

November 17, 2022 – SUPPLEMENTAL CORRESPONDENCE

**BAY AREA WATER SUPPLY AND CONSERVATION AGENCY
BOARD OF DIRECTORS MEETING**

November 15, 2022

Correspondence and media coverage of interest between November 11, 2022 and November 15, 2022

Correspondence

From: Dave Warner
To: BAWSCA Board Chair, Board Members and CEO/General Manager
Date: November 14, 2022
Subject: Excellent Demand Study

Media Coverage

Water Supply Conditions:

Date: November 11, 2022
Source: San Francisco Chronicle
Article: California was in exceptional drought a year ago. After recent rains, where are we now?

Water Policy:

Date: November 14, 2022
Source: Maven
Article: Superior Court of California ReAffirms The Delta Stewardship Council's Broad Authority As Delta Stewards

Date: November 11, 2022
Source: Modesto Bee
Article: Praise and criticism for river flow deal reached by Modesto, Turlock irrigation districts

Water Supply Management:

Date: November 2022
Source: Public Policy Institute of California
Material: Priorities for California's Water Report

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November 14, 2022

Board Chair Gustav Larsson, Board members and CEO Nicole Sandkulla,
Bay Area Water Supply and Conservation Agency
155 Bovet Road, Suite 650
San Mateo, CA 94402
Via email

Re: Excellent Demand Study!

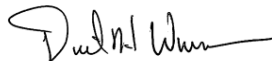
Dear Board Chair Larsson, Board members and CEO Sandkulla,

Thank you for investing in BAWSCA's just completed demand study. The results provide valuable information for water supply planning, including alternative water supply decisions and water rate management. The study shows how water demand may be affected in different possible future scenarios based on such variables as population growth rates, housing density and climate change. With these different scenarios we have a better idea of how water demand may play out in the next 25 years.

The study also indicates which of the variables studied has the greatest and least influence on water demand. For example, the differing population projections between the California Department of Finance and ABAG, have a significant influence on water demand. Such information could lead to decisions to invest at one level and have contingency plans in case a different result becomes more probable.

Thank you for a significant advance in water demand planning. I hope other agencies, including the SFPUC adopt such an approach in their water demand planning.

Kind regards,

A handwritten signature in black ink, appearing to read "Dave Warner", with a stylized flourish at the end.

Dave Warner

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California was in exceptional drought a year ago. After recent rains, where are we now?
San Francisco Chronicle | November 11, 2022 | Gerry Díaz and Yoohyun Jung



A boat pilots across Shasta Lake, which has dipped to below-average levels after three years of drought, as seen on Aug. 26, 2022. Stephen Lam, Staff Photographer / The Chronicle

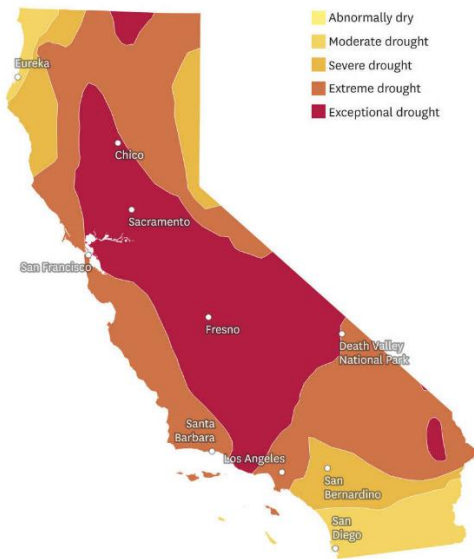
California's drought situation is looking better this year compared with the same time last year.

In November 2021, more than 80% of California was in extreme or worse drought, compared with about 43% this year, U.S. Drought Monitor data shows. The data is updated weekly and shows drought conditions across the country.

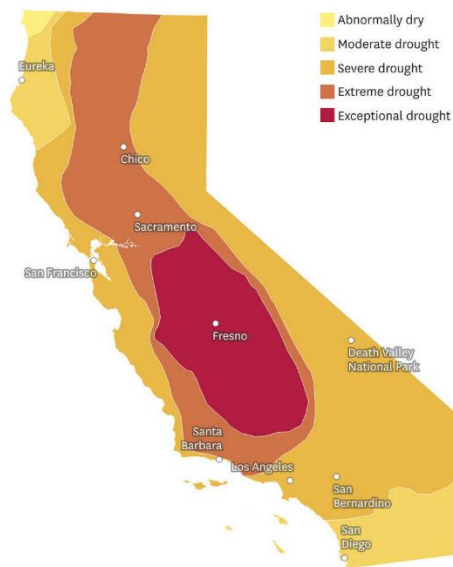
Aside from the San Joaquin Valley, exceptional drought conditions have been stomped out across the majority of the state. This means East Bay and North Bay cities such as Oakland, Napa and Walnut Creek are finally out of this most severe drought designation.

