

Department of Water Resources
Department of Food and Agriculture



CALIFORNIA'S DROUGHT

WATER CONDITIONS & STRATEGIES
TO REDUCE IMPACTS

Report to the Governor March 30, 2009

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REPORT TO THE GOVERNOR MARCH 30, 2009

State of California
Governor Arnold Schwarzenegger

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Introduction

Governor Schwarzenegger's Feb. 27, 2009, proclamation declared a state of emergency due to drought conditions. At the time, statewide reservoir storage was extremely low, snowpack water content was 39 percent below average, and the State Water Project allocation was set at 15 percent. These dry conditions were worsened by depletion of surface and groundwater storage caused by very dry conditions in 2007 and 2008. Though the water supply conditions were dire, the proclamation stopped short of mandatory water conservation and other measures pending a re-evaluation of water conditions and drought mitigation actions.

This report is intended to satisfy the following requirements set forth in the proclamation:

- By March 30, 2009, the Department of Water Resources (DWR) shall provide an updated report on the state's drought conditions and water availability.
- 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 (California Irrigation Management Information Systems).

For this report, DWR has examined current hydrologic conditions including changes that have occurred since the proclamation was issued. Snowpack, runoff, groundwater, and surface reservoir levels are evaluated, as well as Colorado River supplies, and current social, economic, and environmental impacts caused by drought. The report also outlines steps that have been taken in response to the drought including progress on the Governor's statewide water conservation outreach campaign and the status of the Drought Water Bank.

While there have been some improvements in this year's hydrologic conditions, allocations to state and federal water contractors are expected to remain at or near record lows for the rest of 2009. As a result, many parts of California will be faced with reduced water supplies this year.

Responding to conditions this year and preparing for possible future dry years pose compelling, yet critically important, challenges to meet statewide water needs.

Hydrologic and Water Supply Conditions Statewide and Regional

Precipitation

Water year 2009 followed two consecutive dry years. In terms of precipitation, after an average October, both November and December fell short of average in the north part of the state raising the threat of a third dry year. Concern increased markedly in January 2009 as an unusually strong high pressure system limited precipitation to only one-third of the statewide average for the month. February began with water year to date precipitation at only 65 percent of average and the statewide snowpack at only 60 percent of average to date. At that time, reservoir storage was down to 65 percent of average with the largest reservoirs nearing historic low levels. Inflows to Lake Shasta, the largest reservoir in the state, were falling behind the record low inflows of 1977.

In the middle of February 2009, the weather patterns shifted considerably. A series of wet storms crossed the state for the next three weeks. Some of these storms tapped into subtropical moisture, raising snow levels and significantly increasing rainfall totals. By the end of the first week of March, the hydrologic picture had changed considerably. Seasonal precipitation totals for the Northern Sierra (Figure 1) and the Southern Sierra moved up to near average conditions. For the first time since spring 2006, the Sacramento Basin recorded two consecutive above-average months for precipitation (February and March). Figure 2 shows precipitation as a percent of average for each of the state's hydrologic regions. Heavy precipitation in December and again in February helped the interior areas of Southern California improve to above average conditions.

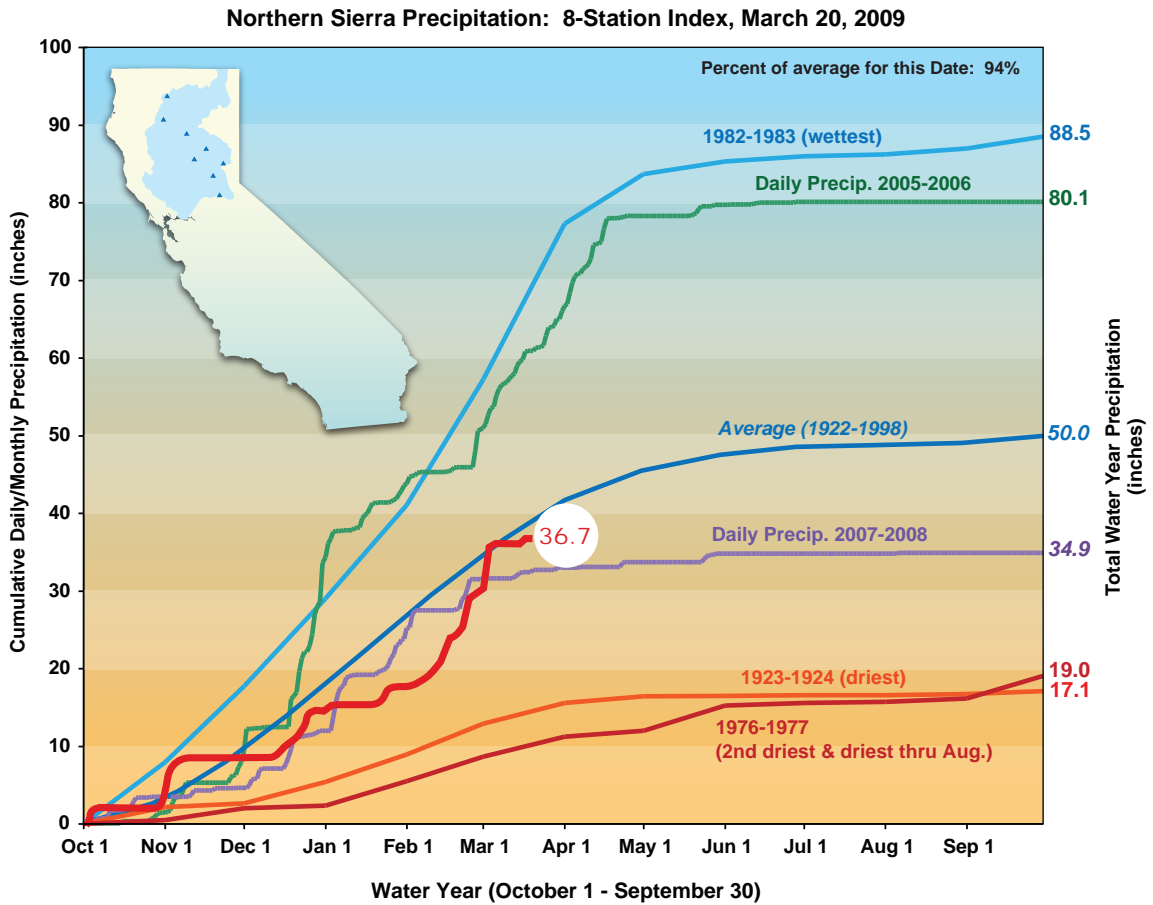


Figure 1. Northern Precipitation: 8 Station Index, March 20, 2009

Snowpack

Sierra snowpack represents one-third of California's water supply. The state's snowpack levels also benefited greatly from the influx of water in February and March 2009. As of March 27, 2009, statewide snowpack levels have reached 87 percent of average. April 1 is historically considered the peak of the snowpack development and the beginning of the snowmelt period.

