

Water Market Insider



2017 Water Market Outlook

Defining the Water Rights Market

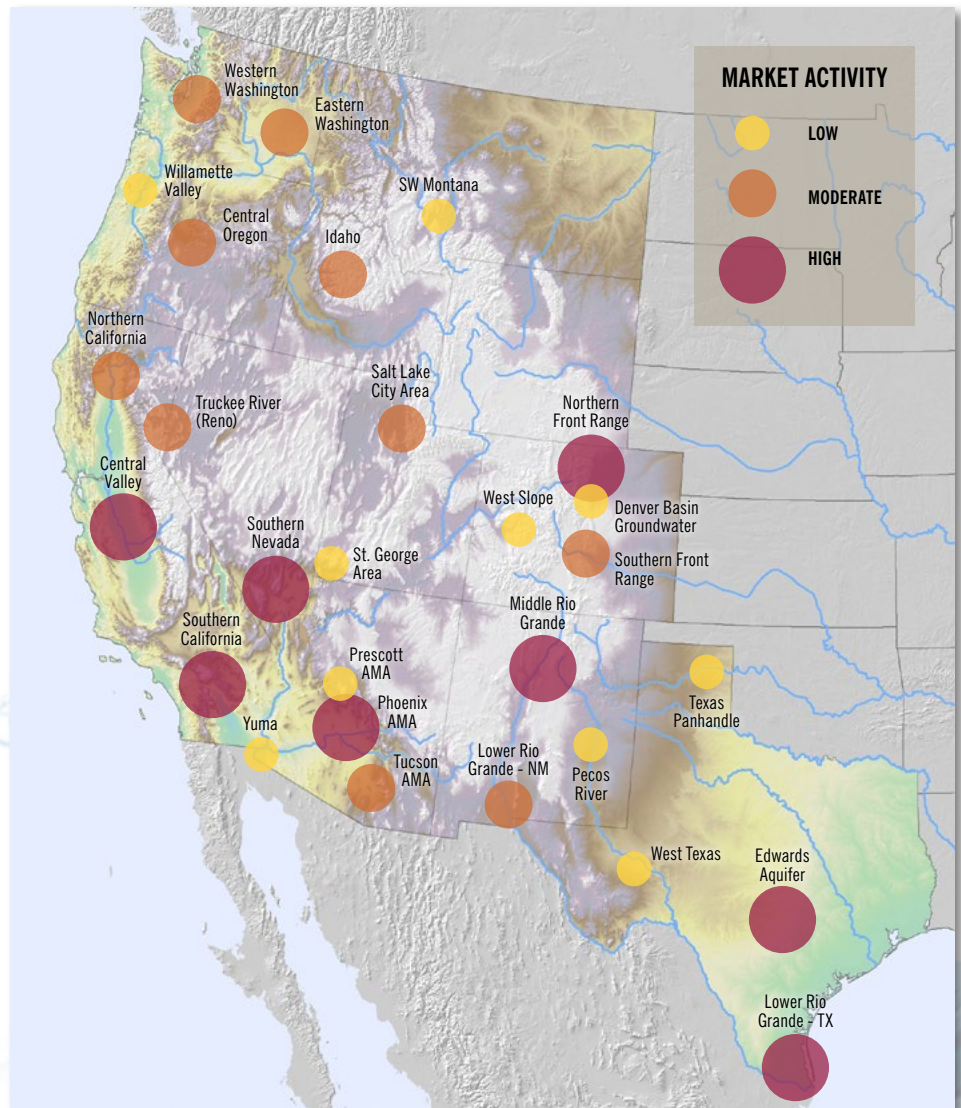
Water markets have emerged over the last thirty years to meet growing demands and firm existing water supplies across the arid western United States. Indeed, traditional large scale water users like municipal utilities, environmental groups and farmers are increasingly turning to water markets as an alternative to constructing costly new infrastructure projects to address growing water demands.

Growing water scarcity and population growth have driven price appreciation in the water rights market and have created opportunities for private capital investment as new water development projects such as reservoirs and pipeline projects are increasingly less viable solutions to water scarcity due to high cost and environmental impacts, which in turn further increases the interest in water reallocation. Water rights have historically lagged behind other subsectors of the water industry in terms of market development and private investment, but interest in water rights as an asset class has intensified in the past 10 years.

