Free Water While It Lasts: An Analysis of Wholesale Water Pricing in the Lower Colorado River Basin States

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Acknowledgments

This report received substantial consultation and review, both internally and externally, from more than 10 individuals and experts with over 200 years of combined experience across a wide range of water-related enterprises. Their participation contributed greatly to the quality of the report and its conclusions and recommendations, and the authors wish to thank them for their input. However, participation by these individuals or their organizations does not constitute endorsement of anything in the report, including the report's conclusions or recommendations.

The authors wish to thank Edith de Guzman for her generous help and collaboration.

The authors would like to additionally thank Scott Gruber for design and production of the report, Claire Griffiths for design and production of charts, and Leah Stecher, Natural Resources Defense Council, and Elise Marton for editing.

Finally, we would like to thank Natural Resources Defense Council for its generous support of this work.

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Executive Summary

The Colorado River is facing a shortage of between two million and four million acre-feet per year (MAFY), nearly one-third of its current annual flow and the equivalent of the amount needed to supply up to 30 million people with water each year (Shutt, 2022). Following a century of declining flow and two decades of the worst drought in more than 1,200 years to grip the U.S. Southwest, the U.S. Bureau of Reclamation is putting pressure on states that draw from the Colorado River to reduce water usage and create a long-term plan for responsible water management. But the price that agricultural and municipal water districts and utilities pay to divert federal water supplies in the western United States disincentivizes sustainable water practices and conservation efforts. In this paper, the UCLA Institute of the Environment and Sustainability (IoES) and the Natural Resources Defense Council (NRDC) explored the current state of water pricing for surface water supplies across Arizona, California, and Nevada, the three states comprising the Lower Colorado River Basin. We demonstrate that the vast majority of water sourced through the federal government from the Colorado River and other federal projects is sold or supplied at prices that do not reflect the scarcity of the resource; we also identify significant disparities between large agricultural districts and municipal utilities in the price paid for water at the wholesale level.

To assess the wide variation in water prices across the Lower Colorado River Basin states, we investigated the wholesale price of water paid by larger water districts and municipal utilities or entities in Arizona, California, and Nevada that purchase or divert more than 10,000 acre-feet (AF) of water annually from the Colorado River, major drainages of the Sierra Nevada range, and other surface water sources. We analyzed a total of 217 diversions, purchases, and transfers of water by 172 unique water districts or utilities from 41 unique water suppliers, amounting to an average of 16,400,801 AF of water per year. We found large discrepancies in the price paid for water across these transactions, with prices ranging from no charge, or $0.00/AF, to more than $2,800/AF.

This wide range of prices led us to three main conclusions:

First, the vast majority of water diverted from the Colorado River through the U.S. Bureau of Reclamation, and through federal water projects more broadly, is much less expensive than water obtained from state infrastructure projects or from “other” sources (i.e., water not diverted from the Colorado River, California’s Central Valley Project (CVP), or California’s State Water Project). Water supplied by the U.S. Bureau of Reclamation from the Colorado River is provided at a weighted average price of $0.12/AF to districts through projects including the All-American Canal and Colorado River Aqueduct or to the Southern Nevada Water Agency. The Bureau provides water to the Central Arizona Water Conservation District for $0.25/AF, which then supplies it to districts and utilities through the Central Arizona Project at an average weighted cost of $227.93/AF. Water supplied by the Bureau of Reclamation through the CVP is provided to districts directly at a weighted average price of $38.92/AF, and water supplied by California’s Department of Water Resources through the State Water Project has an average cost of $247.14/AF.

In each of these cases, the price paid by wholesalers, districts, and utilities reflect only the cost for *delivery* of the water—the capital costs of the conveyance infrastructure or the cost for operations and maintenance—and even then, the price remains inexpensive. The water itself, the actual corpus of water taken from the Colorado River and other streams, is free or nearly free.

This low-cost water was compared with an average price of $853.15/AF for water from all other sources, including water that may have initially been purchased or acquired at low cost or free of charge from the federal government by one entity, then sold and resold multiple times to additional districts and retailers, with each transaction raising the price of water to account for conveyance and distribution costs and, in many cases, baked-in profits.

Second, our research determined that on average, agricultural districts pay far less than municipal districts for the same volume of water. The weighted average price of wholesale water for primarily agricultural water use districts in our study is $30.32/AF compared with $512.01/AF for primarily municipal water utilities. This is in large part due to the overwhelming amount of free or nearly free water supplied by the federal government to agricultural districts pursuant to surface water rights or longstanding delivery contracts. In fact, nearly a quarter of all water in our dataset is obtained for $0.00/AF from the Bureau of Reclamation by five agricultural purchasers: the Imperial Irrigation District, the Coachella Valley Water District, and the Palo Verde Irrigation District (all in southeastern California); the Truckee–Carson Irrigation District (in northwestern Nevada); and the Unit B Irrigation and Drainage District (in southwestern Arizona). In contrast, 94.7% of the water purchased at prices above $150.00/AF is purchased by municipal districts.

Third, on average, districts in California pay significantly more for water than in Nevada and Arizona, by multiples of 2.4 and 7.0 respectively. The weighted average price of water across California districts is $343.32/AF compared with $144.52/AF for Nevada and $49.17/AF for Arizona, reflecting higher costs for conveyance and delivery or the results of one or more transfers common in California. The elevated water prices apply throughout California but are concentrated in coastal regions of the state between San Francisco and San Diego, where all of the highest prices in our study are found.

Through our investigation we have developed a set of recommendations for the U.S. Bureau of Reclamation, the agency that oversees water supply conveyance and distribution through the Colorado River and Central Valley Project, or for creation of a multistate legal agreement or authority. These recommendations include the following:

- *Addition of a Reliability and Security Surcharge to Federal Water Deliveries*: Adding a modest surcharge to federal water would provide funding for system resilience or for modernizing aging equipment and infrastructure, while providing a price signal recognizing the scarcity of water. Assuming that implementation of a current reduction proposal from the lower basin states of up to 1.5 MAFY brings the total allocation for the lower basin to 6 MAFY, a $50/AF charge would generate about $300 million to $375 million per year for Colorado River Water. The $50 surcharge would generate $350 million per year if applied to CVP water. This surcharge could be used to invest in capital improvements such as upgrading distribution systems in subsidence areas and reducing evaporative and leakage losses from conveyance, distribution, and storage systems. It could also help reduce demand and enhance local supplies by providing financial incentives to agricultural communities for

more durable, efficient on-farm irrigation systems, or more broadly for funding replacement of nonfunctional turf with climate appropriate landscaping, increasing use of stormwater capture, and helping pay for water reuse and recycling facilities.

- *Development of a Centralized Water Database:* To make more-informed decisions on water management, including to address overconsumption, evaluate distribution system performance, and prioritize cost-effective investment in modernizing distribution systems, states must work toward establishing a more accurate water budget. This can be achieved only by having more transparency in the volume and price of water bought and sold in the Colorado River Basin states. The database could include the price and volume of transactions for surface water by source and accounting of appropriative surface water rights, groundwater, and recycled water. The data should be collected by states and then made available on a centralized federal website. Increased transparency around our water systems could also be accomplished by passing federal or state legislation that would establish consistent reporting requirements for all districts diverting or purchasing more than 1,000 AFY.

Significant action must be taken to achieve sustainable water management across the Lower Colorado River Basin states. With existing Colorado River operating agreements set to expire in 2026, it is crucial that stakeholders come to an agreement on future, sustainable river management.

Central Arizona Project crossing the Sonoran Desert east of the Colorado River. (© Ted Wood/The Water Desk with aerial support provided by LightHawk.)

Introduction

The Colorado River, Snowpack, and Drought

The Colorado River, a critical source of water for 40 million people and 5.5 million acres of agricultural land across the western United States and northwestern Mexico, is facing a shortfall of between two and four million acre-feet per year (MAFY) to sustainably manage the river (Sencan & Gray, 2025; Shutt, 2022). This volume represents as much as one-third of the river's current annual flow and is enough to meet the water supply needs of 30 million people each year. But following a century of declining flow in the Colorado River and two decades of the worst drought in more than 1,200 years to grip the U.S. Southwest (Williams, Cook & Smerdon, 2022), the river and the crucial resources it provides—including hydropower; water for multiple Tribal Nations; habitat for biodiverse ecosystems; and support for seven national wildlife refuges, four national recreation areas, and 11 national parks throughout the western United States (USBR, 2013)—are under severe threat. In 2022 the U.S. Bureau of Reclamation (USBR) responded by ordering the seven states that share water supply from the Colorado River to reduce water use in the Colorado River Basin.[1]

After a subsequently wet year across 2022–2023, the USBR approved a proposal by the lower basin states for modest and temporary reductions in Colorado River water allocations totaling three million acre-feet (MAF) until the end of 2026. But existing Colorado River operating agreements, including a 2019 Drought Contingency Plan and 2007 Colorado River Interim Guidelines, also expire in 2026, placing pressure on the states to reach a more permanent agreement. For two years, the seven basin states have been at an impasse on developing a consensus-based approach to post-2026 Colorado River systems operations. Strong disagreements between the upper and lower basin states have not been resolved; the lower basin states have offered to initially reduce consumption by 1.5 MAFY and share additional shortages above that amount, while the upper basin states have taken the position that all reductions should be made by the lower basin states because of inequities in overall water use. And even among the lower basin states there is a lack of consensus on how to allocate any proposed reductions. Further complicating the picture is that the 30 Native American Tribes in the basin have for decades been excluded from decisions on Colorado River management, and Tribal rights to water are in many cases unresolved or are unrealized, even if recognized (Walker, 2025). However, Tribal rights to water are increasingly, and rightfully, likely to be more fully recognized.

Following one of the driest years on the Colorado River in decades, the USBR in August issued a dismal two-year projection for the Colorado River's two primary reservoirs, Lake Powell and Lake Mead (Schmidt et al., 2025). The threat of lake levels dropping to the point of significant hydropower reductions is high. The USBR has again called on the basin states to reach a resolution on how to cut back their water supply from the river. If an agreement cannot be reached, the USBR will decide the path forward on post-2026 river system management; a draft environmental impact statement on potential post-2026 management alternatives is anticipated to be released by the USBR in early 2026.

1 The Colorado River Basin states include Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming. The river is traditionally divided into an upper basin (Colorado, New Mexico, Utah, and Wyoming) and a lower basin (Arizona, California, and Nevada), with the boundary roughly marked by Lees Ferry, just below Glen Canyon Dam near the Arizona–Utah border.

Drought and the long-term effects of climate change are posing a greater threat and resulting in increasing impacts on surface water supply sources across the western United States beyond the Colorado River. Substantial reductions are projected for Rocky Mountain and Sierra Nevada snowpack and the region is likely to see greater variability and extremes in surface stream flow (see, e.g., Hale et al., 2023; Bass et al., 2023). In this framework, the seven states that make up the Colorado River Basin––including the lower basin states of Arizona, California, and Nevada––are facing a critical need to shift to more resilient approaches to water management. In response to this urgent problem, the Climate Mayors, a bipartisan network of more than 300 U.S. mayors, recently released a call to action for cities, agriculture, states, and the federal government to move toward sustainable water management to achieve a climate-resilient future for the Colorado River Basin (Climate Mayors, 2025).

OVER-ALLOCATION AND CLIMATE CHANGE

Colorado River water has been over-allocated from the very first water agreements. Early 20th-century hydrological studies of the river's flow, conducted during a period of unusually high precipitation, were used as the basis for calculating allocations among the basin states as stipulated in the 1922 Colorado River Compact, a foundational agreement among the seven basin states and the federal government that divided the river into the upper basin (Wyoming, Colorado, Utah, and New Mexico) and the lower basin (Arizona, Nevada, and California) (Mullane, 2023; Stern et al., 2024; Kenney, 2009; Bittle & Penner, 2023; Schmidt et al., 2025). These overly optimistic estimates did not account for long-term variability or the significant and prolonged periods of drought that have become increasingly severe in recent decades. Nor did they account for the impacts of climate change. Altogether, the average flow of the Colorado River from 2000 to 2023 is 13% lower relative to the preceding 70 years (Schmidt et al., 2025; Bass et al., 2023). Current projections suggest that for every additional 1.8 degrees F of warming, the river's flow could diminish by another 7% (Bass et al., 2023; Bittle & Penner, 2023; Schmidt et al., 2025; U.S. Department of the Interior, 2022a; Lozano, 2022).

Storage levels in critical reservoirs like Lake Mead and Lake Powell, the two largest reservoirs in the country, have declined dramatically, raising concerns about the long-term sustainability of the Colorado River as a water source (Kenney, 2009; Schmidt et al., 2025). In October 2025, Lake Powell and Lake Mead sat at 28% and 31% of their capacity, respectively, after falling to record lows of 22% and 28% capacity in early 2023 (U.S. Drought Monitor, 2025; Garrison et al., 2025). Reduced inflow as a result of decreased precipitation and ongoing high demand has led to a situation in which consumptive uses in the basin greatly exceed natural supply, necessitating the drawdown of reservoir storage to meet needs.

Figure 1. Map of the Colorado River Basin and major conveyance and delivery systems. (Center for Colorado River Studies, Utah State University, 2022.)

The Price of Water

One of the greatest problems facing the Lower Colorado Basin states for ensuring a continued safe, reliable supply of water is that much of the surface water allocations across all three states utilize antiquated pricing structures that incentivize inefficiency and overuse. Regardless of the basis for diversions—riparian or appropriative rights (which may be a century old or older), contractual purchase, or other means—substantial volumes of water in the Colorado River Basin

are sold or diverted at little to no cost.[2]

A driving motivation behind this investigation is the reality that water is, as a result, often priced in a manner that does not reflect the scarcity of the resource. The lack of a true signal communicating water's reduced availability (or its over-allocation) can suppress the impetus for water conservation and disincentivize efforts to develop more resilient—and potentially more costly—local water supplies. Research on price signaling typically focuses on retail water supplies or groundwater (Bruno, Jessoe, & Hanemann, 2024; Allaire & Dinar, 2022; Hagerty, 2017; Hagerty, 2025; Archibald & Renwick, 1998), and there is limited research or data available on wholesale pricing systems for surface water in the western United States. But irrespective of delivery or infrastructure costs or price increases resulting from multiple resale transactions, it is unquestionable that starting from a price of zero dollars or even $0.50/AF for the water itself in a wholesale context—as we demonstrate is the case in our analysis below—artificially deflates the cost for districts purchasing potentially massive volumes of water and clearly impacts where and how much water is used across the Colorado Basin (see, e.g., Bork, 2023; Glennon, 2005).