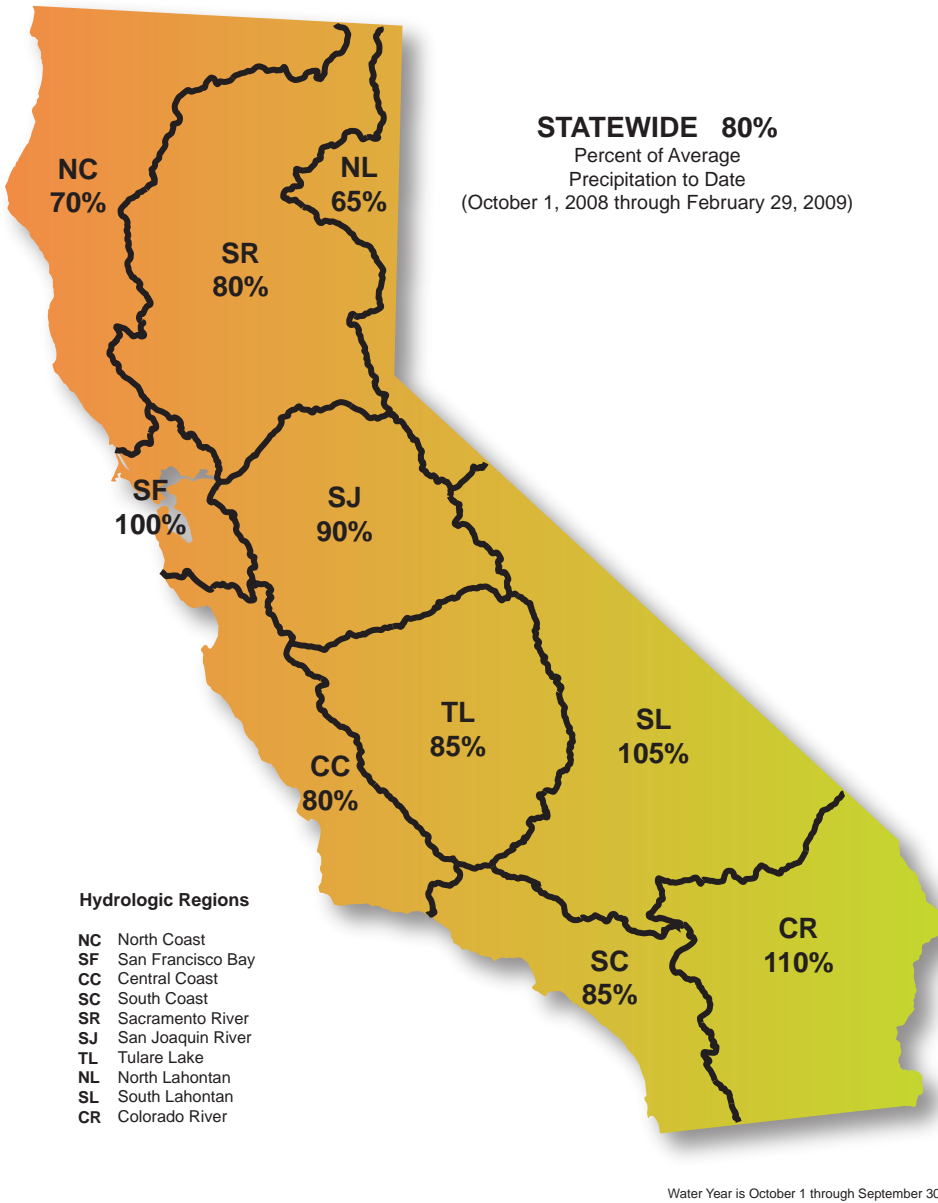


Figure 2. This season's precipitation, percent of average

Reservoir Storage

Over the last two months, the state's reservoirs gained nearly 3 million acre-feet of storage. Smaller reservoirs like Friant and Folsom were able to fill to their current flood control limits. However, the state's largest reservoirs, which are major water supply sources for the state and federal water systems, Lake Shasta and Lake Oroville, still remain significantly below average. Although Lake Shasta gained over 1 million acre-feet of storage from the February and March rains, it remains 860,000 below its average end-of-March storage. Oroville, after gaining 600,000 acre-feet of storage from the storms, remains 795,000 acre-feet short of its average for the end of March. The current condition of the state's larger reservoirs is shown in Figure 3.

Runoff Forecasts

Beginning in April, many of the state's reservoirs shift from flood control to water supply operations. Runoff from the spring snowmelt is captured for use later in the season. In terms of water year runoff, the past two years and projections for this water year rank among the top eight driest for the Sacramento and San Joaquin basins.

Water year 2006-07 ended with 53 percent of average statewide runoff. Sacramento River region was classified as "Dry," and the San Joaquin River region was classified "Critical." Water year 2007-08 ended with 58 percent of average statewide runoff, and both the Sacramento and San Joaquin River regions were classified "Critical." Water year 2008-09 is expected to yield more runoff than 2007-08 with a forecast of 70 percent of average. The March 1, 2009, forecast had been for both regions to be classified as "Critical" at the end of this water year, though current snowpack and runoff may improve these forecasts. Estimates now are that the April 1 projections will project that both river regions will end the water year "Dry."

The present drought period—water years 2007, 2008, and 2009 to date—is shorter in duration than California's most significant statewide multiyear droughts (1929–34 and 1987–92) and less severe in single-year intensity than 1977, when estimated statewide runoff reached a record low.