The California coast has also seen significant improvements this year. San Francisco, Los Angeles and the Big Sur coastline dropped from the "extreme" to "severe" category quickly after recent rains. "A wet week for much of the West helped to put a boost into the start of the current water year after a slow start," the drought monitor's current summary shows.

Drought in California, Nov. 9, 2021



Drought in California, Nov. 8, 2022



In recent years La Niña weather patterns stomped out early season storms approaching California, but this year has been different.

Toward the end of September, the state saw a solid fall showing when a rainstorm drenched the Bay Area and Sierra. October wound up being dominated by fog that replenished the redwoods and other flora along the Santa Cruz Mountains. And November saw a weak atmospheric river churn rain and snow showers into all corners of the Southern Cascades, the Tahoe area along the Sierra Nevada, San Bernardino Mountains and the coastal mountains along Highway 1. The Bay Area also saw several rounds of showers just this past week, bringing up to an inch of rain to downtown San Francisco and close to 2 inches of rain in the East Bay hills and North Bay valleys.

Last year's wet season — the rainier months from fall to spring — began with a bang, with a series of atmospheric rivers inspiring hope for the end of the multi-year drought. However, it ended in disappointment with scant rainfall in the new year.

This year's sudden improvements were no fluke — they were largely driven by a global weather pattern floating thousands of miles away in the Arctic. This pattern is called the Pacific North American oscillation — or PNA. It's marked by two phases: positive and negative.

In a positive PNA phase, a high-pressure system stalls off the coast of California and shuts our storm door. Systems that bring rain and snow are booted out and the state stays dry. In a negative phase, a low-pressure system sets up off the coast and keeps the storm door wide open. California sees storm after storm when the pattern is negative, which has been dominating since September.

While better than last year, data released Thursday shows about 38% of the state is still in exceptional drought. Areas in the Central Valley, such as Fresno, that have experienced back-to-back years of severe dry conditions are at risk of experiencing widespread crop losses and water shortages.

The gains seen in the Bay Area and Central Valley from recent storms are expected to carry over into the rest of the winter season. This wet pattern is set to likely continue, according to the Climate Prediction Center, though La Nina conditions could still limit how much precipitation makes it to California.

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Superior Court of California ReAffirms The Delta Stewardship Council's Broad Authority As Delta Stewards

Maven | November 14, 2022 | Delta Stewardship Council:

For the second time since the Delta Stewardship Council's establishment in 2010, its regulatory authority has been upheld by California's judicial branch, clearing the way for the Council to continue to apply its expertise and exercise its broad authority in determining how to accomplish the goals and objectives of the Delta Reform Act. On November 4, the Superior Court of California ruled in favor of the Council regarding lawsuits filed by 17 parties challenging two amendments to the Delta Plan and the Programmatic Environmental Impact Report (PEIR) prepared pursuant to the California Environmental Quality Act (CEQA).

"Since 2013, the Delta Plan has served as a comprehensive, forward-looking management plan for tackling the Sacramento-San Joaquin Delta's challenges related to water supply reliability and ecosystem resiliency in a way that protects and enhances the area's special character and attributes," said Chair Virginia Madueño. "Amending the Delta Plan in response to the region's ever-changing landscape and to reflect the best available science is directly tied to how successful the Council is in carrying out its legally mandated role as Delta stewards."

Like the original Delta Plan itself, amendments go through an extensive, transparent, multi-year public process. The Council remains steadfast in its commitments to furthering California's coequal goals through the implementation of the Delta Plan, which is only strengthened by the amendments thoughtfully adopted by the Council, and to creating opportunities for meaningful stakeholder and public participation in its decision-making processes.

"The Council has now received recognition of our broad authority and discretion by the Appeals and Superior Courts," said Executive Officer Jessica R. Pearson. "Combined, the Courts have affirmed and then reaffirmed that the Council has a central role in guiding and managing the long-term sustainability of the Delta that goes beyond ensuring regulatory compliance with the Delta Plan regulations. This includes directing actions across State, federal, and local agencies that support the coequal goals and promoting a shared body of science upon which to base decisions."

Earlier this month, following the Court of Appeals' 2020 precedential decision to uphold the Delta Plan, the Superior Court rejected all four suits denying 17 plaintiffs in four consolidated cases contesting the legality of the conveyance, operations, and storage amendment, the performance measures amendment, and the certification of the PEIR. The Superior Court also recognized the complexity of the Delta Plan and stated that the amendments bore the "hallmarks of reliability, in that they are the product of careful consideration by numerous agency officials and are the culmination of years of decision-making and several opportunities for the public to comment thereon."