Pricing water in a way that more directly signals its scarcity has the potential to assist in prioritizing diversions of limited water supplies to the uses with the greatest value and to accomplish additional, significant conservation outcomes. Our previous report targeted the potential of increased water reuse to provide up to one million acre-feet per year of additional supply in the Colorado basin (Garrison et al., 2025). This report is directed at providing an overview of surface water pricing at the wholesale (non-retail) level across sources in the Lower Colorado River Basin states of Arizona, California, and Nevada. By gaining a clearer understanding of the prices that water districts and utilities pay for water supplies, we can better identify and address mechanisms that have created inertia in advancing sustainable management of declining Colorado River and southwestern water resources and develop viable solutions to these obstacles.[3]

Governance of the Colorado River

The Colorado River's waters are managed under a complex web of laws, agreements, and compacts collectively known as the "Law of the River," which governs water rights, allocations, and distribution across the basin (Kenney, 2009; Mullane, 2023; Stern, Sheikh & Hite, 2024). Governance of the river is rooted in the Colorado River Compact (Mullane, 2023; Stern, Sheikh & Hite, 2024). Each basin was apportioned 7.5 million acre-feet (MAF) of water annually (Sencan & Gray, 2025). An additional 1.5 MAF per year was allocated to Mexico pursuant to a subsequent treaty in 1944. The compact established Lees Ferry in Arizona as the dividing point between the two basins (Stern et al., 2024; Water Education Foundation, 2024). However, the compact also reflected overly optimistic assumptions about water availability based on wet years that in turn led to over-allocation of Colorado River flows (Stern et al., 2024).

2 The actual mechanisms for diversion of water in the Colorado basin states can be enormously complex, including purchases, diversions pursuant to surface water rights, transfers, and other agreements. For purposes of this paper, we use the terms purchase or sale of water to refer to any transaction of water, including for purchase, transfer, contract agreement, or other conveyance of water between parties.

3 There are any number of names used to describe entities that purchase large amounts of water and then resell or serve water to end users. For purposes of this report, we use utilities and districts to refer to these entities.

In 1928 the Boulder Canyon Project Act, which authorized the federal impoundment that would later be renamed Hoover Dam, set apportionments for the lower basin's 7.5 MAFY as 4.4 MAFY to California, 2.8 MAFY to Arizona and 300,000 AFY to Nevada. The act also established the USBR's role as the "water master" on behalf of the secretary of the interior, empowering the bureau to enter into contracts for water delivery and giving the federal government significant authority over the allocation of water, especially in times of surplus or shortage (Stern et al., 2024). Allocations for the upper basin states were established under the Upper Colorado River Basin Compact of 1948 and were set as a percentage of the apportioned flow available each year. Colorado holds rights to 51.75% of upper basin flows, with Utah (23%), Wyoming (14%), and New Mexico (11.25%) receiving lesser volumes (Kenney, 2009; Mullane, 2023; Stern et al., 2024; USBR, 2023). The Colorado River Basin Project Act of 1968 later established the criteria for apportioning shortages among the lower basin states in times of drought, making the Central Arizona Project subordinate to California in the event of water shortages (USBR, 2008). This prioritization has been a source of tension among the states (and Mexico), particularly as drought and climate change have made shortages more frequent and greater in severity.

Surface Water Infrastructure and Major Suppliers in the Lower Colorado Basin States

Today the USBR supplies water to large water districts including the Imperial Irrigation District, the Central Arizona Water Conservation District, the Metropolitan Water District of Southern California, and the Southern Nevada Water Authority, among others. Those districts then sell to agencies in the region, which may, in turn, sell to smaller agencies, often with the costs of treatment, conveyance, distribution, and in many cases profit added, resulting in significant increases in the price of water sold along the way.

Figure 2 shows an example of wholesale levels for water sold from the U.S. Bureau of Reclamation to the Metropolitan Water District of Southern California and then to the Municipal Water District of Orange County and to many other, smaller districts or wholesalers. These transfer or resale relationships can be much more complex or much simpler, depending on the context of the specific district.

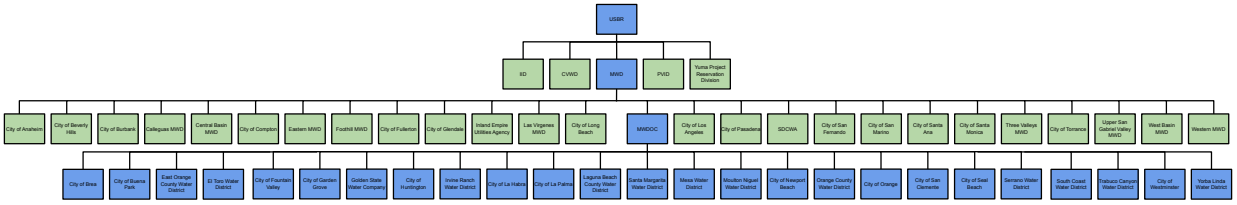

Figure 2. Example chain of wholesaler water transactions.

Supply of surface water in the Lower Colorado Basin states, from both the Colorado River and other major surface sources, is dominated by five major infrastructure and conveyance projects that supply a broad network of agricultural and urban users: the Colorado River Aqueduct, All-American Canal, and Central Arizona Project, which supply water from the Colorado River to Southern California and Arizona, and the Central Valley Project and State Water Project, which provide water, primarily from Sierra Nevada runoff, to central and southern California through

the Sacramento–San Joaquin Delta and numerous other rivers flowing from the Sierra Nevada. Many more systems, for example, the Truckee Canal in northern Nevada, supply water in a complex system of diversions and reclamation projects at both the local and regional levels. The financing and pricing structures for water from these systems can be convoluted and outdated. Notably, as we discuss further in our analysis below, water from the Colorado River and other surface sources is provided by the USBR for free or nearly free, primarily to agricultural water districts, through four of these five projects; pursuant to water rights or contract agreements, the districts pay only for the cost of infrastructure and conveyance (if at all), but not for the actual water they receive.

COLORADO RIVER AQUEDUCT

The Colorado River Aqueduct is a 242-mile-long canal system running from Parker Dam and Lake Havasu on the Colorado River across the Mojave Desert to Southern California. The Metropolitan Water District of Southern California (MWD), a regional water district, was established by the state in 1928 to develop and construct the aqueduct. Construction was completed in 1941 on a voter-approved $220 million bond. The aqueduct's capacity is 1.2 million acre-feet per year, and it supplies 20-25% of the total water MWD delivers to its 26 member water agencies across Southern California each year. Operation and maintenance of the aqueduct, including substantial energy usage to pump Colorado River water more than 1,600 feet in elevation over its course, remain a significant annual cost for MWD.

ALL-AMERICAN CANAL

The All-American Canal is an 82-mile-long system located in Southern California that delivers water from the Imperial Dam on the Colorado River to the USBR's Yuma Irrigation Project, the Imperial Valley, and a number of small cities. The canal was authorized along with the Hoover Dam under the 1928 Boulder Canyon Act; it was constructed and is owned by the USBR but is managed by the Imperial Irrigation District (IID). It conveys an average of approximately 2.3 to 2.6 MAFY (USBR, 2023; USBR, 2025b; USBR, 2025c). Runoff and tail water from land irrigated from the canal provides the majority of water draining to the Salton Sea.

CENTRAL ARIZONA PROJECT

The Central Arizona Project (CAP) is a 336-mile-long system of aqueducts and tunnels that transports water across the Sonoran Desert from Lake Havasu to Phoenix, Tucson, and agricultural areas across central and southern Arizona. CAP was authorized in the Colorado River Basin Project Act of 1968. Construction began in 1973, but was not substantively completed until 1993, at a then staggering cost of $4.4 billion—the most expensive project in Bureau of Reclamation history (Zuniga, 2000).

The Bureau of Reclamation has retained ownership of CAP, but the Central Arizona Water Conservation District (CAWCD), an Arizona multi-county conservation district, manages and operates the system. CAWCD is responsible for repayment of the non-federal portion of the project's construction costs and for regular operations and maintenance. The district generates revenue by purchasing water from the USBR and reselling it to water agencies and agricultural districts, among other customers (Central Arizona Water Conservation District, 2025). Water prices can be set only at a level sufficient to recover the operational and capital costs of providing

the water. As of 2025, CAP has more than 60 users, including the cities of Phoenix, Scottsdale, Mesa, Glendale, and Tucson, as well as a number of Tribal Nations and agricultural districts. In non-shortage years the CAWCD can deliver approximately 1.6 MAFY (Ikeya, 2019).

CENTRAL VALLEY PROJECT

The Central Valley Project (CVP) is both the largest water conveyance and distribution system in California and the largest water supply project operated by the Bureau of Reclamation. The CVP encompasses 20 reservoirs and some 500 miles of canals and aqueducts and covers 35 of California's 58 counties (USBR, 2024). Cumulative storage capacity of the reservoirs in the CVP system is approximately 20 MAF, and the CVP supplies an average of 7 MAFY, approximately 75% for agriculture, sourced from streams and rivers flowing off the west flank of the Sierra Nevada range into the Sacramento–San Joaquin Bay Delta. However, CVP water deliveries are governed by a complex set of contracts with the Bureau of Reclamation with varying claims of priority that are further impacted by factors such as drought, environmental flow and ecosystem needs, and other hydrologic conditions. This complexity means that actual allocations and deliveries can vary significantly from year to year (Stern, Sheikh & Hite, 2025).

California had considered development of the CVP as early as 1921, and the state passed the Central Valley Project Act in 1933, but when it was unable to finance the project by itself, construction by the U.S. Army Corps of Engineers was authorized under the Rivers and Harbors Act of 1935. The Roosevelt administration later transferred the project to the USBR, and construction began on the CVP's first unit in 1937, with water deliveries following in 1940. The last unit of the CVP was completed in 1978.

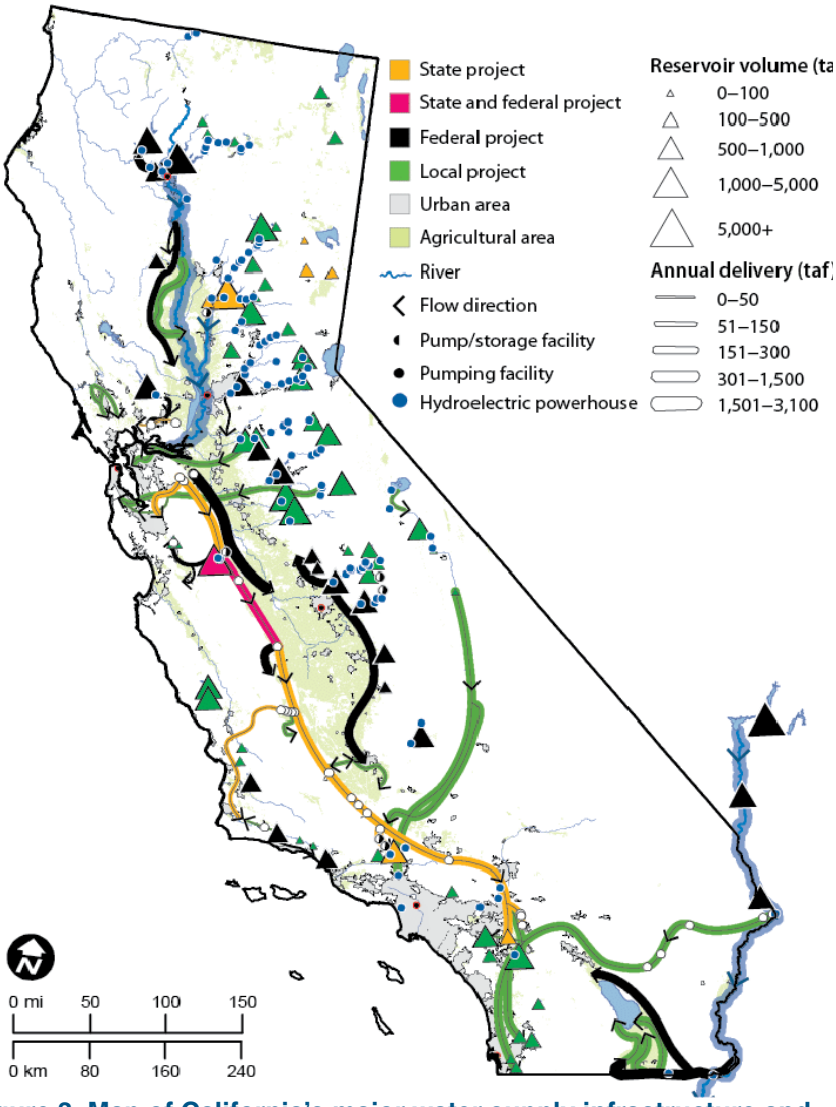

Figure 3. Map of California's major water supply infrastructure and delivery systems. (Hanak et al., 2011.)

Under the Reclamation Act of 1902 and subsequent laws, contractors receiving water from the CVP were required to repay the federal government's costs. To ensure payment, the USBR entered into contracts with corporate water districts with guaranteed 40-year terms. While the USBR intended for the contracts to cover the costs of construction and ongoing operations and maintenance (O&M), the approach proved to be costly for the government; over time O&M costs increased to the point that they exceeded the static contract payment rates. By the 1970s, only a small percentage of the original construction costs had been repaid, and debt due to increasing O&M costs was beginning to accumulate. Multiple efforts to address the CVP payment deficit, including the Coordinated Operations Act of 1986 and the 1992 Central Valley Project Improvement Act, have been adopted with only minimal progress toward cost recovery. By 2006 only approximately 21.5% of the total capital costs of the system had been repaid (Entrix, Inc., 2008). In general, CVP water rates remain insufficient to cover costs (U.S. Department of the Interior, Office of Inspector General, 2013; U.S. Department of the Interior, 2020).