CURRENT RESERVOIR CONDITIONS

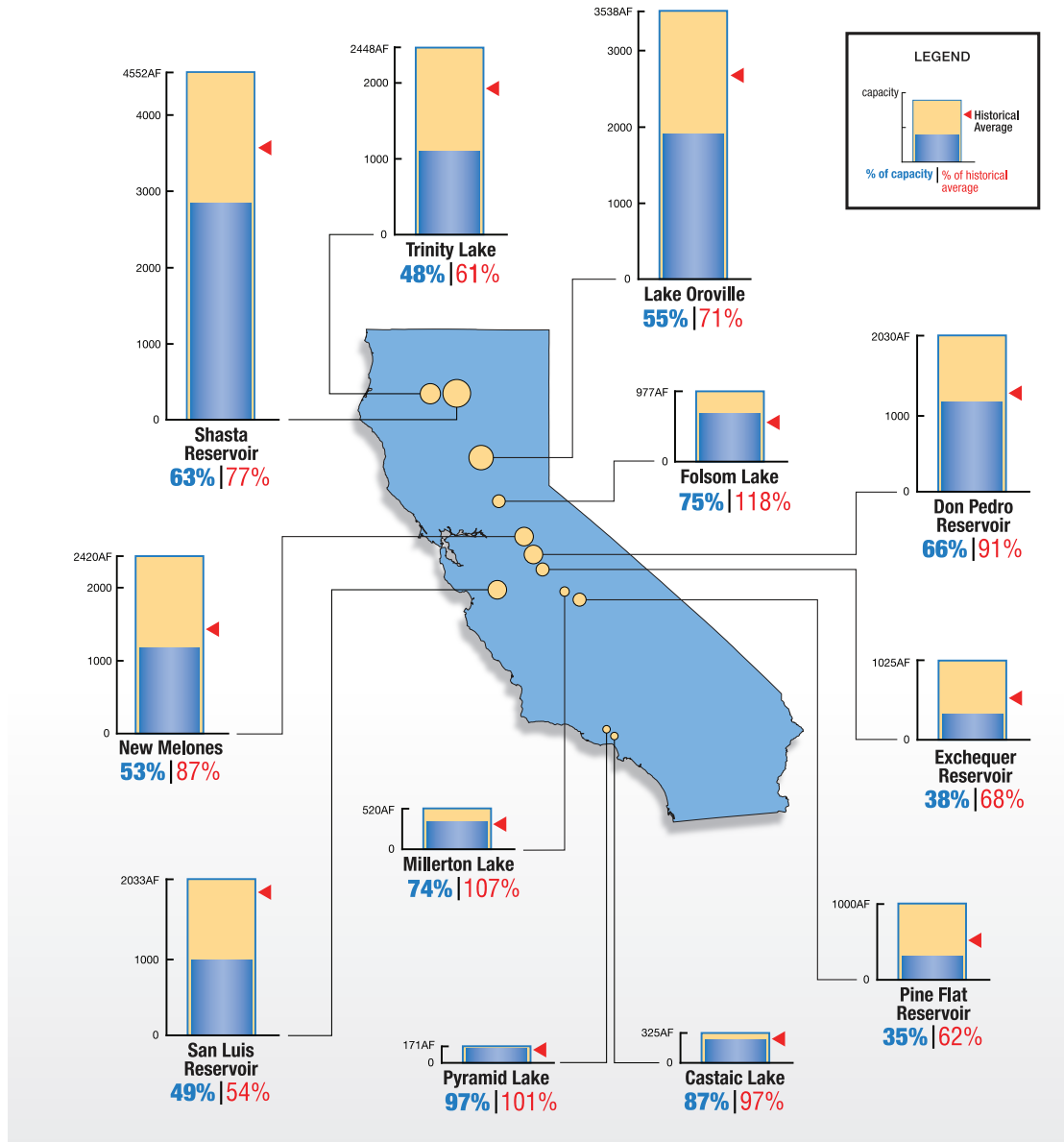


Figure 3. Reservoir levels for selected reservoirs on March 28, 2009

Figure 4 shows a comparison of statewide runoff from 2006-09. The impact of the below-average runoff will be smaller for the reservoirs that are closer to their average storage. Reservoirs with significant storage deficits like Shasta and Oroville will not recover this year. In basins that lack significant snowmelt such as the Russian River, further gains in reservoir storage will only be realized with additional spring storms.

Groundwater Basin Conditions

DWR monitors groundwater levels in some groundwater basins and relies on local agencies to conduct the monitoring in other parts of the state. The current data shown in Figure 5 indicate that some groundwater levels are comparable to previous drought periods (1976-77 and 1991-92).

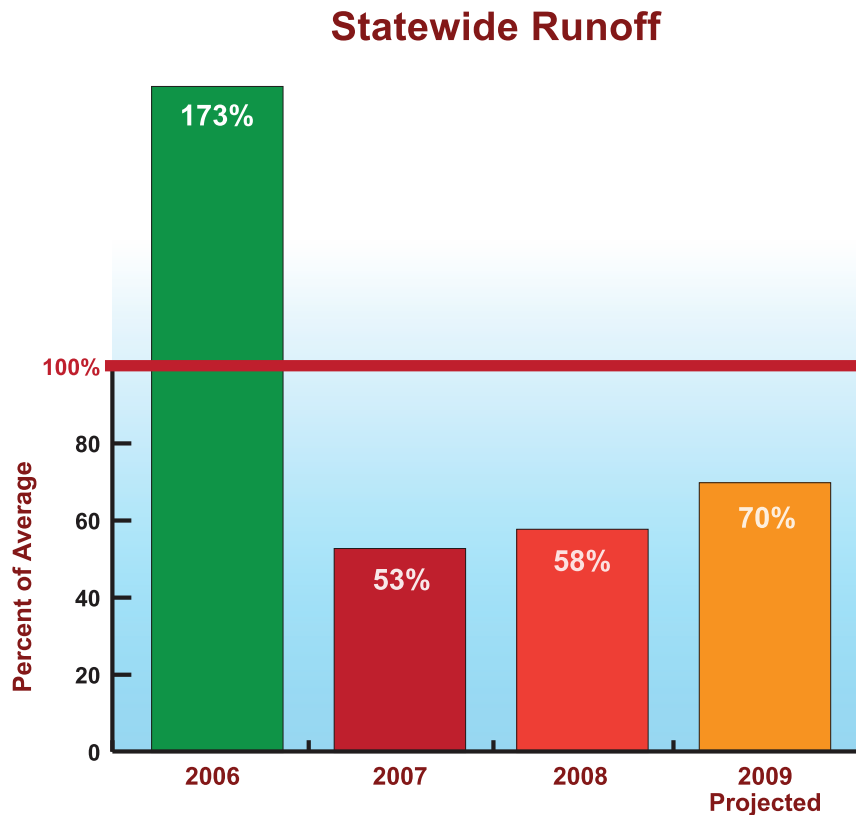


Figure 4. Statewide runoff for water years 2006, 2007, 2008, and projection as of March 27, 2009