The November 4 ruling is available at the Sacramento Superior Court (Nos. 34-2018-80002898, 34-2018-80002900, 34-2018-80002901, and 34-2018-80002904).

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For more information, contact media@deltacouncil.ca.gov

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Praise and criticism for river flow deal reached by Modesto, Turlock irrigation districts

Modesto Bee | November 11, 2022 | John Holland

The Modesto and Turlock irrigation districts and San Francisco finally have reached a deal with the state on protecting fish in the Tuolumne River.

The eight-year pact, announced Thursday, boosts releases from Don Pedro Reservoir but at a volume lower than the diverters had feared. They also will pay for about \$64 million worth of nonflow habitat projects, such as rebuilding gravel spawning beds for salmon.

The Tuolumne River Trust, an environmental group, said the agreement falls short of what is needed for the waterway. It supports a previous state plan to roughly double releases from Don Pedro.

The districts and San Francisco had warned that the 2018 plan would take too much water from farm and city users. Gov. Gavin Newsom urged them in 2019 to renew talks on a compromise

“We are pleased that our multiyear effort to find a path forward based on sound science is taking a significant step forward today,” TID General Manager Michelle Reimers said in a news release.

The partners still need to pin down technical details before the agreement gets final approval from the district and city boards and the State Water Resources Control Board. It includes a provision to negotiate an extension beyond eight years.

DISTRICTS GET HALF OF RIVER

About 1.9 million acre-feet of water run off into the Tuolumne in an average year for rain and snow. About 900,000 goes to farmers in the districts and to an MID treatment plant for Modesto residents. San Francisco takes about 240,000 into a system providing part of the water in four Bay Area counties. Smaller amounts are used by riverside rights holders.

That leaves only about 380,000 acre-feet reaching the ecologically stressed Sacramento-San Joaquin Delta and San Francisco Bay.

The diverters already are required to release some water for fish under state and federal laws. The new agreement would boost this in ways that vary with drought cycles:

- 138,000 acre-feet of new releases in years defined as wet or above-normal
- 127,000 acre-feet in below-normal years, reduced to 98,000 if this happens in consecutive years
- 140,000 acre-feet in dry years, reduced to 40,000 in a second such year
- 86,000 acre-feet in critical years, reduced to 17,000 in a second straight year.

The Tuolumne agreement adds to the many recently reached on Central Valley rivers between diverters and state and federal agencies. The partners hope that they can end decades of rancor via the emerging Bay-Delta Plan.

100,000 TONS OF GRAVEL

The Tuolumne agreement calls for placing 100,000 tons of clean gravel roughly between La Grange and Hughson. It would aid spawning by native salmon that return in autumn after a few years in the Pacific Ocean.

The agreement also provides for 77 acres of restored floodplain, where newly hatched salmon would find food and shelter. And the partners would try to control striped bass and other introduced species that prey on salmon.

The Tuolumne River Trust said the compromise fails to provide fish with the deep, cold water they need.

“We’re disappointed that the focus is predominantly on nonflow measures, such as habitat restoration and predator control,” Policy Director Peter Drekmeier said by email Thursday. “These are important, but in the absence of adequate flows, they are unlikely to produce the results we all would like to see.”

PRAISE FOR THE PACT

The agreement will “break the paradigm of management through regulation and litigation,” MID General Manager Ed Franciosa said in the news release.

“We have invested heavily in studying and truly understanding the Tuolumne River, the species and industries that depend on it and developing a realistic and sustainable voluntary agreement,” he said.

Dennis Herrera, general manager of the San Francisco Public Utilities Commission, also praised the pact.

“We’ve always been willing to do our part to further protect natural habitats, including in times of drought,” he said. “Now we have a framework agreement that strikes the right balance.”

Newsom’s resources secretary, Wade Crowfoot, was among the top state officials involved in the talks.

“We need every tool to improve environmental conditions,” Crowfoot said. “This collaborative approach holds the promise to do that more quickly and holistically, while improving water reliability to communities, farms and businesses.”

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PPIC Water Policy Center

PRIORITIES FOR CALIFORNIA'S WATER

Thriving with Less

NOVEMBER 2022

CONTRIBUTORS

Jeffrey Mount, Ellen Hanak, Sarah Bardeen, Alvar Escriva-Bou, Caitlin Peterson, Andrew Ayres, Spencer Cole, Brian Gray, Zaira Joaquín-Morales, Annabelle Rosser, Gokce Sencan

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INTRODUCTION

In the last decade, California—along with the rest of the world—has entered a new phase of climate change. The changes that scientists predicted have started to arrive. California’s already variable climate is growing increasingly volatile and unpredictable: The dry periods are hotter and drier, and the wet periods—lately too few and far between—are warmer and often more intense.