CALIFORNIA STATE WATER PROJECT

While nearly 24 million of California's residents and 80% of the state's water demand are located in the southern region of the state, 75% of the state's water supply comes from rain and snowmelt runoff from the Sierra Nevada snowpack—the state's largest source of surface water supply—and other watersheds north of Sacramento. The geographic split between population and water source poses challenges for water distribution and infrastructure (California Department of Finance, 2023). The State Water Project (SWP) was developed to supply water for growing Southern California urban centers by pumping water from the Sacramento–San Joaquin Bay Delta and Northern California rivers 444 miles and nearly 3,000 feet in elevation over the Tehachapi Mountains to the south. Construction began in 1960 under a $1.75 billion bond measure, and its most recent extension was completed in 1998. Today the SWP supplies water to 27 million California residents as well as commercial, industrial, and agricultural users. Urban end users receive 56.4% of the water from the SWP, and 43.6% is used by agricultural producers.

The cost of water deliveries to SWP contractors is determined by a water charge that covers the capital and operational costs of facilities that collect water north of and within the Delta, as well as the project's share of costs of the California Aqueduct and San Luis Reservoir. Contractors also pay a transportation charge that covers the capital and operational costs of facilities that pump and convey water from the Delta to the contractors. The capital costs are amortized over varying periods, with the requirement that the cost of the project's initial facilities be recovered by the end of 2035 (Sunding, Browne & Zhu, 2023).

Enterprise bridge crossing Lake Oroville in northern California during drought. (Andrew Innerarity/California Department of Water Resources.)

THREATS TO SURFACE WATER INFRASTRUCTURE PROJECTS

Climate change and, in California, the continued and growing impacts of land subsidence pose a significant threat to ongoing operations for major water conveyance and distribution systems in the Lower Colorado River Basin states (California Department of Water Resources, 2025a). In addition to the impacts of drought, the increasing occurrence and severity of extreme weather events and flooding due to climate change have the potential to both overwhelm systems and cause severe damage to infrastructure and surrounding regions (Wang et al., 2018; Huang & Swain, 2022). Of potentially more immediate concern for infrastructure operations, land subsidence resulting from groundwater over-pumping, particularly in California's Central Valley, is projected to reduce long-term average delivery conveyance and distribution capacity of California's SWP by as much as 87% by 2043 if corrective action is not taken (California Department of Water Resources, 2025a).

Immediate and near-term repair costs for the SWP already total in the tens of millions of dollars, but California's Department of Water Resources (DWR) recently estimated the long-term planning cost to water contractors to reconstruct the California aqueduct to be $3 billion, half of which would fall on MWD (Galicia, 2025; Carter, 2025). Land subsidence beneath the Friant-Kern Canal, a 151-mile section of the CVP that conveys water from the San Joaquin River, has reduced capacity on the canal by 60%. The first phase of repairs, begun in 2022, have already cost an estimated $325 million (McEwen, 2024).

Surface Water Rights

One aspect of surface water usage that our study does not capture is water that is diverted pursuant to riparian or appropriative rights but is not supplied through a state or federal contract or infrastructure. Because this water is not acquired from a government entity or through a secondary purchase from a district or utility, it is not captured in our study. However, surface rights to water (as well as groundwater use) are an undeniably crucial part of the conversation around water usage and how the pricing of water—or lack of associated price––can impact conservation or broader water supply sustainability efforts.

Water Usage in the Lower Colorado River Basin States

CALIFORNIA

California is the most populous state in the nation, with approximately 39.5 million residents, and has the largest allotment of water from the Colorado River of any state. California's Colorado River allocation is 4.4 MAFY, or 58.7% of the lower basin's 7.5 MAFY total. Of this allocation, 3.85 MAFY is allotted to agricultural irrigation districts, with growers supplied by IID entitled to 70% of the state's Colorado River water, or 3.1 MAFY.[4] The Coachella Valley Water District (433,000 AFY) and Palo Verde Irrigation District (317,000 AFY), both predominantly

4 Between 2022 and 2024, IID diverted approximately 2.2 to 2.6 MAF annually (USBR, 2022; USBR, 2023; USBR, 2024).

agricultural users, as well as MWD (550,000 AFY), are the largest remaining California allocations. MWD distributes its allocation through 26 member agencies to 19 million people in its largely urban service area in Southern California. California's average annual consumptive use of Colorado River water for the years 2022–2024 was 4,022,381 acre-feet, with conservation appropriations accounting for the consumptive use being slightly higher than the state's total allocation (USBR, 2023; USBR, 2025b; USBR, 2025c). In 2019, however, the Colorado River contributed only 3.84 MAF of California's total water supply (Colorado River Board of California, 2020).

The All-American Canal, the largest diversion on the Colorado River, passes through Winterhaven, CA on its way to the Imperial Valley. © Ted Wood/The Water Desk with aerial support provided by LightHawk.

Overall, California used a total of 64.4 MAF of water in 2020, 40.4 MAF of which was for non-environmental uses (e.g., urban and irrigated agriculture uses rather than instream flows or managed wetlands) (California Department of Water Resources, 2023). Of this 40.4 MAF, 32.4 MAF was for agricultural uses and 8.0 MAF was for urban uses (California Department of Water Resources, 2023). This 80% agricultural versus 20% municipal split of applied water usage is typical for California (California Department of Water Resources, 2023). Of the 64.4 MAF of dedicated and developed water in 2020, 4.1 MAF was supplied from the Colorado River, local projects and local imported deliveries contributed 7.4 MAF, federal projects contributed 7.8 MAF, and the State Water Project 1.9 MAF. The state estimates 16.4 MAF was sourced from groundwater extraction and 14.5 MAF was supplied through agricultural return flows or reuse

and recycled water (of which less than 2% was from recycled water).[5] The remaining 12.0 MAF was reserved for instream environmental supply (California Department of Water Resources, 2023; California State Water Resources Control Board, 2024).

ARIZONA

Arizona is one of the 10 fastest-growing states in the country, its population increasing by 11.9% between 2010 and 2020 (U.S. Census Bureau, 2021). Maricopa County, home to the Phoenix metropolitan area, had the highest population increase in the nation between 2021 and 2022 (O'Kray-Murphy et al., 2023). The most recent data published by the Arizona Department of Water Resources (ADWR) indicates that Arizona has used an average of approximately 7 MAFY of water since 2017. Arizona has a Colorado River allocation of 2.8 MAFY. In 2020, this allocation contributed 36% of the state's total water. Other in-state surface waters provided 18%, while groundwater provided the largest portion of total water at 41%, and reclaimed water provided 5% of Arizona's supply (Arizona Water Facts, n.d.). Arizona's average consumptive use of Colorado River water between 2022 and 2024 was 1,946,070 acre-feet (USBR, 2023; USBR, 2025b; USBR, 2025c). Of Arizona's total water supply in 2019, 72% went toward agricultural use, 22% toward municipal use, and 6% toward industrial use (Pullan, 2023).

NEVADA

Nevada holds the smallest allocation of Colorado River water of the seven basin states, at only 1.8% of the overall allotment, or 300,000 AFY (Stern et al., 2024). Of Nevada's 3.1 million residents, 75% live in the southern portion of the state—where Las Vegas and surrounding population-dense areas are located—and 75% of the state's water demand arises there (Nevada State Climate Office, 2024; Legislative Counsel Bureau, 2021; EPA, 2016). In turn, southern Nevada relies on the Colorado River for 90% of its water supply. This is in part possible because of Las Vegas's proximity to Lake Mead. Nevada's average consumptive use of Colorado River water between 2022 and 2024 was 207,647 acre-feet. But Nevada receives "return flow" credits for water that is used and then returned to the Colorado River or Lake Mead. As a result of these credits, Nevada's total withdrawals from the Colorado River in 2022 were 465,767 acre-feet (USBR, 2023; USBR, 2025b; USBR, 2025c). Overall, Nevada gets 70% of its total water supply from surface waters, including the Colorado River, and the remaining 30% from groundwater (EPA, 2016; Legislative Counsel Bureau, 2019). In 2015 approximately 69.7% of Nevada's water supply was used for agricultural irrigation and 17.9% for municipal public supply (Foresta, 2018).

5 California defines "recycled water" as treated wastewater that "is suitable for a direct beneficial use or a controlled use that would not otherwise occur" (Cal. Wat. Code § 13050(n)). The state reported that in 2020 the total volume of water treated to California Title 22 standards for an approved beneficial use was 729,000 AF (California Water Boards, 2023).

Methodology

Identification of Qualifying Water Districts, Utilities, or Municipal Agencies

For this study, we obtained surface water purchase pricing data for purchases or diversions from federal, state, and other public or private wholesale water providers and resellers for water utilities, districts, and municipalities in the Lower Colorado Basin states. We narrowed the scope of entities reviewed to those that: 1) divert or purchase a total of 10,000 AF or more of surface water from one or more government sources, districts, or utilities; 2) designate agriculture or municipal water supply as the major end use of the purchased water; and 3) have both volume and pricing data available for at least one district or wholesaler from which they buy water. For the purposes of our analysis, we use purchase to mean water that is bought, diverted, or acquired from a surface source other than through direct riparian or appropriative extraction from a river.

We chose 10,000 AF as the volume cutoff for review in order to capture data from as many large-scale water users as possible while also maintaining a feasible level of data collection and analysis. This cutoff captures a significant sample size of the largest users of water in all three states in the lower basin study area. Groundwater, locally produced recycled water, and local surface water obtained directly via individual surface water rights or appropriative rights were not assessed in our study or counted toward the 10,000 AF threshold.

There were a few instances in which recycled water that was not produced locally and was purchased from a producing district by an entity meeting the 10,000 AF threshold was included in our dataset as imported surface water. However, we recognize that there may be other, similar transactions in which water either was purchased by an entity that did meet the criteria for inclusion listed above or was purchased by a qualifying entity, but was not captured within the transactions we identified in the study.

Due to a lack of available data, our investigation did not include every district that purchases water exclusively from surface sources, even if those agencies purchase more than 10,000 AF from surface sources. In particular, a lack of adequate data on Tribal and industrial purchasers precluded us from including those categories. Additionally, although districts or utilities do not always fit squarely into one category (e.g., municipal or agricultural), we categorized entities on the basis of their stated majority usage of water.

We collected purchase data from a variety of sources, including USBR contracts for Colorado River water and the CVP; California Department of Water Resources data on State Water Project deliveries; CAP data and information on Salt River and Gila River deliveries from the Arizona Department of Water Resources; and data for Colorado River, Truckee River, and other surface sources in Nevada from the Nevada Division of Water Resources and Southern Nevada Water Authority (SNWA). Data was additionally collected and validated through review of water district websites, data repositories, annual financial reports, and posted water rate data and rate studies, as well as through personal contact with federal agency or water district staff.

California data, including confirmation that districts or utilities met the study's 10,000 AF threshold, was further validated through review of entities' 2020 urban water management plans (UWMPs) or agricultural water management plans (AWMPs). Urban utilities are required to submit a UWMP if they use more than 3,000 AFY or serve more than 3,000 connections (California Department of Water Resources, n.d.). We reviewed all 452 UWMPs compiled in the state's Water Use Efficiency database for 2020 for volumetric data to ensure that agencies meeting the 10,000 AF threshold were included in this study. We also reviewed 2020 AWMPs, but there is no comparable volume threshold for agricultural water districts other than a requirement from California's Water Conservation Act of 2009 (SB X7-7) for water suppliers serving more than 25,000 irrigated acres to submit an AWMP (California Department of Water Resources, 2025b). As a result, there is potential for agricultural districts to have purchased more than 10,000 AF of water but to have not submitted an AWMP and therefore evade review.

We also identified a small number of entities that met our volume criteria for inclusion but either did not have available price data or did not have price data per volume of water. For example, the California cities of Modesto, Fresno, and Clovis do not maintain a volumetric measurement of water, and we were only able to obtain price information for these municipalities by acreage irrigated. The cities of Manteca and Tracy did not have available price data.

The lack of standardized reporting across the lower basin states and between agricultural and municipal wholesalers served as a significant challenge for developing a comprehensive dataset of water pricing. As we expand on in our recommendations, creation of a centralized database or development of standardized reporting requirements across all three states would help ameliorate the current lack of transparency and inconsistent availability of information.

Pricing Data and Weighted Analysis

For our analysis, in most cases the most recent price up to and including 2024 was used as the pricing data point for each included entity, with most data dating from 2023 or 2024. There were a few instances in which our analysis did not use the most recent price available. For example, the SWP in California has two pricing calculation methodologies now in place, one for capital costs incurred before January 1, 2024 and a new pricing structure for costs incurred after January 1, 2024 (California Department of Water Resources, 2024). Given the recent change, and since our data utilizes volumes from 2019–2023, we opted to use 2023 pricing for the SWP.

To address concerns over variability of volumetric data for districts or utilities from year to year, particularly between wet or dry water years, where available we obtained five-year averages of volumetric data from 2019–2023 for each qualifying entity. If five-year volumetric data was not available, we obtained three-year averages of data from 2021–2023, which captured both wet and drought years. If neither five-year nor three-year average data was available, we utilized two-year averages for each district for 2019–2020.

We calculated the volumes using an average over the years of data we collected for each district. However, for the visual analysis we had to further simplify the data to mitigate the challenge of mapping "multiple purchase districts," districts that purchase water from more than one other district. These multiple purchase districts necessitated producing a weighted average price per AF, not just a volumetric average. For a district D that purchased water from districts 1,...,n let

$P_{i->D}$ be the price of water purchased from district i and $V_{i->D}$ be the volume of water purchased from district i. The weighted average price per acre foot paid by the district is:

$$P_D^{avg} = \frac{\sum_{i=1}^{n} P_{i->D} \times V_{i->D}}{\sum_{i=1}^{n} V_{i->D}}$$

In total, we obtained data from 217 districts, 37 of which were multiple purchase districts.

Limitations

There is a complex web of water purchases included in our dataset—where, for example, one city may buy its water from an agency that buys its water from MWD, which in turn purchases water from the USBR and SWP. Tracking pricing along that web is complex and results in challenges for obtaining complete pricing information. Furthermore, this network of sales and resales results in duplication of volumes throughout our data. Agencies that purchase from MWD, for example, may by default be repurchasing a volume of water that MWD originally purchased from the USBR or the SWP, meaning that this volume of water is counted twice within our analysis—representing two separate transactions with two separate prices for the same water. We have not attempted to factor into our pricing analyses the double-counting of those volumes; each purchase is analyzed as a separate transaction. As a result, pricing averages across states or end-use activities may reflect multiple layers of transactions or resales.