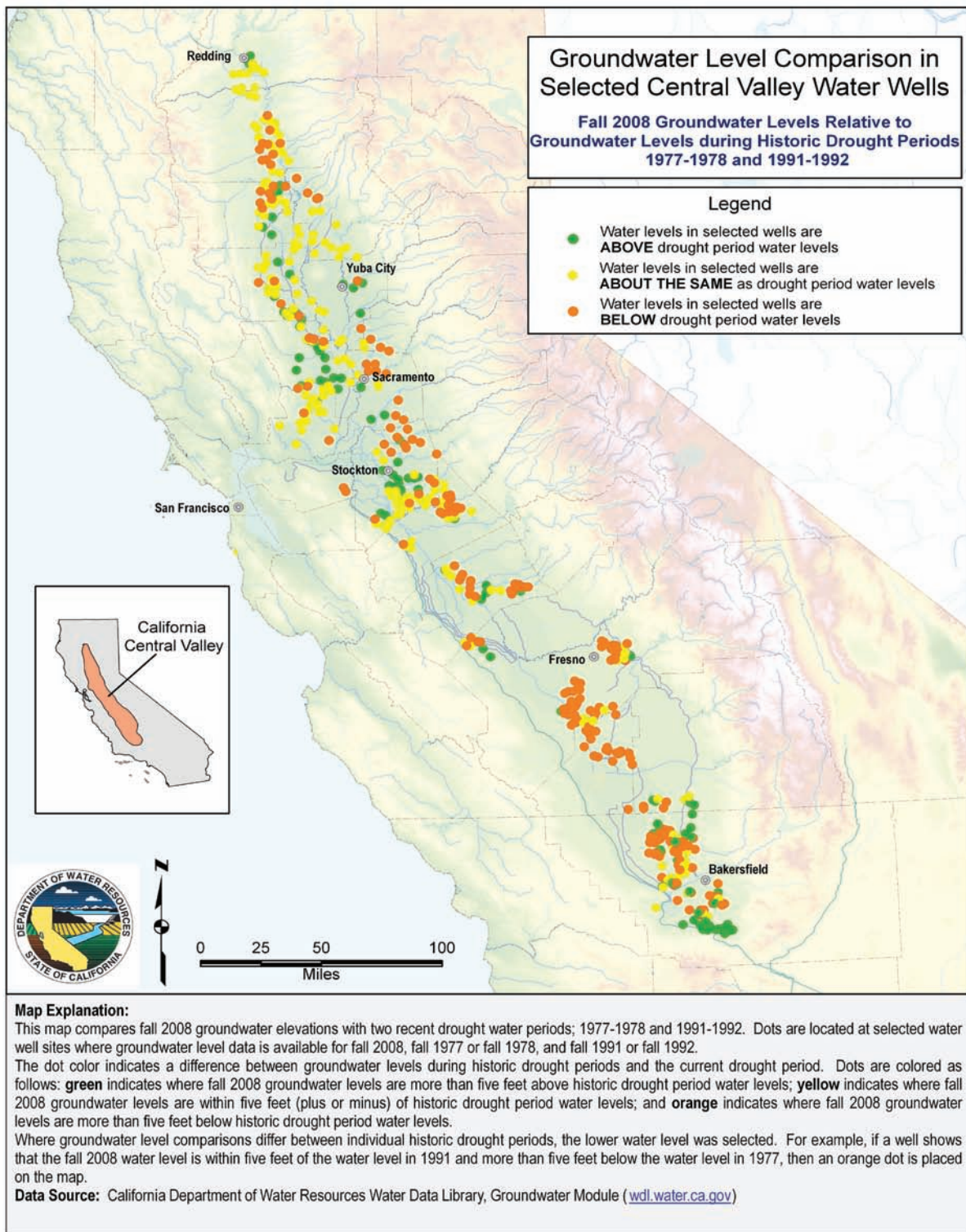


Figure 5. Groundwater level comparisons in selected Central Valley wells

In some areas, these lower levels reflect additional water use that occurs during droughts. In other areas, declining water levels are a continuation of over-extraction taking place prior to the drought. The lack of recharge from precipitation and percolation of surface water exacerbates an already serious condition.

In some areas such as in the foothill regions of the Sierra Nevada, the Coastal Range, and parts of inland Southern California, groundwater is found in the fractures of hard rock. Generally, once these wells go dry, there are very few water supply alternatives except to import water. In other areas, particularly valleys, sustained groundwater extraction can cause permanent land subsidence. In portions of western San Joaquin Valley, for example, groundwater levels are declining below historical levels, and the renewal of land subsidence is a possibility. Land subsidence can affect the flow direction of water conveyance facilities and can cause physical damage to infrastructure.

Previous droughts have brought marked increases in well-drilling activity in areas like the Central Valley where surface water has been a reliable source of water. Many parts of the state are seeing an increase in new wells this year in response to reductions in other sources of water supplies.

Water Project Allocations

State Water Project and Central Valley Project. Despite the wetter conditions that have occurred mid-February through early March, south-of-Delta water allocations for the State Water Project and Central Valley Project remain at record low levels. Because of the dry conditions in January and early February, the water projects received a late start in filling the San Luis Reservoir south of the Delta. Despite improved Delta inflow occurring now, the continuing Delta crisis and regulations imposed to protect endangered species have limited exports. Since mid-February, the State Water Project has not been able to export approximately 180,000 acre-feet of water from the Delta due to flow restrictions. These issues will continue to limit the water supply for users south of the Delta.

Table 1. State Water Project and Central Valley Project allocations

Year	Type	CVP Allocation	SWP Allocation
2006	Wet	100% ag/100% M&I	100%
2007	Dry	50% ag/ 75% M&I	60%
2008	Critical	40% ag/75% M&I	35%
2009	Dry*	0% ag/ 50% M&I*	20%*
Ag: Agriculture M&I: Municipal and Industrial * Projected			

Using current projections and average precipitation conditions for the remainder of the water year, the State Water Project and Central Valley Project will likely deliver no more, and possibly less, water than the very low allocation levels of 2008 (Table 1).

Colorado River. Overall water conditions on the Colorado River remain a bright spot in the state's overall water supply conditions despite unprecedented dry conditions from 2000 through 2007 that reduced total system storage to a little more than half of capacity. Basin-wide, water users experienced no shortages thanks to the river system's large reservoir storage capacity. Storage is gradually beginning to recover in response to an above-average 2008 and a forecasted roughly average 2009.

During past years, including drought years, California has consistently received its basic interstate apportionment of 4.4 million acre-feet annually from the river and is expected to continue doing so in the foreseeable future, reflecting the relative seniority of water rights in California. Prior to 2003, California was additionally able to use as much as 800,000 acre-feet annually of surplus water and water not yet needed by Arizona and Nevada. Much of this additional supply was delivered to urban Southern California.

Status of Regulatory and Court Actions

Water supply deliveries in California are governed by a number of federal and state court actions, laws, and regulations designed to protect water quality, fish and wildlife, and water rights. Taken together, these actions limit water supply deliveries, which is particularly problematic during droughts.

The ongoing conflict between the need to protect and restore the Sacramento-San Joaquin River Delta and the need for a reliable water supply is at the heart of California's water crisis. The Natural Resources Agency, water managers, and environmental groups are working together on the Bay Delta Conservation Plan (BDCP). The BDCP will require actions to restore habitat and to recover and protect species in the Delta in exchange for increased reliability in the state's water supplies.

