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PPIC WATER POLICY CENTER

# PRIORITIES FOR CALIFORNIA'S WATER

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# INTRODUCTION

This past year was a prime example of California’s highly variable climate—and a precursor of the types of extremes that are expected to become more common. After five years of drought exacerbated by record heat, 2017’s record rain and snow brought more challenges—stressing dams and levees, causing landslides, and adding fuel to fire-prone landscapes.

Across California, leaders have responded with a number of policy and management reforms, including some that will help the state adapt to droughts and floods of the future. But there’s more work to be done.

In this brief we outline issues that are front and center for managing California’s water supply and natural environment. We also suggest priorities for actions that would improve California’s water systems and better support the state’s residents, businesses, and ecosystems. These priorities fall under three overarching themes:

- **Ensuring clean and reliable water supplies:** Key issues include increasing the capacity to store water, managing water demands cost-effectively in both urban and farm settings, and providing safe drinking water to poor, underserved communities.
- **Enhancing the natural environment:** California’s native landscapes are highly valued and under threat. The decline of the state’s headwater forests and freshwater ecosystems—both reeling from the latest drought—has increased the urgency for new management approaches.
- **Tackling problems in key watersheds:** Big decisions lie ahead for addressing water supply and environmental challenges in two watersheds that are especially important to California’s water supply—the Colorado River and the Sacramento–San Joaquin Delta.

Just as many of the issues described herein are interconnected, so too are the solutions. For example, managing drought with conservation is more effective if some saved water can be stored for later use. Some of the threads that run through our recommendations include opportunities presented by implementing the Sustainable Groundwater Management Act (SGMA); the value of solutions that bring multiple benefits and reflect a “portfolio approach” to problem solving; the need for better accounting of both water and ecological indicators; and the importance of finding durable funding to address critical gaps.

In some cases new legislation may be the best solution, but in many others meaningful change is possible by expanding the use of innovative approaches already authorized under existing law. For instance, there is significant potential to improve forest health if key agencies and stakeholders fully utilize new collaborative tools for forest management.

Something as complex as managing California’s water is an iterative process, and long-standing problems can’t be solved in a year or two. But if all Californians pull together, it’s possible to make real progress on the most pressing issues. It will take creative thinking and bold action from all quarters—local, state, and federal officials; agricultural and urban water users; community and environmental advocates; business and scientific leaders. We hope you’ll find the following to be a useful road map for addressing some of the state’s pivotal water challenges—and for moving forward together to better steward this vital resource.



*Ellen Hanak*

# PRIORITIES FOR CALIFORNIA'S WATER

## ENSURING CLEAN AND RELIABLE WATER SUPPLIES

### Storing Water

Decisions on spending \$2.7 billion of state bonds for new storage infrastructure are slated for 2018. Other top priorities are improving groundwater recharge and dam safety.

### Managing Demand

Cities and farms are trying to maintain momentum on using water more efficiently. Priorities include improving basin-level planning and water markets.

### Providing Safe and Affordable Drinking Water

Some rural Californians lack safe drinking water. This problem could be resolved with reliable funding and a clear state-level action plan.

## ENHANCING THE NATURAL ENVIRONMENT

### Headwater Forests

The recent drought increased tree die-off and severe wildfires in headwater forests. Improving forest health requires greatly expanding the work to thin overly dense forests.

### Freshwater Ecosystems

California's rivers, lakes, estuaries, and wetlands have been profoundly compromised. New approaches can reduce conflict and make durable improvements in the health of fish and wildlife.

## TACKLING PROBLEMS IN KEY WATERSHEDS

### The Colorado River

Water users in this basin are working on new agreements to address the long-term imbalance between water supply and demand. This will also require making progress in addressing problems at the Salton Sea.

### The Sacramento–San Joaquin Delta

After more than a decade of planning, the state is poised to make a decision about building new tunnels to convey water across the Delta. Other critical issues include rethinking Delta levees and ecosystem management.

SUPPLY

## STORING WATER

The recent combination of record drought followed by record rainfall highlights the need for more effective management of California's water storage. While reservoirs and aquifers were substantially depleted during the drought, the 2017 downpours caused floods and resulted in almost 200,000 people being evacuated when Oroville Dam threatened to fail. The Oroville incident highlighted the need to reconsider how the state manages floods in a changing climate and raised concerns about the safety of aging infrastructure. The wet weather also revealed that California's infrastructure and institutions are inadequate for capturing floodwaters to recharge aquifers as much as is needed to restore this critical drought reserve.

Some big funding decisions will be made during the coming year, and important groundwork for future investments will get under way. In 2014, Proposition 1 authorized up to \$2.7 billion in state matching funds for water storage projects. Funding applications have been submitted for 12 projects across the state, with total requested funds far exceeding available bond funds. In 2018, the California Water Commission will complete its review of these applications and commit to initial funding agreements.

**43 MILLION  
ACRE-FEET**

STORAGE SPACE IN  
CALIFORNIA'S RESERVOIRS

**1/3**

PORTION OF STATE'S ANNUAL  
WATER SUPPLY FROM  
SNOWPACK

**1,500**

NUMBER OF DAMS  
IN CALIFORNIA



*The Oroville spillway failure.*

Now that sustainability agencies have been formed, the hard work of developing sustainability plans has begun. There's an opportunity to scope out priorities for groundwater recharge and explore how innovations being piloted across the state could work in other communities.

This past year also increased concerns about what a changing climate means for snowpack, which historically has been a big part of California's water storage. Warmer temperatures are changing snowmelt patterns, affecting how surface reservoirs function for flood protection and water supply.