The water rights market is increasingly attractive for private investment, but is often difficult to navigate due to its fragmented geographic and ownership characteristics. Unlike other commodities, water markets are highly regionalized due to infrastructure or regulatory burdens that restrict water transfers between regions.

There are over 25 established and emerging regional markets across the western United States that have developed as a response to

Figure 1: Overall Market Activity



ongoing scarcity concerns and other factors. Each regional market has distinct market drivers, pricing, and levels of trading activity. The most active market regions include California's Central Valley; the northern front range of Colorado; the Edwards Aquifer and

Lower Rio Grande River basin in Texas; and the Pacific Northwest. It is anticipated that additional market regions will continue to emerge in the coming years in response to numerous market drivers.

Table 1: Asset Class Categories

Asset Class	Description	Active Markets
Surface Water	Common in every western state and entitle the water right holder to use direct flow out of a stream	CA, CO, NV, NM, WA
Groundwater	Authorized withdrawal and use of water pumped directly from aquifers	AZ, CA, CO, TX
Groundwater Storage	Credits awarded	AZ, CA
Effluent	Treated wastewater generally put to use in irrigation or industrial settings	AZ, CA, CO
Storage	Entitles users to impound or store surface water for use at a later time	CA, CO

Commonly Traded Water Assets

Water resources in the United States are primarily regulated at the state level of government. In most western states, water rights are considered a property right that may be transferred separately from land ownership, allowing water markets to emerge. Each state has developed unique systems for administering water rights, resulting in a variety of asset classes traded with varying levels of regulatory complexity. Water rights transactions between states generally do not occur, with a limited number of exceptions.

Table 1 provides a description of commonly traded asset classes and the most active regional markets for each asset class.

In most western states, water rights are allocated based on the principle of prior appropriation. Water is allocated according to seniority and is required to be put to beneficial use in order to establish and maintain a water right. In many parts of the west, water resources are fully appropriated, meaning no water is available for new appropriation to meet new demands. This tightening of available water rights has in turn spurred new interest in water rights marketing. The most active water markets

typically have clearly defined and quantified water assets, an established transfer process, and rising water demand and water scarcity.

Surface water rights are the most basic and most commonly traded asset class. Markets for surface water rights exist in every western state, and are especially active in California, Colorado, New Mexico, Nevada and Washington.

Groundwater rights are the second most commonly traded asset class, though groundwater regulation varies significantly between states. Some states, such as Texas, have limited restrictions on groundwater pumping and do not have established groundwater rights that may be transferred separate from land. Groundwater rights markets are particularly active in Arizona and California. Other less traditional asset classes include groundwater storage credits, treated wastewater that is discharged into the environment, and water stored in reservoirs.

Not All Water Rights are Created Equal

Water rights are further delineated due to each state’s regulatory process for transferring them from one water user to another. Some asset classes require lengthy regulatory reviews to determine marketable water volumes and to ensure neighboring water rights will not be harmed by a given water transfer. However, some states have been working toward policies that make water transfers easier and more streamlined.

In some areas, the difficulty in transferring water lies in the how the states regulate defined purpose and place of use, as well as the timing of the water use. Users with narrowly defined water rights often have difficulty finding buyers willing to navigate the regulatory waters to modify the water right to their new needs.

Differing legalistic definitions are not the only barrier to water transfers. The physical characteristics of water delivery systems in active water markets vary region by region. For a transfer, water must be conveyed from the original point of use to the new point, oftentimes by diverting the water from the source by installing costly delivery infrastructure. As such, water transfer markets are usually most active in regions with existing conveyance infrastructure in addition to similar regulatory attributes.

Water Transfer Structures: An Evolving Landscape

Water markets have evolved to incorporate a variety of traditional and unconventional transaction structures for both permanent and temporary transfers.

Historically, growing cities and other buyers have secured new water supplies through permanent purchases of agricultural water rights that ultimately remove irrigated farmland from production. Rural economies where agriculture is a key economic driver have raised concerns about these “buy and dry” transactions, and a number of agricultural communities have begun to oppose the transfers.

There has been a greater focus recently on transaction structures that allow water users to flexibly accommodate new and changing water needs while protecting historic agricultural economies. Some unconventional transaction structures have been employed with success, including so-called “dry year option” contracts between irrigators and municipalities which secure the option for the municipality to purchase water from the

irrigator should it be a dry year. This keeps the agricultural land in production when it is an average or wet year.

