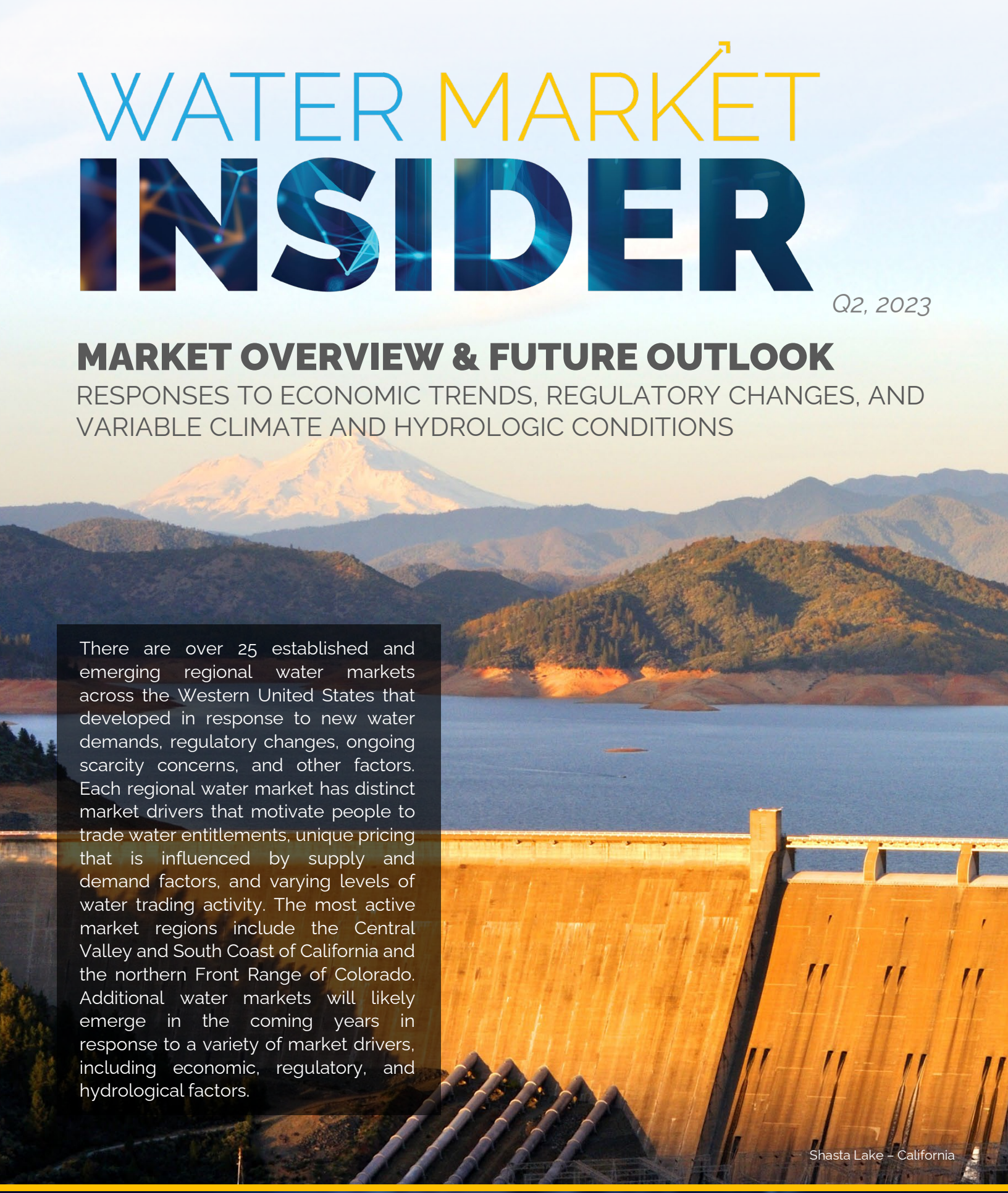
WATER MARKET INSIDER

Q2, 2023

MARKET OVERVIEW & FUTURE OUTLOOK

RESPONSES TO ECONOMIC TRENDS, REGULATORY CHANGES, AND VARIABLE CLIMATE AND HYDROLOGIC CONDITIONS

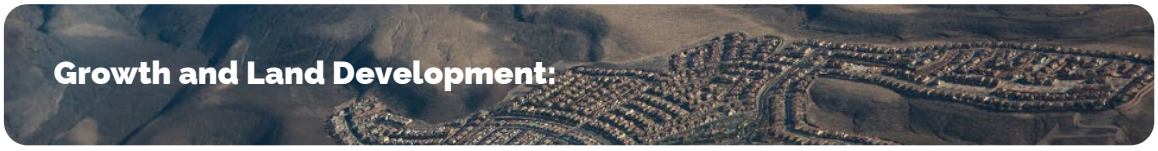
There are over 25 established and emerging regional water markets across the Western United States that developed in response to new water demands, regulatory changes, ongoing scarcity concerns, and other factors. Each regional water market has distinct market drivers that motivate people to trade water entitlements, unique pricing that is influenced by supply and demand factors, and varying levels of water trading activity. The most active market regions include the Central Valley and South Coast of California and the northern Front Range of Colorado. Additional water markets will likely emerge in the coming years in response to a variety of market drivers, including economic, regulatory, and hydrological factors.



