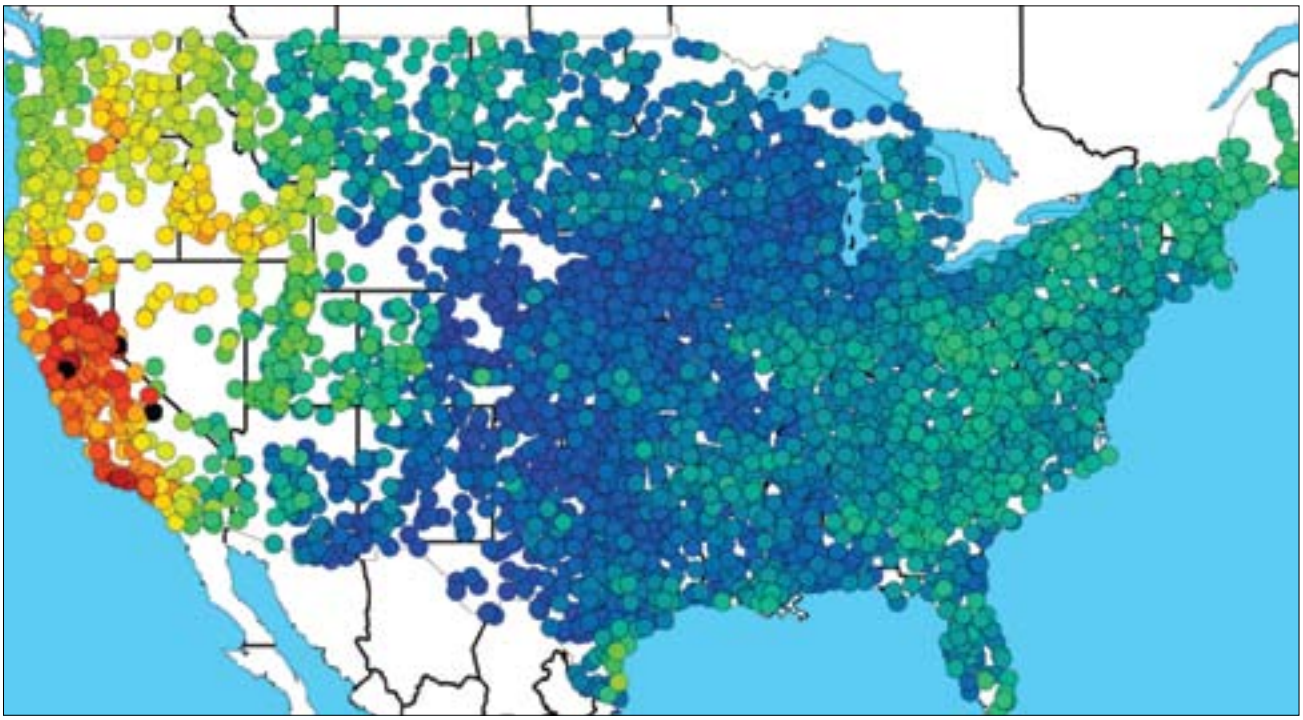


Figure provided courtesy of Mike Dettinger, USGS.

Better understanding of regional and statewide groundwater conditions is a key element of understanding regional vulnerability to drought. In other Western states where groundwater rights are administered at the state level in tandem with surface water rights, state resource management agencies typically exercise extra enforcement efforts during droughts to ensure that groundwater extraction does not injure the rights of senior surface water right holders, dewater streams having mandated fishery protection requirements, or cause well interference. Such states frequently maintain databases of long-term groundwater level measurements for water rights administration purposes that additionally facilitate tracking of drought impacts. California has historically lacked a comprehensive statewide capability for assessing groundwater level conditions (an indirect estimation of groundwater in storage), a capability that is crucial for monitoring drought impacts. Legislation adopted in November 2009 (Water Code Section 10920 et seq.) calls for establishment of local agency groundwater monitoring programs and finds that: *It is the intent of the Legislature that on or before January 1, 2012, groundwater elevations in all groundwater basins and subbasins be regularly and systematically monitored locally and that the resulting groundwater information be made readily and widely available.* This effort will facilitate drought response over time, as the program is implemented and measurement records are established.

FIGURE 40 — Sierra Nevada Snow Water Equivalent for April 1, 2006 and April 1, 2007
Maps were derived using snow observations from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor on board the NASA Terra spacecraft combined with a snow model. Note the differences in snowpack between 2006 (wet) and 2007 (dry).

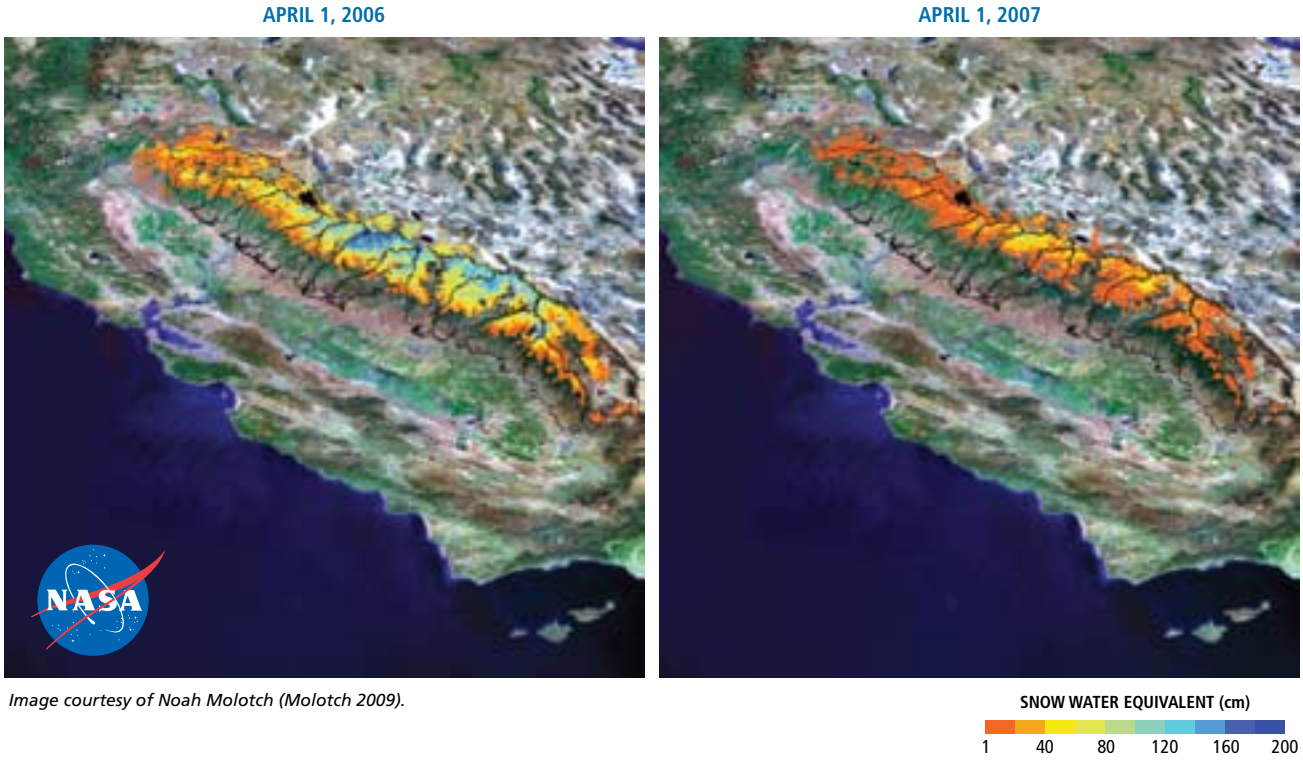


Image courtesy of Noah Molotch (Molotch 2009).

Monitoring of hydroclimate information also facilitates drought response, especially information that may provide predictive capability for water supply conditions at seasonal to interannual time-frames. Present scientific capabilities provide relatively little useful skill at making forecasts beyond the weather time domain (roughly 10 days out), with limited insight for making such predictions being provided largely only by ENSO conditions. Ongoing research and data collection to understand important events that strongly affect seasonal precipitation — such as atmospheric river events (FIGURE 39) — offers promise over the longer-term for assisting in drought response. Additional research and data collection efforts that would be helpful include:

» Development of a statewide soil moisture monitoring network to assess changes in streamflow timing and watershed response due to drought, as well as wildfire risks and rangeland forage conditions. Program-specific soil moisture data are presently collected by a patchwork of state and federal agencies for specific purposes in geographic areas targeted for a particular program; California does not have a monitoring framework for soil moisture analogous, for example, to the cooperative snow surveys program.

» Reevaluation of watershed hydrologic characteristics to assess changes over time in selected major watersheds that are important water supply sources. The Colorado River — where what is now known to be the wettest part of the observed hydrologic record was used to establish the river's interstate apportionment — is a well known example of wide variability within the historical record. More

subtle changes appear to be occurring in important Sierran watersheds in response to climate change; evaluation of those changes would be useful for improving runoff forecasting and modeling.

» Development of paleoclimate streamflow reconstructions (e.g. from tree ring chronologies) for important Sierran watersheds, where droughts more severe than those within the historical hydrologic record are known to have occurred within climatologically modern times. Such reconstructions would provide data sets that could be used for sensitivity analyses in existing water operations models.

» Expansion of the California Irrigation Management Information System (CIMIS) station network, together with expansion of evapotranspiration data collection and distribution capability, to broaden water users' access to information that would assist them in irrigating more efficiently.

» Continued development of remote sensing research and applications that would enable rapid data integration over broad geographic areas or fill in gaps in existing ground-based monitoring networks (such as high-elevation snowpack water content) (**FIGURE 40**). The NASS estimates of San Joaquin Valley cropped acreage provided in Chapter 3 are an example of the potential for using information derived from remote sensing to assimilate large amounts of data within a short time period.