Across the state, water and land managers are being forced to respond in real time to changes that were once hard to imagine. The snowpack—that once-reliable annual source of water—is diminishing as temperatures rise. Water withdrawals during multiyear droughts are depleting the state’s reservoirs and groundwater basins. Hundreds of thousands of acres of farmland come out of production during droughts; further reductions will be needed to restore our groundwater basins to balance. And mammoth floods could eventually devastate our currently parched state. Warming is also intensifying water quality problems, such as harmful algal blooms. These changes are posing widespread challenges for our businesses, communities, and ecosystems—and often hitting low-income residents the hardest.

This report considers the state of water in California: What changes are we seeing now, and what should we expect in the near future? Then it examines how these climate shifts will impact urban and rural communities, agriculture, and the environment. Finally, it explores wet-year strategies that will help Californians get through the dry years.

The challenges are real, but there is reason for hope. California still possesses an abundance of resources, both natural and human. It’s a global center of innovation and an agricultural powerhouse. California is also a renewable energy leader with massive growth potential. And the state has proven that it’s capable of passing big reforms to address major problems, from groundwater overdraft to climate change. Californians have the will to confront these crises, and the funding to take action. In short, we have all the tools to thrive, even in this unpredictable—and at times nearly unrecognizable—climate.

Sources for this document are available at <https://www.ppic.org/wp-content/uploads/priorities-for-californias-water-sources-2022.pdf>.

The moment to sound the alarm has passed. It's time now to accept what's happening and roll up our sleeves. We must put all our resources into responding calmly, with data and a clear goal: To protect people and the environment from the worst impacts of our changing climate. California is not just an example to the nation, it's a global player: Others follow where we lead. And how we handle this new reality will have global repercussions. We can model how to manage uncertainty while keeping equity at the forefront of our planning efforts. We can show that the Golden State can continue to thrive by embracing innovations—and broad-based partnerships across sectors and regions—that allow us to do more with less.

“During the dry years, the people forgot about the rich years, and when the wet years returned, they lost all memory of the dry years. It was always that way.”

—JOHN STEINBECK, *EAST OF EDEN*

A handwritten signature in black ink, appearing to read 'Ellen Hanak', with a long horizontal flourish extending to the right.

Ellen Hanak
Director, PPIC Water Policy Center

CONTINUING CHANGE

As California's climate changes, policy and regulatory frameworks must move quickly to keep up:

Warmer, drier conditions reveal weaknesses in supply systems: There is growing scientific consensus that [conditions have changed](#), making droughts more intense. Over the past two years, low rainfall, warming, [an increasingly thirsty atmosphere](#), and losses in snowpack have broken two of our most important water supply systems, causing hardship across California. In 2021, [all runoff in the Delta watershed](#) was used either upstream of the Delta (85%) or within the Delta (15%), leaving nothing for managing water quality or the environment. To avert a crisis, meager supplies in state and federal reservoirs were drawn down, water quality standards were relaxed, and rock barriers were installed in the Delta to keep salinity at bay. And following more than two decades of “megadrought” in the Colorado Basin, reservoir levels are so low that [near-term supply cuts](#) are likely. Finally, many rivers, lakes, and estuaries are being impacted by declining water quality, including increases in [harmful algal blooms](#).

But big policy and regulatory changes are underway: The state has adopted plans to improve supply reliability—including the governor's new [Water Supply Strategy](#)—while continuing to move forward on implementing the Sustainable Groundwater Management Act (SGMA) and supplying water to rural communities impacted by drought. The State Water Board—having learned key lessons from the last drought—has become more nimble at [ordering cutbacks](#) in times of shortage. The state continues to update water quality and flow standards for the Delta watershed, and to negotiate draft [voluntary agreements](#) to meet environmental objectives. The federal government is prompting Colorado River users to take [urgent efforts to reduce demand](#). State–federal cooperation on water management has also been increasing, including for [operations of two large water projects](#): the Central Valley Project (CVP) and the State Water Project (SWP).

And funding is starting to appear: Responding to changing conditions will require significant and sustained funding. The federal Bipartisan Infrastructure Law [allocated \\$3.5 billion](#) to improve water infrastructure in California, with an emphasis on underserved communities, along with [\\$8 billion](#) for western water infrastructure. The Inflation Reduction Act provides another [\\$4 billion](#) to support western drought management. And over the past three years the state legislature has authorized [more than \\$8 billion](#) to improve water supply and river and wetland ecosystems.

Still, we must learn to thrive with less: Changes in policy and regulation, along with increased funding, are all positive steps in adapting to rapid drought intensification. But even if we do everything right, water supplies are likely to decline. This is the elephant in the room. The grand challenge for 21st-century water management in California is learning how to thrive with less.

LEARN MORE

“Our Experts Weigh in on the Drought.”
Hanak et al., *PPIC Blog*, 2022.