The following is a description of recent regulatory actions that affect the reliability of Delta water supplies:

- In December 2008, U.S. Fish and Wildlife Service (USFWS) issued a new biological opinion for delta smelt that will severely constrain water project operations, especially in the fall months. The U.S. Bureau of Reclamation (Reclamation), in cooperation with DWR, is currently reviewing the biological opinion to determine if it can be implemented in a manner that is consistent with the intended purpose of the action, is within the agency's legal authority and jurisdiction, and is economically and technically feasible.
- On March 4, 2009, the Fish and Game Commission listed longfin smelt as threatened under the California Endangered Species Act. At the same meeting, the commission voted to "uplist" delta smelt as endangered based on its continued decline during the drought years. These species declines and associated state and federal legal requirements have a major effect on water project operations.
- The National Marine Fisheries Service (NMFS) is drafting its biological opinion on the Long-Term Operations Criteria and Plan (OCAP) for the Central Valley Project and State Water Project. The draft biological opinion finds that the OCAP is likely to jeopardize the continued existence of winter-run and spring-run Chinook salmon, Central Valley and central California coast steelhead, green sturgeon, and southern resident killer whales. The draft calls for further export curtailments and habitat restoration. NMFS will finalize and publish the final biological opinion in June 2009.

Risk of Continuing Drought

California has a history of droughts, but there are some significant differences between the current drought and those of the past:

- Increased regulatory restrictions in the Delta to protect listed fish species limit when and how much water can be moved through the state's water system,
- Nine million new residents since 1990 have increased the demand for water and
- Increased conversion of agricultural lands to higher value permanent crops, primarily orchards and vineyards has eliminated the flexibility of changing crop patterns or fallowing lands in response to dry conditions.

Each of these factors have compounded the severity of the current drought.

Some of the drought related impacts being experienced are similar to those experienced in past droughts such as loss of dryland grazing and risks to small water systems. However, in the current drought the reductions in water deliveries for both the state and federal water projects are substantially greater than those that occurred during previous three-year drought periods.

Water conservation programs are already in effect for many water agencies and some agricultural lands may not be planted in the San Joaquin Valley and other areas of the state due to reduced water deliveries. Continuing drought is likely to have an increased impact on urban areas and agriculture resulting in increases in voluntary and mandatory water conservation and land fallowing.

An additional risk of continuing drought is an increase in wildfire. In recent years, earlier spring snowmelt coupled with longer and drier summers have resulted in an increase in severe wildfires. Prolonged drought in Southern California has led to extensive tree mortality

from bark beetles which increase fuel loads and further aggravates wildfire risk. Wildfires can also affect water quality and recharge of groundwater basins.

Figure 6 shows other expected consequences of continuing drought conditions.

California may be in the third year of a three-year drought or it could be the third year of a drought that will last much longer. Looking to other places around the world that are also experiencing drought conditions, Australia stands out as representative of what California may be facing. Australia, whose water and delivery system and seasonal rainfall are similar to California, is in the tenth year of a drought. They have been forced to make drastic changes in their urban and agricultural water use. Whole sectors of the economy have collapsed and some areas of the country have struggled to survive on the little water that is left. This year, like California, Australia has faced severe wildfires with high human casualties.

Our state must learn from the devastating experiences of others and take action now to avoid or minimize the risks of continuing drought.

Initial Estimates of 2009 Economic Impacts from Drought

Current drought conditions are causing economic hardship in California, particularly in agricultural communities.

A collaborative economic impact modeling effort between the California Department of Food and Agriculture (CDFA), University of California at Davis, and DWR has estimated income and employment impacts from water shortages to irrigated agriculture in the Central Valley based on the current forecasted water project deliveries and estimates of local surface and groundwater water supply availability. The results are as follows:

- Central Valley farm revenue loss is estimated to range between \$325 million and \$477 million.

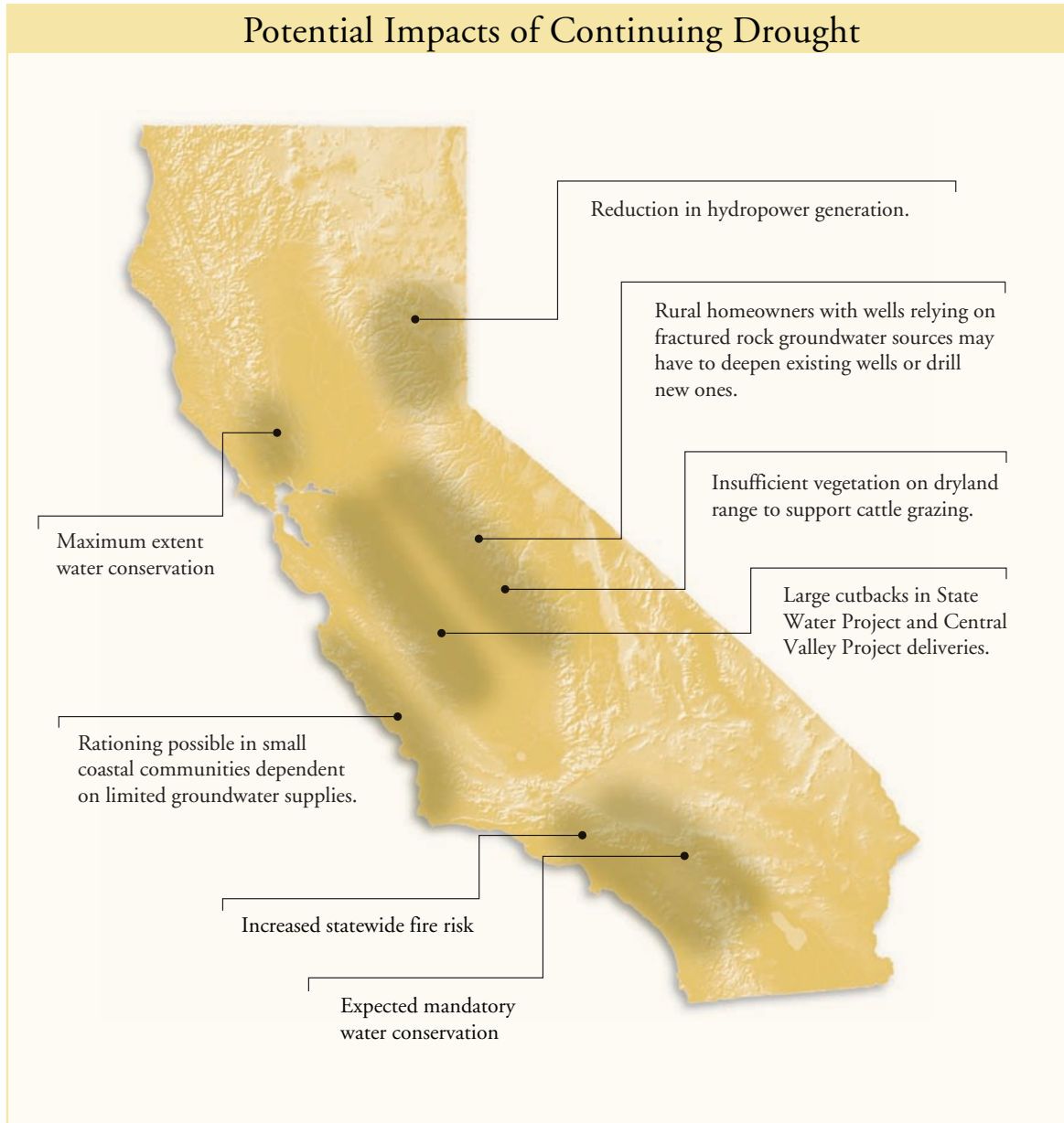


Figure 6. Impacts of continuing drought

- Total income losses to those directly involved in crop production and to those in businesses related to crop production is estimated to range between \$440 and \$644 million.
- The associated total employment loss is estimated to be between 16,200 and 23,700 full-time equivalent jobs, with the majority of jobs lost in the lowest paying categories.
- Groundwater pumping cost increases are expected to range between \$153 million and \$165 million.