## PRIORITIES

### Promote flexible and integrated storage management.

Managing surface and groundwater storage in a more integrated way—by capturing some water released from reservoirs to store in aquifers—can help California reach groundwater sustainability, increase drought reserves, provide environmental benefits, and enable the state's water system to adapt to earlier snowmelt by freeing up storage capacity for flood operations. Where feasible, local water managers and state and federal reservoir operators should take steps to integrate aquifer storage into reservoir operations. Proposition 1 funding should prioritize projects that integrate reservoir and aquifer water management and storage.

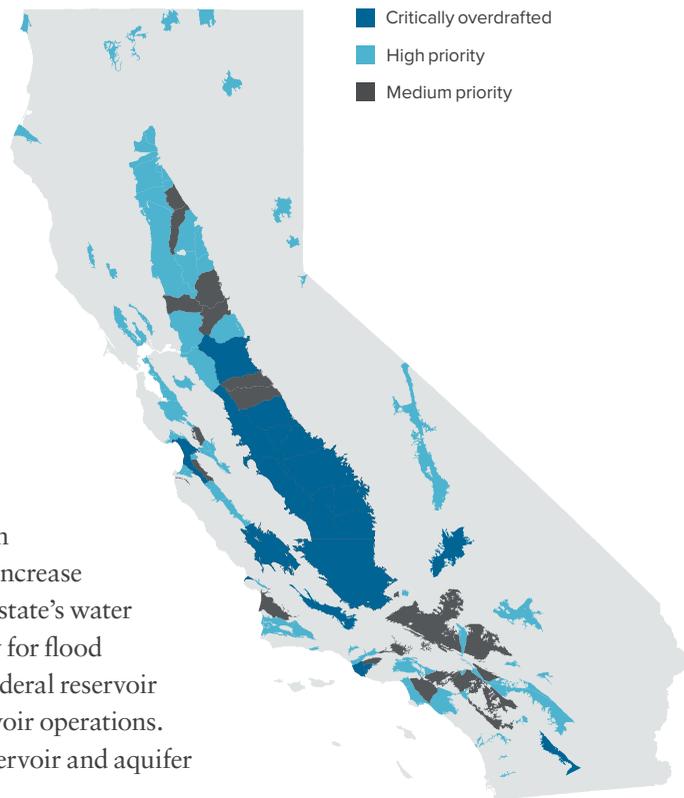
### Make it easier to recharge groundwater.

Although efforts to increase groundwater recharge intensified in 2017, there are still many barriers to taking full advantage of this important strategy. Obstacles include permitting challenges, infrastructure constraints, and a lack of incentive programs to encourage farmers to recharge shared aquifers. While the state has begun to look into barriers to recharge, a plan of action to resolve these issues is a high priority. State technical and financial support for local groundwater plans will be essential to improve capacities of the new agencies. Recharging basins with recycled water and urban stormwater runoff is an especially valuable strategy in places where this water would otherwise flow into the ocean or cause flooding, and these efforts should be ramped up where feasible.

### Make California's dams more climate-resilient.

California's dams are showing signs of age. Half are more than 50 years old, and all were designed for the climate of the past. Some improvements can be funded under Proposition 1, which authorized \$395 million for flood management in 2014 (this was increased by \$111 million in the 2017 budget). The Oroville crisis also spurred new efforts to evaluate dam safety and develop emergency action plans. For the longer term, California will need to modernize dams where needed and rethink how to operate dams and other flood infrastructure in response to a changing climate. This should be a priority issue for the new Climate-Safe Infrastructure Working Group, whose recommendations are due to the legislature in mid-2018.

## PRIORITY BASINS FOR SUSTAINABLE GROUNDWATER PLANS



SOURCE: California Department of Water Resources.

## LEARN MORE

*California's Water: Storing Water.*  
Lund et al., PPIC, 2016.

*Water Stress and a Changing San Joaquin Valley.* Hanak et al., PPIC, 2017.

"Dams in California." Escriva-Bou et al., PPIC, 2017.

SUPPLY



## MANAGING WATER DEMAND

Augmenting water storage is not enough to ensure adequate supply to support California's economy and environment. Managing the demand for water and having the flexibility to trade it are also essential tools for water supply reliability, both over the long term and during periodic droughts. California's cities and farms have been making strides in durable water use efficiency. Changes in technology and water use practices have enabled the state to increase both farm and nonfarm economic activity and accommodate 9 million new residents since the early 1990s—without increasing overall water use.

California's latest drought showed the importance of flexibility in making short-term reductions in water use that minimize economic and social disruptions. At the height of the drought urban residents reduced per capita water use by an average of nearly 25 percent. Most savings came from cuts in less essential uses such as landscape watering, and the urban economy remained robust. The state's farmers pumped extra groundwater to help make up for lost surface water deliveries but still cut irrigation water use by about 10 percent and reduced irrigated crop acreage by about 6 percent. Farmers fallowed their least productive fields and directed water to higher-revenue orchards, vines, and vegetable crops, as well as corn silage for the state's dairies.

**93%**

SHARE OF CALIFORNIANS SERVED BY LARGE URBAN WATER SUPPLIERS

**3%**

SHARE OF WATER USE THAT COMES FROM WATER TRADES

**127**

GROUNDWATER BASINS REGULATED UNDER SGMA



*New technology can help manage agricultural water demand.*

Water trading has also been a cost-effective way for California to manage demand by sharing supplies within and across regions. During the latest drought, temporary trades helped farmers keep their orchards alive and helped some cities avoid acute water shortages. Long-term trades have boosted the supply of growing urban areas and are increasingly sought by farmers seeking reliable water supplies.

The drought also revealed several ways to enable California's cities and farms to take full advantage of demand-management tools. The following reforms would help the state accommodate continued population growth, adapt to a changing climate, and bring groundwater basins into balance under SGMA.