Shasta Lake – California

MARKET OVERVIEW & FUTURE OUTLOOK

MARKET DRIVERS



Growth and Land Development:

Population projections indicate that over half of future population growth and associated land development in the US will occur in the 17 Western states, predominantly occurring in urban and suburban areas. The resulting increase in municipal water demand combined with the municipal sector's ability to pay high premiums for water will continue to impact trading volume and future price appreciation.

Drought Conditions:

Droughts exert the heaviest influence on year-to-year price variability by reducing water supply, resulting in upward pressure on prices that affects both rural and urban users. For example, spot market prices in California reached record highs in 2021 and 2022 due to extreme drought conditions. With multi-year droughts becoming increasingly common in the West, drought conditions will continue to drive prices in these markets.

Agricultural Trends:

The agricultural sector, which is the largest water user in the West, continually shifts their mix of crops based on commodity prices, labor costs, water availability and costs, and other factors. These shifts directly influence demand for water from the agricultural sector and the associated supply of water to other sectors.

Regulatory Landscape:

Implementation of new regulations, such as increased environmental protections and requirements for urban water suppliers to demonstrate reliable, long-term supplies, influences water supply and demand conditions and associated prices. The most impactful regulatory change in the last 10 years is the move towards sustainable groundwater management, which will continue to disrupt established agricultural water uses.

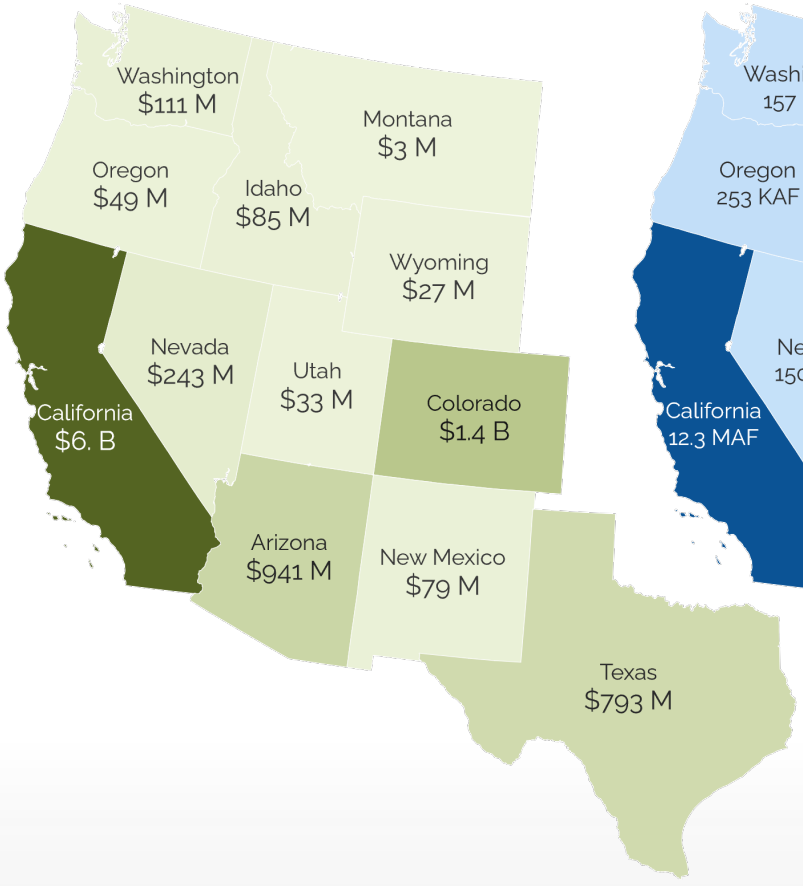
Environment:

Government agencies and environmental organizations support initiatives aimed at maintaining or improving conditions in the natural environment, particularly as they relate to supporting threatened and endangered species. To improve river and other aquatic habitats, these entities buy and lease water rights to increase flow to critical habitat areas, resulting in benefits such as reduced risk of fish dying due to low flow in rivers. These efforts continue to expand, increasing water demand by government and environmental sectors.