DROUGHT PREPAREDNESS CONSIDERATIONS

From the long-term planning perspective, preparing for droughts and planning for future water supply reliability tend to be synonymous, especially for larger urban water agencies that have been engaged in preparing UWMPs. Legislative reauthorization of an agricultural water management planning program as part of the package of water legislation enacted in late 2009 (see sidebar) has now established a planning framework for the agricultural sector. Projects and programs that urban and agricultural agencies have been putting in place (often with state financial assistance) to improve local water supply reliability also help with drought preparedness. Operationally, continuing improvements in interconnections among California's larger public water systems provide a foundation that helps support drought response actions as well as emergency response actions.

Most water supply reliability planning has historically been focused on local water supplies at the level of an individual community or special district. More recently, emphasis is being placed on the need for local water agencies to consider integrated regional water management (IRWM) and planning; state financial assistance (i.e. Proposition 50 and Proposition 84) has been provided to enable IRWM. Implementation of IRWM over time could help improve planning for water supply reliability and drought preparedness at the regional scale, particularly in the context of local capital improvement planning for water infrastructure. However, drought preparedness for small water systems that are not covered under UWMP planning requirements or are located in isolated rural areas will remain challenging. California has a daunting number of small water systems, many of which struggle for the resources to comply with basic Safe Drinking Water Act (SDWA) public health and safety requirements, and have unreliable water sources or facilities. Financial assistance alone, even if such levels of support were available, would not itself be sufficient to address other technical and managerial capacity issues faced by small systems, and concerted effort over time will be required to improve water supply reliability and drought preparedness for these systems.

It is also important to recognize that drought preparedness at a regional or statewide scale extends beyond local provision of urban or agricultural water supplies, and must involve consideration of abilities to mitigate drought impacts — e.g. wildfire or loss of grazing resources — that are not associated with provision of managed water supplies but cause

The Whitewater River channel near the foot of the San Bernardino Mountains

November 2009 Comprehensive Water Legislative Package

A fall 2009 special legislative session resulted in enactment of a comprehensive package of water bills with statewide significance. Highlights of this package included:

- SBX7 1 – Delta governance and Delta plan: established the Delta Stewardship Council and the Sacramento-San Joaquin Delta Conservancy, and called for preparation of a Delta plan with co-equal goals of Delta restoration and water supply reliability.
- SBX7 2 – General obligation bond proposal: authorized placement of an $11.14 billion water bond measure before the voters in the November 2010 election. (Subsequently, this statute was amended to delay placing the measure before the voters until 2012, in response to present economic conditions.)
- SBX7 6 – Groundwater monitoring: required that local agencies monitor groundwater basin water levels and that the Department undertake specified supporting actions. Also provided that the Department may implement the required groundwater monitoring if local agencies fail to do so.
- SBX7 7 – Statewide water conservation: required urban water agencies to reduce statewide per capita water consumption 20 percent by 2020 and required preparation of agricultural water management plans.
- SBX7 8 – Water diversion and use: removed an exemption from reporting water use by in-Delta water users and assessed civil liability and monetary penalties on diverters who fail to submit statements of diversion and use, also appropriated $546 million from Proposition 1E and Proposition 84 for specified programs, including IRWM grants and Delta flood protection projects.

significant economic damages and can trigger state or federal emergency services provisions. Similarly, extended droughts can cause ecosystem impacts that may entail regulatory actions under state or federal laws to protect special status species; responses to such actions could trigger activities such as establishment of emergency water banks or refugia.

As illustrated by the unexpected local need for social services assistance in the 2007–09 drought, preparing for drought entails having in place an institutional framework that addresses not only actions that are directly related to provision of water supplies, but also provides for the information collection and expertise to support emergency services response. In some sectors (such as wildfire response) institutional capabilities are well developed in terms of mutual aid agreements and the state's incident command system. Development of institutional frameworks remains to be worked out in other sectors, including methodologies for quantifying and dealing with socioeconomic impacts.

California has been fortunate in having major regional and statewide infrastructure that can facilitate drought water transfers to most large urbanized areas, although present conveyance constraints across the Delta illustrate the limitations of the present system. In the long-term, drought preparedness for California must include managing the problems confronting the Bay-Delta. Sustainability — for water users and for the ecosystem — is a necessity. One of California's major strengths in responding to droughts is its extensive system of water infrastructure that affords great flexibility in moving water to areas of critical need; this is a capability unmatched in any other state. The Delta lies at the hub of this water distribution system, and implementing a solution there is central to maintaining operational flexibility during droughts and other emergencies.

The package of comprehensive water legislation enacted in November 2009 — establishing a Delta governance framework, calling for development of a Delta plan, creating a requirement for local agency monitoring of groundwater, establishing a process and goals for statewide water conservation, providing for improved accounting of water diversion and use, and authorizing placement of a water bond measure before the voters — was a critical first step toward improving water management capabilities. Time will be needed, however, to put these new programs in place and to gain the benefits of their implementation. In particular, until Delta water management conditions can be improved, California's vulnerability to drought will remain elevated.

Appendix

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Executive Order S-06-08

06/04/2008

WHEREAS Statewide rainfall has been below normal in 2007 and 2008, with many Southern California communities receiving only 20 percent of normal rainfall in 2007, and Northern California this year experiencing the driest spring on record with most communities receiving less than 20 percent of normal rainfall from March through May; and

WHEREAS California is experiencing critically dry water conditions in the Sacramento and San Joaquin River basins and the statewide runoff forecast for 2008 is estimated to be 41 percent below average; and

WHEREAS water storage in many of the state's major reservoirs is far below normal including Lake Oroville, which supplies the State Water Project, at 50 percent of capacity, Lake Shasta at 61 percent of capacity and Folsom Lake at 63 percent of capacity; and

WHEREAS the Colorado River Basin has just experienced a record eight-year drought resulting in current reservoir storage throughout the river system reduced to just over 50 percent of total storage capacity; and

WHEREAS climate change will increasingly impact California's hydrology and is expected to reduce snowpack, alter the timing of runoff and increase the intensity and frequency of droughts in the western United States; and

WHEREAS diversions from the Sacramento-San Joaquin River Delta for the State Water Project (SWP) and federal Central Valley Project (CVP) are being greatly restricted due to various factors including federal court actions to protect fish species, resulting in estimated SWP deliveries of only 35 percent, and CVP deliveries of only 40 percent, of local agencies' requested amounts for 2008; and

WHEREAS dry conditions have created a situation of extreme fire danger in California, and these conditions resulted in devastating fires last year, resulting in proclamations of emergency for the counties of El Dorado, Los Angeles, Orange, Ventura, Santa Barbara, Riverside, San Bernardino, Santa Clara, Santa Cruz and San Diego, with wildfires there causing millions of dollars in damages; and

WHEREAS on May 9, 2008, I signed an Executive Order directing various agencies and departments within my administration to respond to these dry conditions and prepare for another potentially severe wildfire season; and

WHEREAS the current drought conditions are harming urban and rural economies, and the state's overall economic prosperity; and

WHEREAS some communities are restricting new development and mandating water conservation and rationing, and some farmers have idled permanent crops and are not planting seasonal crops this year, because of unreliable or uncertain water supplies; and

WHEREAS recent supply reductions have jeopardized agricultural production in the San Joaquin Valley; and

WHEREAS it is not possible to predict the duration of present drought conditions; and

WHEREAS while communities throughout the state have worked to significantly improve their drought preparedness, the readiness to cope with current and future drought conditions varies widely; and

WHEREAS immediate water conservation measures are needed this year to address current conditions and prepare for a dry 2009; and

WHEREAS the State of California is committed to enhancing drought response and drought preparedness and to protecting the state's economy and its environment

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, do hereby proclaim a condition of statewide drought, and in accordance with the authority vested in me by the Constitution and statutes of the State of California, do hereby issue the following orders to become effective immediately

IT IS HEREBY ORDERED that the Department of Water Resources (DWR) shall take immediate action to address the serious drought conditions and water delivery limitations that currently exist in California, and that are anticipated in the future, by taking the following actions:

1. Expedite existing grant programs for local water districts and agencies for new or ongoing water conservation and water use reduction programs and projects that are capable of timely implementation to ease drought conditions in 2008 or 2009.
2. Facilitate water transfers in 2008 to timely respond to potential emergency water shortages and water quality degradation, and prepare to operate a dry year water purchasing program in 2009.
3. In cooperation with local water agencies and other water-related organizations, conduct an aggressive water conservation and outreach campaign.
4. Immediately convene the Climate Variability Advisory Committee to prioritize and expedite drought-related climate research that will assist in responding to current drought conditions and help prepare for a potentially dry 2009.
5. Provide technical assistance for drought response to local water agencies and districts for improving landscape and agricultural irrigation efficiencies, leak detection and other measures as appropriate.
6. Review the water shortage contingency elements of Urban Water Management Plans and work cooperatively with water suppliers to implement improvements.
7. Coordinate and implement State Water Project operations and water exchanges to alleviate critical impacts to San Joaquin Valley agriculture.
8. Implement additional actions to facilitate drought response, preparedness and promote water conservation in 2008 and 2009, and which will contribute to achieving long term reductions in water use.

IT IS FURTHER ORDERED that DWR and the Department of Public Health (DPH) prioritize processing of loan and grant contracts for water suppliers and public water systems demonstrating drought-related hardships.

IT IS FURTHER ORDERED that DWR and DPH coordinate with the State Office of Emergency Services and local offices of emergency services to identify public water systems at risk of experiencing health and safety impacts due to drought conditions and water delivery limitations, and to mitigate such impacts.

IT IS FURTHER ORDERED that DWR and DPH work with local water districts to evaluate system interconnections among the state's large water purveyors, review the status or availability of mutual aid agree-

ments among those large water purveyors, and work with the parties to those mutual aid agreements to correct any deficiencies that restrict the movement of water in an emergency situation

IT IS FURTHER ORDERED that DWR coordinate with the California Public Utilities Commission to identify investor-owned water utility systems at risk of experiencing health and safety impacts due to drought conditions and water delivery limitations, and to mitigate such impacts.

IT IS FURTHER ORDERED that DWR work with the Department of Food and Agriculture (CDFA), the United States Department of Agriculture and the United States Bureau of Reclamation to identify potential federal funding for local water agencies and farmers to facilitate the rapid installation of best available irrigation management and conservation systems.