## PRIORITIES

### **Balance short-term conservation and long-term efficiency in the urban sector.**

Both state and local officials have called for maintaining momentum on water conservation in the aftermath of the drought. Within most communities, there are still cost-effective opportunities to reduce per capita water use, especially by transitioning to lower-water landscapes. But planners will need to keep in mind the potential trade-offs between managing long-term demand and implementing cuts quickly during future droughts. One promising strategy is to store a portion of saved water as a “reliability reserve” that can be used during droughts. This approach highlights the importance of linking storage and water conservation investments.

### **Manage agricultural water demand at the basin scale.**

Under SGMA, many farming regions now face a long-term goal of eliminating groundwater “overdraft” (pumping in excess of the amount of water being replenished). While augmenting supplies—such as increasing aquifer recharge in wetter years—can help, managing demand is key to reducing long-term overdraft and responding to drought. This will require better basin accounting systems to keep track of the net amounts of water used and recharged into aquifers. Selective land fallowing will remain an important tool for managing demand. Although more efficient irrigation systems can have substantial benefits—including reducing the discharge of fertilizers into streams and aquifers—they often do little to expand usable supplies within basins, and actually reduce recharge. These trade-offs need to be considered carefully in basin accounting and planning.

### **Reduce barriers to trading water.**

California needs to make it easier to trade water. The approval process is often overly complex, particularly for short-term, drought-related trades. One new area to explore is localized trading of groundwater shares, which can help reduce overdraft. With good accounting systems and well-designed trading programs, groundwater sustainability agencies can set up incentives to pay farmers who are willing to reduce their net water use. Such trading is already being done in the Mojave basin and is being tested in Ventura County.



*Lawn removal can save water.*

## LEARN MORE

*Building Drought Resilience in California's Cities and Suburbs.* Mitchell et al., PPIC, 2017.

*Accounting for California's Water.* Escriva-Bou et al., PPIC, 2016.

"California's Water Market." Hanak and Jezdimirovic, PPIC, 2016.

## PROVIDING SAFE AND AFFORDABLE DRINKING WATER

Unfortunately, new investments in storage and demand management will not resolve California’s most unacceptable water problem. Several hundred small, rural water systems and schools—along with thousands of domestic wells—do not provide safe drinking water. Common problems include nitrate from farm runoff and other groundwater contaminants, such as naturally occurring arsenic. Treating these pollutants can be very expensive, and many small, poor communities lack the resources to address them. During the recent drought, falling groundwater levels also caused some wells to go dry.

In some urban areas, rising water bills are affecting affordability for low-income families. Publicly owned water utilities are restricted in their ability to provide relief for these customers because of Proposition 218, a constitutional amendment approved by voters in 1996 that requires tight connections between water rates and the cost of service. This limits options for funding lifeline rate programs, such as those commonly used for electricity and gas.

The state has begun to address these issues. For example, California’s water quality programs were merged under the State Water Board to streamline oversight of water quality. A special office was created to focus on the problems of disadvantaged communities, and legislation was enacted that authorizes consolidation of water systems in cases where that is the best way to provide access to safe drinking water. The board was also tasked with creating a plan to fund and implement a low-income water rate assistance program.

Although the issues of safe drinking water in rural areas and affordable supplies in cities and suburbs are often lumped together, they generally require different policy solutions.

**300**

APPROXIMATE NUMBER OF SMALL WATER SYSTEMS AND SCHOOLS IN CALIFORNIA WITHOUT SAFE DRINKING WATER

**\$30–\$160 MILLION**

ANNUAL COST OF SAFE WATER SOLUTIONS FOR SMALL, POOR COMMUNITIES STATEWIDE

## PRIORITIES

### Improve estimates of the population at risk from unsafe drinking water.

Despite recent strides in understanding the extent of the safe drinking water problem, there are still major gaps in the data and problems in the way it is reported. It is often stated that more than one million Californians are exposed to unsafe drinking water every year. But this total includes people served by larger systems with infrequent problems—sometimes lasting no more than a day—as well as those served by smaller systems that regularly deliver water below public health standards. Moreover, estimates of the population that relies on domestic wells or the very small systems that are not regulated by the federal Safe Drinking Water Act vary widely—from 1 to 2 million—and the state lacks good data on how many of these residents face water safety problems. Developing more comprehensive and clearer metrics on drinking water quality is key to prioritizing actions and tracking progress.

### Support cost-effective solutions for safe drinking water in poor communities.

The state should prioritize support for communities that are regularly exposed to unsafe drinking water and have an inadequate local funding base. In addition to providing financial assistance, the state should continue to promote cost-effective approaches, such as physical or administrative consolidation between small and large systems. PPIC estimates that solutions for small, poor communities would cost up to \$160 million annually. While Proposition 1 and various federal programs can support some infrastructure upgrades, more durable funding—including for ongoing operations and maintenance—is needed. Pending legislation would establish statewide surcharges on water and chemical use to help fill this funding gap.

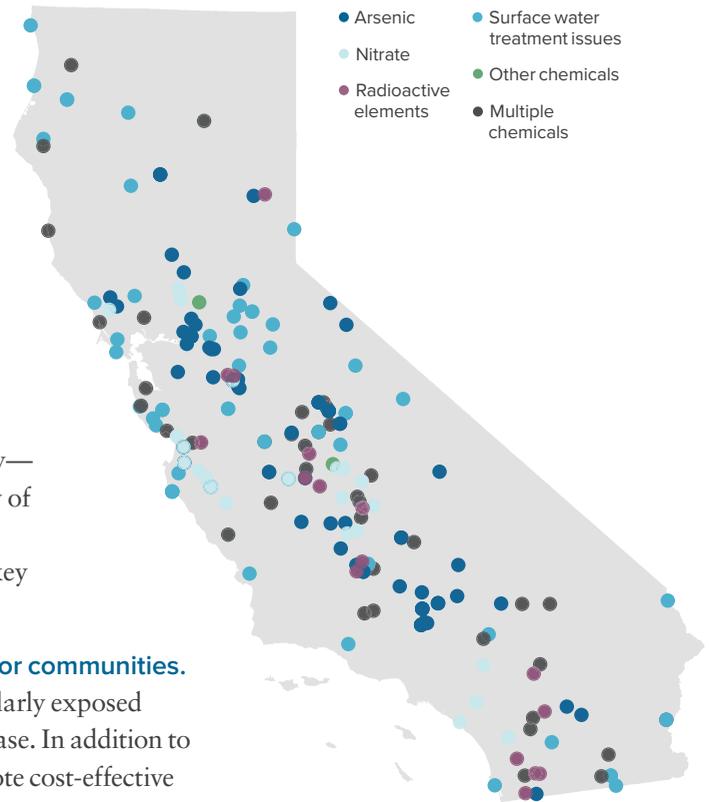
### Develop programs to mitigate dry drinking-water wells during droughts.