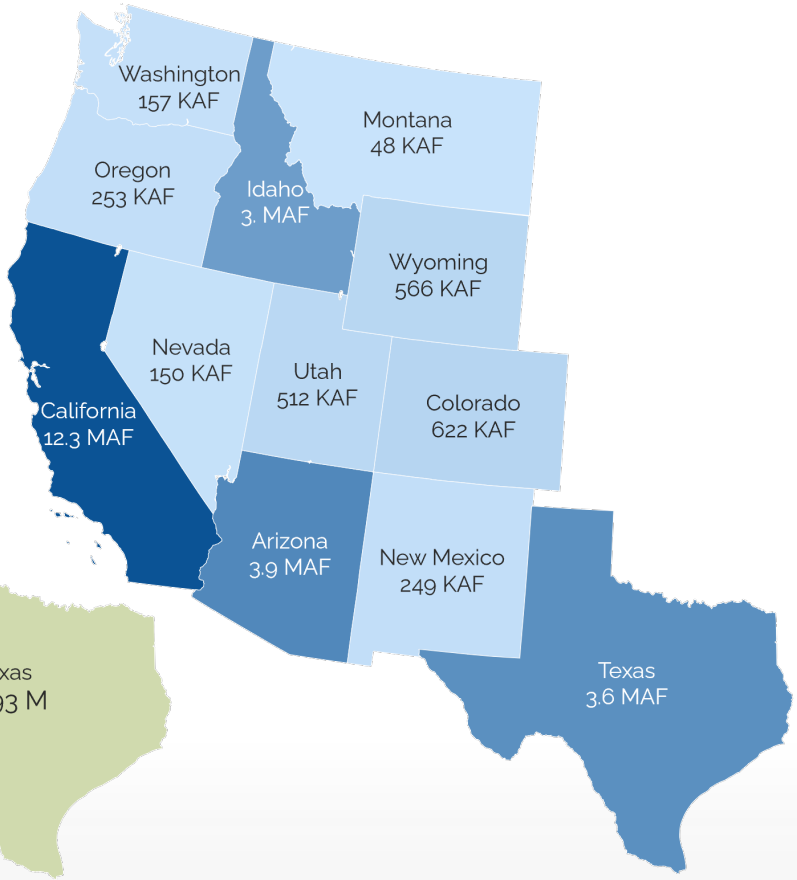
MARKET OVERVIEW & FUTURE OUTLOOK
MARKET SIZE

The market for water transactions includes permanent water right transfers and temporary or one-time use agreements, including single- and multi-year leases and spot market purchases. Our team collects transaction data, including volume and price, for water markets across the Western states, including Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming, Based on this data, the Western water markets supported an annual average of 2.5 million acre-feet (AF) of water trades and $998 million of market activity in the 10-year period from 2013 through 2022. Lease and spot-market transactions made up most of this activity, representing 97 percent of the volume and 73 percent of the value traded over this period. Although permanent water right transfers made up only 3 percent of the volume traded, they represented 27 percent of the value due to the higher prices associated with permanent transfers.