Another emerging contract structure is “rotational fallowing”, which allows farmers to continue farming a portion of irrigated land while temporarily transferring a portion of their water rights to an urban user. These rotational fallowing programs are often popular with irrigators as water rights payments often exceed the revenue that could have been generated by farming the land, and provide a hedge against falling crop prices.

Agricultural users are not the only market players taking advantage of innovative contract structures. “Partial season leases” have been used with success by environmental water buyers. Under this transaction structure, growers forego irrigation during a portion of the irrigation season, typically late in the season when the returns from irrigating are the lowest. This leaves conserved water instream to boost stream flows for native aquatic species when the water is needed most, such as during salmon spawning season.

Example Transaction: Bard Unit Partial Season Fallowing Program

In 2016, irrigators in the Bard irrigation district (“Bard Unit”) along the Colorado River in Southern California agreed to fallow a portion of their fields during the spring and summer months in return for payments from the Metropolitan Water District of Southern California (MWD).

Water use is highest during these months when local farmers typically grow low value hay crops, while later in the fall and winter they grow higher value vegetable crops.

This agreement is an example of an unconventional transaction structure that will transfer water to MWD, while allowing irrigators to continue farming during the portion of the year when the economic value of agriculture is highest. In addition, the agreement provides a supplemental revenue source to farm owners.

Market Drivers

Water markets are influenced by a variety of market drivers including economic, regulatory, and hydrological factors, which each can increase trading activity and increase price in their own way.

1 THE ENVIRONMENT

Low-flow rivers can kill fish protected by the Endangered Species Act. Environmental groups buy water rights to increase water flow to fragile riparian areas.

2 DROUGHT

Multi-year droughts affect rural and urban users alike, and prices increase due to simple supply economics. California has seen record water prices in recent years because of its ongoing record drought.

3 AGRICULTURAL TRENDS: LOW TO HIGH VALUE CROPS

The Agricultural sector is the largest water user in the West. The shifting commodities market can mean more water thirsty crops are grown.

4 GROWTH

Nearly 82% of the United States is urbanized, and much of its future growth is centered in the West. Increasing urban demand and the ability of urban users to pay premiums for water will impact its future price.

5 REGULATION

The ever-changing regulatory landscape can affect many things, from requirements to demonstrate long-term urban water supplies to increased protection of aquatic wildlife.

6 LAND DEVELOPMENT

As urban boundaries expand, land developers must secure long-term water supplies for planned communities. Cities will also often purchase large water rights holdings in anticipation of future demand.

Market Size

The water rights market remains relatively small compared to other sectors of the water industry. Over the last 10 years, an annual average of \$385 million in water rights transactions occur throughout the west. Trading activity spiked in 2015, when

\$800 million was transacted. The increase in trading activity was spurred by ongoing drought in California and an increased focus on acquiring reliable water rights portfolios.

Total Trading

The majority of both annual value and volume traded was typically via lease arrangements,

though permanent water rights sales account for a significantly higher percentage of total value as a result of the higher prices associated with permanent ownership (See fig. 2).