Declining groundwater levels can make shallow drinking-water wells go dry. But during drought extra pumping can be important for reducing the costs of water shortages to the local economy. In the recent drought, the state worked with counties and community groups to provide emergency supplies. Going forward, groundwater sustainability agencies should develop programs to promptly mitigate impacts on wells caused by drought-related pumping. This model is already used effectively in Yuba County and parts of Kern County.

### State and local governments should work together on affordability for the urban poor.

The state is developing a program to address affordability for low-income households, but this challenge could be better handled at the local level. Constitutional relief from Proposition 218 restrictions on using water rates to fund lifeline programs would give utilities more flexibility to offer these programs where they are needed. Utilities can also minimize the need for rate increases in their communities with more attention to cost control.

### A VARIETY OF POLLUTANTS AFFECT SMALL WATER SYSTEMS



SOURCE: State Water Board Human Right to Water data showing systems with fewer than 3,300 connections.



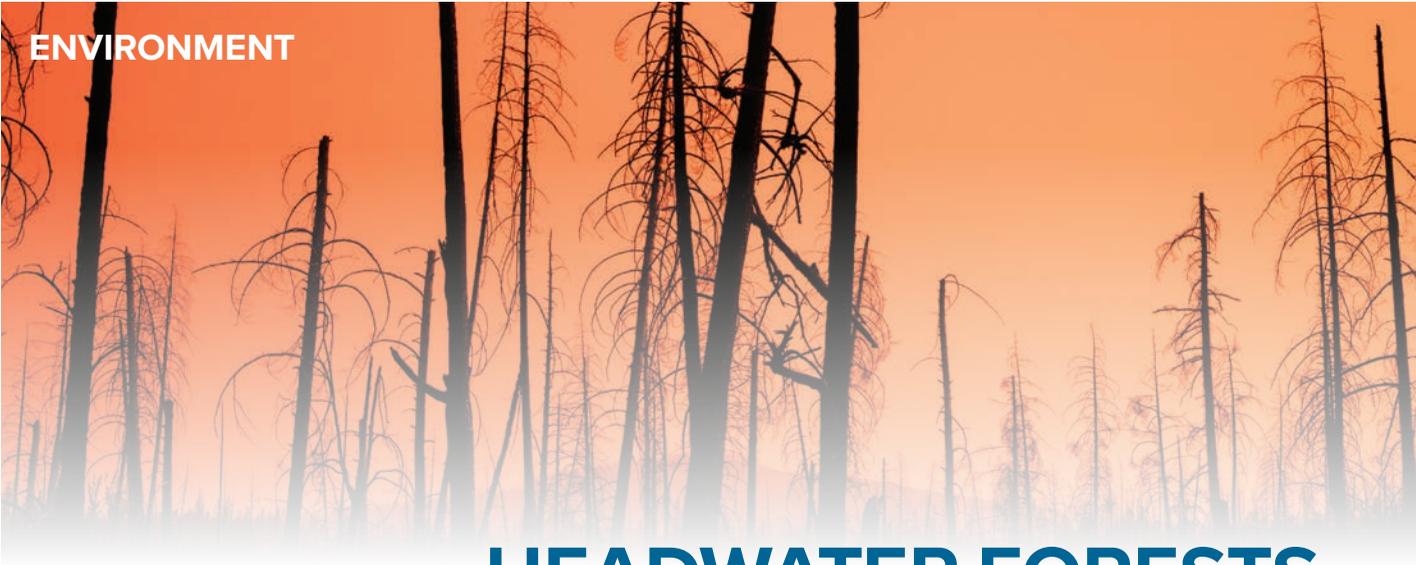
Safe water arrives in East Porterville.

### LEARN MORE

*Paying for Water in California.* Hanak et al., PPIC, 2014.

“New Laws Strengthen State’s Water Safety Net.” McCann and Hanak, *PPIC Blog*, 2016.

“The High Cost of Drought for Low-Income Californians.” Hanak, *PPIC Blog*, 2015.



# HEADWATER FORESTS

California’s mountainous forests are a critical part of the state’s natural infrastructure. They provide outdoor recreation, timber and forage, habitat for plants and animals, and large quantities of high-quality water. The latest drought increased widespread tree die-off and high-intensity wildfires in the headwater forests—particularly the western slope of the Sierra Nevada and the Southern Cascades— foreshadowing changes that are likely to increase as the climate warms.

Reducing forest density with the strategic use of fire and mechanical thinning is critical to increasing the resilience of headwater forests in a changing climate. But implementing these management practices is hard due to the massive scale of the problem; the complex mosaic of public, industrial, and family landowners; and the difficulty in building social acceptance for such a major intervention.