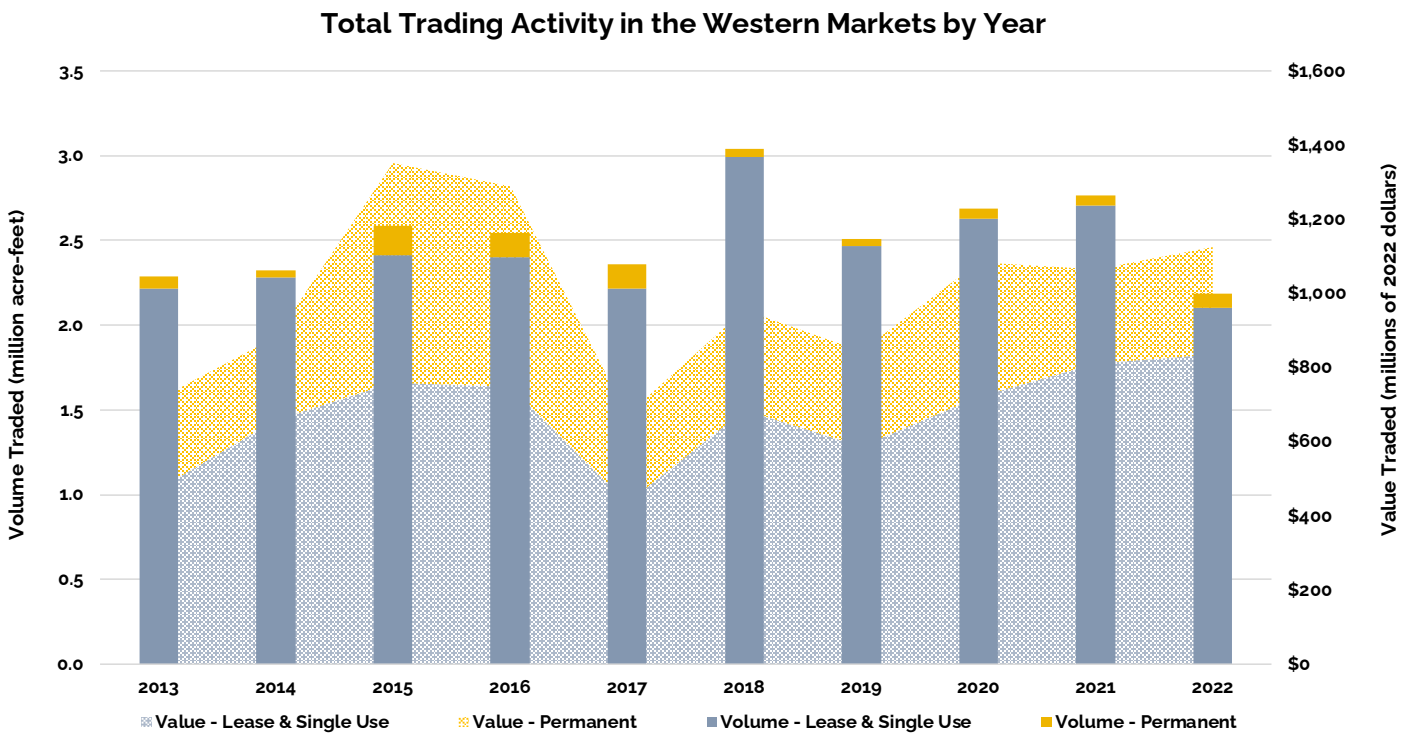
Value Traded 2013 to 2022



Volume Traded 2013 to 2022



MARKET OVERVIEW & FUTURE OUTLOOK
MARKET SIZE



* Values and volumes for 2021 and 2022 were inflated by 4% and 18%, repectively, based on historic experience over the last five years. These adjustments account for activity we expect to capture over the next year due to the lag between water transactions and data availability.

The highest volume of trading activity occurs in years that precipitation is neither particularly low nor high because these conditions generate strong supply of and demand for water. In dry years, the lack of supply constrains trading activity, as seen in 2022 when the volume of trading activity declined by 21 percent relative to the previous year due to dry conditions throughout the Western states. In wet years, such as 2017 and 2019, water users generally receive their full allocation of water supplies, with some also receiving the benefit of rainfall or additional water deliveries due to excess supply in the system. These conditions reduce market demand for water and the associated volume of trading activity. In 2018, however, when weather conditions were neither exceptionally wet nor dry, the volume of trading activity reached a high of 3.0 million AF.

Both the volume and price of water trades define the total value of the Western markets. The relationship between prices and weather conditions are relatively straight forward, with lower prices occurring in wet years with ample supply and higher prices occurring in dry years with strong demand and limited supply. These price effects are the dominant force on annual market values, as evidenced by the high prices in 2022 driving the market value to $1.13 billion, the highest since 2016, while supporting the smallest volume of trades (2.2 million AF) over the 10-year period from 2013 to 2022.