Results

We identified a total of 217 transactions or purchase points bought by 172 unique water utilities from 41 unique water wholesalers. To assess water pricing across the Lower Colorado River Basin, we first categorized each purchase point according to the purchasing entity's indicated primary use, either agricultural or municipal. (See appendix for water district specific data.)

The average price of water paid by agricultural purchasers across the three states, weighted by volume, was $30.32 per acre-foot. The average price of water paid by municipal entities, weighted by volume, was $512.01 per acre-foot. Although agricultural users make up only 26.7% of the districts or purchasers in our dataset, they purchased 48.9% of the overall water volume we accounted for. Municipal users, which comprise 73.3% of our utilities or purchasers, purchased 51.1% of the overall volume.[6]

6 Agriculture generally accounts for approximately 80% of water use in the lower basin states, compared to 20% for municipal use, yet the ratio of agricultural purchased water to municipal purchased water accounted for in this study was closer to 1:1. One major reason for the difference in these ratios is the large volume of groundwater and appropriative and riparian surface water used in the agricultural sector that is not captured in our analysis.

	Total Number of Purchase Points	Weighted Price ($/AF)	Overall Average Annual Volume (AF)
Agriculture	58	$30.32	8,025,518
Municipal	159	$512.01	8,375,283
Overall	217	$276.30	16,400,801

Table 1. Weighted price of water, total volume, and number of purchase points by district type.

To better visualize the stark difference in average agricultural and municipal water prices, we broke the dataset down into deciles by number of purchase points. Table 2, below, includes the following information for each decile: the range of prices represented in that decile, the number of municipal versus agricultural users, the total volume of water represented in that decile, and the volume and percentage of volume broken down by municipal and agricultural users.

In line with the overall price split between municipal and agricultural purchasers, as price increases across the deciles, the volume of water purchased by agricultural districts and the number of agricultural district purchasers decreases, while the volume of water and number of municipal purchasers increases. Among the details revealed by the table are:

- 43 of the 66 lowest-price purchasers, covering the lowest three deciles, are predominantly agricultural districts, while the highest four deciles are almost entirely composed of municipal entities (82 of the 85 highest-price purchasers).
- In the highest four deciles, with prices above $776.68/AF, only 1.2% of the water is purchased by agricultural districts.
- Across the highest six deciles, marked by purchase prices above $170.11/AF, only 8 out of the 129 purchasers are agricultural districts, representing purchases of only 5.4% of the water in our dataset by volume above this price. The remaining 94.6% of water above this price point is purchased by municipal districts.
- All of the agricultural districts in the highest six deciles, with prices above $170.11/AF, are located in California and within 50 miles of a large metropolitan area (San Francisco, Los Angeles, San Diego) or the greater Coachella Valley (approximate population of 500,000).

As will be discussed below, access to federal water, or in some cases geographic proximity to federal sources, has a substantial impact on the price of water.

Decile	Price Range ($)	Municipal Users (Count)	Agricultural Users (Count)	Total Volume (AF)	Municipal Volume (AF)	Municipal Volume %	Agricultural Volume (AF)	Agricultural Volume %
1	$0.00–$3.70	8	14	7,646,517	2,395,931	31.3%	5,250,586	68.7%
2	$3.70–$33.41	12	10	861,931	388,852	45.1%	473,079	54.9%
3	$33.50–$49.94	3	19	1,106,246	100,730	9.1%	1,005,516	90.9%

Table 2. Decile analysis of water purchase points.

Decile	Price Range ($)	Municipal Users (Count)	Agricultural Users (Count)	Total Volume (AF)	Municipal Volume (AF)	Municipal Volume %	Agricultural Volume (AF)	Agricultural Volume %
4	$50.08–$154.85	15	7	1,557,313	544,101	34.9%	1,013,212	65.1%
5	$170.11–$297.46	20	2	943,922	798,477	84.6%	145,445	15.4%
6	$316.00–$730.28	19	3	1,521,196	1,417,006	93.2%	104,190	6.8%
7	$776.68–$1,080.18	21	1	1,239,818	1,238,118	99.9%	1,700	0.1%
8	$1,116.64–$1,288.00	21	0	758,444	758,444	100.0%	0	0.0%
9	$1,288.00–$1,900.68	20	1	449,168	433,857	96.6%	15,311	3.4%
10	$1,903.26–$2,870.21	20	1	316,244	299,766	94.8%	16,478	5.2%

Table 2. Decile analysis of water purchase points.

Water Deliveries Are Missing a Price Signal

Wholesalers, districts, and utilities receiving deliveries of Colorado River water or water from Sierra Nevada runoff through California's Central Valley Project or State Water Project often pay a price for that delivery, reflecting the capital costs of the conveyance infrastructure or operations and maintenance costs. Where the water is delivered through federal- or state-owned and managed infrastructure (for example, the CVP, CAP, or SWP), that cost is reflected—and presented in our analysis—in the price paid by districts or utilities for delivery of the water. But in these cases, the water itself, the actual liquid taken from the Colorado River and other streams, delivered in staggering quantities by the Bureau of Reclamation or California Department of Resources, is free or close to it.

For example, the CAWCD purchases water from the Bureau of Reclamation for $0.25/AF and then delivers it to municipalities through CAP for $227.93/AF to partially cover capital costs as well as costs of operations, maintenance, and repairs of the system. For other, privately owned or operated systems such as the All-American Canal or Colorado River Aqueduct, the wholesale entity (IID or MWD) receives water from the Bureau of Reclamation free of charge, or nearly free, and the costs of conveyance and delivery are then passed on to districts or utilities that purchase from them farther downstream. In other words, it costs money to move water around, but there is no cost, and no price signal, for the actual water.

Agricultural Districts Pay a Fraction of What Municipal Districts Pay

A review of the lowest and highest deciles demonstrates a clear division between agricultural and municipal pricing schemes. The lowest decile, comprising districts that purchase water between $0.00/AF and $3.70/AF, covers nearly half of the total water volume in our analysis. In fact, 44.5% of the water in our dataset costs less than $1/AF. While the indicated price does not reflect the costs of conveyance or delivery within privately owned infrastructure projects (e.g., the All-American Canal or Colorado River Aqueduct), discussed further below, there remains an extreme divide between the benefit of low-cost water for agricultural as opposed to municipal entities.

Within the lowest decile, 14 of the 22 purchasing entities are primarily agricultural districts, which account for 68.7% of the water purchased. Only 8 of the 22 are municipal, accounting for 31.3% of the water. IID purchases by far the largest volume of the least expensive water, receiving an average of 2,534,319 AF of Colorado River water from the USBR each year, nearly 15.5% of the volume represented in our overall dataset, at nearly zero cost. Overall, 91% of the water in the lowest decile is taken from the Colorado River through purchases from the Bureau of Reclamation, with the remaining 9% split among the Truckee River, Carson River, Lake Oroville, Lake Berryessa, Feather River, Lake Spaulding, Yuba River, Bear River, and Collins Lake.

Nearly a quarter (24.3%, or 3.98 MAF) of all purchased water in our dataset is obtained for $0.00/AF from the federal government by five agricultural purchasers: Imperial Irrigation District (southeastern California), the Coachella Valley Water District (southeastern California), Palo Verde Irrigation District (southeastern California), Truckee–Carson Irrigation District (northwestern Nevada), and Unit B Irrigation and Drainage District (southwestern Arizona).

In contrast, the four municipal users that pay $0.00/AF for water obtained only 38,683 AF of water, or 0.2% of the total volume in our dataset—two full orders of magnitude less than agricultural users. These include the California cities of Vacaville, Vallejo, and Fairfield and the Placer County Water Agency. Expanded to all the municipalities in the lowest decile, we include the city of Yuma, Arizona; the Central Arizona Water Conservation District, MWD (for part of its supplies), and the Robert B. Griffith Water Project (a project of SNWA). For water priced under $1.00/AF in our study, the CAWCD (which serves municipal and agricultural districts) pays $0.25/AF for an average of 1,043,783 AF per year. MWD similarly pays $0.25/AF for 846,006 AF per year. The combined volume is still substantially less than the volume obtained by primarily agricultural districts.

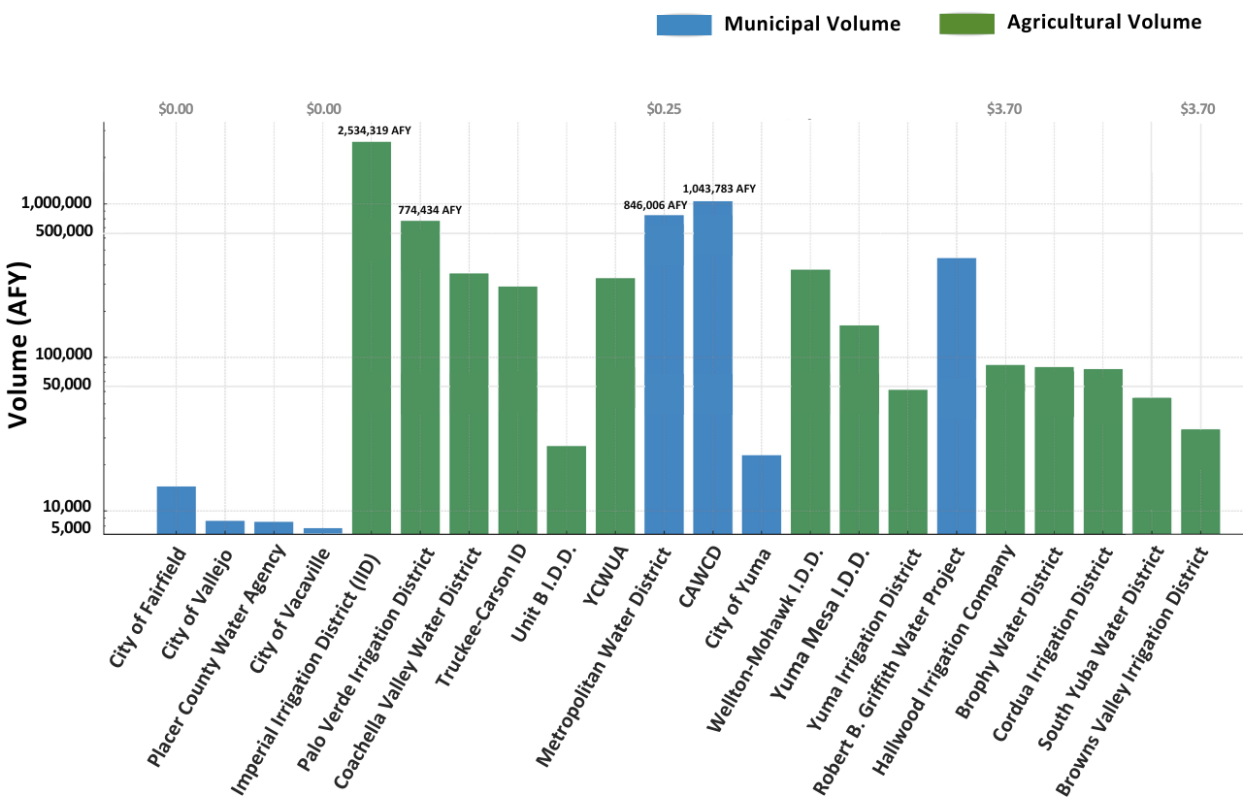

Figure 4. Districts and utilities in the lowest decile ($0.00/AF–$3.70/AF) and volume purchased in AF, listed in increasing order of price paid (logarithmic scale). Agricultural districts purchased 68.7% of the water in this decile.

Figure 4 shows the purchase volumes and price for water across the lowest decile of purchasers in our study. The municipalities in this graph represent a small subset of primarily municipal districts that obtain water directly from the federal government. Seven of the eight municipalities in the lowest decile receive water either directly from the federal government or through the Solano Project in Northern California, also a federal project within the Bureau of Reclamation.

In contrast, municipal purchasers overwhelmingly buy the majority of the most expensive water. As shown in Figure 5, the San Jose Water Company purchases by far the greatest volume of water in the highest decile—the most expensive water—though its purchase volume is less than 1% of the total volume in our dataset and the highest decile comprises only 1.9% of the total volume overall. 15 out of the 21 districts paying the highest price for water are in the San Francisco Bay Area and six are in Southern California; all are located in coastal California. The only non-municipal district in the highest decile is the Valley Center Municipal Water District (VCMWD), which purchases agricultural water from a primarily municipal-serving utility also located in Southern California.

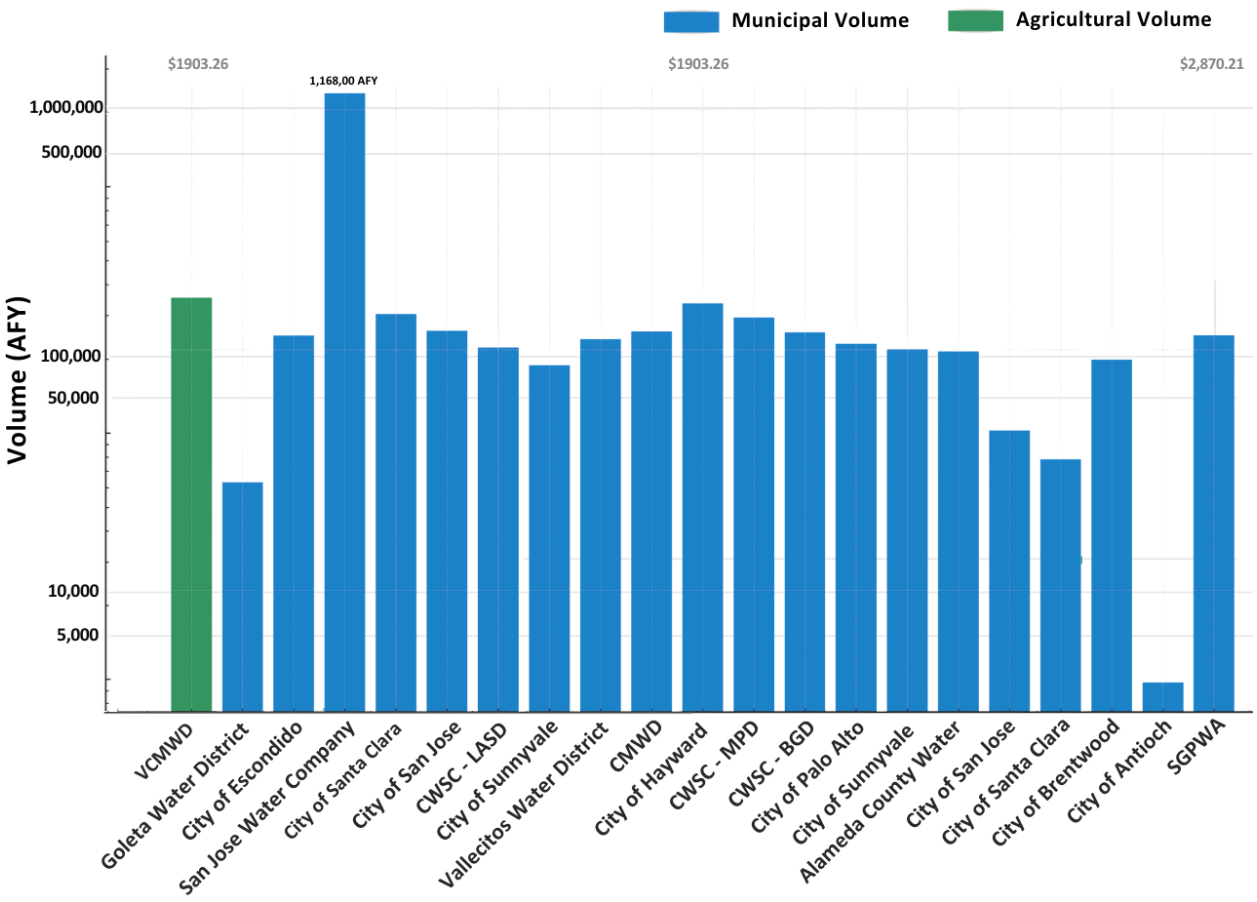

Figure 5. Districts and utilities in the highest decile ($1,903.26/AF–$2,870.21/AF) and volume purchased in AF, listed in increasing order of price paid (logarithmic scale).

