

CALIFORNIA FACES GROWING WATER MANAGEMENT CHALLENGES

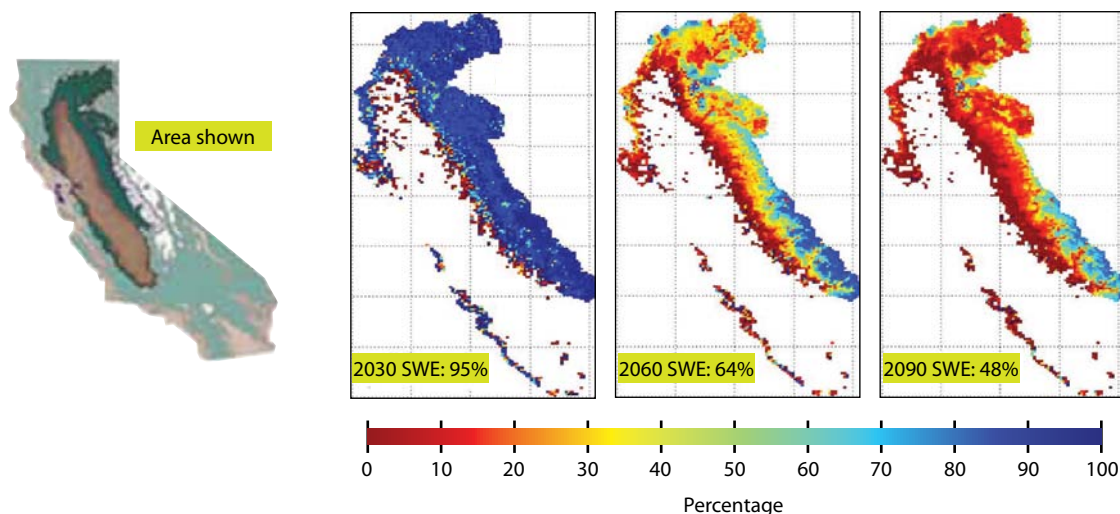
Water management in California has always been difficult, especially because the state's variable climate is marked by long droughts and severe floods. The state also features stark regional differences in water availability and demand; it relies on a vast network of storage and conveyance facilities to deliver water from the wetter parts of the state (mostly the northern and eastern mountains) to population and farming centers in the Bay Area, the San Joaquin Valley, and Southern California. This supply network is now threatened by the physical and biological fragility of the system's hub in the Sacramento–San Joaquin Delta.

Other challenges are also on the horizon. Population growth is increasing water demand in urban areas and this demand is likely to increase even if current efforts to reduce per capita water use are successful. At the same time, conflicts are growing between human water uses and water necessary to maintain fish and other wildlife. In addition, California faces serious and growing threats to life and property from flooding, particularly in the Central Valley.

Climate change will play an important, if uncertain, role. California's natural variability is likely to increase, accentuating droughts and floods. Rising air temperatures are expected to significantly reduce the Sierra Nevada snowpack, affecting water storage as well as winter and spring flood flows. Higher water temperatures may make it harder to maintain aquatic habitats for native fish species.

Over time, all of these challenges are likely to intensify. Potential solutions will involve difficult and sometimes costly tradeoffs and inconvenient legal and political changes.