These impacts include both direct, on-farm impacts and indirect, off-farm multiplied economic impacts. However, the impacts exclude losses to dryland range and pasture, unirrigated crops, livestock operations, and dairies. They exclude revenue losses in 2010 and beyond from orchards and vineyards that are damaged or abandoned due to water shortages in 2008 and 2009. They also exclude some increased costs incurred by California agriculture due to the drought and water shortages, including pumping from greater depths, refurbishing and deepening existing wells, and constructing new wells. Finally, the impact estimates exclude agricultural drought losses in other parts of California where DWR survey information indicates such losses may occur this year. Those areas include parts of northeast California, the Russian River watershed, San Benito County, the Antelope Valley, western Riverside County, and northern San Diego County.

Strategies for Responding to the Drought

In response to the continuing drought conditions, DWR is taking action to reduce the adverse and economic impacts of the drought. In addition, DWR and CDFA are coordinating with numerous groups including the California Water Plan steering committee and advisory groups and various agricultural stakeholders for additional concepts and ideas that have the potential to reduce the economic impacts of the drought. The following is a summary of strategies being implemented and concepts which may provide additional benefits once fully developed. Following the preparation of this report, a series of regional meetings will be held in conjunction with DWR's water planning efforts to allow further discussion and development of drought response strategies and concepts.

Statewide Water Planning and Integrated Regional Water Management

DWR's existing statewide water planning and integrated regional water management functions provide a solid and comprehensive framework for responding to the state's current drought conditions. Every five years DWR updates the state's vision for water management with the California Water Plan. The process of updating the state's water plan is collaborative and inclusive. The current effort includes a steering committee representing 21 state government agencies with jurisdictions over different aspects of water resources and integrates companion planning documents of other state agencies. In addition, a 45-member public advisory committee, expanded regional outreach, greater involvement of Native American tribes, and coordination with federal agencies provide broad participation in plan preparation. The California Water Plan addresses the state's water supply and drought conditions. The state agency steering committee and public advisory committee provide a framework for addressing statewide water issues, including the current drought.

Integrated Regional Water Management (IRWM) is a major DWR initiative that enables regions to come together to implement water management strategies appropriate for their own needs and helps them become more self-sufficient. IRWM is intended to promote and practice the integration of regional water management actions to ensure sustainable water uses, reliable water supplies, better water quality, environmental stewardship, efficient urban development, protection of agriculture, and a strong economy.

The IRWM Program encourages development of integrated regional strategies for the management of water resources and provides funding for projects to protect communities from drought, protect and improve water quality, and reduce dependence on imported water.

Water Transfers and Drought Water Bank

Water transfers are an important strategy to respond to drought conditions. Maximizing the ability to move water around the state increases water system flexibility and allows water to be used in the

places where it is needed the most. In response to serious drought conditions in 2008, DWR facilitated water transfers to respond to emergency shortages across the state. Approximately 14,300 acre-feet of groundwater was transferred through the State Water Project to alleviate drought impacts in the Westlands Water District. Approximately 37,500 acre-feet of water was loaned to federal Central Valley Project contractors out of the San Luis Reservoir south of the Delta.

In 2008, DWR also established the 2009 Drought Water Bank (Water Bank) to purchase water from willing sellers and transfer it to water suppliers at risk of experiencing water shortages due to drought conditions. The Notice of Exemption for the Water Bank was filed with the State Clearinghouse on March 9, 2009. Buyer and Seller contracts are being finalized and will be signed beginning April 1. Reclamation is the lead for federal environmental compliance. Completion of federal environmental documentation is expected on or around April 7, 2009. This includes a biological opinion from USFWS for the Water Bank. The biological opinion will contain protective measures for the giant garter snake. Water Bank transfers are expected to occur from July through September this year.

Water transfers occurring outside of the Water Bank will also be important in meeting the state's water needs in 2009. Water for transfer is generally made available in four main ways: reservoir releases above average operations; groundwater substitution in which groundwater is used instead of surface water supplies; cropland idling; and crop substitution by growing a less water-intensive crop than would have been planted except for the water transfer. The Governor's drought proclamation calls for DWR and the State Water Resources Control Board (State Water Board) to prioritize and expedite the approval and processing of water transfers to help respond to drought conditions.

In addition, on March 20, 2009, DWR filed a petition with the State Water Board to allow a consolidation of places of use between the State Water Project and the Central Valley Project during 2009 and 2010. The consolidated places of use will provide DWR and Reclamation flexibility in moving State Water Project and Central Valley Project water to their service areas that are in need of water. It is expected the State Water Board will hear this item before the end of April.

Desalination

Desalination is a water treatment process for the removal of salt from water for beneficial use. Desalination is used on brackish (low-salinity) water such as brackish groundwater as well as seawater. In California, the principal method for desalination is reverse osmosis.

DWR is funding desalination projects in California through the IRWM Program. Desalination projects, especially seawater desalination projects located within the coastal zone, are very complex capital projects that face many regulatory and permitting requirements. As a result, new permanent desalination plants should not be relied upon to alleviate short-term drought conditions, but be considered longer term solutions to water supply problems.

In 2008, DWR published a *California Desalination Planning Handbook* to help communities and project proponents identify regulatory issues and facilitate permitting. Additional opportunities may exist to coordinate or streamline the permitting process, and these opportunities should be explored to help produce a reliable and drought-proof supplemental water supply.

DWR is currently administering \$50 million in Proposition 50 grants to carry out desalination research and development and support project design and construction. About \$4.6 million in unexpended funds remain in this account. DWR will investigate the feasibility of using this funding to help provide emergency portable desalination units to drought-stricken communities. Remaining funding will be used for targeted grants to overcome technical and environmental impediments to desalination.

Groundwater

Groundwater is water that exists or is stored below the ground surface, in pore spaces or in fractures that exist in geologic materials. These water-filled geologic materials, or aquifers, may receive their water or be recharged from natural hydrologic process, or the water may be introduced to the aquifer by active groundwater management. The water in these aquifers may be withdrawn through wells, or the water may discharge naturally, contributing to streamflow or to the supply of water for springs, seeps, and wetlands.