Expanding the view to roughly the highest three deciles, Figure 6 shows that only two agricultural entities purchase water for more than $1,000/AF: the Rainbow Municipal Water District and VCMWD. Both these districts are located in Southern California and obtain their water from the San Diego County Water Authority (SDCWA), a regional wholesaler that primarily supplies municipal agencies in western San Diego County. In comparison, agricultural water purchasers in our dataset located in California's Central Valley, many of which obtain their water from the CVP, in general pay rates of $100/AF or less. The variation in cost is impacted greatly by the source of water and the effect of multiple resale transactions. For example, SDCWA purchases water from IID and MWD, which obtain their water from the USBR (Colorado River) and SWP, whereas users in the Central Valley often purchase directly from the USBR via the CVP. Whether an agricultural purchaser obtains water from a largely municipal versus agricultural district, or directly from the federal government (or at least through federal infrastructure) versus from multiple resellers, immensely impacts the price paid for water.[7]

7 As of December 21, 2023, the Rainbow Municipal Water District detached from SDCWA, citing high costs as the reason (Mora, 2023). The separation of this district from SDCWA due to price considerations emphasizes how disproportionately high prices for urban agriculture could discourage farming in more urban areas.

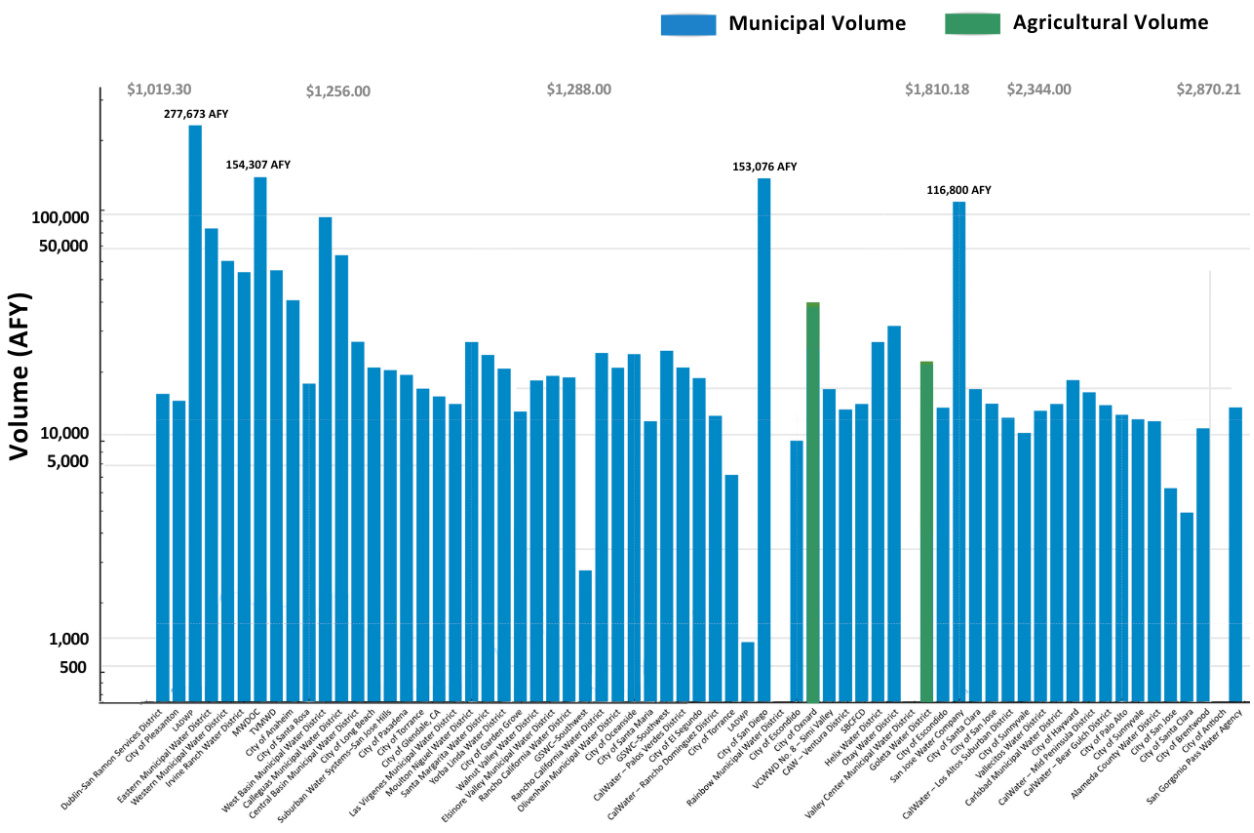

Figure 6. Districts and utilities purchasing water at prices greater than $1,000/AF by volume (AF) (logarithmic scale).

Federally-Purchased Water Provides an Immense Advantage

In Table 3, below, we compare pricing data across five source categories: Colorado River, Central Arizona Project (Colorado River Water through CAWCD), Central Valley Project, California's State Water Project, and "Other." The first three cover water diverted through federal water projects and supplied from the Colorado River or CVP.

The first category of water, labeled "Colorado River," encapsulates water supplied directly by the USBR from the Colorado River through projects including the All-American Canal and Colorado River Aqueduct. Colorado River water in this category has a weighted average price of $0.12/AF and includes 6,968,944 AF of water, 42.5% of the total in our study. Districts that receive this Colorado River water directly from the USBR do not pay more than $0.50/AF to the federal government, though they incur costs associated with delivery through their own conveyance infrastructure.

The second category of water is also from the Colorado River, reflecting water administered by the CAWCD through CAP, and has a weighted average price of $227.93/AF. While the CAWCD

pays the USBR only $0.25/AF for the water at Parker Dam, the cost to utilities or districts receiving CAP water is largely due to a pricing structure that includes capital costs, operations, maintenance, and repairs (discussed above) and is the most expensive of the federally supplied water.

The third category, covering water supplied by the USBR through California's CVP, has a weighted average price of $38.92/AF, again to cover partial capital and O&M costs of the system. Agricultural districts receive 85.9% of this water. As discussed above, regardless of pricing method, the water itself in all of these cases is free, or nearly free.

The fourth category of water deliveries comes from California's SWP and has a weighted average price of $247.14/AF, though that price is split at $364.38/AF for municipal entities and $95.03/AF for agricultural districts. In this case, the difference in price is largely reflective of variation in delivery costs. Agricultural districts that receive SWP water are largely located in California's Central Valley and therefore benefit from lower energy costs for conveyance compared to municipal districts located farther south, which must cover the cost of pumping the water over the Tehachapi Mountains as well as transportation capital costs that are amortized over 50 years, as opposed to 75 years for agricultural contractors.

The final category in our analysis is water purchased from "other" sources. This category is a catch-all for any water not diverted directly from the Colorado River (including CAP), CVP, or SWP, including transfers and inter-district purchasing and purchasing from private-sector sources.[8] For example, MWD's purchased water from the USBR is included in the first category of water diverted directly from the Colorado River, but the water MWD then sells to districts or utilities falls under the "other" category. Much of the water captured in the "other" category may have passed through multiple transactions, with each raising the price to account for conveyance and distribution costs and, in many cases, baked-in profits. This water has a weighted average price of $852.15/AF and is by far the most expensive category in our dataset—the highest purchase prices exceed $2,800/AF.

On average, the cost of water purchased from the USBR is nearly 12 times cheaper than water purchased from California's SWP and nearly 40 times cheaper than water purchased from other sources. Agricultural districts receive 66.7% of inexpensive federal water but purchase only 13.0% of the substantially more expensive "other" water. The disparity highlights a central tension: municipalities, particularly those that do not receive water from federal projects, pay much more for water than agricultural districts do. And as discussed earlier, it further reflects that the price of water from federal sources, as opposed to the cost to deliver that water, does not reflect the scarcity of water in the Colorado Basin states.

8 A small volume (9,322 AF) of water purchased from the U.S. Bureau of Reclamation's Cachuma Project in Central Coast, California, is included in the "other" category because it does not fall under the four major projects included in Table 3.

	Number of Purchases	Weighted Overall Price ($/AF)	Weighted Municipal Price ($/AF)	Weighted Agricultural Price ($/AF)	Overall Volume (AF)	Municipal Volume (AF)	Agricultural Volume (AF)
Colorado River	12	$0.12	$0.30	$0.04	6,968,944	2,357,248	4,611,696
Colorado River via CAP	14	$227.93	$227.93	–	598,012	598,012	–
CVP	36	$38.92	$47.02	$37.60	1,745,724	245,503	1,500,221
SWP	26	$247.14	$364.38	$95.03	2,423,302	1,368,521	1,054,781
Other	128	$852.15	$956.66	$152.24	4,374,318	3,805,999	568,319

Table 3. Weighted price of water and volume purchased by source and user type.

Districts are Selling Free Water Back to the Federal Government

The federal government routinely buys water back from districts for conservation purposes. In 2022 the federal government announced the Lower Colorado River Basin System Conservation and Efficiency Program, which would "help increase water conservation, improve water efficiency, and prevent the System's reservoirs from falling to critically low elevations that would threaten water deliveries and power production" (U.S. Department of the Interior, 2022b). Under this program, the USBR paid districts upwards of $400 per acre-foot of water they conserved. For example, the USBR paid IID $777/AF of water conserved for a total of $82.4 million, Coachella Valley Water District $400/AF for $8.4 million total, MWD $400/AF for a total of $140.4 million, and Yuma Mesa Irrigation and Drainage District $400/AF for a total of $27.2 million—among others (USBR, n.d.). Per the data in our study, IID and Coachella Valley Water District pay $0.00/AF and MWD and the Yuma Mesa District pay $0.25/AF for water from the USBR. This means that the districts obtain water from the federal government at low or no cost, and the government then buys that water back from the districts at enormous cost to taxpayers. While there is opportunity cost lost to the agricultural sellers in this scenario, the overall inequity and burden on the public is a clear example of how water delivery systems in the Lower Colorado River Basin states are outdated.

California Pays More for the Same Water Resource

Disparities in water pricing play out across states as well. Figure 7 shows the geographic distribution of prices for districts in our study across California, with dark green representing higher prices per acre-foot and lighter green representing lower prices per acre-foot (an interactive online version of our map can be found here). Our California data covers districts spanning

the San Francisco Bay region, Central Valley, Central Coast, and Southern California. We note that highly productive agricultural areas including the Salinas and Anderson Valleys, as well as Monterey Bay and Napa, were not included in our analysis because the vast majority of water used in these regions comes from groundwater or from appropriative and riparian water rights held by the water districts. As a result, purchase volumes are modest and generally fall under our 10,000 AFY threshold.

In Arizona (Figure 8) our data is concentrated in the southern region of the state around Phoenix and Tucson, in Maricopa and Pima Counties, where 76% of the state's population lives. This geographic focus is driven largely by deliveries from the Central Arizona Project, which runs from Lake Havasu on the Colorado River roughly east-southeast to its terminus beyond Tucson. In Nevada (Figure 9) our data is concentrated near the three largest cities: Las Vegas, Henderson, and Reno. Some 75% of Nevada's 3.1 million residents live in southern Nevada, which also accounts for 75% of the state's water demand (Nevada State Climate Office, 2024; Legislative Counsel Bureau, 2021; EPA, 2016). Southern Nevada relies on the Colorado River for 90% of its water supply, accounting for the vast majority of the state's total use. As is evident from the maps, the regions with the most expensive water are all in California, mostly concentrated in coastal areas around the San Francisco Bay and in Southern California.