RISING TEMPERATURES WILL DIMINISH THE SIERRA NEVADA SNOWPACK

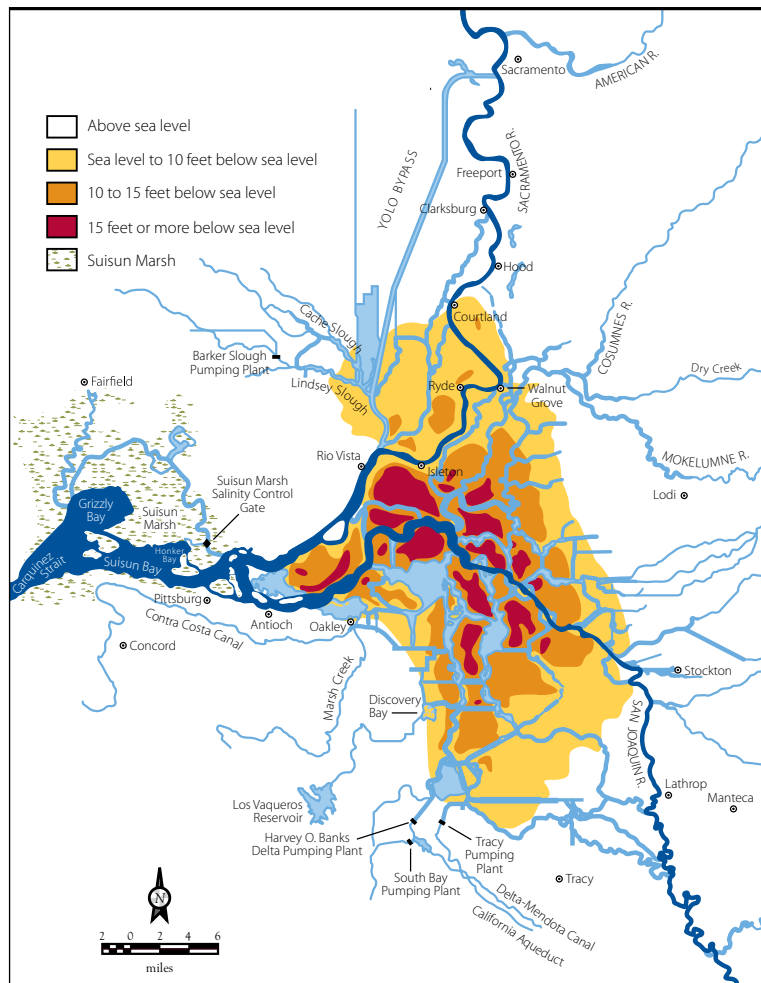


SOURCE: N. Knowles and D. R. Cayan, "Potential Effects of Global Warming on the Sacramento/San Joaquin Watershed and the San Francisco Estuary," *Geophysical Research Letters* 29, no. 18 (2002). NOTE: Projected temperature increases: 0.6°C (2020–2039), 1.6°C (2050–2069), and 2.1°C (2080–2099), expressed as a percentage of estimated present conditions (1995–2005). SWE is snow water equivalent.

CALIFORNIA'S BIGGEST WATER CHALLENGE: INSTABILITY IN THE DELTA

As the fragile hub of California's water supply, the Delta now poses serious risks to the economies of the Bay Area, Southern California, and the San Joaquin Valley. Sea level rise and earthquakes threaten the weak Delta levees that keep salt water at bay. Environmental concerns further affect water supplies. Since 2007, the collapse of native fish species has led to court-ordered cutbacks of pumping from the southern Delta. The Delta's physical deterioration will not be delayed by political indecision: the state faces inevitable, fundamental change in this region.

AN EARTHQUAKE COULD CAUSE SALT WATER TO FILL THE DELTA'S LOW-LYING ISLANDS AND DISRUPT WATER SUPPLIES



SOURCE: Department of Water Resources, *Sacramento-San Joaquin Delta Atlas* (1995).

- **A peripheral canal is the best approach for addressing both ecosystem and economic risks.**

Instead of pulling water through the Delta to the pumps (the current system), a peripheral canal (or tunnel) would tap water upstream on the Sacramento River and move it around (or underneath) the Delta to the pumps. This change would be good for fish: fewer would be trapped in the pumps and most would benefit from an increase in natural tidal flows within the Delta. It would also be good for the economy, improving both water quality and water supply reliability. Dual conveyance (combining a peripheral canal with continued through-Delta pumping) is a potential near-term solution. But over the longer term, sea level rise and levee failures will make Delta waters too salty to sustain through-Delta pumping.

- Governance and finance solutions are needed; so is attention to the Delta economy.**

Safeguards are needed to ensure that the canal is managed for environmental benefits and to prevent a “water grab” by those who rely on Delta exports. Giving fish managers a share of canal capacity can provide environmental safeguards. Financing mechanisms are needed to ensure that water users fund the new infrastructure and support ecosystem restoration. Funds will also be needed to support transitions in the Delta. The region will lose some agricultural islands from levee failures, whether or not there is a canal, but it could benefit from new recreation opportunities.