IT IS FURTHER ORDERED that the CDFA work with county Agricultural Commissioners and others as necessary to identify and gather data on crop losses and other adverse economic impacts caused by the drought and, when necessary, transmit that information to the appropriate federal and state agencies.

IT IS FURTHER STRONGLY ENCOURAGED that local water agencies and districts work cooperatively on the regional and state level to take aggressive, immediate action to reduce water consumption locally and regionally for the remainder of 2008 and prepare for potential worsening water conditions in 2009.

This Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this Executive Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given to this Executive Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 4th day of June 2008.

ARNOLD SCHWARZENEGGER, *Governor of California*

ATTEST:

DEBRA BOWEN, *Secretary of State*

Emergency Proclamation Central Valley

06/12/2008

STATE OF EMERGENCY — CENTRAL VALLEY REGION

PROCLAMATION
by the Governor of the State of California

WHEREAS on June 4, 2008, I issued an Executive Order proclaiming a statewide drought; and

WHEREAS in my June 4 Executive Order, I called on all Californians to conserve water, and I directed state agencies and departments to take immediate action to address the serious drought conditions and water delivery reductions that exist in California; and

WHEREAS in issuing my June 4 Executive Order, I said that I would proclaim a state of emergency in any county where emergency conditions exist due to the drought, in an effort to protect the people and property of California, including the businesses, workers and communities that depend on water deliveries for their livelihood and survival; and

WHEREAS since issuing my June 4 Executive Order, I have determined that emergency conditions exist in Central Valley counties caused by the continuing drought conditions in California and the reductions in water deliveries; and

WHEREAS statewide rainfall has been below normal in 2007 and 2008, with many Southern California communities receiving only 20 percent of normal rainfall in 2007, and Northern California this year experiencing the driest spring on record with most communities receiving less than 20 percent of normal rainfall from March through May; and

WHEREAS California is experiencing critically dry water conditions in the Sacramento and San Joaquin River basins and the statewide runoff forecast for 2008 is estimated to be 41 percent below average; and

WHEREAS water storage in many of the reservoirs serving the Central Valley are far below normal including San Luis reservoir which is at 53 percent of capacity, Lake Shasta at 61 percent of capacity and Lake Oroville at just 50 percent of capacity; and

WHEREAS diversions from the Sacramento-San Joaquin River Delta for the State Water Project (SWP) and federal Central Valley Project (CVP) are being greatly restricted due to various factors including federal court actions to protect fish species, resulting in estimated SWP deliveries of only 35 percent, and CVP deliveries of only 40 percent, of local agencies' requested amounts for 2008; and

WHEREAS the United States Bureau of Reclamation (USBR) recently announced an unexpected reduction in its water supply allocations to Central Valley Project

(CVP) contractors within the San Luis Delta Mendota Water Agency Service Area from 45 percent to 40 percent; and

WHEREAS this unanticipated reduction will result in crop loss, increased unemployment and other direct and indirect economic impacts to Central Valley counties; and

WHEREAS water rationing has been ordered by the City of Long Beach, the City of Roseville, and the East Bay Municipal Utility District, which serves 1.3 million people in Alameda and Contra Costa counties; and

WHEREAS on June 10, 2008, the Metropolitan Water District of Southern California, which supplies water for 26 cities and water agencies serving 18 million people in six southern California counties, declared a water supply alert in an effort to sustain their water reserves; and

WHEREAS some communities are also restricting new residential and commercial development because of unreliable or uncertain water supplies, and this is causing harm to the economy; and

WHEREAS dry conditions have created a situation of extreme fire danger in California, and these conditions resulted in devastating fires last year, with wildfires causing millions of dollars in damages; and

WHEREAS San Joaquin Valley agriculture constitutes a $20 billion industry, and serves as an essential part of California's economy; and

WHEREAS the lack of water will cause devastating harm to the communities that rely on this important industry, as growers lack sufficient water to finish the growing season, are forced to abandon planted crops, and are forced to dismiss workers; and

WHEREAS the lack of water is causing agricultural workers in the Central Valley to lose their jobs, resulting in a loss of livelihood, an inability to provide for their families, and increased negative social and economic impacts on the communities that depend on them; and

WHEREAS San Joaquin Valley agricultural production and processing industries account for almost 40 percent of regional employment, and every dollar produced on the farm generates more than three dollars in the local and regional economies, and the loss of these dollars is devastating communities; and

WHEREAS almost 20 percent of San Joaquin Valley residents already live in poverty, and it consistently ranks as the top region in the nation in foreclosures; and

WHEREAS as workers lose their jobs because of the lack of water, they often move their families away from the communities, resulting in further harm to local economies, lower enrollments in local schools and reduced funding for schools; and

WHEREAS the city of Fresno received only 54 percent of normal rainfall in 2007 and 76 percent of normal in 2008, and had its fourth driest spring on record; and

WHEREAS on June 11, 2008, the Fresno County Board of Supervisors passed a resolution declaring a local state of emergency due to the severe drought conditions, stating among other things that the lack of water has resulted in water rationing by Fresno County water districts; that these reductions are causing abandonment of current planted seasonal crops and permanent crops; that the cumulative crop reductions will result in job losses in Fresno County communities; that the loss of revenue has negatively impacted Fresno County businesses and Fresno County government tax revenue; and that there will be a substantial negative economic impact to the community; and

WHEREAS the Fresno County Board of Supervisors also requested that I declare a state of emergency due to the drought conditions; and

WHEREAS the Central Valley cities of Bakersfield, Modesto, Stockton, and Sacramento experienced their driest spring on record in 2008, and additional Central Valley counties are experiencing similar emergency conditions caused by drought and lack of water deliveries; and

WHEREAS to date, almost $65 million in losses have been reported by 19 counties due to reduced rangeland grasses that are used to graze livestock, and those reductions have been caused by drought; and

WHEREAS statewide and local conditions collectively have led to the rationing of water by affected water districts to their member farmers and these further reductions are resulting in abandonment of current planted seasonal crops and permanent crops; and

WHEREAS the crop losses will cause increased food prices, which will negatively impact families and economies throughout California and beyond our borders; and

WHEREAS the lack of water deliveries has forced local communities to draw water from their emergency water reserves, putting communities at risk of further catastrophe if emergency reserves are depleted or cut off; and

WHEREAS the circumstances of the severe drought conditions, by reason of their magnitude, are beyond the control of the services, personnel, equipment and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property exist within the counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern, caused by the current and continuing severe drought conditions.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the California Constitution and the California Emergency Services Act, and in particular, section 8625 of the California Government Code, HEREBY PROCLAIM A STATE OF EMERGENCY to exist within the counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern.

IT IS HEREBY ORDERED that all agencies of the state government utilize and employ state personnel, equipment and facilities for the performance of any and all activities consistent with the direction of my Office of Emergency Services (OES) and the State Emergency Plan, and that OES provide local government assistance under the authority of the California Disaster Assistance Act, and that the emergency exemptions in sections 21080(b)(3) and 21172 of the Public Resources Code shall apply to all activities and projects ordered and directed under this proclamation, to the fullest extent allowed by law.

I FURTHER DIRECT THAT:

OES shall provide assistance under the authority of the California Disaster Assistance Act, by assisting public water agencies with drilling of groundwater wells or the improvement of existing wells and water delivery systems for human consumption, sanitation, and emergency protective measures, such as fire fighting.

The Department of Water Resources (DWR) shall transfer groundwater of appropriate quality through the use of the California Aqueduct to benefit farmers in the San Joaquin Valley

DWR and the State Water Resources Control Board (SWRCB) shall expedite the processing of water transfer requests.

DWR, in cooperation with USBR, shall make operational changes to State Water Project facilities, including the San Luis Reservoir and Southern California reservoirs, that will permit additional water deliveries to the San Joaquin Valley.

DWR shall prepare and file necessary water right urgency change petitions to facilitate surface water transfers and the use of joint point of diversion by the SWP and Central Valley Project.

SWRCB shall expedite the processing and consideration of water rights urgency change petitions filed by DWR and other water agencies to facilitate water transfers to the San Joaquin Valley.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 12th day of June, 2008.

ARNOLD SCHWARZENEGGER, *Governor of California*

ATTEST:

DEBRA BOWEN, *Secretary of State*

Emergency Proclamation Water Shortage

2/27/2009

STATE OF EMERGENCY – WATER SHORTAGE

PROCLAMATION
by the Governor of the State of California

WHEREAS the State of California is now in its third consecutive year of drought; and

WHEREAS in each year of the current drought, annual rainfall and the water content in the Sierra snowpack have been significantly below the amounts needed to fill California's reservoir system; and

WHEREAS the rainfall and snowpack deficits in each year of the current drought have put California further and further behind in meeting its essential water needs; and

WHEREAS statewide, 2008 was the driest spring and summer on record, with rainfall 76 percent below average; and

WHEREAS the Sacramento and San Joaquin River systems, which provide much of the state's reservoir inflow, were classified as Critically Dry for the 2008 water year; and

WHEREAS in the second year of this continuous drought, on June 4, 2008, I issued an Executive Order proclaiming a statewide drought, and I ordered my administration to begin taking action to address the water shortage; and

WHEREAS because emergency conditions existed in the Central Valley in the second year of the drought, I issued an Emergency Proclamation on June 12, 2008, finding that conditions of extreme peril to the safety of persons and property existed in the counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern caused by severe drought conditions, and I ordered my administration to take emergency action to assist the Central Valley; and

WHEREAS the drought conditions and water delivery limitations identified in my prior Executive Order and Emergency Proclamation still exist, and have become worse in this third year of drought, creating emergency conditions not just in the Central Valley, but throughout the State of California, as the adverse environmental, economic, and social impacts of the drought cause widespread harm to people, businesses, property, communities, wildlife and recreation; and

WHEREAS despite the recent rain and snow, the three year cumulative water deficit is so large there is only a 15 percent chance that California will replenish its water supply this year; and

WHEREAS in the time since the state's last major drought in 1991, California added 9 million new residents, experienced a significant increase in the planting of permanent, high-value crops not subject to fallowing, and was subjected to new biological opinions that reduced the flexibility of water operations throughout the year; and