Figure 2: Total Value and Volume Traded, 2006-2015

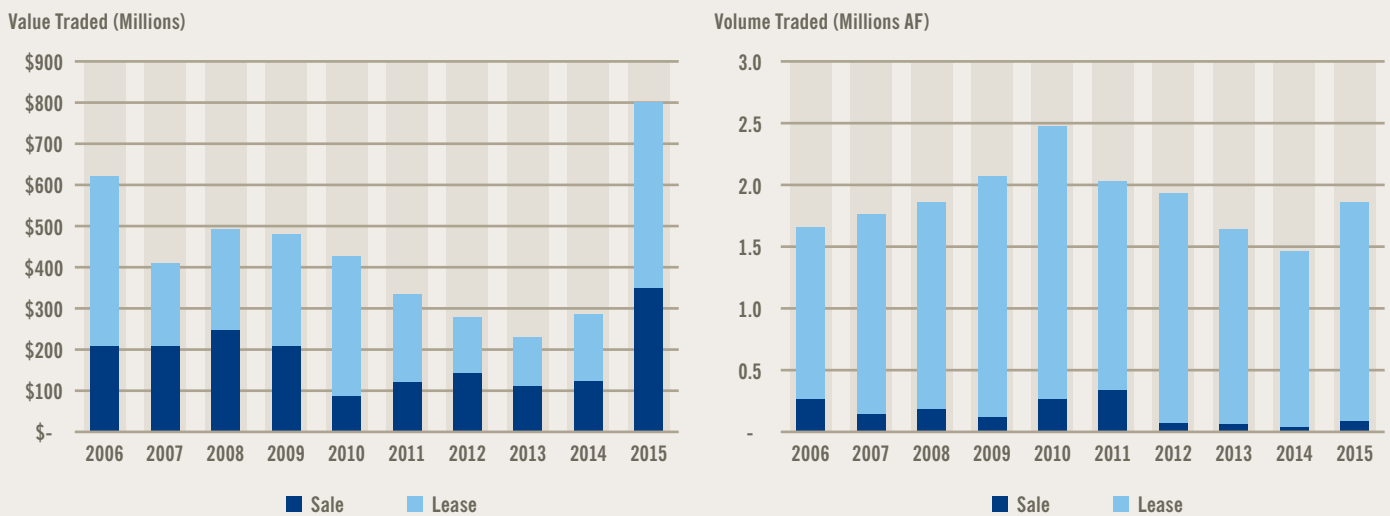
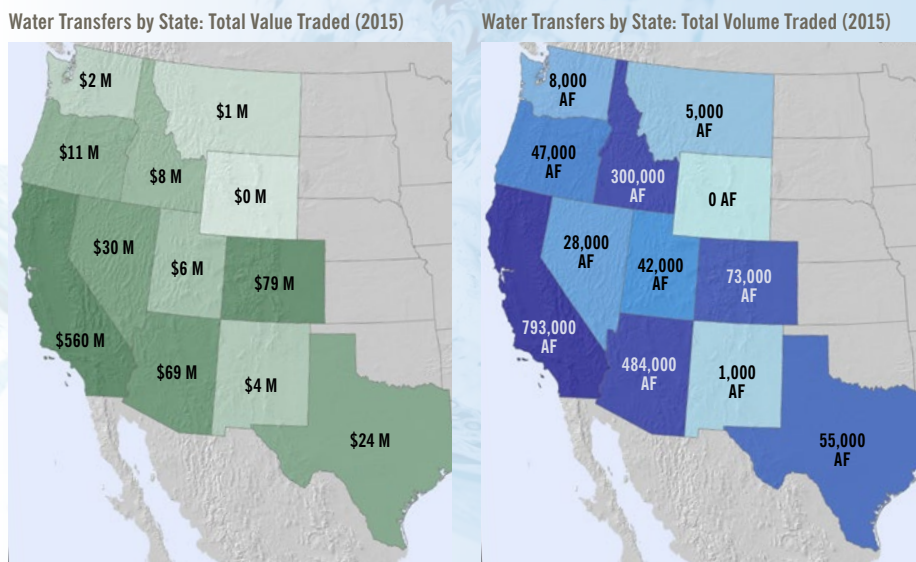


Figure 3: Total Value and Volume Traded by State, 2015



Top Trading States

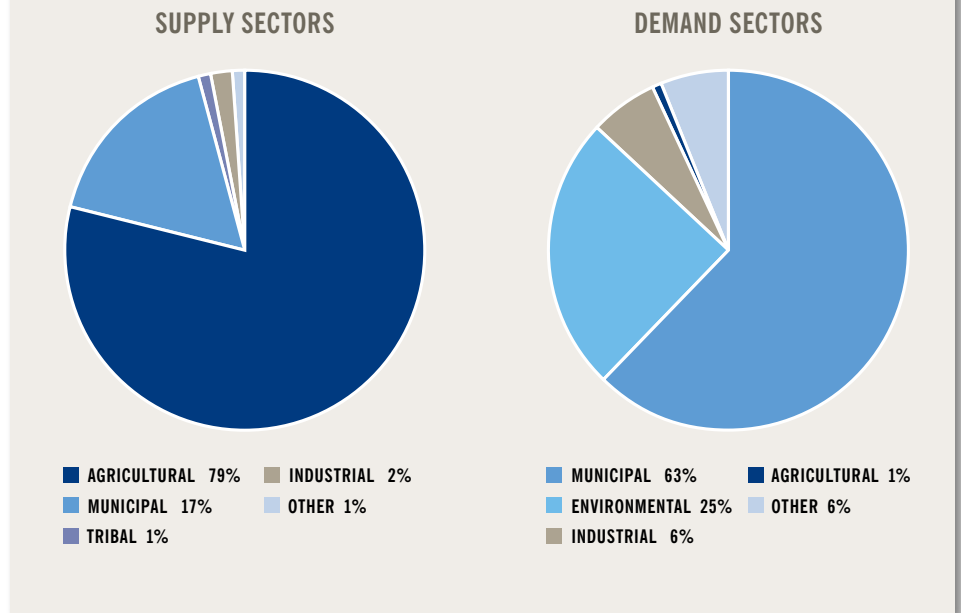
Broken down by state, California was by far the most active market and accounted for the majority of trading activity with a total of \$560 million and 793,000 acre-feet of water traded (See fig. 3).