Groundwater is an important water source for municipal drinking water, agriculture, and individual water users. Groundwater provides about 30 percent of the state's water supply in an average year. In some regions, groundwater provides 60 percent or more of the supply during dry years. Up to half of all Californians rely on groundwater for part of their water supply.

Several strategies have emerged that merit consideration for groundwater and conjunctive use including:

- Encourage stronger and more widespread regional groundwater management. Offer incentives to regions that plan and implement strong programs.
- Establish a voluntary statewide groundwater database to improve understanding of this aspect of our state's water supply.
- Re-establish DWR's mobile lab for testing pump efficiency and to assist well owners in assessing their systems. Conduct water well pump efficiency tests to reveal well inefficiencies due to pump wear and casing incrustation or corrosion. Assist well owners in making sure their systems are operating as efficiently as possible and in making decisions about lowering their pumps or deepening their wells based on local groundwater conditions.
- Monitor areas susceptible to subsidence for renewed activation. If land subsidence is renewed in local areas, recommend management actions to prevent additional large costs to infrastructure.
- Provide technical and financial assistance on well drilling to regions that commit to strong regional groundwater management.

State Agency Water Conservation

The Department of General Services (DGS) oversees about 250 facilities totaling nearly 25 million square feet. Although modern facilities have efficient plumbing fixtures and irrigation systems, many older buildings have antiquated or inefficient plumbing fixtures. DGS also maintains

Capitol Park, which has about 40 acres of irrigated landscape and buildings with a large amount of grass area and a wide variety of non-native, specimen plants. Many other state facilities, including prisons and health facilities, also use large amounts of water.

To make major improvements to the state government's water use efficiency, DGS will implement the following efforts:

- Mandate water conservation best management practices for all state-owned facilities.
- Request owners of state-leased facilities to also implement best management practices for water conservation.
- Develop an investment plan to reduce the amount of water used by state government.

Urban Water Use Efficiency

Californians have made great strides in water conservation and efficiency over the years, but as the state's population has grown so has our demand for water. Many communities are now reaching the limits of their supply. Water use efficiency yields multiple benefits: lowering of demand, ability to cost-effectively stretch existing water supplies, energy savings, reduction in waste stream and treatment costs, as well as mitigation for, and adaptation to, climate change. Until California's drought of 1976-77, conservation was viewed and invoked as a temporary source of water in response to drought or emergency water shortage situations. Since then, water use efficiency and conservation approaches have become important parts of our day-to-day lifestyle. Efficient use of water can result in a viable long-term supply, save considerable capital and operating costs for utilities and consumers, and avoid environmental degradation. Reduced water demands free up water in average and wet years. Saved water can be stored in surface or groundwater storage for use during drought years.

Although many Californians have done a lot to use water more efficiently, many additional improvements are possible and cost-effective. Implementation of additional efficiency measures will

save water, energy, and money, and strengthen our economy. As dry conditions continue, Californians will need to conserve immediately because sufficient supplies will not be available. In 2008, Governor Schwarzenegger called for Californians to reduce their per-capita water consumption by 20 percent by the year 2020. DWR is working with other state agencies to develop this long-term plan. As part of his February 27, 2009, statewide drought proclamation the Governor asked every Californian to immediately take steps to conserve 20 percent. DWR is carrying out water conservation programs and other assistance efforts to help hard-hit communities implement drought conservation measures.

Most of the 459 urban water suppliers in California have prepared a water shortage contingency analysis (WSCA) as a required element of their legally required Urban Water Management Plan. To help suppliers update their WSCA and prepare for continuing drought conditions, DWR updated its Urban Drought Guidebook in late 2007. This *Urban Drought Guidebook 2008 Updated Edition* is posted on the DWR website and has been distributed in hard copy form to water suppliers. It has been used at 18 public workshops for water suppliers (11 in fall 2007, three in spring 2008, three in spring 2009).

Several strategies have emerged that merit consideration for urban water use efficiency including:

- Encourage water suppliers to fully implement best management practices for water conservation. Insist on implementation as a condition of state assistance.
- Develop a comprehensive plan of long-term actions to permanently reduce per-capita water use 20 percent by 2020. State agencies are developing this plan, with its completion scheduled for summer 2009. Support legislation to place this goal into statute.
- Support legislation to require every residential and commercial property to be equipped with efficient plumbing fixtures either upon resale or change of service.

- Develop and implement new programs to help communities reduce their landscape water use, which accounts for about half of all urban water usage.
- Help unmetered areas accelerate their metering programs through targeted investment of IRWM funds or in other ways.

Water Recycling

Recycled water has been recognized for many years as an important component of the state's water supply. Recycled water is water that, as a result of wastewater treatment, is suitable for a direct beneficial use or a controlled use that would not otherwise occur. The state has established regulatory requirements for recycled water to protect water quality and public health. The permitted uses of recycled water depend on the levels of treatment and nature of proposed use.

DWR is funding water recycling projects through the IRWM Program. Several strategies merit consideration for improving the use of recycled water including:

- Adoption of design standards to safely plumb buildings with both potable and recycled water systems (dual plumbing). A state standard for dual plumbing for the indoor use of recycled water in commercial buildings will facilitate and further the use of recycled water for additional applications. The adopted standards will also remove any inconsistencies with state regulations governing recycled water. This strategy provides the framework to increase the safe use of recycled water. DWR is currently working with the Department of Housing and Community Development and the California Building Standards Commission to develop and adopt these standards.
- The Recycled Water Policy adopted by the State Water Board requires salt and nutrient management plans for recycled water projects because recycled water use can increase the salt and nutrient concentrations in groundwater basins. Advance preparation of salt and nutrient management plans for groundwater basins where recycled water is used is a key step to streamlining the permitting process for recycled water projects.

Agricultural Water Use Efficiency

Agriculture has made, and continues to make, great strides in water use efficiency over the years. Between 1967 and 2007, California agriculture increased its inflation-adjusted gross revenue more than 83 percent while decreasing total crop applied water use by nearly 15 percent. This statewide effort is also evidenced by an increase in precision irrigation technologies and infrastructure improvements to capture and reuse irrigation water. In addition to the existing efforts, several water use efficiency strategies that merit further consideration include:

- Support legislation to enact an Agricultural Water Management Planning Act similar to the existing Urban Water Management Planning Act. This will ensure that agricultural water suppliers fully consider a range of efficiency measures.
- Establish mobile laboratories to make on-site assessments of irrigation facilities, methods, and crop water use, resulting in specific recommendations to improve distribution uniformity, irrigation scheduling, and on-farm irrigation efficiency.
- Compile strategies currently in use by growers and water suppliers to deal with water shortages and droughts and develop a comprehensive Agricultural Drought Guidebook as a storehouse of information and procedures for drought mitigation, including new and innovative methods.
- Conduct workshops on water shortage and drought water management and provide technical and financial assistance to irrigation districts and growers. Workshops should be targeted to different commodities and irrigation systems with an emphasis on how to manage crop production and irrigation water during water shortages and droughts.