WHEREAS because there is no way to know when the drought will end, further urgent action is needed to address the water shortage and protect the people and property in California; and

WHEREAS rainfall levels statewide for the 2008–2009 water year are 24 percent below average as of the February 1, 2009 measurement; and

WHEREAS the second snow pack survey of the 2009 winter season indicated that snow pack water content is 39 percent below normal; and

WHEREAS as of February 23, 2009, storage in the state's reservoir system is at a historic low, with Lake Oroville 70 percent below capacity, Shasta Lake 66 percent below capacity, Folsom Lake 72 percent below capacity, and San Luis Reservoir 64 percent below capacity; and

WHEREAS low water levels in the state's reservoir system have significantly reduced the ability to generate hydropower, including a 62 percent reduction in hydropower generation at Lake Oroville from October 1, 2008 to January 31, 2009; and

WHEREAS a biological opinion issued by the United States Fish and Wildlife Service on December 15, 2008, imposed a 30 percent restriction on water deliveries from the State Water Project and the Central Valley Project to protect Delta Smelt; and

WHEREAS State Water Project water allocations have now been reduced to 15 percent of requested deliveries, matching 1991 as the lowest water allocation year in State Water Project history, and Central Valley Project water allocations for agricultural users have now been reduced to zero; and

WHEREAS the lack of water has forced California farmers to abandon or leave unplanted more than 100,000 acres of agricultural land; and

WHEREAS California farmers provide nearly half of the fresh fruits, nuts and vegetables consumed by Americans, and the crop losses caused by the drought will increase food prices, which will further adversely impact families and economies throughout California and beyond our borders; and

WHEREAS agricultural revenue losses exceed $300 million to date and could exceed $2 billion in the coming season, with a total economic loss of nearly $3 billion in 2009; and

WHEREAS it is expected that State Water Project and Central Valley Project water delivery reductions will cause more than 80,000 lost jobs; and

WHEREAS the income and job losses will adversely impact entire communities and diverse sectors of the economy supported by those jobs and income, including the housing market and commercial business; and

WHEREAS these conditions are causing a loss of livelihood for many thousands of people, an inability to provide for families, and increased harm to the communities that depend on them; and

WHEREAS this loss of income and jobs will increase the number of defaults, foreclosures and bankruptcies, and will cause a loss of businesses and property at a time when Californians are already struggling with a nationwide and worldwide economic downturn; and

WHEREAS the Central Valley town of Mendota, as one example, already reports an unemployment rate of more than 40 percent and lines of a thousand or more for food distribution; and

WHEREAS when jobs, property and businesses are lost, some families will move away from their communities, causing further harm to local economies, lower enrollments in local schools and reduced funding for schools; and

WHEREAS at least 18 local water agencies throughout the state have already implemented mandatory water conservation measures, and 57 agencies have implemented other water conservation programs or restrictions on water deliveries, with many agencies considering additional rationing and water supply reductions in 2009; and

WHEREAS the lack of water has forced local communities to draw water from their emergency water reserves, putting communities at risk of further catastrophe if emergency reserves are depleted or cut off; and

WHEREAS the state recently endured one of its worst wildfire seasons in history and the continuing drought conditions increase the risk of devastating fires and reduced water supplies for fire suppression; and

WHEREAS on February 26, 2009, the United States Department of Agriculture and the United States Department of Interior created a Federal Drought Action Team to assist California to minimize the social, economic, and environmental impacts of the current drought; and

WHEREAS the circumstances of the severe drought conditions, by reason of their magnitude, are beyond the control of the services, personnel, equipment and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property exist in California caused by the current and continuing severe drought conditions and water delivery restrictions.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the California Constitution and the California Emergency Services Act, and in particular California Government Code sections 8625 and 8571, HEREBY PROCLAIM A STATE OF EMERGENCY to exist in California.

IT IS HEREBY ORDERED that all agencies of the state government utilize and employ state personnel, equipment and facilities for the performance of any and all activities consistent with the direction of the California Emergency Management Agency (CalEMA) and the State Emergency Plan.

I FURTHER DIRECT THAT:

1. The California Department of Water Resources (DWR) shall, in partnership with other appropriate agencies, launch a statewide water conservation campaign calling for all Californians to immediately decrease their water use.
2. DWR shall implement the relevant mitigation measures identified in the Environmental Water Account Environmental Impact Report, Environmental Impact Statement, Supplement, and Addendums for the water transfers made through the 2009 Drought Water Bank. In addition, the California Air Resources Board shall, in cooperation with DWR and other agencies, expedite permitting and development of mitigation measures related to air quality impacts which may result from groundwater substitution transfers.

3. DWR and the State Water Resources Control Board (SWRCB) shall expedite the processing of water transfers and related efforts by water users and suppliers that cannot participate in the 2009 Drought Water Bank, provided the water users and suppliers can demonstrate that the transfer will not injure other legal users of water or cause unreasonable effects on fish and wildlife.
4. The SWRCB shall expedite the processing and consideration of the request by DWR for approval of the consolidation of the places of use and points of diversion for the State Water Project and federal Central Valley Project to allow flexibility among the projects and to facilitate water transfers and exchanges.
5. DWR shall implement short-term efforts to protect water quality or water supply, such as the installation of temporary barriers in the Delta or temporary water supply connections.
6. The SWRCB shall expedite the processing and consideration of requests by DWR to address water quality standards in the Delta to help preserve cold water pools in upstream reservoirs for salmon preservation and water supply.
7. To the extent allowed by applicable law, state agencies within my administration shall prioritize and streamline permitting and regulatory compliance actions for desalination, water conservation and recycling projects that provide drought relief.
8. The Department of General Services shall, in cooperation with other state agencies, immediately implement a water use reduction plan for all state agencies and facilities. The plan shall include immediate water conservation actions and retrofit programs for state facilities. A moratorium shall be placed on all new landscaping projects at state facilities and on state highways and roads except for those that use water efficient irrigation, drought tolerant plants or non-irrigated erosion control.
9. As a condition to receiving state drought financial assistance or water transfers provided in response to this emergency, urban water suppliers in the state shall be required to implement a water shortage contingency analysis, as required by California Water Code section 10632. DWR shall offer workshops and technical assistance to any agency that has not yet prepared or implemented the water shortage contingency analysis required by California law.
10. DWR shall offer technical assistance to agricultural water suppliers and agricultural water users, including information on managing water supplies to minimize economic impacts, implementing efficient water management practices, and using technology such as the California Irrigation Management Information System (CIMIS) to get the greatest benefit from available water supplies.
11. The Department of Public Health shall evaluate the adequacy of emergency interconnections among the state's public water systems, and provide technical assistance and continued financial assistance from existing resources to improve or add interconnections.
12. DWR shall continue to monitor the state's groundwater conditions, and shall collect groundwater-level data and other relevant information from water agencies, counties, and cities. It is requested that water agencies, counties and cities cooperate with DWR by providing the information needed to comply with this Proclamation.
13. DWR and the Department of Food and Agriculture shall recommend, within 30 days from the date of this Proclamation, measures to reduce the economic impacts of the drought, including but not limited to, water transfers,

through-Delta emergency transfers, water conservation measures, efficient irrigation practices, and improvements to CIMIS.

14. The Department of Boating and Waterways shall recommend, within 30 days from the date of this Proclamation, and in cooperation with the Department of Parks and Recreation, measures to reduce the impacts of the drought conditions to water-based recreation, including but not limited to, the relocation or extension of boat ramps and assistance to marina owners.
15. The Labor and Workforce Development Agency shall recommend, within 30 days from the date of this Proclamation, measures to address the impact of the drought conditions on California's labor market, including but not limited to, identifying impacted areas, providing one-stop service, assisting employers and workers facing layoffs, and providing job training and financial assistance.
16. DWR and the Department of Food and Agriculture shall be the lead agencies in working with the Federal Drought Action Team to coordinate federal and state drought response activities.
17. The emergency exemptions in Public Resources Code sections 21080(b)(3), 21080(b)(4) and 21172, and in California Code of Regulations, title 14, section 15269(c), shall apply to all actions or efforts consistent with this Proclamation that are taken to mitigate or respond to this emergency. In addition, Water Code section 13247 is suspended to allow expedited responses to this emergency that are consistent with this Proclamation. The Secretary for the California Environmental Protection Agency and the Secretary for the California Natural Resources Agency shall determine which efforts fall within these exemptions and suspension, ensuring that these exemptions and suspension serve the purposes of this Proclamation while protecting the public and the environment. The Secretaries shall maintain on their web sites a list of the actions taken in reliance on these exemptions and suspension.
18. By March 30, 2009, DWR shall provide me with an updated report on the state's drought conditions and water availability. If the emergency conditions have not been sufficiently mitigated, I will consider issuing additional orders, which may include orders pertaining to the following:
    (a) institution of mandatory water rationing and mandatory reductions in water use;
    (b) reoperation of major reservoirs in the state to minimize impacts of the drought;
    (c) additional regulatory relief or permit streamlining as allowed under the Emergency Services Act; and
    (d) other actions necessary to prevent, remedy or mitigate the effects of the extreme drought conditions.

I FURTHER REQUEST THAT:

19. All urban water users immediately increase their water conservation activities in an effort to reduce their individual water use by 20 percent.
20. All agricultural water suppliers and agricultural water users continue to implement, and seek additional opportunities to immediately implement, appropriate efficient water management practices in order to minimize economic impacts to agriculture and make the best use of available water supplies.
21. Federal and local agencies also implement water use reduction plans for facilities within their control, including immediate water conservation efforts.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 27th day of February, 2009.