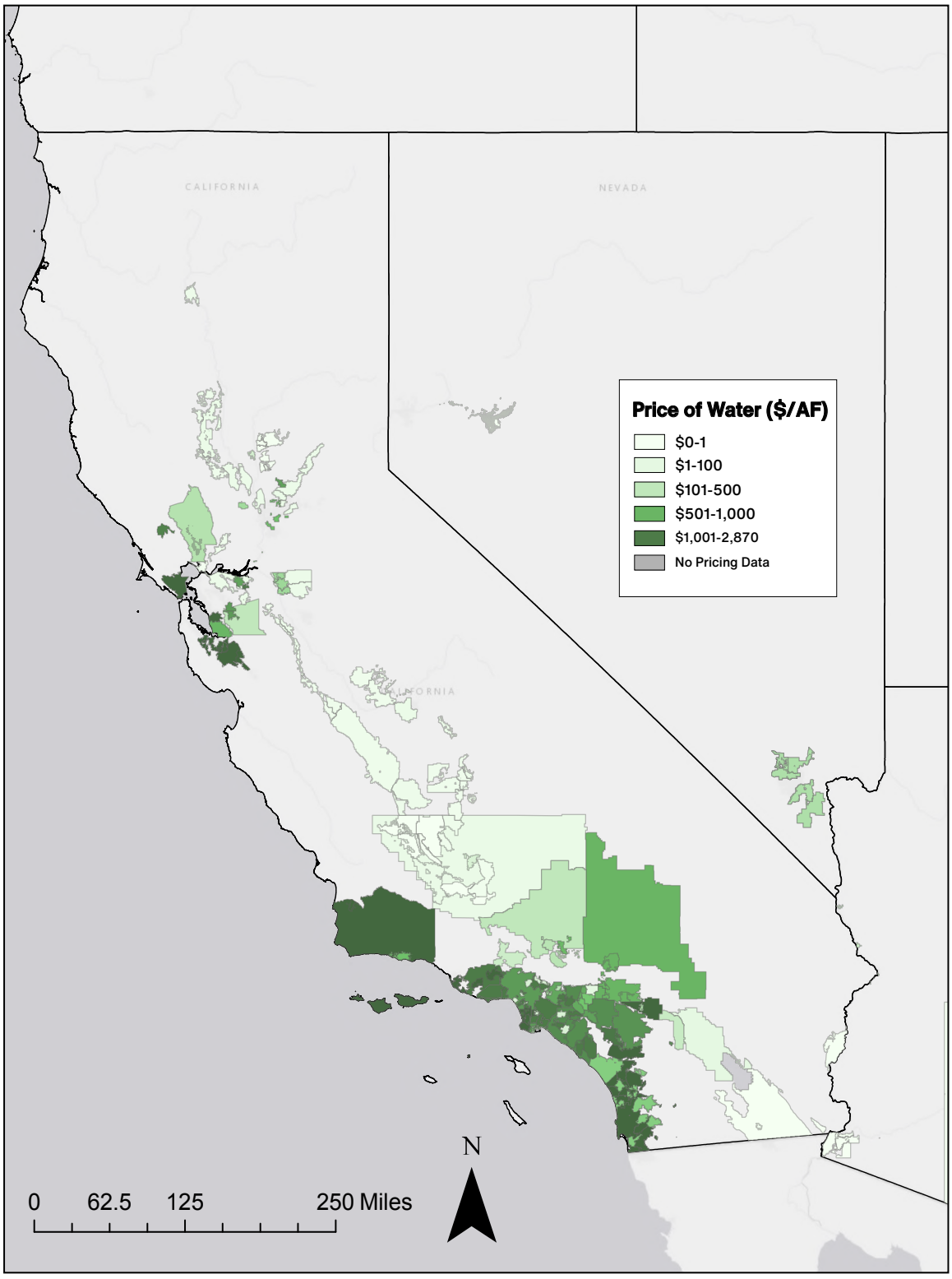

Figure 7. Water prices by district in California (≥10,000 AF/yr).

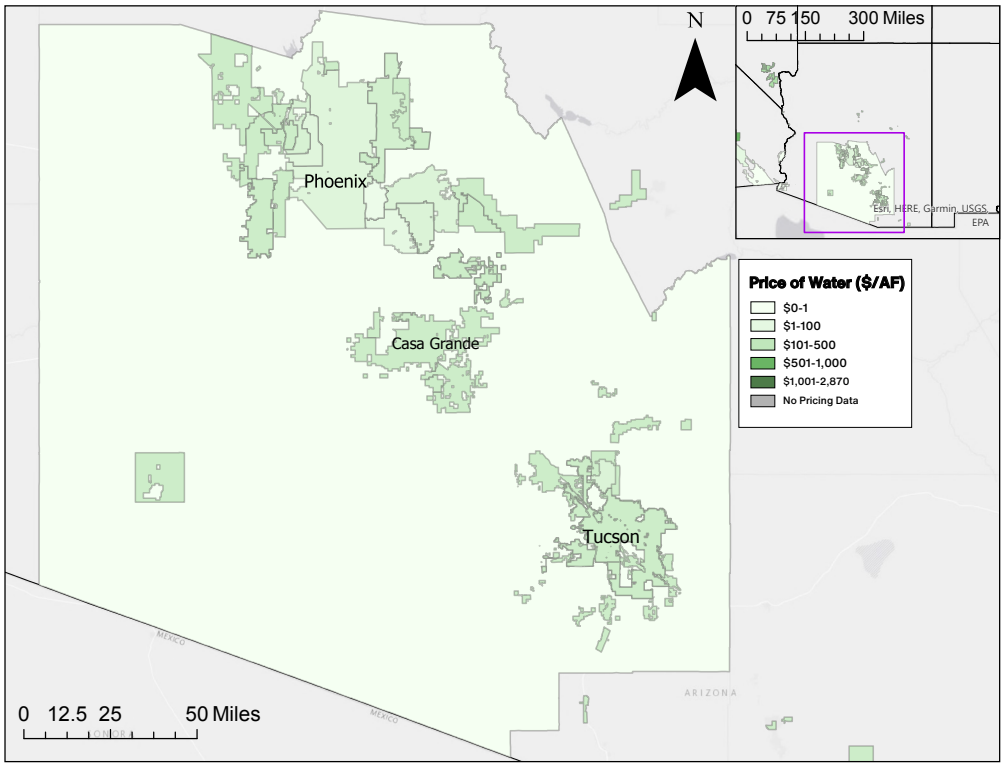

Figure 8. Water prices by district in southern Arizona (≥10,000 AF/yr).

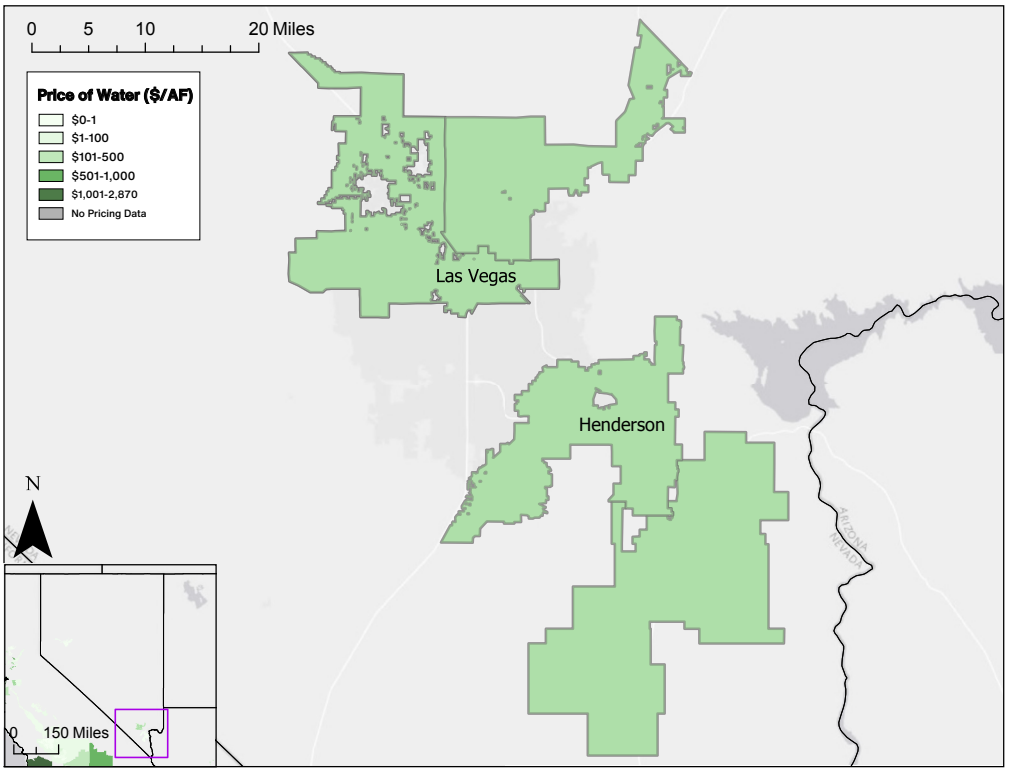

Figure 9. Water prices by district in southern Nevada (≥10,000 AF/yr).

Price differences across states are further demonstrated by the breakdown of purchases between municipal and agricultural entities by state. In all three states, agricultural water is on average priced significantly lower than municipal water. But California districts pay by far the highest prices across each category. In fact, all of the price points for municipal entities paying more than $1,000/AF are located in California, which drives the state's weighted average up to $343.32/AF. Arizona, on the other hand, has the lowest prices across each category, with the state's overall weighted price sitting at just $49.17/AF, in large part due to the substantial volume of water purchased from the USBR by CAWCD at $0.25/AF.

The large differences in weighted average water prices across states, especially for municipal water, is driven primarily by the volume and pricing of "other" water. The "other" category of water in California costs an average of nearly $1,000/AF across our study, or 2.5 times the price of water from other sources in Nevada and 39 times the price paid in Arizona.

	Weighted Overall Price ($/AF)	Weighted Municipal Price ($/AF)	Weighted Agricultural Price ($/AF)	Overall Volume (AF)	Municipal Volume (AF)	Agricultural Volume (AF)
California	$343.32	$722.32	$35.84	12,289,235	5,504,478	6,784,847
Nevada	$144.52	$193.01	$0.00	1,156,409	865,909	290,500
Arizona	$49.17	$72.39	$0.17	2,955,067	2,004,896	950,171

Table 5. Weighted price of water and volume purchased, by state and end use.

For example, the largest purchaser of water in California is IID, which receives 2,534,319 AF of water from the USBR for $0.00/AF. IID then sells this water to additional districts for prices between $20.00/AF and $776.97/AF; further resales of this water can drive the price up to $1,256.00/AF. Though the relatively high price compared with the free water received through the USBR is partially a result of embedded costs for conveyance and treatment, and also reflects opportunity costs for the seller, districts purchasing water two or three transactions removed from the initial purchase pay a premium for profits realized earlier in the supply chain, against sellers that receive the initial resource free or nearly free of charge.

Discussion and Recommendations

The need for the price of water to reflect its scarcity is urgent in light of the growing Colorado River Basin crisis. The river is facing unprecedented water supply shortages, but as stated previously, negotiations among the seven Colorado River Basin states have been at an impasse for two years. The federally imposed November 11th deadline for state consensus on a solution has passed, and there is a critical need for a longer-term strategy. Below, we offer two recommendations to help achieve the goal of reliable, sustainable and resilient water supply management.

The federal government has the leverage, opportunity, and clear exigency to step in and establish a water reliability and security surcharge for deliveries from federal projects as part of the final post-2026 Colorado River systems operations package. We cannot address water scarcity in the West without first ending the massive federal subsidization of free or nearly free water. As an initial step toward reducing subsidization, the federal government should recognize that water is a limited resource and must be priced as such to encourage conservation and eliminate waste; to do so, the federal government should assess a water reliability and security surcharge on all deliveries of water from the Colorado River, Central Valley Project, and other major federal projects.

The surcharge should cover operations, maintenance, and repair costs for the federal project infrastructure. And with climate change and groundwater overdraft issues leading to major infrastructure impacts and future risks—including land subsidence beneath existing water infrastructure and extreme and temporally shifted flows placing strain on storage and conveyance systems—the price of water must include the cost of building climate resilience and water security into the water conveyance distribution, and storage systems. Adding a modest surcharge to diverted federal water would still result in low-cost water but would provide funding for building in this system resilience.

A surcharge would curtail the excessive water waste across the lower basin states, because there would finally be a significant price signal associated with the volume of water used. The greatest impact here would be to the agricultural sector. Though there is not a direct correlation between initial purchase or diversion cost at the wholesale level and retail or end user prices, especially given the complex chain of resale transactions that may occur, the introduction of a price signal will reduce water use and affect where it is used across the Colorado Basin (see, e.g., Bork, 2023; Glennon, 2005). And while a surcharge would be only a first step toward addressing the equity concerns raised in our analysis regarding the disparity in price paid by agricultural and municipal purchasers, it would ensure that agricultural entities pay for the water resource and decrease the burden placed on taxpayers to subsidize water use.

As an example, even a $50 per acre-foot water reliability and security charge for water from the Colorado River would generate approximately $300 million to $375 million per year (assuming up to a 1.5 MAFY reduction in post-2026 deliveries) depending on future river flow diversions, and for CVP water would generate about $350 million a year. If the water reliability and security charge were $100 per acre-foot, then those numbers would double to $600–$750 million per year for the lower basin and $1.2–$1.5 billion per year if the charge applied to lower and upper basin diversions for the entire Colorado River watershed. All revenues generated through the program should provide benefits to, or be utilized in, the water districts that pay the surcharges.

This would greatly reduce the annual crises of trying to find general fund money in the federal budget or state bond dollars for system capital improvements such as upgrading conveyance, storage, and distribution systems in subsidence areas and reducing evaporative and leakage losses from conveyance, distribution, and storage systems.

Furthermore, a portion of the water reliability and security charge could be used to reduce demand and enhance local supplies. Revenues could be utilized to reduce demand by funding the purchase and installation of more efficient agricultural irrigation or conveyance systems to reduce or eliminate wasteful irrigation practices. To maximize water use efficiency, agricultural districts must invest in upgrades to their water management systems and services to complement farmers' investments in their on-farm irrigation systems. We need significant and reliable investments in irrigation district–level infrastructure so that farmers can proactively plan for and work within a future with more limited, increasingly variable water supplies. Revenues could also be used to fund the replacement of urban nonfunctional turf with climate appropriate landscaping to reduce landscape irrigation needs. On the increased supply side, revenues could be used to enhance stormwater capture for groundwater augmentation and for direct stormwater capture and use systems, as well as for tail-end water reuse or recovery systems on agricultural lands. In addition, revenues could be used to help pay for water recycling facilities. Funds for water recycling and stormwater infiltration and capture projects could be tied to commitments to reduce a commensurate volume of water purchases from suppliers of nearly free water. Program funds should provide proportional benefits to the districts that generate fee revenues.

The water reliability and security surcharge program could be implemented by the USBR, which already has similar fee and water system management systems in place. Another possible mechanism to implement the program would be a legally binding multistate agreement or authority wherein the states collect the water reliability and security charges and allocate the funds appropriately and equitably. In either case, effective implementation of a surcharge at the wholesale level could result in a more efficient and resilient water delivery system, along with reduced demand and increased supply in the Colorado River Basin states.