Tracking Where Water Goes in a Changing Sacramento—San Joaquin Delta. Gartrell et al., PPIC, 2022.

“A Shrinking River Inspires Growing Collaboration.” Bardeen, *PPIC Blog*, 2022.

“Last Week's Storm: The Good, the Bad, and the Inconclusive.” Mount, *PPIC Blog*, 2021.



WATER FOR COMMUNITIES

Reliable, safe, and affordable water supplies are essential for the well-being of communities throughout California and the economic activity they support. But the local and regional utilities that provide water for these communities—both urban and rural—face some significant challenges in procuring these supplies. These challenges are not equal everywhere.

The state’s communities are using roughly the same amount of water as in the late 1980s, despite growing by more than 10 million residents. Per-capita water use [has declined over time](#), thanks to water-saving indoor plumbing fixtures and appliances, better leak detection, and, more recently, efforts to reduce outdoor water use with less thirsty landscaping and more efficient irrigation systems. These long-term conservation measures help make the most of available water. Continued progress is still possible in many communities—especially for outdoor water use—and will be even more important if available supplies decline in the future.

During droughts, utilities often call on their customers to save additional water to help manage shortages. Efforts to encourage such reductions [have varied across the state](#) during the current drought, reflecting differences in local supply conditions. And while conservation is becoming a way of life in California’s communities, it is not enough to rely solely on conservation to meet demand. Unless they can tap alternative sources of supplies, communities that have already attained low levels of per-capita use are more vulnerable during droughts, because they have less flexibility to further reduce water use.

When shortages loom, most large, urban utilities can also call on a portfolio of supply sources to avoid disruptions for their residential and business users. Indeed, these utilities [have made great strides in investing in water supply infrastructure](#). But smaller,

“Droughts will become more frequent, longer, and more severe. Yet there are striking differences across hydrologic regions and service areas in the pace, degree, and timeframe for these changes. We need to understand those differences to decide where to invest.” – KEN JENKINS, CAL WATER

rural utilities are often isolated and more vulnerable to impacts such as **dry wells and poor water quality**. The tens of thousands of Californians who rely on domestic wells face similar challenges. Over the past two years, numerous small water systems have faced shortages and **more than 2,000 domestic wells** have gone dry. Under SGMA, groundwater sustainability agencies now have a responsibility to mitigate the impacts of groundwater overdraft on rural drinking-water wells, but these efforts are **still in early stages**. And while emergency measures for small community water supplies were deployed more readily in this drought, long-term solutions are more challenging to implement. The responsibility for making the needed changes—such as developing water supply plans for small communities—often rests with understaffed and over-stretched county and local governments.

It is essential for California’s economy and well-being that urban and rural communities increase the resilience of their supplies. This will involve a portfolio of actions along with unprecedented regional cooperation. Urban communities will need to continue their efforts to manage long-term demand while making significant investments in supplies, including building more interconnections with other communities, new surface and underground storage, new reuse and recycling projects, and more stormwater capture systems. Ongoing investments will also be essential to protect water quality.

The state also needs to redouble its efforts to provide reliable, safe supplies to underserved rural communities that rely on small water utilities or domestic wells. **Utility consolidation** and connection with other water systems can help in many places, as can support for **upgrades of domestic wells** and **joint investments in new supplies**. And local governments, with help from the state, need to accelerate the implementation of SGMA sustainability plans to protect water supplies for rural communities from increasing drought intensity. Finally, addressing affordability concerns for low-income Californians must be an ongoing priority in both urban and rural settings.

“Everything we do is about public health and protecting the environment. That’s a water utility’s role.”

– CLIFFORD CHAN, EAST BAY MUNICIPAL UTILITIES DISTRICT

“Your access to safe drinking water should not be determined by your address.” – RYAN JENSEN, COMMUNITY WATER CENTER



LEARN MORE

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

Access to Safe Drinking Water. Chappelle et al., PPIC, 2021.

Water Affordability in California. Chappelle et al., PPIC, 2021.

“How Are California’s Cities Managing the Drought?” Escrivá-Bou et al., *PPIC Blog*, 2021.

Groundwater and Urban Growth in the San Joaquin Valley. Ayres et al., PPIC, 2021.



WATER FOR AGRICULTURE

Agriculture faces a unique challenge in adapting to the declining reliability of water supplies. California is the nation’s agricultural powerhouse, accounting for 12 percent of agricultural production in 2021—including more than 70 percent of the nation’s fruits and nuts. This sector produces annual revenues of more than \$50 billion, employs more than 420,000 people, and supports large food and beverage processing industries. But California agriculture wouldn’t exist without the elaborate network of surface water and groundwater supplies needed for irrigation.