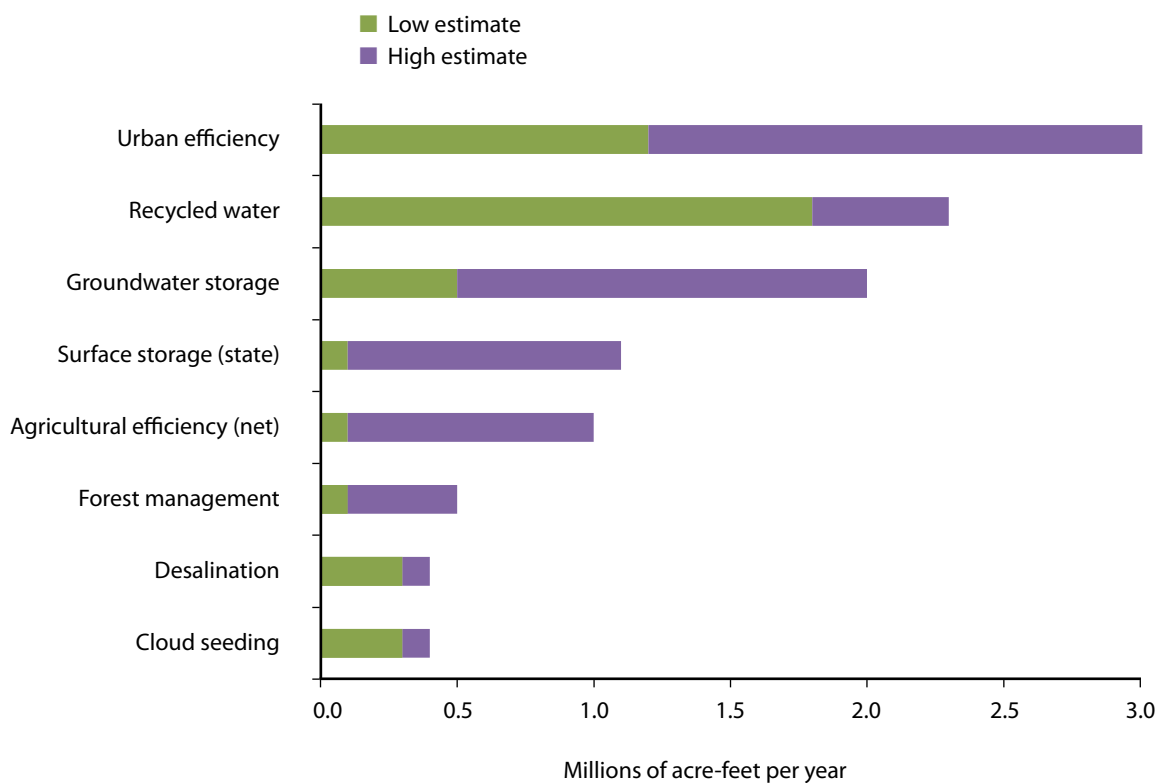
WATER SUPPLY PLANNING NEEDS TO RELY ON A PORTFOLIO APPROACH

Since the 1980s, water supply planning has been moving toward a portfolio approach: instead of looking for “silver bullets,” planners are developing multiple supply sources and water conservation strategies, balancing costs and reliability.

- California is fortunate to have many options for meeting new demands.**

Expanding traditional supply sources—particularly surface reservoirs and native groundwater supplies—is more difficult than in the past. But there is considerable scope for cost-effective expansion of nontraditional supplies, such as recycled wastewater, and for improving water use efficiency. Water marketing, which involves the sale or leasing of water, allows water to be transferred from lower- to higher-value farming and to growing urban areas.

CHANGING WATER DEMANDS CAN BE MET IN MANY WAYS



SOURCE: Department of Water Resources, California Water Plan Update 2009 (Bulletin 160-09).
 NOTE: Annual production potential from new water sources and conservation by 2030.

