

## Groundwater Valuation in Texas: The Comparable Transactions Method

**Gabriel Collins, J.D.**, Baker Botts Fellow in Energy & Environmental Regulatory Affairs,  
Center for Energy Studies



Multiple methods can be used to value groundwater, with some more applicable in certain situations than others. This report analyzes the “comparable transactions” method and how it can be applied to groundwater valuation in Texas. In a nutshell, this entails examining transactions for groundwater purchases or sales to gather pricing information. If available, recent sales or leases of comparably situated water rights or water resources in place offer a useful valuation metric.

Part A outlines why comparable transaction valuation has become the “go-to source” of valuation information for groundwater assets in Texas. Part B elaborates on factors that may be used to adjust comparable transactions data to more closely reflect the factual situation of a specific asset being valued at a given point in time. Part C briefly discusses how groundwater has been priced to date, using publicly available transaction data covering various regions of Texas.

### A. WHY USE COMPARABLE TRANSACTIONS VALUATION, AND WHAT IS THE LEGAL BASIS FOR DOING SO IN TEXAS?

Comparable transaction valuations are predicated on the principle that the “fair market value of property” denotes “the amount that a willing buyer, who desires but

is not obligated to buy, would pay a willing seller, who desires but is not obligated to sell.”<sup>1</sup> This fundamental idea of fair market value is also enshrined in the Texas Water Code, which states that:

*Whenever the law requires the payment of fair market value for a water right, fair market value shall be determined by the amount of money that a willing buyer would pay a willing seller, neither of which is under any compulsion to buy or sell, for the water in an arms-length transaction and shall not be limited to the amount of money that the owner of the water right has paid or is paying for the water.<sup>2</sup>*

In other words, the value of the water right or asset should be based on *actual market conditions as dictated by supply and demand and other factors*, and not simply on the basis of compensating a water owner based on what he or she originally paid for the property. To yield a true “fair market value,” the transaction should occur between parties that are operating under normal commercial conditions and are not facing any financial, regulatory, or other duress that could skew the terms of the deal.

Even moving beyond the legal realm and into “plain English,” the concepts underpinning “fair market value” do not change. Merriam-Webster’s Dictionary defines “fair market value” as “a price at which buyers and sellers with a reasonable

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knowledge of pertinent facts and not acting under any compulsion are willing to do business.”

Water valuers who use comparable sales methodology are in good company. For a cross-industry comparison, consider that NFL and NBA player contracts involve very large amounts of money, the market for talent is relatively illiquid, and precise transaction terms are often kept confidential.<sup>3</sup> Notwithstanding these challenges, many player agents and teams use the terms and economic parameters reflected in prior contract agreements in their respective leagues as a baseline to inform new contractual negotiations for player signings each year during free agency, a period in which total transaction value turnover approaches \$2 billion per league.<sup>4</sup>

On an even larger scale, reporting of comparable prices—including bids and offers where a transaction was not necessarily completed—provides the basis for indices used to price commodity contracts in natural gas, petrochemical, and crude oil markets.<sup>5</sup> Combined trade turnover in markets priced off indices from Platts, Argus, and other price providers can exceed \$300 billion per year.<sup>6</sup> As such, using comparable sales transaction data to value and price groundwater in Texas is a highly defensible strategy, and will become more so as additional data from sales and leases become publicly available.

### 1. Obtaining Comparable Transaction Data

Water marketing in Texas is generally opaque, and deal terms are often kept private. Actual signed water supply and purchase agreements and judicial rulings and settlements, which taken collectively generally offer the highest fidelity source of information, can be obtained through a number of channels, including:

- a) open records requests to municipalities, their water suppliers (such as the San Antonio Water System or Hays Caldwell Public Utility Agency), and other public entities that own or regulate groundwater resources;
- b) discussions with private water sellers, purchasers, and ancillary parties such as

county extension agents and others who may have access to deal flow information;

- c) judicial decisions; and
- d) for the San Antonio area, purchase solicitations for period water rights issued by the San Antonio Water System (SAWS).<sup>7</sup>

In addition, surveys can be helpful in assessing various parts of the groundwater value chain, including sales prices, production costs, and transport costs. The most reliable information is likely to come from parties who are already participating in the market, such as oilfield water sellers or farmers, or who are actively preparing to do so.

Such parties have either already made the physical infrastructure investments necessary to sell water or are engaged in an activity that is very sensitive to water costs and depends on water as a critical input—farming, for instance. Simply asking landowners, “At what price would you be willing to sell or buy water?” risks generating a response that often lacks anchoring context—such as the value of water-dependent outputs, water extraction costs, and other important information—that helps inform the ultimate value of water in a given area for a particular application.

While more sparse than oilfield data, municipal water sourcing data is highly useful. Municipalities typically do not enter into water sales and purchase transactions as frequently as oilfield parties, but when they do enter the market, the water volumes and capital dollars at stake are often enormous. Many of these agreements have terms of at least 30 years, which force the municipalities to deeply contemplate future supply/demand conditions, hydrological risks, capital market conditions, and other factors. As such, if a water appraiser is comparing the value information from short-term oilfield supply deals versus that from longer term, higher volume, and more capital-intensive municipal deals in the same area, the municipal deals arguably hold a greater validity over a longer period of time for baseline valuation assessments.

## 2. Judicial Rulings

While not “sales” in the traditional sense, court rulings offer a number of unique factors that can make them useful barometers of groundwater value. First, judicial opinions are matters of public record, which makes them broad and transparent benchmarks that are far more accessible than most water sales and purchase contracts. Second, the parties to litigation each often face enormous financial stakes and have commensurately high incentives to provide as much powerful evidence as possible to support their positions. Third, the analysis underlying judicial decisions draws upon a robust debate and information discovery process that is more likely than not to render its value reasonably reflective of actual prevailing market conditions.