During severe droughts, farmers reduce irrigated acreage—last year, they fallowed about 400,000 acres (about 6% of 2018 acreage), and this year that number will be considerably higher. Where possible, farmers also pump additional groundwater to make up for lower surface supplies. This pumping keeps cropland in production, but it also aggravates a longer-term challenge for many groundwater basins: For decades, farming regions like the San Joaquin Valley and the Central Coast have been relying on unsustainable groundwater pumping to meet demands. SGMA—the groundwater sustainability law enacted in 2014—is designed to bring overpumping to an end by the early 2040s.

As earlier PPIC studies have shown, the San Joaquin Valley—the state’s largest farming region—has been overdrafting groundwater by close to 2 million acre-feet annually, or roughly 10 percent of current use. Achieving sustainability will require both demand reduction and supply augmentation. Even with new supply investments, at least 500,000 acres of land will likely need to come out of intensively irrigated production on a long-term basis.

The challenge of meeting SGMA requirements is compounded by projected climate-related declines in available water supplies. Warmer, drier droughts make it harder to recharge groundwater basins, increasing pressure to reduce demands through land fallowing. There is also great uncertainty over future water availability due to several

“We’ve never had this little surface water in the Sacramento Valley. . . . We’re worried about the thousands of jobs that will be lost, and the hundreds of suppliers. . . . Those [impacts] trickle down.”

— NICOLE MONTNA VAN VLECK,
MONTNA FARMS

ongoing regulatory processes, including the update of the Bay-Delta water quality control plan and the reconsultation over the long-term coordinated operations of the CVP and SWP. And with severe shortages on the Colorado River, farmers in Imperial County—who hold some of the most senior water rights in the basin—are being called on to reduce their use.

All trends point toward a reduction in irrigated agriculture in California over the next few decades as water use comes into balance with water availability. Our earlier research has shown that there are ways to soften the economic and social impacts for agriculture and regional economies through [water trading](#) to put water on the most economically productive lands; [groundwater banking](#) to manage risks; and investing in new surface and underground storage and conveyance to augment supplies, including through [partnerships with urban areas](#). Strategic land repurposing can also reduce the economic and environmental costs of land fallowing, like [increased dust](#). This will entail encouraging growers to shift some lands to alternative uses, such as [water-limited farming and grazing](#), [wildlife habitat](#), and [solar farms](#). These actions will require unprecedented coordination and integration, along with incentives for growers and social safety net investments to support transitions in impacted communities. State and federal funding will surely help.

But it is important to dispel a common myth. There will be no “end to agriculture” as some have envisioned; the agricultural industry and the communities it supports can continue to thrive. Even with these reductions in available water and the associated decrease in irrigated farmland, California will continue to be the nation’s most productive agricultural state. (The closest behind is Iowa, with [\\$35 billion in production in 2021](#).) California’s farmers have shown an extraordinary capacity for adaptation to changes in prices, technology, and the regulatory environment. This will continue into the indefinite future, even though the total footprint of irrigated agriculture is likely to shrink.

“There’s a legitimate quantitative limit to how much water can be extracted and utilized. Land fallowing programs and policies, cover cropping, and restoration . . . are all critical to land repurposing.”

— REYN AKIONA, TULE SUBBASIN

“Farmers are going to be the solution, not just for water but for climate change.”

— DON CAMERON,

TERRANOVA RANCH AND
CALIFORNIA BOARD OF FOOD
AND AGRICULTURE



LEARN MORE

“Drought Requires New Strategies for Managing Cropland.” Ayres and Peterson, *CalMatters*, 2022.

Drought and California’s Agriculture. Escriva-Bou et al., PPIC, 2022.

“Implementing SGMA at Ground Zero: Challenges and Opportunities for the San Joaquin Valley.” Hanak and Escriva-Bou, *PPIC Blog*, 2022.

Improving California’s Water Market. Ayres et al., PPIC, 2021.



WATER FOR THE ENVIRONMENT

California’s freshwater biodiversity has been declining for decades, along with overall ecosystem health. Reduced runoff and increases in temperature are making matters worse. Fish and wildlife populations that are in poor shape tend to be less resilient to increasing drought intensity, struggling to survive drought and recover when wet years return. And drought can lead to fundamental changes in ecosystem conditions as temperatures increase, water quality declines, and non-native species take hold. These factors have likely played a major role in the decline of the Sacramento–San Joaquin Delta.

Despite years of regulation and substantial investments, more than 80 percent of native freshwater fishes are in decline and almost half the runs of steelhead and salmon are facing extinction by the end of the century. For several species, extinction appears imminent. The challenge in reversing species declines is related to the many factors that contribute to ecosystem degradation—including land use changes, loss of physical habitat, poor fisheries and hatchery management, discharges of pollutants, and the introduction of invasive species. But it is the way we manage water—an essential ingredient for freshwater ecosystem health—that is the most contentious subject.