- Much progress has been made since the drought of the early 1990s.**

Water markets have been valuable in supplying water to cities and high-value agriculture during droughts and for long-term growth. Urban water use efficiency has risen in most areas thanks to new plumbing codes, better technology, and better pricing incentives. Regional cooperation is helping local utilities cope with supply emergencies.

- **Underground storage has great potential but faces institutional obstacles.**

Where space is available in aquifers, storing water underground can be a cost-effective way to save water for dry years. This “groundwater banking” will become increasingly important as the snowpack declines. The current lack of state regulation makes success dependent on agreements among local parties. Groundwater banking has increased in some areas, but much more could be done, particularly in the Central Valley.

- **Surface storage expansion has been very contentious.**

Increased surface storage could make up for some loss of storage in the snowpack and could also provide more flexibility in managing floodwaters and environmental flows. However, new storage has not been proven to provide large new supplies of water, and it will be less valuable if climate change reduces overall precipitation. Large financial and environmental costs also raise concerns. Public opinion appears split: 50 percent of all adults feel that California should focus on improving water use efficiency; 43 percent prefer building new storage (PPIC Statewide Survey, July 2009).

- **California needs to decide how to pay for water investments.**

State general obligation bonds (funded by tax dollars) have funded some local water supply investments in recent years. When investments lead to true public benefits, such as ecosystem restoration, relying on tax dollars makes sense. But this takes general revenue funds away from education and other state budget categories. One alternative is the “user pays” principle, which guided investments in the State Water Project. Also, higher water rates create incentives to use water more efficiently.

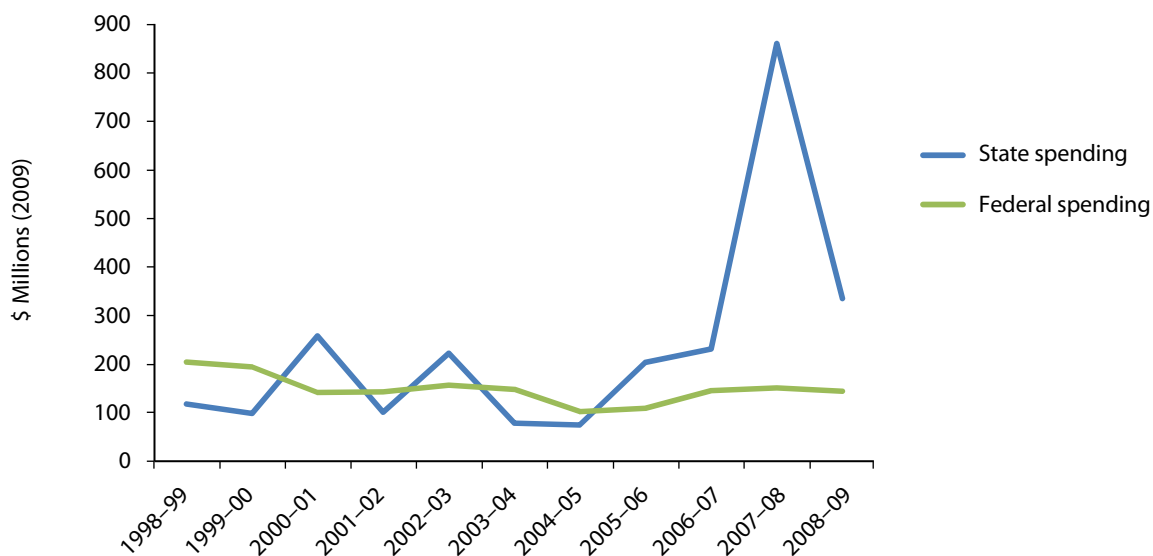
CALIFORNIA HAS ONLY JUST BEGUN TO ADDRESS THE CHALLENGE OF EXTREME FLOOD RISKS

Sacramento has the highest flood risk of any major U.S. city, and many other areas in the Central Valley are at extreme risk of flooding. These risks are expected to grow with climate change. Although the state has recently increased investments in flood control infrastructure, more work is needed to keep new development out of harm’s way.