Wildfire suppression now consumes most dollars spent by the California Department of Forestry and Fire Protection (CAL FIRE) and the US Forest Service (USFS)—about \$2 billion a year, versus just \$100 million for active forest management. Focusing on suppression also prioritizes the treatment of symptoms rather than the causes of unhealthy forests. Local, state, and federal managers have temporarily increased resources for removing hazardous dead trees in response to the recent drought, and forest management is eligible for some funding under the state’s Greenhouse Gas

**100 MILLION**

NUMBER OF DEAD TREES  
ACROSS CALIFORNIA’S  
FORESTS

**2X**

FACTOR BY WHICH THE  
DENSITY OF SMALL TREES HAS  
INCREASED SINCE THE 1930S  
IN HEADWATER LANDS

**2/3**

AMOUNT OF CALIFORNIA’S  
SURFACE WATER ORIGINATING  
IN SIERRA NEVADA  
HEADWATER LANDS



*Tree die-off is widespread in California’s headwater forests.*

Reduction Fund, supported with cap-and-trade revenues. However, headwater forest health will continue to decline in the absence of a strategy to increase the pace and scale of management work.

## PRIORITIES

### **Make forest health a top priority for forest management.**

Management techniques such as the strategic use of fire and mechanical thinning would improve the ability of headwater forests to adapt to future droughts and a changing climate. But they can also result in short-term negative environmental impacts. For example, strategic burning causes short-term air quality impairment, greenhouse gas emissions, habitat disturbance, and scarred landscapes. Such consequences drive social concern and environmental protection laws that limit the use of strategic fire. Yet preventing its use is likely to result in the same short-term consequences—because fires will occur anyway, but without the ability to control when and where the negative impacts will be felt. Federal and state rules governing the review and permitting of forest management projects should be changed to allow some short-term negative impacts for proposals that will increase long-term forest health.

### **Define funding needs and make the most of available funds.**

California lacks good estimates of the underlying conditions of different forests, and data on forest management are often reported in terms that are not easily comparable across public and private lands. This makes it difficult to determine the potential cost of improving forest health through additional management. To provide a better foundation for prioritizing actions and tracking progress, the Board of Forestry and Fire Protection should develop and maintain a high-quality inventory of forest growth and mortality across all types of land ownership. State and federal agencies should also work together to broaden and standardize forest management accounting practices in areas that are being actively managed. And to reduce the net costs of management, parties should consider including revenue-generating opportunities in their projects. For example, bundling ecologically responsible mechanical harvesting (which brings in revenue) with prescribed fire can help stretch available funds while providing jobs and incomes to rural communities.

### **Utilize new tools that facilitate collaboration.**

Meeting the need for large management projects is complicated by the mosaic of forest landownership and the lack of sustainable funding for management activities. CAL FIRE and USFS have access to new collaborative tools for overcoming these challenges. For example, the Good Neighbor Authority makes collaboration between state agencies and USFS easier in areas with mixed ownership, and there is significant opportunity to expand its use. And “stewardship contracting” is a tool that allows USFS to implement longer public-private forest management contracts, and projects that offset the cost of management with revenues from harvesting commercially valuable wood. Private forest owners should consider creating forest health improvement districts to pool resources and make costly forest management activities more feasible. These tools can also promote investment in mills and other wood-processing infrastructure—a key gap in headwater areas.



*Mechanical thinning removes trees from overly dense forests.*



*Strategic use of managed fire reduces the risk of wildfire.*

### LEARN MORE

*Improving the Health of California's Headwater Forests.* Butsic et al., PPIC, 2017.

*California's Water: Protecting Headwaters.* Mount et al., PPIC, 2016.

Watch the 3-minute video “Headwaters.” PPIC, 2016



## FRESHWATER ECOSYSTEMS

The recent drought didn't just reduce water supplies for California's cities and farms. Diminished precipitation, low river flows, and warm temperatures put fish and wildlife under severe stress. Water shortages also heightened conflicts between some environmental advocates and water users.

Yet the drought did not create these problems. California's rivers, lakes, estuaries, and wetlands have been profoundly altered by development, population growth, and the state's many water projects. Today, less than 20 percent of California's native fish species are reasonably secure from extinction. Imperiled fish include California's most iconic aquatic species, such as the Sacramento River winter-run Chinook salmon, Central Valley steelhead, coastal coho salmon, and green sturgeon.

California has also lost more than 90 percent of its native wetlands. These habitat losses contributed to a dramatic decline in the number of waterbirds in the Central Valley—now just a fraction of historic populations. The state's remaining wetlands consist of public refuges and private duck hunting clubs, along with some seasonal farmland habitat (especially rice). These lands support more than 5 million waterbirds.

Future droughts—made more severe by climate change—are expected to worsen these accumulated stresses on California's freshwater ecosystems.

While the recent experience has fueled tensions over the allocation of scarce water resources, it has also put a spotlight on the need to provide more reliable protection for California's aquatic ecosystems and better manage water allocated to them. New approaches that reduce conflict and make enduring improvements in ecosystem health are needed.

**25%**

SHARE OF NATIVE FISHES  
THAT ARE THREATENED  
OR ENDANGERED

**5 MILLION**

NUMBER OF MIGRATORY  
WATERBIRDS THAT USE  
CALIFORNIA'S WETLANDS

**50%**

SHARE OF ENVIRONMENTALLY  
SENSITIVE WATERSHEDS  
WITHOUT FLOW MEASUREMENT

## PRIORITIES

### Promote projects that bring multiple benefits.

Water can simultaneously provide benefits to people and nature. For example, wildlife-friendly farming can support ecosystems while maintaining the economic viability of farms. When water users and wildlife managers cooperate on the timing of storing and releasing water from reservoirs, this can benefit fish while meeting downstream users' needs. Investing in healthy watersheds helps protect drinking water supplies and provides recreation. Flood protection projects that reconnect rivers to their floodplains can provide fish and wildlife habitat. Across California, there are promising examples of such approaches, but they are still the exception rather than the rule.