The current approach to environmental water management emphasizes minimum flow and water quality standards to meet the needs of fish protected by state and federal endangered species acts. This single-species focus tends to overlook the needs of the broader ecosystem and fails to acknowledge that healthy ecosystems provide an array of benefits for people—supporting recreation and cultural values, sustaining commercial and subsistence fishing, and serving as important natural infrastructure to manage floods, recharge groundwater, and improve water quality.

“Because of severe wetlands loss in the Central Valley, birds face drought conditions every year. The Central Valley Improvement Act provided a more consistent water supply. This has . . . improved wetland resilience by reducing the impacts of severe droughts.” – JEANNE BRANTIGAN, THE NATURE CONSERVANCY

The current approach also establishes the environment as a constraint on water management operations, rather than a principal management objective like water supply, hydropower, and flood control. Furthermore, rivers and streams that don't support listed species are often left unprotected.

California needs a change in course on ecosystem management to adapt to rapidly changing conditions. Ecosystem health needs to become an explicit objective of water management, rather than merely a constraint. This approach—often referred to as **ecosystem-based management**—integrates the environment into all phases of decision-making, effectively giving the environment a seat at the table. It also increases flexibility in how and when water is used (e.g., allocating environmental water as **“functional flows”** to get the most ecosystem benefit), while allowing other users to plan accordingly and with greater certainty. Making this work may require establishing **assets for the environment**—such as water budgets, **reservoir storage space**, and funding to restore physical habitat—that can be flexibly used to adapt to changing conditions.

The most difficult impediment to adopting this strategy, however, will be setting priorities. Conditions are changing fast, and the state needs to articulate the most important and immediate actions required to preserve biodiversity and build drought resilience for freshwater ecosystems. This should include designating specific areas for concentrated investments (e.g., biodiversity hotspots and population strongholds), rebuilding resilience where possible, and conserving climate refugia (areas naturally buffered from climate change). Accelerating the **pace and scale** of physical habitat improvements through more nimble permitting is also vital. This year's **statewide Programmatic Biological Opinion** for restoration programs is a major step in the right direction.

The extensive portfolio of actions provided in the governor's **Water Supply Strategy** left the environment out, stating only the desire to not cause additional harm. This approach is no longer sufficient. Water supplies for the environment—and the multiple benefits provided by healthy ecosystems—should be the third leg of this strategy, along with water for communities and farms. And the state needs a strategy to help ecosystems—California's vital natural infrastructure—adapt to the impacts of warming and drying.



“Nature is the engineer of the 21st century. Nature-based solutions will help us get seven benefits for every dollar we put in.” – LETITIA GRENIER, SAN FRANCISCO ESTUARY INSTITUTE

“Dos Rios Ranch Preserve is California's largest floodplain restoration project ever. . . . Thousands of acres of reconnected floodplains are thriving as wildlife habitat. The whole complex has . . . served as a shock absorber, taking pressure off floodwater further downstream.” – JULIE RENTNER, RIVER PARTNERS

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“Newson's Water Strategy Needs to Go a Step Further.” Null and Mount, *CalMatters*, 2022.

Storing Water for the Environment. Null et al., PPIC, 2022.

Making the Most of Water for the Environment. Grantham et al., PPIC, 2020.

Advancing Ecosystem Restoration with Smarter Permitting. Grenier et al., PPIC, 2021.



WET-YEAR STRATEGIES

During drought, it is easy to forget that California also has wet years and occasionally very large, damaging floods. Indeed, even in dry years there are often large storms. Climate models do not project a California that is in a permanent state of drought: Rather, the state will continue to experience wet and dry periods. But drought intensity and storm intensity are both increasing, which is likely a signature of climate warming.

The shift to drier dry years and wetter wet years makes it imperative that all of California’s water systems develop comprehensive wet-year strategies that take full advantage of times of abundance, while also ensuring public safety from floods. For urban areas, this means doing a better job of capturing and storing storm runoff. Farms should maximize groundwater recharge—and do so, where possible, in places that also boost supplies for rural communities and do not harm water quality. And for freshwater ecosystems, wet years are essential for recovering from drought and key to building drought resilience.

The state is making important strides in this regard. Flood-managed aquifer recharge on farms is gaining considerable momentum, particularly in the San Joaquin Valley. The seven Proposition 1 Water Storage Investment Program projects are all focused on storing water during wet periods, with a portion going to augment environmental flows when it’s dry. There is growing interest in making major investments in conveyance infrastructure for recharge and establishing groundwater banks. Cities—particularly in the South Coast—are developing new stormwater capture systems. And reservoir operators are using new forecasting models to better manage the trade-offs between flood protection and water supply during storms.