- **The state has taken important steps to reduce flood risk.**

After Hurricane Katrina, state investments in flood prevention increased considerably, thanks to voter approval of two state general obligation bonds, but the recession and resulting budget woes have made it difficult to sell the bonds. These investments are important, because federal contributions have been lagging. Local contributions are difficult to increase given that local bonds and assessments require supermajority votes.

STATE GOAL TO RAMP UP FLOOD INVESTMENTS HINDERED BY RECESSION



- **Local governments have few incentives to limit flood risk exposure.**

Since a 2003 court decision, the state is considered liable for damage from failure of most Central Valley levees, even those maintained by local agencies. A legislative package passed in 2007 requires that locals make land-use decisions that will reduce flood risk to new homes, but implementation is still several years off. Moreover, it is unclear whether climate change will be taken into account in setting new rules.

- **Residents also have few incentives to limit flood risk exposure.**

As long as buildings are located behind levees deemed to provide protection against a “100-year flood,” there is no requirement to disclose flood risks to residents, even though many areas would face serious flooding if levees were breached. Few Californians hold flood insurance, which is required only in areas with extreme flood risk. Fifty-five percent of Californians are very (27%) or somewhat (28%) concerned that flood risks will increase with climate change (PPIC Statewide Survey, July 2009).

LOOKING AHEAD

California has the tools to help secure a safe and reliable water supply, improve conditions for aquatic species, and reduce flood risks. In recent years, water managers have made significant progress toward these goals. But the challenges are increasing with population growth and climate change.

In the final months of 2009, the state legislature passed a comprehensive package of water legislation that begins to address some key issues. For example, groundwater basins will now have to be monitored throughout California, and penalties against illegal diversions of surface water have been strengthened, as have staffing resources to enforce water rights. In addition, a new governance structure for the Delta sets the stage for more integrated management of this critical region. The legislation also requires per capita conservation targets for urban water users and better measurement by agricultural water users. Stakeholder resistance to state oversight weakened the legislation considerably in the final weeks of negotiations. Nevertheless, these are important first steps toward more sustainable management of California’s water.

The package includes an \$11.14 billion bond measure that is slated for the November 2010 ballot. Whether or not voters approve this bond, the state will need to find ways to pay for water infrastructure and for critical improvements in aquatic habitat. Local funding will need to increase under any circumstances. If public policy discussions focus solely on the water bond, we’ll miss an opportunity to build on the other reforms.

In short, the legislative package is a good beginning. Increased momentum in policy reform—coupled with new investments—is essential to the state’s future. Some needed changes will be politically difficult. The following issues still require sustained attention:

The Delta. A peripheral canal or tunnel has the best potential for safeguarding the Delta’s environment while maintaining water supply reliability. But this solution requires solid policies on governance, finance, and mitigation for Delta land-owners and residents. Given the extreme environmental degradation of this region, water users must be prepared to take less water from the Delta, at least until endangered fish populations recover.

Water efficiency. Better pricing policies—such as tiered water rates, which charge higher prices for greater use—can heighten incentives to conserve.

Groundwater management. Better basin management is a prerequisite to realizing the significant potential of groundwater banking. Many groundwater basins have effective local management protocols, especially in Southern California and Santa Clara County. But progress is needed elsewhere.

Flood risk exposure. To reduce risks to new development, state floodplain mapping should account for climate change and increasing flood risks. To boost homeowner awareness, the risks from living behind levees should be disclosed and flood insurance requirements should perhaps be strengthened. More forward-looking federal policies will also be important, to account for changing flood risks.

Climate change. Higher water temperatures and sea level rise will alter aquatic habitat in significant but largely unexplored ways. Environmental laws will require that water users respond to these changes with potentially costly management actions (e.g., changing reservoir operations). Anticipating the likely changes would allow the design of more cost-effective responses.

We invite you to dig deeper at ppic.org. Related PPIC resources include:

California Water Myths

Paying for Infrastructure: California's Choices

Comparing Futures for the Sacramento-San Joaquin Delta

Water for Growth: California's New Frontier

Flood Control

Water Supply and Quality

Contact a PPIC expert:

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