### Focus environmental planning on watersheds and ecosystems.

Current planning efforts tend to be too narrowly focused on single species and locations. This has limited managers' ability to make coordinated, strategic decisions about where to direct water and habitat investments to achieve the greatest effect. Watershed-scale plans that focus on building ecosystem health would greatly improve the chances of survival for California's native freshwater species. By identifying priority actions needed for different types of water years, such plans can help boost populations in wetter years and limit harm during droughts. In addition, more transparent accounting of water allocated to the environment would reduce misunderstandings and help parties identify opportunities to use water for multiple benefits.

### Adopt ecosystem water budgets for California's principal watersheds.

California currently protects water quality and flows by regulating the use of water. These regulations often provide inadequate protection for fish and wildlife, especially during drought. Reliance on regulatory constraints also creates uncertainty for urban and agricultural water users, leading to conflict. The State Water Board is in the process of defining minimum flows for the tributaries of the San Joaquin River, with plans to extend this process to Sacramento River tributaries. An alternative approach would be to adopt ecosystem water budgets—preferably based on negotiations among key stakeholders in each watershed—that define the quantity of water available to maintain healthy and sustainable populations of native species. These budgets could facilitate collaborative approaches to managing environmental water more flexibly, using tools such as storage and trading.

### Create more reliable sources of funding for freshwater ecosystem protection.

State bonds, such as Proposition 1, have provided funding for water and habitat investments, as have some water projects and communities. But aquatic ecosystem protection lacks adequate and reliable sources of funding. To fill this fiscal void, the state should develop other long-term sources of funding.



*Many native fishes are at risk.*



*Shasta Dam operations affect salmon migration.*

### LEARN MORE

*California's Water: Water for the Environment.* Mount et al., PPIC, 2016.

"Lessons on Sustaining the Environment During Drought." Mount, *PPIC Blog*, 2016.

*Allocating California's Water.* Gray et al., PPIC, 2015.

## THE COLORADO RIVER

The Colorado River is a major source of water for California, six other western states, and Mexico. But it has been strained by over-allocation and long-term drought. California is the largest single user of this water, which helps supply close to 20 million residents across Southern California and 600,000 acres of irrigated farmland in Imperial and Riverside Counties. Because Southern California relies on both the Colorado River and water that flows through the Sacramento–San Joaquin Delta, shortages in the Colorado increase pressure on Delta supplies. Several key decisions related to water and ecosystem management in the Colorado basin are expected in the coming year.

Current laws allocate 15 million acre-feet (maf) of Colorado River water to the United States and 1.5 maf to Mexico per year—amounts that exceed average annual supplies. Water levels in major reservoirs have been in decline for two decades. Water users across the basin have taken steps to address the supply and demand imbalance. In 2007, California and the other six states adopted interim guidelines allowing flexible water management tools to avoid shortages. Similar arrangements were made with Mexico in 2012 as part of an agreement that was renewed in 2017.

These tools—water trading, conservation programs, and “carryover storage” (unused water that can be stored for later use)—have already proven helpful in addressing some of the basin’s tough water scarcity challenges. For instance, in the early 2000s, California was required to reduce its use of the river as other states began to take their full allocations. Under the Quantification Settlement Agreement (QSA), irrigation districts in Southern California (Imperial and Palo Verde) employed a variety of water-use reduction tools to make water available for long-term transfer to Southern California cities. The transfers helped California reduce its use of Colorado River water but also reduced inflows to the Salton Sea, adding to environmental and public health concerns in the region.

These problems could accelerate when the current mitigation program for the Salton Sea expires at the end of 2017. Measures are also needed to address continued declines in Lake Mead, which supplies water to the lower basin states (California, Arizona, Nevada) and Mexico.

**27%**

PORTION OF COLORADO RIVER WATER ALLOCATED TO CALIFORNIA

**1/3**

PORTION OF SOUTHERN CALIFORNIA URBAN WATER SUPPLY THAT COMES FROM THE COLORADO RIVER

**1.2 MILLION ACRE-FEET**

PROJECTED ANNUAL WATER SUPPLY DEFICIT IN THE BASIN

## PRIORITIES

### Foster flexible solutions to help the lower basin states avoid mandatory cuts.

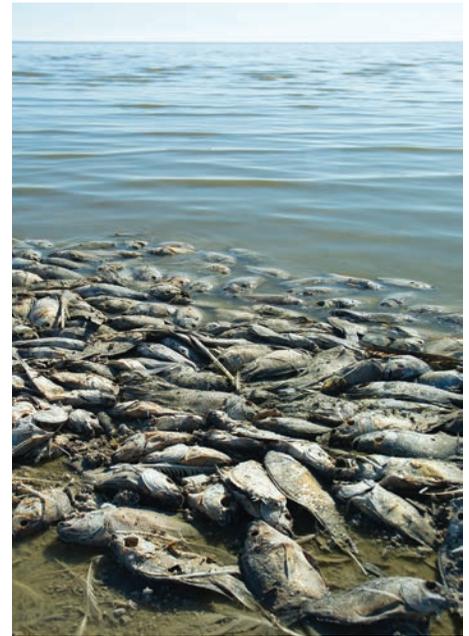
Lake Mead is at risk of reaching record-low levels by 2019. In an effort to slow the lake's decline and avoid mandatory cuts, California, Arizona, and Nevada have been negotiating a drought contingency plan. A key piece of the plan is voluntary conservation. While California would not lose supplies in the first round of cuts, the state will benefit from solutions that reduce supply uncertainties for all parties. California should help complete the drought contingency planning and expand the use of flexible water management tools to lessen the economic costs of water shortages.