Colorado was the second most active state in terms of value, with \$79 million changing hands, as water rights prices in Colorado are high relative to other western states. The Colorado market consists primarily of permanent water rights sales, hence the large dollar value traded versus the comparatively small total volume traded.

Market Participants

Water markets incorporate a wide variety of market participants on both the supply and demand side. Though the majority of water traded is from the agricultural sector to the municipal sector, other buyers and sellers include Native American tribes, environmental agencies, investment firms, and industrial users. North American tribes, for instance, increasingly use water rights settlement agreements to develop their water for on-reservation agricultural irrigation; at the same time, many are leasing their water as a form of economic development. Environmental buyers, meanwhile, are a major market participant, representing 25% of the total volume traded over the last decade.

Figure 4: Total Value and Volume Traded by State, 2015



Market Price Performance

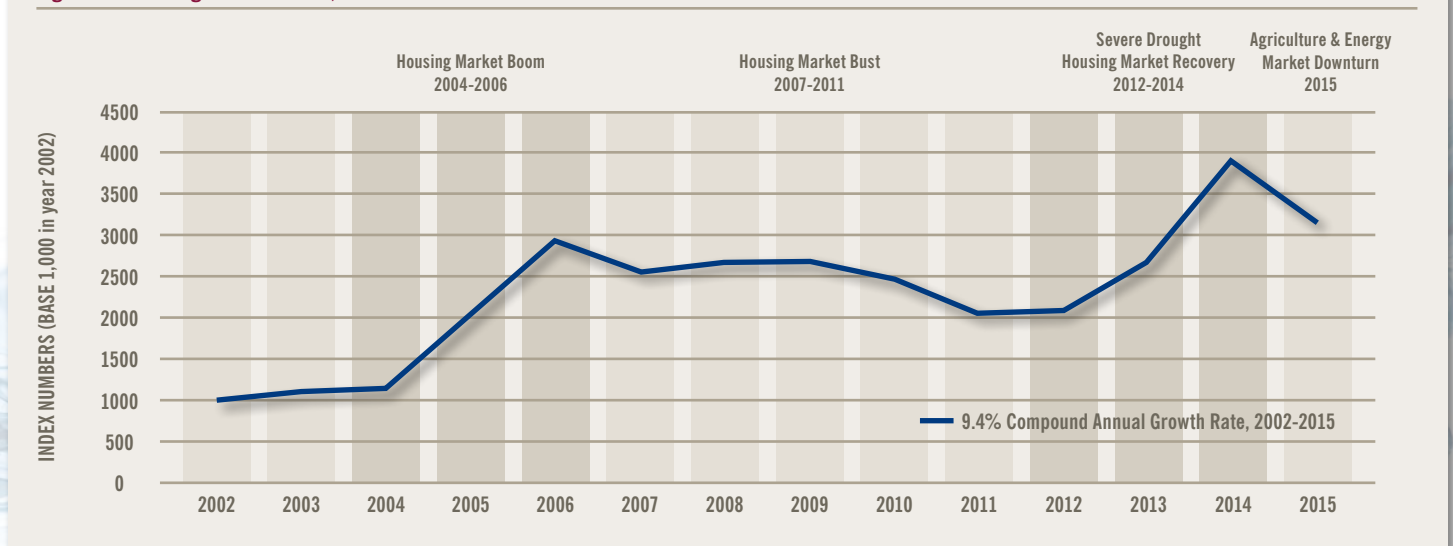
The Water Rights Price Index (WRPIx) tracks annual performance of water rights prices in the western United States using information from more than 4,500 individual transactions in 14 regional markets. The index has shown strong price appreciation since 2002, with a 9.4% compound annual growth rate despite setbacks during the economic recession and, more recently, during the agriculture and energy market downturns.