ARNOLD SCHWARZENEGGER, *Governor of California*

ATTEST:

DEBRA BOWEN, *Secretary of State*

Executive Order S-11-09

06/19/2009

WHEREAS on June 4, 2008, I issued an Executive Order proclaiming a statewide drought, and I ordered my administration to take immediate action to address the water shortage; and

WHEREAS on June 12, 2008, I proclaimed a state of emergency for nine Central Valley counties because the drought had caused conditions of extreme peril to the safety of persons and property; and

WHEREAS on February 27, 2009, I proclaimed a state of emergency for the entire state as the severe drought conditions continued and the impacts were well beyond the Central Valley; and

WHEREAS the February 27, 2009 state of emergency proclamation provided specific orders and directions to my Department of Water Resources, State Water Resources Control Board, Department of General Services, Department of Public Health, California Department of Food and Agriculture, and Labor and Workforce Development Agency to reduce and mitigate the human, environmental, and economic impact of the drought; and

WHEREAS I have supported state and local water managers' efforts to increase the availability of water, directed efforts to better integrate regional water management practices to balance water demand with water supply, directed expedited water transfers, ordered increased job training, and substantially increased statewide water conservation; and

WHEREAS I have requested and we have received United States Department of Agriculture disaster designations for 21 counties for drought; and

WHEREAS the drought conditions have exacerbated unemployment and the local emergency food banks are struggling to meet the demands of hungry families.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the state Constitution and statutes, activate the California Disaster Assistance Act to provide temporary supplemental assistance to the local governments and non-profit organizations that provide food and other aid to those who are impacted by the drought statewide.

IT IS HEREBY ORDERED that my California Emergency Management Agency, Department of Social Services, Labor and Workforce Development Agency, and California Department of Food and Agricultural develop a comprehensive strategy by July 15, 2009, to provide adequate nutrition for those individuals who are temporarily unable to afford food as a result of the drought conditions.

IT IS FURTHER ORDERED THAT the provisions of California Unemployment Insurance Code section 1253 imposing a one-week waiting period for unemployment insurance applicants are suspended as to all applicants who are unemployed as a specific

result of the drought conditions, who apply for unemployment insurance benefits during the time period beginning June 19, 2009, and ending on the close of business on November 1, 2009, and who are otherwise eligible for unemployment insurance benefits in California.

I FURTHER DIRECT that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given this Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 19th Day of June 2009.

ARNOLD SCHWARZENEGGER, *Governor of California*

ATTEST:

DEBRA BOWEN, *Secretary of State*

State of Emergency Fresno County

PROCLAMATION BY THE GOVERNOR OF THE STATE OF CALIFORNIA

WHEREAS on June 4, 2008, I issued an Executive Order proclaiming a statewide drought, and I ordered my administration to begin taking action to address the water shortage; and

WHEREAS on June 12, 2008, I proclaimed a state of emergency for nine Central Valley counties because the current and continuing severe drought had caused conditions of extreme peril to the safety of persons and property; and

WHEREAS on February 27, 2009, I proclaimed a state of emergency for the entire state as the severe drought conditions continued and the impacts were well beyond the Central Valley; and

WHEREAS on June 19, 2009, I issued an Executive Order that suspended the one-week waiting period for unemployment insurance applications and ordered the development of a comprehensive strategy to provide adequate nutrition for those individuals who are temporarily unable to afford food as a result of the severe drought conditions; and

WHEREAS severe drought conditions continue and over 28,000 people in Fresno County require emergency food assistance; and

WHEREAS local emergency food assistance organizations serving the Fresno County area cannot keep up with the demand for food; and

WHEREAS the circumstances of these continuing severe drought conditions, by reason of their magnitude, are or are likely to be beyond the control of the services, personnel, equipment, and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property continue to exist in Fresno County, caused by the current and continuing severe drought conditions.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the state Constitution and statutes, including the California Emergency Services Act, and in particular, section 8625 of the California Government Code, HEREBY PROCLAIM A STATE OF EMERGENCY to exist within Fresno County.

IT IS HEREBY ORDERED that all agencies of the state government utilize and employ state personnel, equipment and facilities for the performance of any and all activities consistent with the direction of the California Emergency Management Agency (CalEMA) and the State Emergency Plan, and that CalEMA provide local government assistance under the authority of the California Disaster Assistance Act.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 21st Day of July 2009.

ARNOLD SCHWARZENEGGER, *Governor of California*

ATTEST:

DEBRA BOWEN, *Secretary of State*

California Water Code Emergency Provisions

WATER CODE SECTIONS 350 ET SEQ.

350. The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, may declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

351. Excepting in event of a breakage or failure of a dam, pump, pipe line or conduit causing an immediate emergency, the declaration shall be made only after a public hearing at which consumers of such water supply shall have an opportunity to be heard to protest against the declaration and to present their respective needs to said governing board.

352. Notice of the time and place of hearing shall be published pursuant to Section 6061 of the Government Code at least seven days prior to the date of hearing in a newspaper printed, published, and circulated within the area in which the water supply is distributed, or if there is no such newspaper, in any newspaper printed, published, and circulated in the county in which the area is located.

353. When the governing body has so determined and declared the existence of an emergency condition of water shortage within its service area, it shall thereupon adopt such regulations and restrictions on the delivery of water and the consumption within said area of water supplied for public use as will in the sound discretion of such governing body conserve the water supply for the greatest public benefit with particular regard to domestic use, sanitation, and fire protection.

354. After allocating and setting aside the amount of water which in the opinion of the governing body will be necessary to supply water needed for domestic use, sanitation, and fire protection, the regulations may establish priorities in the use of water for other purposes and provide for the allocation, distribution, and delivery of water for such other purposes, without discrimination between consumers using water for the same purpose or purposes.

355. The regulations and restrictions shall thereafter be and remain in full force and effect during the period of the emergency and until the supply of water available for distribution within such area has been replenished or augmented.

356. The regulations and restrictions may include the right to deny applications for new or additional service connections, and provision for their enforcement by discontinuing service to consumers willfully violating the regulations and restrictions.

357. If the regulations and restrictions on delivery and consumption of water adopted pursuant to this chapter conflict with any law establishing the rights of individual consumers to receive either specific or proportionate amounts of the water supply available for distribution within such service area, the regulations and restrictions adopted pursuant to this chapter shall prevail over the provisions of such laws relating to water rights for the duration of the period of emergency; provided, however, that any distributor of water which is subject to regulation by the State Public Utilities Commission shall before making such regulations and restrictions effective secure the approval thereof by the Public Utilities Commission.

358. Nothing in this chapter shall be construed to prohibit or prevent review by any court of competent jurisdiction of any finding or determination by a governing board of the existence of an emergency or of regulations or restrictions adopted by such board, pursuant to this chapter, on the ground that any such action is fraudulent, arbitrary, or capricious.

359. (A) Notwithstanding any other provision of law that requires an election for the purpose of authorizing a contract with the United States, or for incurring the obligation to repay loans from the United States, and except as otherwise limited or prohibited by the California Constitution, a public water agency, as an alternative procedure to submitting the proposal to an election, upon affirmative vote of four-fifths of the members of the governing body thereof, may apply for, accept, provide for the repayment together with interest thereon, and use funds made available by the federal government pursuant to Public Law 95-18, pursuant to any other federal act subsequently enacted during 1977 that specifically provides emergency drought relief financing, or pursuant to existing federal relief programs receiving budget augmentations in 1977 for drought assistance, and may enter into contracts that are required to obtain those federal funds pursuant to the provisions of those federal acts if the following conditions exist:

1. The project is undertaken by a state, regional, or local governmental agency.
2. As a result of the severe drought now existing in many parts of the state, the agency has insufficient water supply needed to meet necessary agricultural, domestic, industrial, recreational, and fish and wildlife needs within the service area or area of jurisdiction of the agency.
3. The project will develop or conserve water before October 31, 1978, and will assist in mitigating the impacts of the drought.
4. The agency affirms that it will comply, if applicable, with Sections 1602, 1603, and 1605 of the Fish and Game Code.
5. The project will be completed on or before the completion date, if any, required under the federal act providing the funding, but not later than March 1, 1978.

(B) Any obligation to repay loans shall be expressly limited to revenues of the system improved by the proceeds of the contract.

(C) No application for federal funds pursuant to this section shall be made on or after March 1, 1978.

(D) Notwithstanding the provisions of this section, a public agency shall not be exempt from any provision of law that requires the submission of a proposal to an election if a petition requesting such an election signed by 10 percent of the registered voters within the public agency is presented to the governing board within 30 days following the submission of an application for federal funds.

(E) Notwithstanding the provisions of this section, a public water agency that applied for federal funds for a project before January 1, 1978, may make application to the Director of the Drought Emergency Task Force for extension of the required completion date specified in paragraph (5) of subdivision (b). Following receipt of an application for extension, the Director of the Drought Emergency Task Force may extend the required completion date specified in paragraph (5) of subdivision (b) to a date not later than September 30, 1978, if the director finds that the project has been delayed by factors not controllable by the public water agency. If the Drought Emergency Task Force is dissolved, the Director of Water Resources shall exercise the authority vested in the Director of the Drought Emergency Task Force pursuant to this section.

(F) For the purposes of this section, "public water agency" means a city, district, agency, authority, or any other political subdivision of the state, except the state, that distributes water to the inhabitants thereof, is otherwise authorized by law to enter into contracts or agreements with the federal government for a water supply or for financing facilities for a water supply, and is otherwise required by law to submit those agreements or contracts or any other project involving long-term debt to an election within that public water agency.

WATER CODE SECTIONS 71640 ET SEQ.

71640. A district may restrict the use of district water during any emergency caused by drought, or other threatened or existing water shortage, and may prohibit the wastage of district water or the use of district water during such periods for any purpose other than household uses or such other restricted uses as the district determines to be necessary. A district may also prohibit use of district water during such periods for specific uses which it finds to be nonessential.

71641. A district may prescribe and define by ordinance the restrictions, prohibitions, and exclusions referred to in Section 71640. Such an ordinance is effective upon adoption; but, within 10 days after its adoption, the ordinance shall be published pursuant to Section 6061 of the Government Code in full in a newspaper of general circulation which is printed, published, and circulated in the district. If there is no such newspaper the ordinance shall be posted within 10 days after its adoption in three public places within the district.

71642. A finding by the board upon the existence, threat, or duration of an emergency or shortage, or upon the matter of necessity or of any other matter or condition referred to in Section 71640, shall be made by resolution or ordinance. The finding is prima facie evidence of the fact or matter so found, and such fact or matter shall be presumed to continue unchanged unless and until a contrary finding is made by the board by resolution or ordinance.