### Support implementation of the agreement with Mexico.

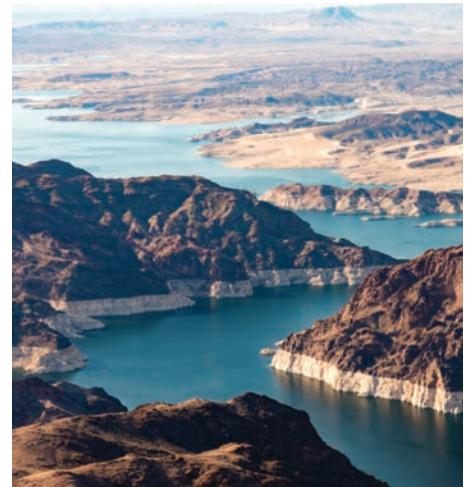
A new agreement between the United States and Mexico (known as Minute 323) signed in September 2017 marked an important step forward in collaborative management. Implementation will require diligent effort by water users in California and elsewhere to ensure continued cooperation between the two nations on the Colorado River.

### Address public health and environmental concerns at the Salton Sea.

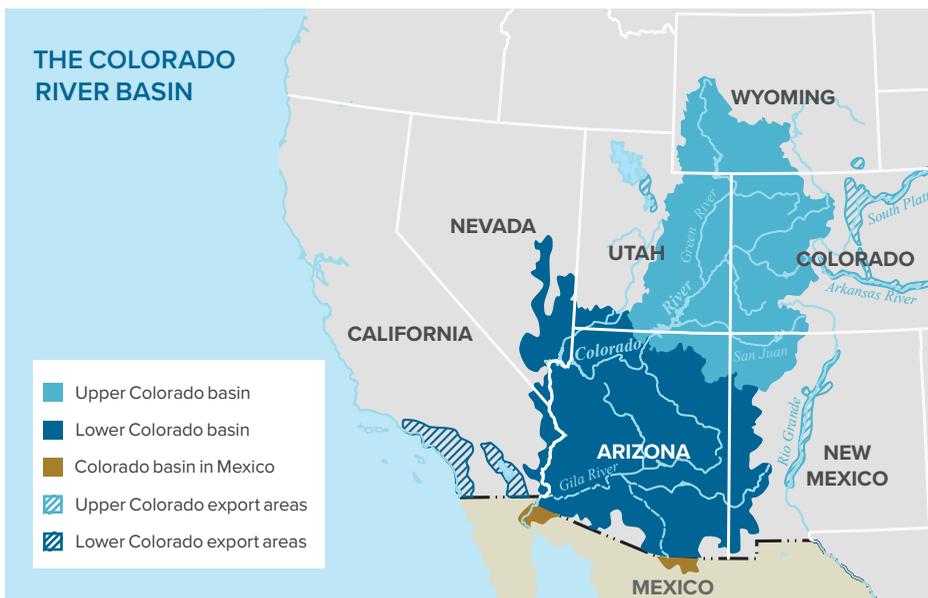
The shrinking water level in the Salton Sea—whose principal water supply is irrigation runoff from the Imperial Irrigation District (IID)—is a major concern for California. Inflows to the Salton Sea will further decline at the end of 2017, when IID will no longer be required to provide mitigation flows to the sea. This will expose more of the sea's shoreline and increase dust pollution (a public health concern), increase water salinity levels in the sea, and erode critical bird habitat. Under the QSA, the state is taking on mitigation responsibilities starting in 2018. The California Natural Resources Agency recently unveiled a 10-year plan that provides a road map for long-term restoration activities. Ensuring reliable and sustainable funding—and maintaining political and institutional momentum for these activities—should be a priority.



*The Salton Sea is in decline.*



*Lake Mead's "bathtub ring" reflects years of dropping water levels.*



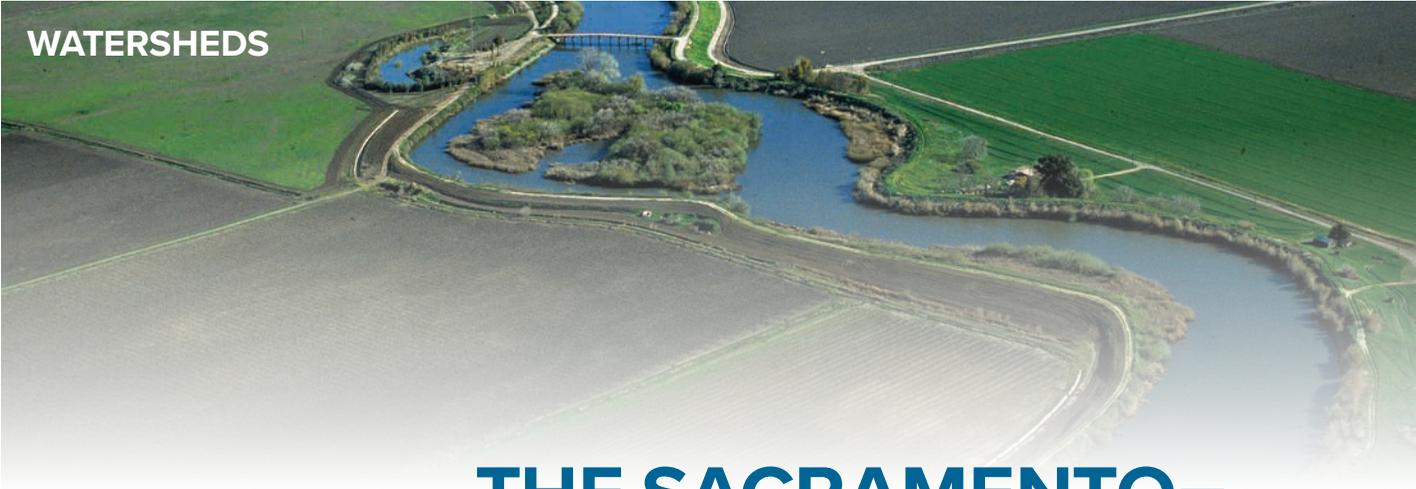
### LEARN MORE

*California's Water: The Colorado River.* Hanak et al., PPIC, 2016.

"Remaking the Salton Sea." Pottinger, *PPIC Blog*, 2017

"The Search for Sustainability in the Colorado River Basin." Pottinger, *PPIC Blog*, 2017.