The Great Recession and Water Markets

Water markets from 2004 to 2014 were largely tied to the boom, bust, and recovery cycle of the housing market. Land developers looking to build new subdivisions during the boom were a major part of the urban purchases of water. As the housing bubble burst, the WRPIx fell significantly. The recession shock was not felt as strongly in the water market as in the

housing market, however, as buyers in other sectors provided some price support for water rights. A combination of the housing market recovery and severe drought from 2012-2014 put upward supply and demand pressures on water right prices.

Figure 5: Water Rights Price Index, 2002-2015



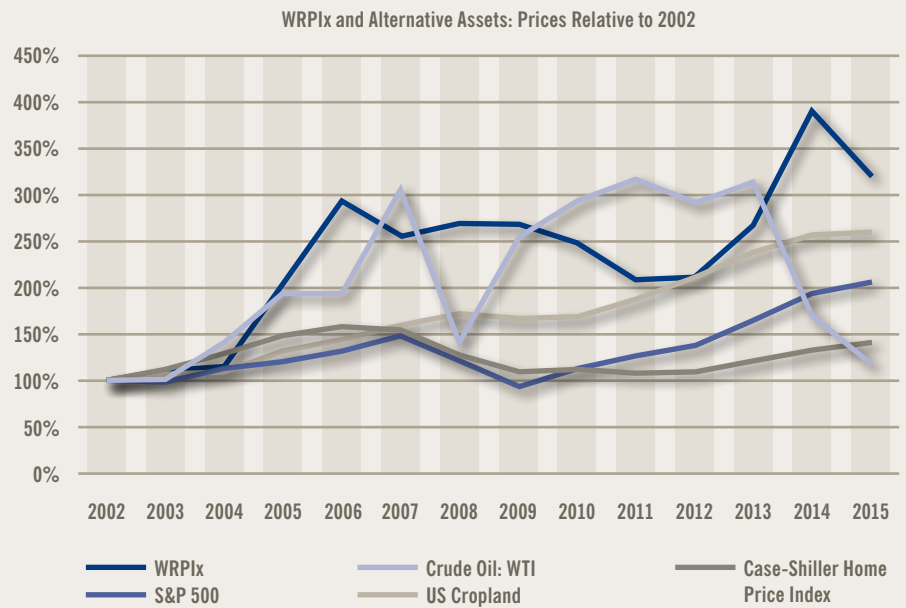
Commodity Bust and Water Markets

In 2015, agricultural and energy market downturns adversely impacted the WRPIx. Falling agricultural commodity prices worldwide contributed to reduced demand for water rights from agricultural buyers and lower asking prices from agricultural producers on the sell side. Global energy markets, meanwhile, were severely affected by the collapse in oil prices at the beginning of 2015, which reduced demand for hydraulic fracturing water and caused a majority of oil & gas exploration and production companies to exit the water market.

Longterm Index Trends

Since 2002, the WRPIx has been comparable to other established investment indices. In some instances, the WRPIx has outperformed more traditional asset classes such as the S&P 500 and Case-Shiller Home Price Index. Some correlation between asset classes exists, but water rights have shown less downside volatility and are an attractive avenue for risk diversification.

Figure 6: WRPIx Performance Comparison



Market Outlook: 2017 and Beyond

Water market drivers and broader macroeconomic factors are expected to drive positive growth outlooks for water markets in 2017. Significant urban growth is projected across the western United States while at the same time many municipalities will look to transition to renewable water supplies. Increased

government support for water transfers, meanwhile, will reduce regulatory barriers and induce water users to enter the market. Furthermore, the relatively slow development pace of additional water supply projects as solutions to water demand needs will continue to encourage water market activity.



ABOUT WESTWATER RESEARCH

WestWater Research (“WestWater”) is the leading economic and financial consulting firm specializing in water rights and water resource development in the United States. With a national practice and offices in four western states, WestWater provides market intelligence, valuation, transaction advisory, economic and strategic planning, and asset management services relating to water resources. The firm has a reputation for rigorous analysis, and information-driven water rights investment strategy formulation and execution. This reputation has been earned over 15 years through advising private, public, and non-profit sector clients on over \$700 million in water rights transactions. Recent transactions have included public-private partnerships for acquisition and development of reclaimed water in the southwestern United States, two of which have been nominated by Global Water Intelligence for “Water Deal of the Year.”

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