71643. The finding made by the board pursuant to Section 71642 shall be received in evidence in any civil or criminal proceeding in which it may be offered, and shall be proof and evidence of the fact or matter found until rebutted or overcome by other sufficient evidence received in such proceeding. A copy of any resolution or ordinance setting forth such finding shall, when certified by the secretary of the district, be evidence that the finding was made by the district as shown by the resolution or ordinance and certification.

71644. From and after the publication or posting of any ordinance pursuant to Section 71641, and until the ordinance has been repealed or the emergency or threatened emergency has ceased, it is a misdemeanor for any person to use or apply water received from the district contrary to or in violation of any restriction or prohibition specified in the ordinance. Upon conviction thereof such person shall be punished by imprisonment in the county jail for not more than 30 days, or by fine not exceeding six hundred dollars ($600), or by both.

Sample County-Level Request For Disaster Declaration

JUL.21.2008 4:19PM SHERIFFS OES NO.278 P.1/2

SHERIFF'S OFFICE
COUNTY OF HUMBOLDT
826 FOURTH STREET
EUREKA, CALIFORNIA 95501-0516 PHONE (707) 445-7251

July 21, 2008

Henry R. Renteria, Director
Governor's Office of Emergency Services
3650 Schriever Avenue
Mather, CA 95655

RE: Humboldt County Request for a USDA Secretarial Disaster Declaration for Damage to Rangelands caused by Drought and Cold Spring Weather.

Dear Director Renteria:

Humboldt County is requesting that the Governor's Office of Emergency Services contact the United States Department of Agriculture (USDA) and request on behalf of Humboldt County a USDA Secretarial Disaster Declaration. The Agricultural Commissioner's Office has determined that a disaster has occurred as a result of drought and colder than normal temperatures experienced in Humboldt County in the late winter and spring of 2008. This disaster for agricultural production began on February 7, 2008, and continues to the present. It is now estimated that rangeland production will suffer a 40 percent loss, and producer losses will become even greater if normal levels of precipitation do not return in the fall.

May was the second driest on record for Humboldt County, during which only .04 inches of precipitation was received or 2% of the normal monthly average. Since February, Humboldt County has received only 51% of normal precipitation. Rangeland forage production is dependent on the timing of adequate rainfall to support forage grass growth. The near record dry May proved disastrous for local rangelands as forage grasses did not grow and dried out at least one month early due to the lack of rain. Unseasonably cold temperatures and winds also contributed to the lack of productivity on Humboldt County rangelands. The Palmer Drought Severity Index which uses temperature and rainfall information to determine dryness on a long-term scale indicates that Humboldt County is in a severe drought.

Humboldt County producers dependent on rangeland production to support livestock have been forced to sell yearling stock early and before maturity because of the lack of forage. Many producers are also considering reducing their overall herd sizes because of uncertainty over future rangeland conditions. Rangeland producer production loss estimates range from 30 to 65 percent. Forage production on coastal pasture has also been reduced by the lack of spring precipitation with loss estimates as high as 25 percent.

Sample County-Level Request For Disaster Declaration *(continued)*

JUL.21.2008 4:19PM SHERIFFS OES NO.270 P.2/2

Letter to Mr. Henry R. Renteria
July 21, 2008
Page Two

The above losses represent significant negative impacts to Humboldt County's livestock industry and agricultural economy; therefore, I am requesting that the Governor's Office of Emergency Services contact the U.S. Department of Agriculture and ask that a primary disaster declaration be granted for Humboldt County due to drought, and Humboldt County be eligible for any drought-related assistance.

Sincerely,

GARY PHILP, Sheriff
Humboldt County

CC: Humboldt County Board of Supervisors
Loretta Nickolaus, County Administrative Officer
Dan Larkin, Humboldt County Office of Emergency Services
Patrick Griffin, Siskiyou County Agricultural Commissioner
Katherine Zelmer, Humboldt County Farm Bureau
Katie Delbar, USDA Farm Services Agency
Alan Bower, U.C. Farm Adviser

SWRCB Letter To Surface Water Diverters

State Water Resources Control Board

Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

February 26, 2009

To: Diverters of Surface Water

NOTICE OF SURFACE WATER SHORTAGE FOR 2009

After experiencing two years of drought, California's water reserves are extremely low in many parts of the state. The California water rights system is designed to provide for the orderly allocation of water supplies in the event that there is not enough water to satisfy everyone's needs. As a result, every water right holder has a priority, relative to every other water right holder. When there is insufficient water for all, water diversions must be curtailed in order of water right priority.

Current hydrologic data indicates that this year will be a dry year in your hydrologic area. In view of the current situation, the State Water Resources Control Board (State Water Board) considers it important and prudent to assume that there will **not** be sufficient surface water available during the year for those who hold water right permits, licenses, and registrations issued by the State Water Board. If water supply conditions do not improve, permit, license and registration holders may be curtailed. It may even become necessary this year in some parts of the state to curtail more senior water rights, such as riparian rights or pre-1914 rights.

If you plan to grow crops that will need water beyond the limited supply available, you may find yourself in a very serious dilemma. There is a strong possibility that your water right will be curtailed due to a lack of surface water or a low priority of right. Consequently, you should look into acquiring a firm alternate source of water, such as a well pumping from groundwater that does not require a water right permit, purchase water from someone that pumps groundwater or has a storage reservoir, or recycled wastewater. You may also be able to contract for water deliveries from a water supplier, such as the U.S. Bureau of Reclamation, the State Department of Water Resources, or a local water or irrigation district, provided that the water supplier has water to deliver to you. In view of the current situation, the State Water Board strongly encourages your immediate implementation of the enclosed conservation guidelines. Additional guidance is available for agricultural water users at the Agricultural Water Management Council's website at http://www.agwatercouncil.org.

If you hold a water right for domestic or municipal use, you may also need to reduce water use and seek alternate supplies. If there are no alternate supplies available, you may be required to reduce water use down to what is necessary for health and safety purposes. Guidance for urban water users is available at the California Urban Water Conservation Council's website at http://www.cuwcc.org.

Unless sufficient additional precipitation occurs this rainy season, no water will be available for many water diverters. It is our intent to contact you again in the near future if there is expected to be no water available for you at your water right priority. State Water Board staff is available to answer your questions at (916) 341-5300.

Sincerely,

Victoria A. Whitney
Deputy Director for Water Rights

Enclosure

California Environmental Protection Agency

Recycled Paper

SWRCB Letter To Surface Water Diverters *(continued)*

Water Conservation in Irrigation: Guidelines for a Dry Year

Here are some of the conservation practices in irrigation that you can implement to cope with water shortages this year.

1. Be realistic. Adjust the planted acreage to the projected water supply, both as to its quality and quantity.

2. Be efficient. Runoff from the lower end of an irrigated field is usually reusable because its quality is only slightly degraded. If the irrigation water is usable, the runoff water should be usable. Tailwater return flow systems will allow recovery of runoff for increased efficiency of irrigation.

3. Careful land grading or smoothing of irrigation checks aids in uniform water application, thus preventing percolation losses below the root zone.

4. Long irrigation runs may cause excessive water application at the upper end and runoff at the lower end. Water can be spread more rapidly and evenly by maintaining and constructing short and narrow irrigation checks and short furrows, combined with return flow systems.

5. Plug leaks in canals, ditches, pipelines, distribution systems, etc. Replace worn orifices in nozzles or sprinkler heads.

6. If present irrigation system is inefficient, consider advantages of upgrading the present system, or changing to a more efficient system.

7. Better uniformity of distribution can be obtained when irrigating by sprinklers if high wind conditions are avoided. In some locations, this can be accomplished by irrigating during night hours.

8. Be especially careful at critical germination period on annual crops. Pre-plant irrigation is probably more essential in a dry year to reduce salinity in the seed area and store water for later use by crops than in more normal years. But, do not overdo pre-plant irrigations. Use a soil auger or other moisture meter to check for soil water supply and depth of wetting after an irrigation.

9. Match water applications closely to crop needs. Find out the amount of water to be applied to refill the soil just to the depth of rooting. In some areas, potential evapotranspiration data will be available. These can be used to estimate the rate of water use by any particular crop. Also, the soil capacity for water storage can be estimated. Then, a simplified budget procedure can be followed to determine approximate time of irrigation and amount to be applied without wasting water. Consult your Farm Advisor for specific information on your crop and soil.

10. Control weeds and cover crops. Weeds use water, too, but don't add to income or efficiency of water use.

11. Keep leaching for salinity control to the minimum dictated by crop tolerance and a realistic yield expectation for the supply of water available. Seldom does average soil salinity of a root zone build up to damaging concentrations during a one- or even two-year period.

Page 1

SWRCB Letter To Surface Water Diverters *(continued)*

12. Select crops and growing seasons that use less water, where possible. By combining planting dates with selected varieties, it is possible to save some water by shortening the growing season and/or avoiding high evaporative demand periods. Small grains and, to some extent, safflower will use significantly less water than summer season field crops.

13. Most crops, if supplied with less than full evapotranspiration requirements will produce less than maximum yields, although in some crops the reduction in yield is less marked than in others. Cotton, sorghum, olives, and wine or raisin grapes are crops relatively insensitive to reduced water supply. Alfalfa, corn, and pasture are examples of crops sensitive to water deficiency.

14. On tree crops and deep-rooted annuals, start the growing season with a fully wet root zone, if at all possible. Use the remaining water supply as needed to maintain crop until the supply is exhausted.

15. Plant the best land. Do not plant marginal land. If future abandonment or pulling of permanent crop acreage is being considered, perhaps now is the time to make the change.

Page 2

CDPH Letter To Public Water Systems

TO ALL WATER SYSTEMS

Restrictions on the State Project operations, below average participation and ground water recharge year, together with an unseasonably dry spring may all contribute to a limited the yield from your ground and/or surface water supply sources. As a result you could experience difficulties in meeting normal system demands resulting in water shortages or low pressure during peak demand periods, such as those that normally occur in the late summer and early fall months.