WATERSHEDS



## THE SACRAMENTO– SAN JOAQUIN DELTA

The Sacramento–San Joaquin Delta, where conflicts over water supply and ecosystems have been especially prominent, is one of the more enduring challenges in California water management. Today, more than 25 million Californians and 3 million acres of farmland depend upon water pumped from the Delta for a portion of their supplies. Rising sea level and changing inflows from the Sacramento and San Joaquin Rivers threaten the reliability of this water source. In addition, more than 1,100 miles of levees protect Delta farms. Some levees help keep out salt water. These fragile levees are susceptible to failure during floods and earthquakes. Finally, the Delta’s aquatic ecosystems have been fundamentally changed by the diversion of water, reclamation of tidal marshes, lining of river channels with levees, and the introduction of non-native plants and animals. Many native species that rely on the Delta are in decline, with several species of fish close to extinction in the wild.

**33%**

AVERAGE PORTION  
OF WATER CONSUMED  
UPSTREAM OF THE DELTA

**17%**

AVERAGE PORTION  
OF DELTA WATER THAT  
IS EXPORTED

**5%**

AVERAGE PORTION  
OF DELTA WATER USED BY  
LOCAL FARMS AND CITIES



*A Delta levee being repaired.*

California has been attempting to craft a comprehensive fix to these issues for decades. The governor has proposed construction of two tunnels to route water from the Sacramento River to export pumps in the south Delta. Known as California WaterFix, this project would increase the reliability and quality of water supplies, but it is highly controversial and costly—and it faces many regulatory hurdles. Meanwhile, multiple efforts to improve native fish populations—including limiting the timing and amount of water exports from the Delta—have thus far failed to reduce the decline of native fishes, and many species reached historic lows during the recent drought. Finally, although there has been an effort to set investment priorities for state dollars (principally bond funds) to improve Delta levees, California still lacks an overall plan for managing these levees over the long term.

The next year will be critical for the future of the Delta. The state will decide whether to go forward with WaterFix—a decision that will, in turn, influence the way forward for ecosystems and levees. Happening concurrently is the State Water Board’s process to update the region’s Water Quality Control Plan, which is expected to increase environmental flow requirements in the Delta and its tributaries.

## PRIORITIES

### **Make a decision about the future of the Delta water supply.**

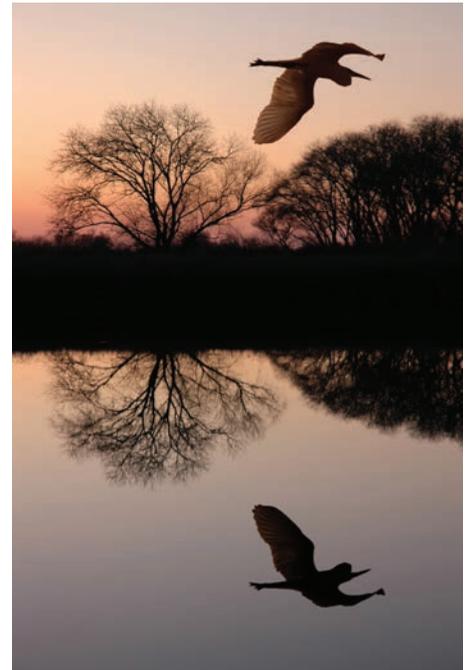
It is in the interest of the state and water users to make a final decision about California WaterFix, moving beyond more than a decade of costly planning and debate. As of this writing, it was unclear whether enough local water agencies would fund the project to allow it to go forward in its present form. Other hurdles include obtaining additional permits from fish and wildlife agencies and the State Water Board, strengthening governance over project operations, and mitigating negative impacts of the project. If the project does not go forward, the state needs to develop an alternative management plan for the Delta that acknowledges and mitigates the continued decline in water supply reliability and quality.

### **Change course on species management in the Delta.**

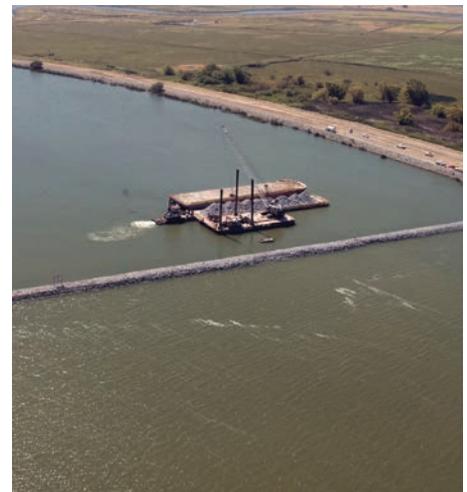
Although WaterFix would bring some flexibility to water management, it will not resolve the problems of the changing ecosystem. California needs to shift the emphasis from managing the Delta for individual species to ecosystem-based approaches that allow for comprehensive actions to address ecosystem decline. Such approaches include setting management targets based on ecosystem functions, dedicating parts of the Delta to these functions, and improving how water is allocated to the environment. Better accounting for environmental water and the establishment of an ecosystem water budget could contribute to better outcomes.

### **Develop a comprehensive plan to manage Delta levees.**

With or without WaterFix, the state will also need to develop a plan for the region’s levees. The Delta Stewardship Council has established priorities for spending existing bond funds on levee improvements, but this will address only a small fraction of levees. More robust funding mechanisms and difficult prioritization will be needed.



*The Delta is important habitat for water birds and aquatic species.*



*A temporary barrier reduced saltwater in the Delta during the drought.*

## LEARN MORE

*California’s Water: The Sacramento–San Joaquin Delta.* Mount et al., PPIC, 2016.

*Stress Relief: Prescriptions for a Healthier Delta Ecosystem.* Hanak et al., PPIC, 2013.

“The High Cost of Fixing Levees.” Mount, PPIC Blog, 2017.

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