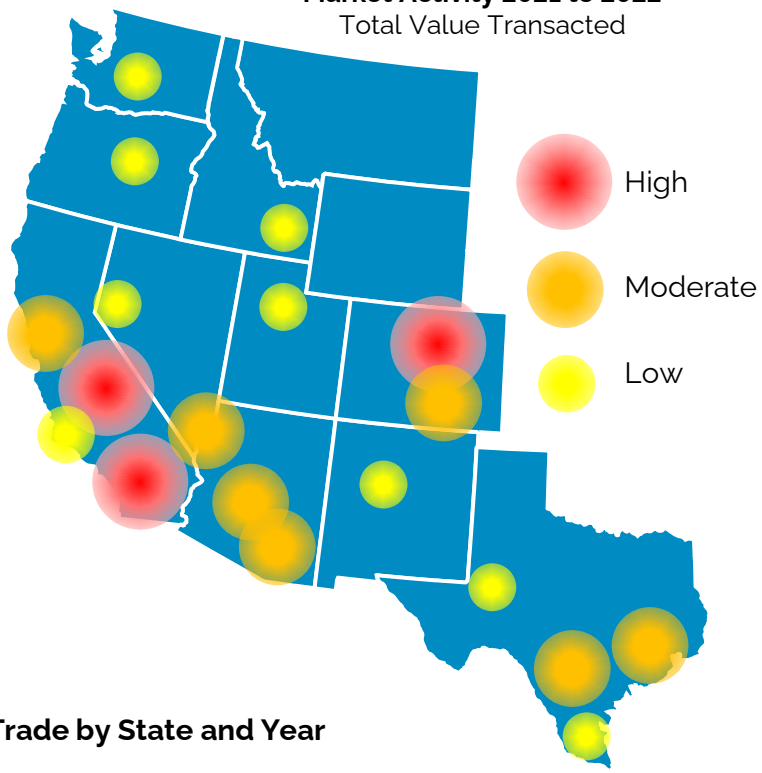
MARKET OVERVIEW & FUTURE OUTLOOK
ACTIVITY BY STATE

The highest-value markets in the Western states include Northern California, the Central Valley of California, the Phoenix Active Management Area of Arizona, and the Northern Front Range of Colorado.

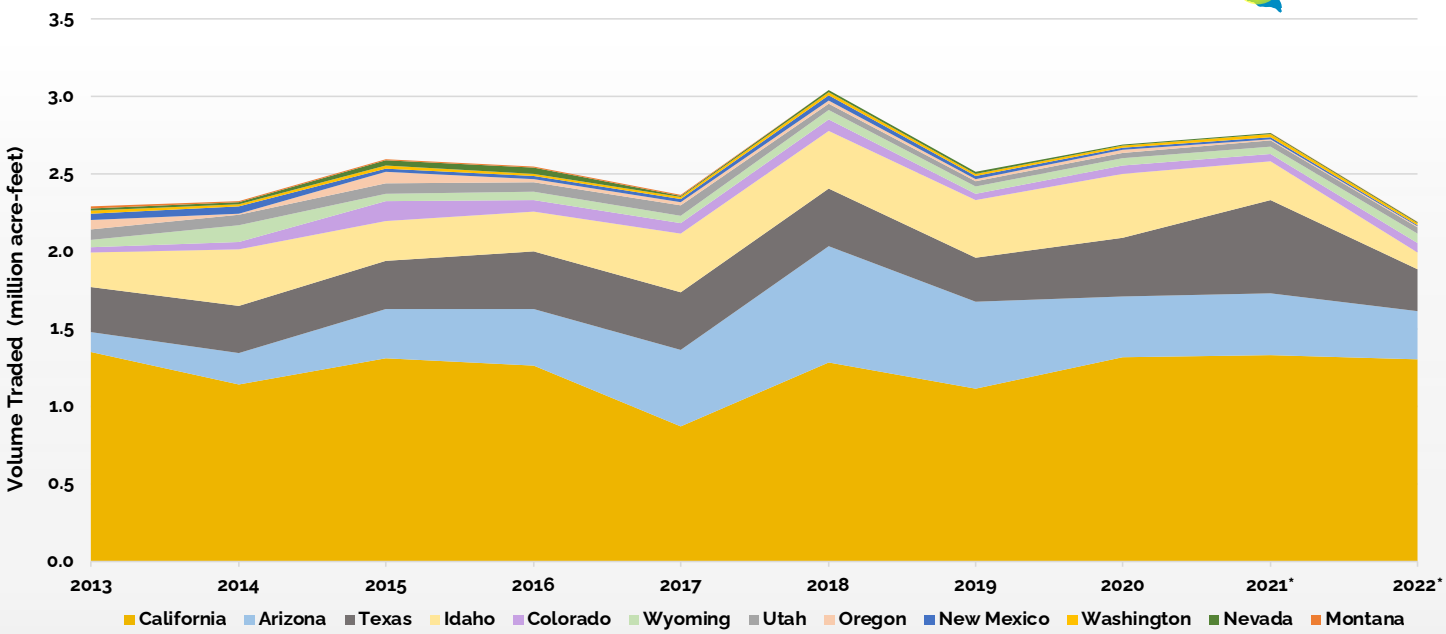
Of the Western states, those with the highest volumes of water traded over the last two years include California (48 percent), Arizona (15 percent), and Texas (14 percent).

Although the Colorado water markets represented only 2 percent of the trade volume over the last two years, they generated 14 percent of the value traded due to the high value of these transactions.