Therefore, it is important that you closely evaluate your water supply situation and develop a contingency plan designed to mitigate any water supply problems that you may experience due to the current conditions. The following elements should be included in evaluating your system and in developing a drought contingency plan:

1. An accurate determination of the system source capacity, including ground water levels, well yields, well pumping capacities and pump bowl settings (depth to the pump's intake). The information you will need should include the following:

   a. The depth to ground water in your wells under both pumping and non-pumping conditions: Information on the depth to ground water is a very good indicator of well capacity. Too often, water systems do not collect information on ground water depth and instead rely solely on the well's pumping capacity. As such, these systems may not be aware of impending problems due to a depletion of the ground water table over time. Systems that do not monitor the groundwater levels over their pump bowls also run the chance of ruining good pumping equipment if excessive draw down in the groundwater table results in air entering the pumping equipment. **Should water levels drop below you pump bowl settings, significant damage to pump impellors, bearings and motors is likely to result! This could result in your system being without water until a new pump can be installed and result in significant equipment and labor costs to replace "burned-out" pumps and motors!**

   b. Well pumping capacity: If your well(s) are not currently metered, we strongly recommend that you install a totalizing flow meter as soon as possible and read and record this data on a regular basis. This can help you monitor usage and identify your degree of water loss or "unaccounted for water". Unaccounted for water is the difference between the water you produce from your sources and the amount actually delivered to customers.

   c. Record the water levels in the system storage tanks during the various high demand periods of the day: We recommend that you monitor and record the level of the water in your storage tanks at the same time each day.

CDPH Letter To Public Water Systems *(continued)*

This will help you identify increasing system demand or reduced source capacity conditions that can lead to major supply problems.

d. Repair any obvious leaks in your storage tanks and distribution system, before summer arrives! If your distribution system is over 25 years in age, consider starting a leak detection program to identify and repair leaks in your distribution system that may not be obvious, particularly unaccounted for water losses. Water that is not wasted through un-repaired leaks is water that will be available to customers when it is needed and saves the system money by lowering power consumption to pump water that is being wasted.

2. Review your past water use data during summer months and anticipated demands this summer and plan appropriately for anticipated shortages.

3. The contingency plan suggested above should as a minimum include:

a. Serious water conservation measures that will help mitigate water shortage problems: If water shortages were experienced in your system last year and additional source capacity has not been brought on-line, it is imperative that conservation efforts begin immediately. Outside watering and other non-essential water use should be curtailed or restricted. Appended to this letter is an excerpt from the California Water Code, which outlines measures that can and should be taken by a utility facing water shortage problems.

b. A temporary or permanent interconnection to a neighboring utility that has excess production capacity: Such an interconnection should be discussed with the Department before the interconnection is made.

c. The development and use of emergency sources of supply **with conditional approval from our Department**: The ability to use surface water from a canal, lake or stream through portable treatment facilities must be evaluated. If adequate treatment cannot be provided, our Department must be contacted to help develop appropiate mitigation measures. In some cases unsafe water sources may be used provided that proper notification to all users is given advising them of the water quality being delivered and steps they can take to address the current water supply and water quality situation. This may include need to use bottled water or to adequately boil their water before drinking.

It is important that even those systems using groundwater wells that have never experienced an outage, take steps to verify water table depth and well pump settings as indicated above. If you believe your utility will be facing water shortage problems, we recommend that you issue a "Declaration of Water Shortage Emergency", as outlined in the Water Code and notify our Department of your Contingency Plan. In the event that

CDPH Letter To Public Water Systems *(continued)*

your system experiences a significant and prolonged water outage, you will need to contact your local County Office of Emergency Services for assistance. Assistance from either the State or Federal Emergency Services Offices can only be provided after the local Emergency Services' resources have been expended.

If you have any questions regarding this letter, please contact our office at (xxx) xxx-xxxx.

Sincerely,

District Engineer:

Chronology of Recent Fish-related Regulatory Actions

AFFECTING CVP AND SWP OPERATIONS IN THE DELTA THROUGH 2009

LONGFIN SMELT

» **FEBRUARY 7, 2008** – The California Fish and Game Commission (Commission) voted to designate the longfin smelt as a candidate for listing pursuant to the California Endangered Species Act, and directed DFG to undertake a status review of the species and to report back to the Commission within the year. The Commission adopted emergency regulations concerning incidental take of longfin smelt during the candidacy period. The regulations became effective on February 29, 2008.

» **MAY 6, 2008** – USFWS made a positive finding on a 2006 listing petition filed by the Center for Biological Diversity, the Bay Institute, and the Natural Resources Defense Council, with a final listing decision due by August 2008.

» **AUGUST 7, 2008** – The Commission readopted the emergency regulations concerning incidental take of longfin smelt. The readopted regulations became effective on August 27, 2008.

» **NOVEMBER 14, 2008** – The Commission readopted the emergency regulations concerning incidental take of longfin smelt for a second and final time. The readopted regulations became effective on November 24, 2008. Emergency regulations were only valid until February 23, 2009.

» **FEBRUARY 23, 2009** – DFG issued the Department an incidental take permit for longfin smelt.

» **MARCH 4, 2009** – The Commission voted to accept DFG's recommendation to list the longfin smelt as a threatened species.

» **APRIL 8, 2009** – USFWS decided not to list the San Francisco Bay-Delta population of the longfin smelt (the same population reviewed by the Commission), declaring it did not qualify as a distinct population segment, but announced that it would examine the conservation status of the species across its range, which extends from California to Alaska.

DELTA SMELT

» **JULY 30, 2005** – USFWS issued a biological opinion addressing formal and early Section 7 endangered species consultation on the coordinated operations of the Central Valley Project and State Water Project and the operational criteria and plan (OCAP) to address potential critical habitat (OCAP biological opinion).

» **APRIL 12, 2007** – The Commission denied a request for emergency action to change the Delta smelt state listing status from threatened to endangered.

However, the Commission determined that endangered status might be warranted, and initiated a species status review.

» **MAY 25, 2007** – The United States District Court for the Eastern District of California issued a summary judgment in a lawsuit challenging the 2005 OCAP biological opinion, and ordered that a new biological opinion be developed by September 15, 2008 (later extended to December 15, 2008).

» **DECEMBER 14, 2007** – The United States District Court for the Eastern District of California issued an interim remedial order in Natural Resources Defense Council, et al. v. Kempthorne to provide additional protection of Delta smelt pending completion of a new biological opinion for continued operation of the CVP and SWP.

» **DECEMBER 15, 2008** – USFWS issued the Delta smelt OCAP biological opinion with a jeopardy finding and finding of adverse modification of designated critical habitat. This opinion on average significantly reduced CVP and SWP delivery capabilities.

» **MAY 29, 2009** – The United States District Court for the Eastern District of California in San Luis and Delta-Mendota Water Authority: Westlands Water District v. Salazar granted a preliminary injunction requiring USFWS to consider in its formulation of the OCAP biological opinion irreparable harm and injury when deciding CVP and SWP operations. USFWS was to consider not only the most protection for the species but also the harm to humans. (Litigation in the Delta smelt cases consolidated by the court under this case name continued into 2010.)

GREEN STURGEON

» **APRIL 7, 2006** – NMFS listed the southern distinct population segment of North American green sturgeon as threatened.

» **MAY 21, 2009** – NMFS proposed an Endangered Species Act section 4(d) rule to apply take prohibitions to green sturgeon.

» **JUNE 4, 2009** – NMFS released its biological opinion and conference opinion on the long-term operations of the Central Valley Project and State Water Project. The opinion provided for protection of the southern distinct population segment of green sturgeon, Sacramento River winter-run and Central Valley spring-run salmon, Central Valley steelhead, and southern resident killer whales. The opinion found that operation of the CVP and SWP was likely to jeopardize the existence of listed species and adversely modify their critical habitat unless protective measures for listed species were taken.

SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON, CENTRAL VALLEY SPRING-RUN, CHINOOK SALMON AND CALIFORNIA CENTRAL VALLEY STEELHEAD

» **OCTOBER 22, 2004** – NMFS issued its biological opinion on the long-term Central Valley Project and State Water Project operations criteria and plan.

» **JUNE 28, 2005** – NMFS issued its final determination to list 16 evolutionary significant units of west coast salmon. Sacramento River winter-run salmon were listed as endangered. Central Valley spring-run salmon were listed as threatened.

- **JANUARY 5, 2006** – NMFS reaffirmed the threatened status of evolutionary significant unit of California Central Valley steelhead. This unit included all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries, as well as two artificial propagation programs: the Coleman National Fish Hatchery and Feather River Hatchery steelhead programs.
- **MAY 31, 2007** – NMFS issued the 2007 federal recovery outline for the evolutionary significant units of Sacramento River winter-run Chinook Salmon and Central Valley spring-run Chinook Salmon and the distinct population segment of California Central Valley steelhead.
- **APRIL 16, 2008** – In a lawsuit contesting the validity of the biological opinion, the United States District Court for the Eastern District of California issued a memorandum decision and order on the cross-motions for summary judgment filed in PCFFA et al. v. Gutierrez et al. The Court found that the biological opinion issued by NMFS in 2004 was invalid due to a lack of analysis of adverse effects on critical habitat for winter-run Chinook salmon and the effects of global climate change on the species, and ordered NMFS to prepare a new biological opinion by March 15, 2009 (later extended to June 4, 2009).
- **OCTOBER 21, 2008** – The United States District Court for the Eastern District of California issued a ruling that California water systems were placing wild salmon "unquestionably in jeopardy." No court-ordered remedies were issued pending a completion of a new biological opinion.
- **JUNE 4, 2009** – NMFS issued the biological opinion and conference opinion on the long-term operations of the Central Valley Project and State Water Project, for salmon, steelhead, and sturgeon, as described previously. (Litigation on this biological opinion continued into 2010.)