States should create and maintain an accessible database that offers a breakdown of dollar-per-acre-foot values and annual volumes purchased year-over-year for all water districts that purchase more than 1,000 AFY. As of the drafting of this report, there is no public database that has comprehensive information on our water inventories broken down by wholesalers. This database would serve as a valuable resource for all stakeholders interested in accessing accurate pricing and volume information and would provide more granularity than this study by extending the threshold for inclusion down to 1,000 AFY, thereby encompassing smaller water purchasers. Such metrics would enable stakeholders to evaluate the overall conveyance and distribution performance over time and scope for cost-effective modernization investments.

Crucially, this database must include not just purchased surface water, but also surface water rights more broadly, as well as groundwater and recycled water. As stated in our methodology section, the lack of comprehensive, standardized reporting across the lower basin states served as a significant challenge for transparency and informed decision- making. A more transparent and accurate water budget would support efforts to address overconsumption, improve distribution system performance, and prioritize cost-effective investments in modernizing distribution

systems at the district, state, and federal levels.

Increased water transparency could also be achieved by passing legislation across all Lower Colorado River Basin states that would establish consistent reporting requirements for all municipal and agricultural districts that reach a certain volumetric threshold of water purchased. In California, urban utilities that use more than 3,000 AFY (or serve more than 3,000 connections) are required to submit a UWMP, whereas agricultural water suppliers have to submit AWMPs only if they serve more than 25,000 irrigated acres. In order to increase transparency to the public on water usage, both agricultural districts and municipal utilities across all three lower basin states should be made to submit AWMPs or equivalent reporting if they use more than 1,000 AFY.

The Need for Future Research

Future research should investigate wholesale water prices in the Upper Colorado River Basin states as well as the price elasticity of agricultural demand for water to discover at what price point the greatest reductions in water use occur. Given that our study focused on the price paid by districts for water rather than the retail water prices paid by consumers, the focus of our research did not include the impact of water pricing on customers in environmentally or economically disadvantaged communities. Nonetheless, we believe our study can serve as a stepping stone for future retail-level research to understand why costs are higher in certain regions, the pass-through costs being disseminated via districts to customers, and the disparities in pricing facing certain communities.

This investigation would ideally be one step along a longer path of investigation of water pricing mechanisms in the Lower Colorado River Basin. Understanding the institutional dynamics of water pricing will be critical for developing effective resource management strategies that incentivize conservation and reflect the scarcity of our vital water resources. The increasing effects of climate change on water system dynamics in the Colorado River Basin underscore the need for updated pricing models that begin to reflect the true cost and value of water under current and projected climate conditions, incentivize more efficient use, and fiscally encourage conservation practices.

Lake Mead and Hoover Dam
(Christian Lendl on Unsplash.)

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Appendix

The table below includes a comprehensive list of the purchasing wholesalers in our analysis, listed in order of lowest to highest price per acre-foot. Sections are left blank where the origin water source could not be identified.

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
City of Fairfield	Municipality	Solano County Water Agency (SCWA)–Solano Project Water	California	Upper Putah Creek (Lake Berryessa), Lake Oroville	14,471	$0.00
City of Vallejo	Municipality	Solano County Water Agency (SCWA)–Solano Project Water	California	Lake Berryessa, Feather River, Upper Putah Creek (Lake Berryessa)	8,621	$0.00
Placer County Water Agency	Municipality	PG&E Zone 3 Water Supply	California	Lake Spaulding, Yuba River, Bear River	8,501	$0.00
City of Vacaville	Municipality	Solano County Water Agency (SCWA)–Solano Project Water	California	Lake Berryessa, Kern River	7,090	$0.00
Imperial Irrigation District	Agriculture	USBR	California	Colorado River	2,534,319	$0.00
Palo Verde Irrigation District	Agriculture	USBR	California	Colorado River	774,434	$0.00
Coachella Valley Water District	Agriculture	USBR	California	Colorado River	352,773	$0.00
Truckee–Carson Irrigation District	Agriculture	USBR	Nevada	Truckee River, Carson River	290,500	$0.00
Unit B IDD	Agriculture	USBR	Arizona	Colorado River	26,518	$0.00
Yuma County Water Users' Association	Agriculture	USBR	Arizona	Colorado River	327,929	$0.05
Metropolitan Water District of Southern California	Municipality	USBR	California	Colorado River	846,006	$0.25
Central Arizona Water Conservation District	Municipality	USBR	Arizona	Colorado River	1,043,783	$0.25
City of Yuma	Municipality	USBR	Arizona	Colorado River	23,034	$0.25
Wellton-Mohawk IDD	Agriculture	USBR	Arizona	Colorado River	372,539	$0.25
Yuma Mesa IDD	Agriculture	USBR	Arizona	Colorado River	161,553	$0.25
Yuma Irrigation District	Agriculture	USBR	Arizona	Colorado River	61,632	$0.25

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Robert B. Griffith Water Project (SNWA)	Municipality	USBR	Nevada	Colorado River	444,425	$0.50
Hallwood Irrigation Company	Agriculture	Yuba Water Agency	California	Yuba River	89,208	$3.70
Brophy Water District	Agriculture	Yuba Water Agency	California	Yuba River	86,870	$3.70
Cordua Irrigation District	Agriculture	Yuba Water Agency	California	Yuba River	84,000	$3.70
South Yuba Water District	Agriculture	Yuba Water Agency	California	Yuba River	54,307	$3.70
Browns Valley Irrigation District	Agriculture	Yuba Water Agency	California	Yuba River, Collins Lake	34,005	$3.70
Ramirez Water District	Agriculture	Yuba Water Agency	California	Yuba River	30,389	$3.70
Wheatland Water District	Agriculture	Yuba Water Agency	California	Yuba River	25,300	$3.70
Dry Creek Mutual Water Company	Agriculture	Yuba Water Agency	California	Yuba River	17,751	$3.70
City of Redding	Municipality	CVP (USBR)–Sacramento River Contract	California	Sacramento River	10,035	$5.91
City of El Centro	Municipality	IID	California	Colorado River	13,001	$20.00
City of Vallejo	Municipality	Solano County Water Agency (SCWA)	California	Lake Berryessa, Feather River, Upper Putah Creek (Lake Berryessa)	8,875	$20.50
City of Phoenix	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	169,507	$25.17
City of Chandler	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	36,418	$25.17
City of Tempe	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	35,660	$25.17
City of Mesa	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	34,500	$25.17
City of Glendale	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	20,171	$25.17
Town of Gilbert	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	18,565	$25.17
City of Scottsdale	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	14,745	$25.17
City of Peoria	Municipality	Salt River Project (SRP)	Arizona	Salt River, Verde River	10,501	$25.17
City of Tracy	Municipality	CVP (USBR)	California	Delta-Mendota Canal	16,874	$26.82
Arvin-Edison WSD	Agriculture	CVP (USBR)	California	Millerton Lake, Kern River	58,177	$28.94
Delano-Earlimart ID	Agriculture	CVP (USBR)	California	Millerton Lake	98,215	$30.61
Porterville ID	Agriculture	CVP (USBR)	California	Millerton Lake, Tule River	27,359	$31.82

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Saucelito ID	Agriculture	CVP (USBR)	California	Millerton Lake	21,769	$32.23
Tulare ID	Agriculture	CVP (USBR)	California	Kaweah River	39,506	$32.87
Shafter-Wasco ID	Agriculture	CVP (USBR)	California	Millerton Lake	41,043	$33.03
Lowr Tule River ID	Agriculture	CVP (USBR)	California	Tule River, Cross Valley Canal	113,570	$33.41
Lindmore ID	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	25,509	$33.50
Chowchilla WD	Agriculture	CVP (USBR)	California	Millerton Lake, Buchanan Dam, Friant Dam, San Joaquin River	76,853	$33.54
San Luis WD	Agriculture	CVP (USBR)	California		30,640	$33.98
Colusa County WD	Agriculture	CVP (USBR)	California		19,898	$34.94
Santa Clarita Valley Water Agency	Municipality	Buena Vista WSD	California	Kern River, Sacramento–San Joaquin Delta, Feather River	11,000	$35.00
Madera ID	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	87,594	$35.54
Southern San Joaquin MUD	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	84,002	$35.75
Orange Cove ID	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	22,262	$36.58
Westlands Water District	Agriculture	CVP (USBR)	California		412,360	$37.63
Orland-Artois WD	Agriculture	CVP (USBR)	California		13,616	$37.94
Kanawha Water District	Agriculture	CVP (USBR)	California		12,919	$38.85
Del Puerto WD	Agriculture	CVP (USBR)	California		34,259	$39.38
Panoche WD	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	27,103	$39.51
Terra Bella ID	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	20,021	$39.73

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
City of Brentwood	Municipality	ECCID	California	Sacramento–San Joaquin Delta, Sierra Nevada range	9,666	$41.45
Lindsay-Strathmore ID	Agriculture	CVP (USBR)	California	Millerton Lake, Friant Dam, San Joaquin River	17,308	$42.00
Dudley Ridge Water District	Agriculture	SWP	California	Sacramento–San Joaquin Delta, Oroville Dam (SWP)	25,632	$42.29
Westside WD	Agriculture	CVP (USBR)	California		18,749	$42.42
Tulare Lake Basin Water Storage District	Agriculture	SWP	California	Kaweah River, Tule River	26,050	$44.01
Santa Clara Valley Water District	Municipality	CVP (USBR)	California	San Luis Reservoir	80,064	$45.96
Natomas Central MWC	Agriculture	CVP (USBR)	California	Sacramento River	14,696	$49.83
Stockton East Water District	Agriculture	CVP (USBR)	California	New Melones Project, New Hogan Reservoir	36,044	$49.94
Contra Costa WD	Municipality	CVP (USBR)	California	Sacramento–San Joaquin Delta	74,323	$50.08
Central San Joaquin WCD	Agriculture	CVP (USBR)	California	New Melones Project, Millerton Lake, Friant Dam, San Joaquin River	23,375	$50.94
Reclamation District No. 108	Agriculture	CVP (USBR)	California	Sacramento River	19,096	$51.79
Placer County Water Agency	Municipality	Western PG&E Water Supply Contract	California	Lake Spaulding, Canyon Creek, Yuba River, Bear River	84,401	$51.91
Sutter MWC	Agriculture	CVP (USBR)	California	Sacramento River	34,830	$51.96
City of Fresno	Municipality	CVP (USBR)	California	Millerton Lake	39,614	$52.43
City of Folsom	Municipality	San Juan Water District	California	Folsom Lake, American River	18,405	$52.96

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Citrus Heights Water District	Municipality	San Juan Water District	California	American River, American River (via Folsom Dam/ Reservoir–USBR), American River (via Middle Fork Project–PCWA), American River (USBR)	10,984	$52.96
City of Roseville	Municipality	CVP (USBR)	California	American River, Folsom Lake	19,358	$53.10
Princeton-Codora-Glenn ID	Agriculture	CVP (USBR)	California	Sacramento River	11,078	$53.16
Glenn-Colusa ID	Agriculture	CVP (USBR)	California	Sacramento River	58,369	$55.07
Westlands Water District	Agriculture	SWP	California	Sacramento–San Joaquin Delta	409,692	$59.04
Kern County Water Agency	Agriculture	SWP	California	Sacramento–San Joaquin Delta, Friant Dam, Millerton Lake, San Joaquin River	456,772	$62.07
West Kern Water District	Municipality	SWP	California	Sacramento–San Joaquin Delta	31,500	$62.07
City of Fairfield	Municipality	Solano County Water Agency (SCWA)	California	Upper Putah Creek (Lake Berryessa), Lake Oroville	7,849	$75.39
City of Vacaville	Municipality	Solano County Water Agency (SCWA)	California	Lake Berryessa, Kern River	4,993	$79.03
Santa Clara Valley Water District	Municipality	SWP	California	Sacramento–San Joaquin Delta, Hetch Hetchy Reservoir	104,229	$92.02
City of Redding	Municipality	CVP (USBR)–Buckeye Contract	California	Whiskeytown Lake	5,235	$100.36
California Water Service Company Bakersfield District	Municipality	City of Bakersfield	California	Kern River	13,529	$114.00

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Alameda County Water District	Municipality	SWP	California	Alameda Creek, Hetch Hetchy Reservoir	23,481	$123.82
City of Redding	Municipality	Anderson Cottonwood Irrigation District (ACID)	California	Sacramento River	1,200	$142.57
Metropolitan Water District of Southern California	Municipality	IID	California	Colorado River	105,000	$154.85
Coachella Valley Water District	Agriculture	IID	California	Colorado River	78,000	$170.11
Yuba City	Municipality	SWP	California	Feather River	13,293	$180.98
California Water Service Company Bakersfield District	Municipality	Kern County Water Agency (KCWA)	California	Kern River	17,739	$195.00
City of Phoenix	Municipality	CAP (CAWCD)	Arizona	Colorado River, Agua Fria River	168,114	$227.93
City of Tucson	Municipality	CAP (CAWCD)	Arizona	Colorado River	128,725	$227.93
City of Scottsdale	Municipality	CAP (CAWCD)	Arizona	Colorado River	75,364	$227.93
City of Mesa	Municipality	CAP (CAWCD)	Arizona	Colorado River	46,357	$227.93
Central Arizona Groundwater Replenishment District	Municipality	CAP (CAWCD)	Arizona	Colorado River	33,263	$227.93
Town of Gilbert	Municipality	CAP (CAWCD)	Arizona	Colorado River	29,005	$227.93
City of Peoria	Municipality	CAP (CAWCD)	Arizona	Colorado River	25,307	$227.93
EPCOR	Municipality	CAP (CAWCD)	Arizona	Colorado River, Agua Fria River	20,021	$227.93
Arizona Water Company	Municipality	CAP (CAWCD)	Arizona	Colorado River	17,385	$227.93
City of Goodyear	Municipality	CAP (CAWCD)	Arizona	Colorado River	14,162	$227.93
City of Glendale	Municipality	CAP (CAWCD)	Arizona	Colorado River	13,603	$227.93
City of Chandler	Municipality	CAP (CAWCD)	Arizona	Colorado River	11,945	$227.93
Town of Oro Valley	Municipality	CAP (CAWCD)	Arizona	Colorado River	10,305	$227.93
City of Tempe	Municipality	CAP (CAWCD)	Arizona	Colorado River	4,456	$227.93
Solano County Water Agency	Municipality	SWP	California	Lake Berryessa, Lower Putah Creek	35,890	$236.26
Desert Water Agency	Municipality	SWP	California	Sacramento–San Joaquin Delta	15,504	$255.12