Market Activity 2021 to 2022
Total Value Transacted



Volume of Trade by State and Year



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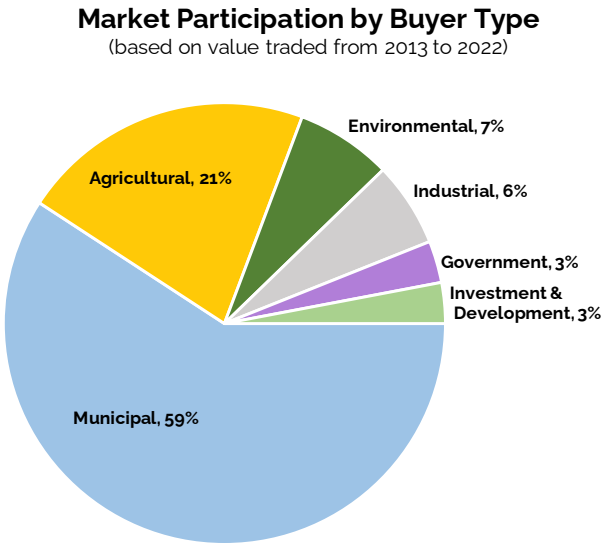
MARKET OVERVIEW & FUTURE OUTLOOK

PARTICIPANTS

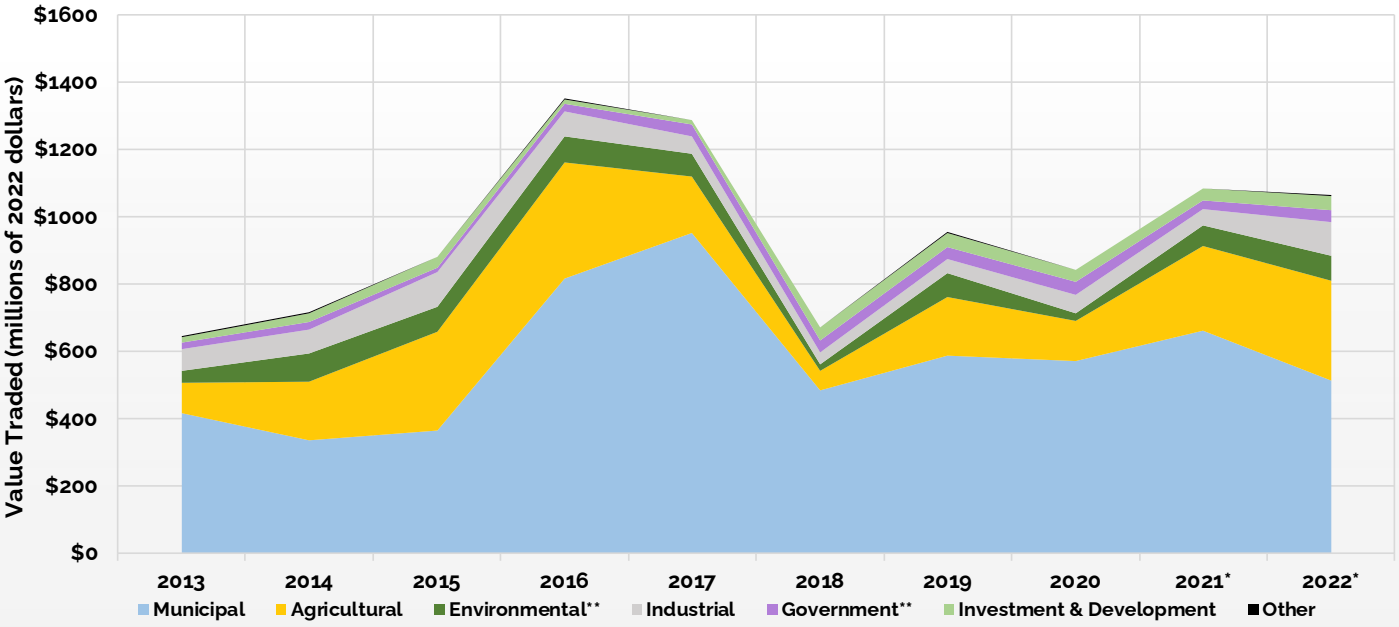


Water markets incorporate a wide variety of participants, including municipalities, agricultural users, environmental organizations, industrial users, investors, development firms, and Federal and state government agencies. The primary buyers are municipal users, making up nearly 60 percent of the market over the last decade.

The agricultural sector is the biggest user and largest supplier of water in the West, with most trades occurring from the agricultural sector to the municipal sector. The agricultural sector is also a major buyer, representing 21 percent of the market, with these trades primarily occurring between agricultural users.

The environmental sector is also a major market participant, representing seven percent of the market value, despite the sector's propensity to pursue low-cost water.

Value Traded by Buyer Type and Year (2013 to 2022)



* Values for 2021 and 2022 were inflated by 4% and 18%, repectively, based on historic experience over the last five years to account for trading activity we expect to capture over the next year due to the lag between water transactions and availability of data regarding these transactions. ** Government buyers include Federal and state agencies that purchase water to help ensure ongoing water supplies; this analysis classifies purchases by these agencies aimed at improving environmental conditions as Environmental.