TABLE A-1 — Conservation Actions and Water Use Reduction Targets of Association of California Water Agencies Members

Agency	Location	Voluntary Conservation	Mandatory Conservation	Drought Response[A]
Atascadero Mutual Water Company	Atascadero			1, 4
Bella Vista WD	Redding			1, 3
Browns Valley ID	Browns Valley			1, 4
Calaveras County WD	San Andreas			1, 3, 4, 5
California American Water Company	Sacramento	10%		1
Calleguas MWD	Thousand Oaks			2
Carlsbad	Carlsbad			2, 4
Carmichael WD	Carmichael			1, 4
Central Basin MWD	Commerce			1, 6, 7, 8
Citrus Heights WD	Citrus Heights	5–10%		1
City of Alhambra	Alhambra			1, 3
City of Antioch	Antioch		15%	2
City of Artesia	Artesia			2, 4
City of Bell Gardens	Bell Gardens			2, 4
City of Burbank	Burbank			1, 3, 4, 5
City of Calistoga	Calistoga			1
City of Carlsbad	Carlsbad		8%	2, 4
City of Chino Hills	Chino Hills			2
City of Commerce	Commerce			2, 3, 4
City of Corona Dept of Water & Power	Corona			2, 3, 4
City of Cotati	Cotati	10%		1
City of Delano	Delano			2, 4
City of Escondido	Escondido			2, 4
City of Folsom	City of Folsom	20%		1, 4
City of Fresno Water Division	Fresno		20%	2, 4
City of Glendale	Glendale			2, 3, 4
City of Glendora Water Division	Glendora			2, 3, 4
City of Healdsburg	Healdsburg	20%		1
City of Huntington Park	Huntington Park			2, 4
City of Imperial Beach	Imperial Beach	10%		1, 3, 5
City of La Verne	La Verne		10%	2, 4
City of Long Beach Water Dept	Long Beach			2, 3, 4, 5, 6, 7, 8
City of Marina Del Rey	Marina Del Rey		15%	2, 4
City of Norwalk	Norwalk			2, 4
City of Oceanside-Water Util. Dept	Oceanside			2, 4
City of Ontario	Ontario			2, 4

Source: Association of California Water Agencies, ACWA.COM (December 1, 2009)

(A) Drought Response of Agencies:

1 = Urging voluntary conservation

2 = Mandatory conservation / rationing in effect

3 = Drought surcharges / rate increases

4 = Restrictions on outdoor residential water use

5 = Tiered rate structure adopted

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(B) Agricultural agency experiencing shortages

TABLE A-1 — Conservation Actions and Water Use Reduction Targets of Association of California Water Agencies Members

Agency	Location	Voluntary Conservation	Mandatory Conservation	Drought Response[(A)]
City of Pico Rivera	Pico Rivera			2, 4
City of Pittsburgh	Pittsburgh		15%	2, 3, 4, 6, 7, 8
City of Pleasant Hill	Pleasant Hill			2, 4
City of Poway	Poway			2, 4
City of Roseville	Roseville			2, 4
City of Sacramento Utilities Dept	Sacramento			1, 4
City of San Diego Water Dept	San Diego			2, 3, 4, 5, 6, 7, 8
City of Santa Ana	Santa Ana			1, 3, 4
City of Santa Cruz Water Dept	Santa Cruz		15%	2, 4
City of Santa Rosa – Utilities Dept	Santa Rosa	15%		1, 4
City of Signal Hill	Signal Hill			2, 4
City of Simi Valley	Simi Valley			2, 4
City of St. Helena	St. Helena			1, 4
City of Stockton, Muni. Util. Dept.	Stockton			1, 3, 4
City of Thousand Oaks	Thousand Oaks			2, 4
City of Wasco	Wasco			1, 4
City of Westminster	Westminster	10%		1
City of Windsor	Windsor	15%		1, 4
Coachella Valley WD	Coachella Valley			1, 5, 6, 7, 8
Contra Costa WD	Concord	15%		1, 3, 4, 6, 7, 8
Crescenta Valley WD	La Crescenta			2, 4, 5
Cucamonga Valley WD	Rancho Cucamonga	5%		1, 3, 4, 5, 6, 7, 8
Del Paso Manor WD	Sacramento			1
Dublin San Ramon Services District	Dublin			1, 5
East Bay MUD	Oakland			1, 3, 5, 6, 7, 8
East Los Angeles	East Los Angeles			2
Eastern MWD	Perris			2, 4, 5, 6, 7, 8
El Toro WD	Laguna Hills			2, 4
Elsinore Valley MWD	Lake Elsinore			1, 3, 5, 6, 7, 8
Fair Oaks WD	Fair Oaks			1
Fallbrook PUD	Fallbrook			2, 3, 4
Foothill MWD	La Canada			2, 3
Helix WD	La Mesa			2, 3, 4, 5, 6, 7, 8
Imperial ID	Imperial			2
Inland Empire Utilities Agency	Chino Hills			1, 4, 6, 7, 8
Jurupa CSD	Mira Loma	10%		1, 4

Source: Association of California Water Agencies, ACWA.COM (December 1, 2009)

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Agency	Location	Voluntary Conservation	Mandatory Conservation	Drought Response[A]
Kern County WA	Bakersfield			2
Kings County WD	Hanford			1
Lakeside WD	Lakeside			2, 4
Las Virgenes MWD	Calabasas			2, 4
Lincoln Avenue Water Co.	Altadena			1
Los Angeles Co. Waterworks District	Alhambra		15–20%	2, 4, 6, 7, 8
Los Angeles DWP	Los Angeles			2, 3, 4, 5, 6, 7, 8
Marin MWD	Corte Madera			1, 6, 7, 8
Metropolitan WD of Southern Cal	Los Angeles			2, 3, 6, 7, 8
Mojave WA	Apple Valley			1, 6, 7, 8
Monte Vista	Montclair			2, 4
Moulton Niguel WD	Laguna Niguel			2, 4
Municipal WD of Orange County	Fountain Valley		10%	2
Nevada ID	Grass Valley			1
North Marin WD	Novato		25%	2, 4
Olivenhain WD	Encinitas			2, 3, 4, 5, 6, 7, 8
Orange County WD	Fountain Valley			1, 3, 6, 7, 8
Orangevale Water Company	Orangevale	5–10%		1
Otay WD	Spring Valley			1, 3, 4
Padre Dam MWD	Santee			2, 3, 4, 5
Rainbow MWD	Fallbrook			2, 4
Ramona MWD	Ramona			2, 3, 4, 6, 7, 8
Rancho California WD	Temecula			2, 4, 5, 6, 7, 8,
Redway Community Services District	Redway			2, 4
Redwood Valley CWD	Redwood Valley		50%	2, 4
Regional Water Authority	Citrus Heights			1
Rincon del Diablo MWD	Escondido			2, 4
Rio Linda/Elverta Community WD	Rio Linda			1
Sacramento County Water Agency	Sacramento	10%		1
Sacramento Suburban WD	Sacramento	20%		1, 4
San Diego County Water Authority	San Diego			2, 4, 6, 7, 8
San Dieguito MWD	Encinitas			2, 4, 6, 7, 8
San Francisco PUC	San Francisco			1, 6, 7, 8
San Juan WD	Granite Bay			1, 4
Santa Clara Valley WD	San Jose		15%	2, 6, 7, 8
Santa Fe ID	Rancho Santa Fe			2, 4

Source: Association of California Water Agencies, ACWA.COM (December 1, 2009)

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TABLE A-1 — Conservation Actions and Water Use Reduction Targets of Association of California Water Agencies Members

Agency	Location	Voluntary Conservation	Mandatory Conservation	Drought Response[A]
Santa Margarita WD	Mission Viejo			1
Sonoma County WA	Santa Rosa			2, 6, 7, 8
Soquel Creek WD	Capitola	15%		1, 4
Sweetwater Authority	Chula Vista	10%		1, 3, 4, 5, 6, 7, 8
Triunfo Sanitation District	Ventura			1, 6, 7, 8
Vallecitos WD	San Marcos			2, 4
Valley Center WD	Valley Center			2, 4
Ventura Co. Watershed Prot. District	Ventura			2
Vista ID	Vista			2, 4
Walnut Valley WD	Walnut			1, 6, 7, 8
West Basin MWD	Carson			2, 3, 5, 6, 7, 8
West Valley WD	Rialto			1
Western MWD	Riverside			1, 4, 6, 7, 8
Westlands	Fresno	See Footnote B	3	
Yuima MWD	Pauma Valley			1, 4
Zone 7 Water Agency	Livermore	10%		1, 6, 7, 8

Source: Association of California Water Agencies, ACWA.COM (December 1, 2009)

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TABLE A-2 — USDA Drought-Related Crop Insurance Payments ($), 2005–09

County	2005	2006	2007	2008	2009
Alameda			3,375	24,030	
Amador					
Butte				955	4,192
Calaveras					56,293
Colusa			20,023	6,066	145,906
Contra Costa					
El Dorado					2,626
Fresno		37,523	552,716	1,424,350	6,798,864
Glenn			3,530		
Imperial					
Kern		45,801	129,279	124,952	290,980
Kings			331,497	173,538	323,718
Lake					
Los Angeles			9,174	969	
Madera			218	65,573	9,558
Mendocino					
Merced			17,371	184,711	390,714
Modoc	2,325				
Monterey	464	16,021	19,868	2,128	51,035
Napa					
Orange					
Placer				29,692	
Riverside		641,097	907,861	858,973	1,482,974
Sacramento					
San Benito			10,744	12,608	19,646
San Bernardino					
San Diego		42,294	48,855	32,539	5,374
San Joaquin			296,382	355,257	597,916
San Luis Obispo			207,151	330,977	60,915
Santa Barbara					
Santa Clara					
Shasta			710		
Siskiyou					
Solano			82,529	97,612	
Sonoma	363			11,112	
Siskiyou					
Stanislaus			9,655	4,109	346,910
Sutter			27,930	170,531	
Tehama					
Tulare	5,620	7,280	302,451	1,350,453	579,008
Ventura					
Yolo			28,822	24,280	6,622
Yuba					
Totals	**8,772**	**790,016**	**3,010,141**	**5,285,415**	**11,173,251**

Notes:

1. Payments are shown only for the cause of loss identified as "drought."

2. Losses resulting from prevented planting due to lack of irrigation supplies are not necessarily included as a "drought" loss for crop insurance payments.

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