California Irrigation Management Information Systems

The California Irrigation Management Information System (CIMIS) was created in 1982 by DWR and the University of California to encourage weather-based irrigation scheduling. CIMIS is a statewide network of automated weather stations that collect and transmit weather data to

Sacramento where the information is used to calculate daily plant water needs. This information is available at no cost to farmers and other users. California's agricultural industry as well as residential landscapers, pest control managers, park and golf course operators, water agencies, and large urban irrigators rely on this system to provide evapotranspiration data that allows them to develop weather-based, water-budgeting methods of irrigation. Several strategies have emerged that merit consideration for improving CIMIS including:

- Upgrade the CIMIS system to take advantage of new technology and allow more users to access the system. Upgrades are under way and will be completed later this year.
- Increase the number of weather stations to better serve all regions of the state.
- Improve maintenance and repair of the weather station network to assure dependable data and uninterrupted service to users.

Education and Outreach

Outreach and education are key components to dealing with California's water crisis. DWR will continue to work in partnership with other state, federal, tribal, and local agencies to help increase public education about the drought and provide information on ways for urban and agricultural users to conserve water.

In response to the need for a comprehensive source of information about California's drought, DWR launched a new drought website, www.water.ca.gov/drought/ to provide easy access to current conditions, statewide drought status, financial assistance, Water Bank transfer information, conservation tips, and links to other drought- and assistance-related websites.

Over the last two years, numerous workshops, training sessions, and outreach forums have been held including:

- A series of interactive webcasts on drought co-sponsored by DWR, the Association of California Water Agencies, and the California Water Awareness Campaign. These webcasts

provided information and assistance to water agencies and the public on how to conserve water and deal with the drought.

- Drought conditions and drought preparedness workshops and webcasts to help agencies prepare urban drought management plans and water shortage contingency plans.
- Local forums in which DWR, in cooperation with local governments and other state agencies, participated and provided updated drought and water supply information.
- Two paleoclimate workshops conducted to look at historic droughts and drought patterns.
- A panel of climate scientists convened to evaluate future weather conditions and provide a best estimate of 2009 water conditions.

DWR has established a Drought Operations Center with four regional drought offices. Public contact and assistance is available by phone and e-mail and through the drought website. A Statewide Drought Coordinator ensures collaboration within DWR and coordinates with other state agencies.

The California Emergency Management Agency (Cal EMA) and DWR are working with key state agencies to ensure the impacts of the drought on communities in the state are being tracked and that information on drought assistance programs is available to impacted communities. A meeting with nine Central Valley counties was held in Merced on March 26, 2009. Representatives from state entities such as Cal EMA, DWR, CDFA, Labor, and the California Health and Human Services Agency, were present to hear from the counties regarding drought impacts and discuss what services may be available to assist. In the coming weeks follow-up public workshops will be held in impacted areas.

The Department of Public Health (DPH) has created a prioritized list of at-risk water systems in the state. DWR and DPH in coordination with the California Rural Water Association and the California Public Utilities Commission will be monitoring, educating, and assisting small at-risk water systems and private well owners.

Responding to the Governor's proclamation, DWR and the Association of California Water Agencies are developing a statewide public education campaign to encourage greater water conservation. Patterned after the successful "Flex Your Power" public education campaign, the "Save Our Water" campaign will reach out to different demographic and business segments to achieve significant reductions in water use. The first step is to educate the public about the drought and what Californians can do to immediately reduce their water use. The second step is to address the state's water crisis and achieve long-term changes in the way Californians think about and use water as part of a comprehensive solution to the state's water problems. The "Save Our Water" campaign will be launched during the week of Earth Day (April 20-25).

Through DWR's statewide water planning efforts, and in conjunction with regional offices and drought centers, periodic status reports will be prepared on the continuing drought. The first update will be completed on June 30, 2009, and the second will be completed September 30, 2009. These updates will continue through the duration of the drought. In addition, DWR will prepare monthly drought bulletins to provide up-to-date information on drought conditions and impacts. The first drought bulletin will be available on April 30, 2009.

Financial Assistance

Extensive funding is being made available for the drought programs and strategies identified above. Primarily through the IRWM Program, grants are being made available for drought relief and water supply projects and programs. Approximately \$240 million will be used for a variety of drought relief, groundwater, conservation, recycling and other water management projects to address California's ongoing drought. DWR has expedited the funding for water conservation activities including rebate programs, public education and outreach, leak detection, and retrofit of systems for greater water efficiency. Additional funding is expected to be awarded this year to provide drought assistance through the IRWM Program.

Federal Coordination

In 2008, DWR cooperated with Reclamation to request federal assistance under the Reclamation States Drought Relief Act of 1991. In addition, Reclamation has been an active partner on the 2009 Drought Water Bank.

On February 27, 2009, the federal administration announced the creation of a federal Drought Action Team. Engagement with a federal team will be critical in working through some drought-related issues, especially those related to federal environmental compliance and endangered species. However, to date, members have not been appointed to this committee.

Conclusion

Water conditions in California at the beginning of 2009 were dire. Favorable storms in February and March improved conditions, but precipitation levels remain about 20 percent below average for this time of year. The overall water supply situation has not improved enough to make up for the two previous dry years and low reservoir conditions. Water storage remains about five million acre feet below average, and the state and federal water project allocations are expected to remain at or near record lows through the end of the year.

With California in a third year of a drought, economic projections continue to show serious impacts to farms, farm workers and agriculture-related businesses. Many local water agencies have imposed water use restrictions to stretch their available supplies. The drought will also impact natural resources and recreational opportunities, and it brings added fire danger. In order to help meet our most essential water needs for 2009, and plan for the possibility of a dry 2010, we are initiating or supporting the following activities:

- Expediting funding to support drought relief, groundwater projects, desalination, conservation, recycling and other water management projects to assist regions in dealing with drought conditions.

- Implementing a comprehensive plan to permanently reduce per-capita water use 20 percent by 2020 and educating the public to increase awareness about the state's water crisis and achieve an immediate drought conservation savings.
- Finalizing standards to safely plumb buildings with both potable and recycled water systems.
- Completing upgrades to the California Irrigation Management Information Systems to take advantage of new technology and allow more irrigators, water agencies and other users to access this network of automated weather stations to manage their water resources more efficiently.
- Conducting workshops in drought-stricken areas to provide information on assistance programs that are available to communities and individuals impacted by the drought.
- Preparing periodic status reports on the continuing drought and a drought contingency plan to address the possibility of a dry 2010.

But these measures are only one part of the comprehensive solution that is needed to provide clean, reliable and sustainable water supplies to our people, farms and businesses. California's water problems don't end when the drought ends. Immediate action on a comprehensive solution must include aggressive conservation, new groundwater and surface storage facilities, conveyance facilities and environmental restoration. California's future economic growth and prosperity depends on it.