MARKET OVERVIEW & FUTURE OUTLOOK

EXAMPLE TRANSACTIONS

Regional water markets have unique drivers of market activity and support transactions of specific types of water entitlements. The following four example water transactions demonstrate some of assets traded in the regional markets and the drivers for these trades.

California State Water Project (SWP) Multi-Year Agreement

Buyer	Seller	Volume	Price
Westside Districts	Mojave Water Agency (MWA)	15,000 to 30,000 AF per year; 0 AF when the SWP allocation is less than 35%	$150 to $550 per AF, based on water conditions, escalated by 5% per year

In late 2021 MWA finalized a 15-year agreement to sell surplus water in average to wet years to the Westside Districts, a group of agricultural districts that regularly acquire and bank water to ensure they can meet demands of their permanent crop growers. The SWP allocations in 2022 were below 35% so MWD did not transfer any water, but in 2023 they will likely transfer at least 25,000 AF at $358/AF based on the current 75% allocation.

As reliability of SWP supplies has declined due to more frequent drought conditions in California, these sorts of agreements have become increasingly common as water users pursue banking and other mechanisms to improve water management flexibility and bolster water supplies in dry years. The sellers in this market include SWP contractors whose water allocations exceed their needs in wetter years.

Long-Term Storage Credits (LTSC) in Arizona

Buyer	Seller	Volume	Price
City of Scottsdale	Gila River Water Storage, LLC (GRWS)	3,720 AF	$430 per AF

In 2022 the City of Scottsdale purchased Long-Term Storage Credits (LTSC), which are marketable entitlements of surface water supplies that are stored underground, from GRWS, an organization that aims to generate revenue for the Gila River Indian Community from their Central Arizona Project water supplies and fund on-reservation irrigation projects. Scottsdale purchased these LTSCs with funds partially generated by their participation in the Lower Colorado River Basin 500+ Plan, an effort by the US Bureau of Reclamation to incentivize Colorado River water users to conserve water in Lake Mead.

This transaction exemplifies the growing demand for LTSCs, typically purchased by a variety of buyers to reduce higher-cost groundwater use assessments from the Central Arizona Groundwater Replenishment District, as well as growing use of government incentive programs to improve the environment by reducing water use.

MARKET OVERVIEW & FUTURE OUTLOOK
EXAMPLE TRANSACTIONS

Texas Groundwater Transfers

Buyer	Seller	Volume	Price
City of Amarillo	Chester Family	15,413 AF	$1,875 per AF

The City of Amarillo purchased the groundwater rights associated with the Chester Family's 15,413-acre ranch, located 80 miles northeast of the city. The purchase includes only the water rights (not the land), which amount to 15,413 AF under the Panhandle Groundwater Conservation District's rules that correlate one acre of land to one AF of groundwater rights.

This transaction exemplifies two major trends in the state of Texas. First, some groundwater conservation districts have developed rules that define the groundwater rights associated with a landowner's property and allow landowners sell these rights separate from the overlying land. In these areas, groundwater transactions and prices have increased in response to decreased transactional risk and increased certainty about water right characteristics, including volume and reliability. Second, to meet growing demand and ensure reliable water supplies, large municipalities have started diversifying their water supply portfolios by purchasing distant groundwater assets and transporting supplies to their service area using pipelines.

Colorado-Big Thompson (CBT) Project

Buyer	Seller	Volume	Price
Northern Front Range municipal water district	Local farm company	140 AF	$105,000 per AF

A municipal water provider located in Weld County purchased 200 contract units in the CBT project for $14.7 million over a series of transactions. These types of municipal water acquisitions are common in northern Colorado, with water utilities using cash provided from land developers to fund water acquisitions in a series of multiple transactions over multiple months.

Ongoing demand for new water supplies by municipalities and land developers has driven the price of CBT contract units to nearly double in the last five years. Prices for CBT trades regularly eclipse $100,000 per AF, which in turn affects demand and prices for other water entitlements such as shares in irrigation ditch companies. Although these other water entitlements trade at significantly lower prices than CBT contract units, their prices have also appreciated, particularly and most significantly for water assets that can be transferred to municipal use.

MARKET OVERVIEW & FUTURE OUTLOOK
MARKET OUTLOOK: 2023 AND BEYOND

Much like other markets, the water market is shifting due to national and global economic trends, local regulatory changes, and ongoing climate and hydrologic volatility. These factors will likely reduce trading activity relative to the previous two years and sustain price appreciation in most markets.