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Santa Clarita Valley Water Agency	Municipality	SWP	California	Feather River, Oroville Dam (SWP)	55,553	$258.90
Antelope Valley-East Kern Water Agency	Agriculture	SWP	California	Sacramento–San Joaquin Delta	67,445	$286.01
Alameda County Flood Control and Water Conservation District, Zone 7	Municipality	SWP	California	Feather River Watershed, Del Valle Reservoir	62,486	$297.46
Coachella Valley Water District	Agriculture	MWD	California		35,000	$316.00
Metropolitan Water District of Southern California	Municipality	SWP	California	Sacramento–San Joaquin Delta	847,024	$322.73
Palmdale Water District	Municipality	SWP	California	Oroville Dam (SWP), Littlerock Reservoir	17,101	$342.60
California American Water Company –Los Angeles Division	Municipality	SWP	California	Colorado River, Oroville Dam (SWP)	15,131	$342.60
Napa County Flood Control and Water Conservation District	Agriculture	SWP	California	Sacramento–San Joaquin Delta	16,959	$360.05
City of Napa	Municipality	SWP	California	Sacramento–San Joaquin Delta, Lake Hennessey, Milliken Reservoir	12,631	$360.05
Goleta Water District	Municipality	USBR (Cachuma Project)	California	Lake Cachuma	9,322	$381.91
Coachella Valley Water District	Agriculture	SWP	California		52,231	$384.18
Las Vegas Valley Water District	Municipality	SNWA	Nevada	Colorado River	278,526	$396.00
City of Henderson	Municipality	SNWA	Nevada	Colorado River	84,581	$396.00
City of North Las Vegas	Municipality	SNWA	Nevada	Colorado River	58,377	$396.00
City of Woodland	Municipality	Woodland-Davis Clean Water Agency	California	Sacramento River	10,912	$449.00
California American Water Company – Sacramento District	Municipality	Sacramento Suburban Water District (SSWD)	California	Sacramento River, American River, Folsom Lake, Folsom Lake Reservoir	698	$463.83

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
City of Ontario	Municipality	IEUA (Direct Use)	California	Recycled Water	8,453	$465.00
City of Chino	Municipality	IEUA (Direct Use)	California	Sacramento–San Joaquin Delta	4,778	$465.00
Cucamonga Valley Water District	Municipality	IEUA (Direct Use)	California		1,017	$465.00
City of Stockton	Municipality	Stockton East Water District	California	Sacramento–San Joaquin Delta, Mokelumne River, Stanislaus River, Calaveras River	30,196	$468.65
California Water Service Company Stockton District	Municipality	Stockton East Water District	California	New Melones Project, New Hogan Reservoir	22,482	$479.67
Cucamonga Valley Water District	Municipality	IEUA (Groundwater Recharge)	California		3,648	$665.00
City of Ontario	Municipality	IEUA (Groundwater Recharge)	California	Recycled Water	3,364	$665.00
City of Chino	Municipality	IEUA (Groundwater Recharge)	California	Sacramento–San Joaquin Delta	620	$665.00
California American Water Company – Sacramento District	Municipality	City of Sacramento	California	Sacramento River, American River	8,145	$730.28
California American Water Company – Sacramento District	Municipality	Placer County Water Agency (PCWA)	California	American River	1,152	$776.68
San Diego County Water Authority	Municipality	IID	California	Colorado River	192,000	$776.97
Los Angeles County Waterworks District 40–Antelope Valley	Municipality	Antelope Valley–East Kern Water District (AVEK)	California	Sacramento–San Joaquin Delta	31,552	$790.00
Cucamonga Valley Water District	Municipality	SWP	California		25,303	$827.15
San Bernardino Valley Municipal Water District	Municipality	SWP	California	Santa Ana River	23,504	$827.15

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
West Valley Water District	Municipality	San Bernardino Valley Municipal Water District	California	Sacramento–San Joaquin Delta, Lytle Creek	22,317	$827.15
City of Redlands	Municipality	SWP	California	Mill Creek, Santa Ana River	21,997	$827.15
Hesperia Water District	Municipality	SWP	California	Oroville Dam (SWP)	12,604	$827.15
Mojave Water Agency	Municipality	SWP	California	Mojave River	27,818	$828.52
Inland Empire Utilities Agency	Municipality	MWD	California		39,253	$903.00
City of Antioch	Municipality	Contra Costa Water District	California	Sacramento–San Joaquin Delta, San Joaquin River	12,053	$905.88
Antelope Valley–East Kern Water Agency	Agriculture	Nickel Family	California	Kings River	1,700	$928.00
Upper San Gabriel Valley Municipal Water District	Municipality	MWD	California		59,367	$930.70
San Diego County Water Authority	Municipality	MWD	California		341,935	$957.07
City of Lincoln	Municipality	Placer County Water Agency (PCWA)	California		10,340	$961.21
City of Corona	Municipality	Western Municipal Water District (WMWD)	California	Colorado River, Sacramento–San Joaquin Delta	16,960	$973.43
City of Ontario	Municipality	Water Facilities Authority (WFA)	California	Oroville Dam (SWP)	5,533	$981.74
City of Chino	Municipality	Water Facilities Authority (WFA)	California	Sacramento–San Joaquin Delta	4,248	$981.74
Dublin–San Ramon Services District	Municipality	Zone 7 Water Agency	California	Feather River Watershed, Lake Oroville	13,374	$1,019.30
City of Pleasanton	Municipality	Zone 7 Water Agency	California		12,394	$1,019.30
Los Angeles City Department of Water and Power	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	277,673	$1,022.02
Eastern Municipal Water District	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	86,740	$1,080.18

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Western Municipal Water District	Municipality	MWD	California	Sacramento–San Joaquin Delta, Colorado River	60,142	$1,116.64
Irvine Ranch Water District	Municipality	MWDOC (Municipal Water District of Orange County)	California	Colorado River, Sacramento–San Joaquin Delta, Irvine Lake	52,915	$1,120.50
Municipal Water District of Orange County	Municipality	MWD	California		154,307	$1,129.82
Three Valleys Municipal Water District	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	54,102	$1,136.10
City of Anaheim	Municipality	MWD	California	Colorado River	38,503	$1,148.14
City of Santa Rosa	Municipality	Sonoma County Water Agency	California	Russian River	15,059	$1,200.74
West Basin Municipal Water District	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	98,438	$1,256.00
Calleguas Municipal Water District	Municipality	MWD	California	Sacramento–San Joaquin Delta, Castaic Lake	63,910	$1,256.00
Central Basin Municipal Water District	Municipality	MWD	California	Colorado River	24,144	$1,256.00
City of Long Beach	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	18,062	$1,256.00
Suburban Water Systems–San Jose Hills	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	17,486	$1,256.00
City of Pasadena	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	16,597	$1,256.00
City of Torrance	Municipality	MWD	California	Colorado River	14,200	$1,256.00
City of Glendale	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	13,022	$1,256.00

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
Las Virgenes Municipal Water District	Municipality	MWD	California	Colorado River, Sacramento–San Joaquin Delta	11,943	$1,256.00
Moulton Niguel Water District	Municipality	MWDOC (Municipal Water District of Orange County)	California	Sierra Nevada range, Colorado River, Sacramento–San Joaquin Delta	24,039	$1,256.00
Santa Margarita Water District	Municipality	MWDOC (Municipal Water District of Orange County)	California	Colorado River, Sacramento–San Joaquin Delta	20,799	$1,256.00
Yorba Linda Water District	Municipality	MWDOC (Municipal Water District of Orange County)	California	Colorado River, Sacramento–San Joaquin Delta	17,826	$1,256.00
City of Garden Grove	Municipality	MWDOC (Municipal Water District of Orange County)	California	Colorado River, Oroville Dam (SWP)	10,952	$1,256.00
Walnut Valley Water District	Municipality	Three Valleys Municipal Water District	California	Sacramento–San Joaquin Delta, Colorado River	15,556	$1,264.00
Elsinore Valley Municipal Water District	Municipality	Western Municipal Water District (WMWD)	California	Lake Skinner, Lake Mathews, Canyon Lake, Railroad Canyon Reservoir	16,442	$1,288.00
Rancho California Water District	Municipality	Western Municipal Water District (WMWD)	California	Colorado River, Sacramento–San Joaquin Delta	16,126	$1,288.00
Golden State Water Company –Southwest	Municipality	Central Basin Municipal Water District	California	Colorado River, Oroville Dam (SWP), Sacramento–San Joaquin Delta	1,825	$1,426.00
Rancho California Water District	Municipality	Eastern Municipal Water District (EMWD)	California	Colorado River, Sacramento–San Joaquin Delta	21,246	$1,568.16
Olivenhain Municipal Water District	Municipality	SDCWA	California		17,972	$1,577.94

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
City of Oceanside	Municipality	SDCWA	California	Colorado River, Oroville Dam (SWP), desalinated water	20,945	$1,584.56
City of Santa Maria	Municipality	Central Coast Water Authority	California	Sacramento–San Joaquin Delta, Feather River Watershed	9,853	$1,619.27
Golden State Water Company –Southwest	Municipality	West Basin Municipal Water District (WBMWD)	California	Colorado River, Oroville Dam (SWP), Sacramento–San Joaquin Delta	21,776	$1,677.00
California Water Service Company Palos Verdes District	Municipality	West Basin Municipal Water District (WBMWD)	California	Colorado River, Oroville Dam (SWP)	18,067	$1,677.00
City of El Segundo	Municipality	West Basin Municipal Water District (WBMWD)	California		16,025	$1,677.00
California Water Service Company Rancho Dominguez (Hermosa-Redondo, Dominguez, and City of Hawthorne) District	Municipality	West Basin Municipal Water District (WBMWD)	California	Colorado River, Oroville Dam (SWP)	10,450	$1,677.00
City of Torrance	Municipality	West Basin Municipal Water District (WBMWD)	California		5,379	$1,677.00
Los Angeles City Department of Water and Power	Municipality	West Basin Municipal Water District (WBMWD)	California		811	$1,677.00
City of San Diego	Municipality	SDCWA	California	Colorado River	153,076	$1,791.81
Rainbow Municipal Water District	Agriculture	SDCWA	California		15,311	$1,808.55
City of Escondido	Municipality	SDCWA via SLRIWA	California	Colorado River, Sacramento–San Joaquin Delta	7,900	$1,810.18

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
City of Oxnard	Municipality	Calleguas Municipal Water District (CMWD)	California	Sacramento–San Joaquin Delta, Castaic Lake	22,306	$1,829.50
Ventura County Waterworks District No. 08–Simi Valley	Municipality	Calleguas Municipal Water District (CMWD)	California	Sacramento–San Joaquin Delta, Castaic Lake	14,096	$1,829.50
California American Water Company – Ventura District	Municipality	Calleguas Municipal Water District (CMWD)	California	Sacramento River, Colorado River	11,213	$1,829.50
Santa Barbara County Flood Control and Water Conservation District	Municipality	SWP	California		11,968	$1,870.58
Helix Water District	Municipality	SDCWA	California	Colorado River	23,996	$1,884.09
Otay Water District	Municipality	SDCWA	California		28,827	$1,900.68
Valley Center Municipal Water District	Agriculture	SDCWA	California		16,478	$1,903.26
Goleta Water District	Municipality	Central Coast Water Authority	California	Lake Cachuma, Oroville Dam (SWP), Sacramento–San Joaquin Delta	2,815	$1,926.92
City of Escondido	Municipality	SDCWA	California	Colorado River	11,471	$1,960.72
San Jose Water Company	Municipality	Valley Water (Santa Clara Valley Water District)	California	Sacramento–San Joaquin Delta	116,800	$2,344.00
City of Santa Clara	Municipality	Valley Water (Santa Clara Valley Water District)	California	Local surface water, Sacramento–San Joaquin Delta, Sierra Nevada range	14,094	$2,344.00
City of San Jose	Municipality	Valley Water (Santa Clara Valley Water District)	California	Hetch Hetchy Reservoir	11,987	$2,344.00
California Water Service Company Los Altos Suburban District	Municipality	Valley Water (Santa Clara Valley Water District)	California	Sacramento–San Joaquin Delta	10,231	$2,344.00

Utility/Agency	District Category	Agency Purchased From	State	Origins of Water Sources	Volume of Water Purchased	Price of Water Purchased (per AF)
City of Sunnyvale	Municipality	Valley Water (Santa Clara Valley Water District)	California	Sacramento–San Joaquin Delta	8,625	$2,344.00
Vallecitos Water District	Municipality	SDCWA	California		11,083	$2,450.53
Carlsbad Municipal Water District	Municipality	SDCWA	California	Colorado River, Oroville Dam (SWP), desalinated water	11,949	$2,455.30
City of Hayward	Municipality	SFPUC	California	Hetch Hetchy Reservoir	15,613	$2,469.47
California Water Service Company Mid-Peninsula District	Municipality	SFPUC	California	Hetch Hetchy Reservoir	13,644	$2,469.47
California Water Service Company Bear Gulch District	Municipality	SFPUC	California	Hetch Hetchy Reservoir	11,810	$2,469.47
City of Palo Alto	Municipality	SFPUC	California	Hetch Hetchy Reservoir	10,588	$2,469.47
City of Sunnyvale	Municipality	SFPUC	California	Hetch Hetchy Reservoir, Sacramento–San Joaquin Delta	10,061	$2,469.47
Alameda County Water District	Municipality	SFPUC	California	Hetch Hetchy Reservoir, Alameda Creek	9,857	$2,469.47
City of San Jose	Municipality	SFPUC	California	Hetch Hetchy Reservoir	4,614	$2,469.47
City of Santa Clara	Municipality	SFPUC	California	Hetch Hetchy Reservoir	3,508	$2,469.47
City of Brentwood	Municipality	Contra Costa Water District	California	Sacramento–San Joaquin Delta, San Joaquin River	9,098	$2,515.62
City of Antioch	Municipality	Contra Costa Water District	California	Sacramento–San Joaquin Delta, San Joaquin River	414	$2,516.04
San Gorgonio Pass Water Agency	Municipality	SWP	California	Sacramento–San Joaquin Delta, Sacramento River	11,503	$2,870.21