Despite this progress, there are some important cautions here. More work is needed on how and when to store wet-year water in ways that benefit the environment and do not harm other water users. A related question to resolve is: Who pays for this

“The state has identified floodwater capture as a priority solution to groundwater overdraft. We would benefit from a collective and streamlined approach from the permitting agencies. Getting all your ducks in a row is more complicated than it should be.” – JOE HOPKINS, ALISO WATER DISTRICT

stored water, and who has a right to its use? Fortunately, California already has some [very good models](#) for how to do this through existing groundwater banks; it will be key to develop strong accounting and monitoring systems in places that currently lack them.

Finally, there was a healthy reminder this year—much in the news—that the climate-driven abundance of water in wet years is a double-edged sword. Updates of climate projections show a steady increase in the intensity of atmospheric rivers, our flood-generating storms. While this is great for water supply, it increases the risk of severe, life-threatening floods. [Modeling suggests](#) that extreme regional floods—like the floods of 1861–62 that inundated most of the Central Valley and Southern California—are becoming more likely. If those floods were to occur today, they would result in approximately \$1 trillion in damages (in today’s dollars), dwarfing damages from even the most severe earthquakes.

Comprehensive wet-year strategies—which integrate water supply, environmental management, and flood-risk reduction objectives—are just as important as drought management strategies if we are to successfully adapt to increasing water scarcity. Indeed, the actions we take (or fail to take) during wet years sow the seeds for our successes (or our challenges) during drought.



“Getting groundwater recharge going in California is going to be one of the single most important investments we can make.”

– KARLA NEMETH,
CALIFORNIA DEPARTMENT OF
WATER RESOURCES

“The idea of ‘natural capital’ took quite a while to take hold. Now we have state policies and initiatives focusing on implementing nature-based solutions for flood risk reduction and climate resilience. That’s heartening to me.” – SUSAN TATAYON, FORMER CHAIR, DELTA STEWARDSHIP COUNCIL

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“Four Strategies for Managing California’s Crucial Watershed.” Gartrell and Hanak, *CalMatters*, 2022.

Groundwater Recharge in California. Escriva-Bou et al., PPIC, 2021.

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“The Environmental Benefits of the Water Storage Investment Program.” Sencan and Mount, *PPIC Blog*, 2022.



CONCLUSION

Most Californians are a bit burned out by drought. The relentless dry days and record warm temperatures are wearying. But we know now that we must adapt to these warmer, drier conditions. Although there will be wet years again, the increase in drought intensity is here to stay.

The fundamental challenge is to shift our traditional focus on expanding supplies toward a different lens: How to thrive with less.

In our communities, conservation is becoming a way of life. But we must do much more to build drought resilience. This includes making more investments in supply reliability, including diversifying sources; improving the capacity to store and trade water; and capturing storm runoff—all while continuing to promote increases in water use efficiency. Policymakers and managers at all levels—federal, state, and local—must continue to emphasize equity and building the reliability of safe water supplies for small and underserved communities.

For the farms that make California an agricultural powerhouse, the future is clear: The footprint of irrigated agriculture is shrinking and will continue to do so until it comes into balance with sustainable water supplies. Yet all indications suggest that agriculture will continue to thrive—albeit with less—if there is a strong commitment to reducing the social, economic, and environmental effects of land retirement. This will involve repurposing land—rather than abandoning it—while expanding water markets and trading, groundwater recharge and banking, and new infrastructure to facilitate these activities. Most of all, it will require unprecedented regional cooperation to succeed, along with state and federal regulatory and financial support.

“We have to figure out how to coexist. It’s not just about having a healthy water supply to the detriment of the environment.”

— ADEL HAGEKHALIL,
METROPOLITAN WATER DISTRICT OF
SOUTHERN CALIFORNIA



Natural infrastructure—our freshwater ecosystems—is under great threat from increasing drought intensity. And the rancorous battles over water for the environment will only grow unless there is a change of course. California needs to commit to making environmental health a principal objective of water management, not merely a constraint. And ecological drought resilience should be priority number one, including improving water quality and setting aside assets for the environment—water, land, and money—that can be flexibly managed to cope with rapidly changing conditions.

“We all need to pitch in.”
— RAUL BARRAZA, JR., ARVIN
COMMUNITY SERVICES DISTRICT



Finally, it is vital that wet-year management for communities, farms, and the environment be as robust as our efforts at dry-year management. Coordinated and integrated statewide, regional, and local action will allow us to develop plans for capturing and storing water in wet periods so that it can soften the harm of dry periods. As with all other water management challenges, cooperation is key. Thriving with less involves thriving together.



“Innovation is not just about doing new things, it’s about doing meaningful things—unleashing the imagination to do good for others.”
— JOONE LOPEZ,
MOULTON-NIGUEL WATER DISTRICT

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