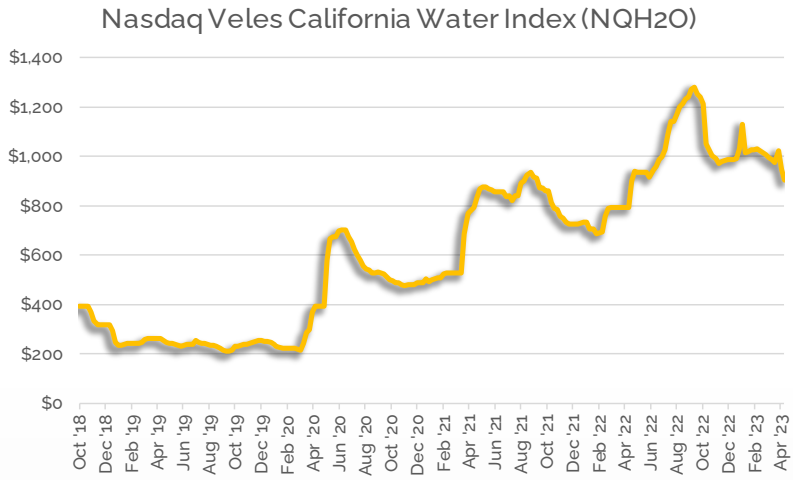
Factor	Description	Water Market Response	
		Influence on Trading Volume	Influence on Prices
Inflation Effects	Inflation has and continues to increase the costs of all goods and services, including the cost of water. Municipal buyers may lack capital to acquire water in the short term but recover after they adjust their customer rates to generate necessary funds.	↔	↑
Reduction in Homebuilding	The increase in mortgage rates has cooled the housing market and many homebuilders are reducing new activity to limit their exposure. This reduction is pulling an active buyer sector out of the market.	↓	↓
Wetter Conditions in California	California hosts the largest water markets by trading volume and value. High precipitation and snowpack have boosted river flows and reservoir storage supplies, which should reduce interest in the spot market. Prices will likely come down significantly and reflect past wet year prices.	↓	↓
Implementation of Groundwater Regulations	New or increased attention to sustainable groundwater management is occurring in many regional water markets including Central Arizona, most of Southern California, West Texas, and areas overlying the Ogallala Aquifer in the Midwest. The resulting restrictions to groundwater supply increase demand for alternative sources of supply, thereby increasing market activity.	↑	↔
Colorado River Basin Stress & Response	The Colorado River Basin is facing unprecedented water supply stress, and demand reduction is the dominant response. Significant Federal funding is available to compensate water users for reducing their use but the unknown mechanics for successfully utilizing these funds make the market response uncertain.	↔	↑
Continued Growth in Environmental Demands & Funding Sources	Over the past decade, environmental water markets have grown and diversified with Federal and State investment and unique transaction structures developed by the NGO community. Examples include the State of Utah's funding of the Great Salt Lake Water Trust and new funding programs to improve streamflow in California . New environmental stresses will likely result in additional market activity.	↑	↔
Record High Hay Prices	Roughly half of irrigated farmland in the Western US supports alfalfa hay, feed corn, or pasture. Record high hay prices will likely influence farmers to plant more hay, a high water-use crop, thereby reducing water trades from agriculture to other sectors and increasing prices in some regions. Balanced against this effect is the inverse but likely lesser effect from depressed prices in many high-value crops such as tree nuts.	↓	↑

MARKET OVERVIEW & FUTURE OUTLOOK

NASDAQ WATER PRICE INDEX IN CALIFORNIA

In October 2018, Nasdaq, along with Veles Water and WestWater Research, launched the Nasdaq Veles California Water Index (NQH2O). This index is the first of its kind and tracks the weekly spot price of water rights transactions (leases and sales) in California based on transaction data from our Waterlitix™ database. The NQH2O reflects the value of the volume-weighted average prices in five specific water markets, including surface water and four adjudicated groundwater basins, adjusting for pricing factors specific to each market and transaction (e.g., conveyance costs).

As reflected in historic NQH2O values, droughts significantly affect the price of water. Between October 2018 and February 2020, immediately prior to some of the driest years in California history, the index value for water in California declined from $395 to $220 per AF. However, drought conditions from 2020 to 2022 exerted substantial pressure on water supplies and associated prices. Between early March and late May 2020, the NQH2O



value more than tripled from $216 to $675. The index value continued rising as the drought continued, reaching an all-time high of $1282 on 7 September 2022, and started softening as drought conditions subsided in 2023, reaching $906 on 12 April 2023.

To learn more about WestWater and stay current on the Western water markets, visit our website at www.waterexchange.com

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We work across the country with five regional offices to provide market intelligence, valuation, transaction advisory, strategic planning, and asset management services relating to water rights and water resources. We are known for our rigorous analysis, and information-driven water rights investment strategy formulation and execution

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