In Texas, the body of judicial and jury decisions and settlements on groundwater value disputes remains relatively small, but already includes at least two prominent case examples. The first, *Bragg v. Edwards Aquifer Authority*, centered on a damage claim that arose from the authority’s decision to deny groundwater pumpage rights to a pecan farming couple in Medina County. After approximately a decade of litigation, a Medina County jury awarded the Braggs \$2.5 million in damages, finding that one of the couple’s orchards was worth \$1.67 million with full access to groundwater from the aquifer but only \$300,000 if water access was limited to 120 acre-feet per year, as the Edwards Aquifer Authority desired.<sup>8</sup> The jury also found that a second pecan orchard was worth \$1.18 million with full access to the necessary water volumes, but had no value as a commercial pecan farm without water rights. The *Bragg* valuation relies heavily upon the cash-generation potential of agricultural land with and without access to water.

The second case, *State of Texas v. 7KX Investments*, involved the condemnation of approximately 28 acres of property for the construction of a rest stop alongside Interstate 35 in Bell County, near Temple. The state offered to pay approximately \$500,000 to acquire the land. However, the owner, 7KX Investments, which had drilled

six large-volume groundwater supply wells on the tract, rejected this offer because it would lose access to the groundwater once the state built the rest stop due to the fact that the water level in the aquifer was too shallow to access via directional drilling.<sup>9</sup> The jury awarded 7KX \$5.8 million for the condemned land, based largely on the likely long-term sales value of the land’s groundwater resources.

The state appealed the case but ultimately settled with the company for \$5.5 million just prior to the commencement of oral arguments before the Third Court of Appeals, meaning the land was effectively valued at more than \$196,000 per acre.<sup>10</sup> The settlement was very likely predicated on the future income generation potential of the proven commercial-scale water resource under the tract taken by the state. The final settlement amount fell nearly in the middle of the \$4.5 million-to-\$6.2 million estimate of the site’s 50-year total groundwater value offered by the plaintiff’s expert witness.<sup>11</sup>

## B. ADJUSTING COMPARABLE TRANSACTION INFORMATION TO SUIT THE CONDITIONS OF A SPECIFIC WATER ASSET OR PROPERTY INTEREST

Groundwater valuations are best framed in terms of what experts Charles Porter and Ed McCarthy call “the most probable price.”<sup>12</sup> Most importantly, this means that groundwater valuations arise from dynamic interaction between many variables, so a valuation issued at any given point is a “snapshot” in time, and could rise or decline meaningfully months or even weeks later.

Businesses often use a “fair value” approach intended to reflect market activity, timing, and a range of other factors to reach value estimates for water assets. For instance, Martin Marietta—a large publicly traded corporation with major land holdings in Texas—employs “a market approach to determine the fair value of water rights that may be associated with its properties.”<sup>13</sup> The company specifies that it values other intangible assets using an “excess earnings” method or a replacement cost

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approach, but classifies water rights entirely differently, which strongly suggests that “market approach” in this context means “comparable sales.”

Forestar Group, another large publicly traded corporation that focuses on relatively illiquid assets such as real estate and groundwater, offers a useful three-level framework for assessing the “fair value” of water property interests in water:

Level 1: “Quoted prices in active markets for identical assets or liabilities.”<sup>14</sup>

Level 2: “Inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.”<sup>15</sup>

Level 3: “Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.”<sup>16</sup>

The closest thing to an “active” market for groundwater in Texas is the Edwards Aquifer, but it is still not a transparently traded market. The Edwards Aquifer Authority provides an online portal for parties wishing to sell or lease groundwater,

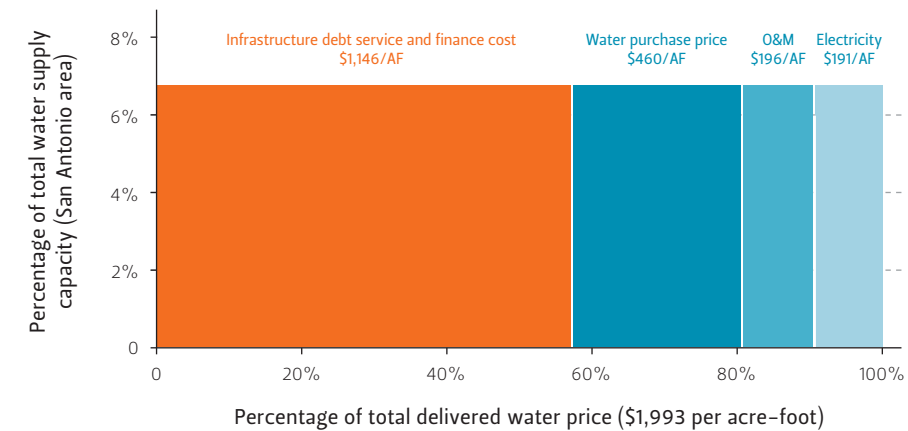
but does not comprehensively report transaction and price data.<sup>17</sup> For other groundwater transactions throughout Texas, data availability is even more sparse.

As such, when a party is evaluating a groundwater asset for a potential purchase or sale, finding apples-to-apples transaction data upon which to price the water is very rare. This means that in practice, buyers and sellers are typically working with Level 2 and sometimes Level 3 data as articulated above in the fair value framework and must apply multiple adjustment factors to determine a defensible fair value range for a transaction at a given place and time. Key variables to consider when adjusting comparable transaction valuations include the following 10 factors:

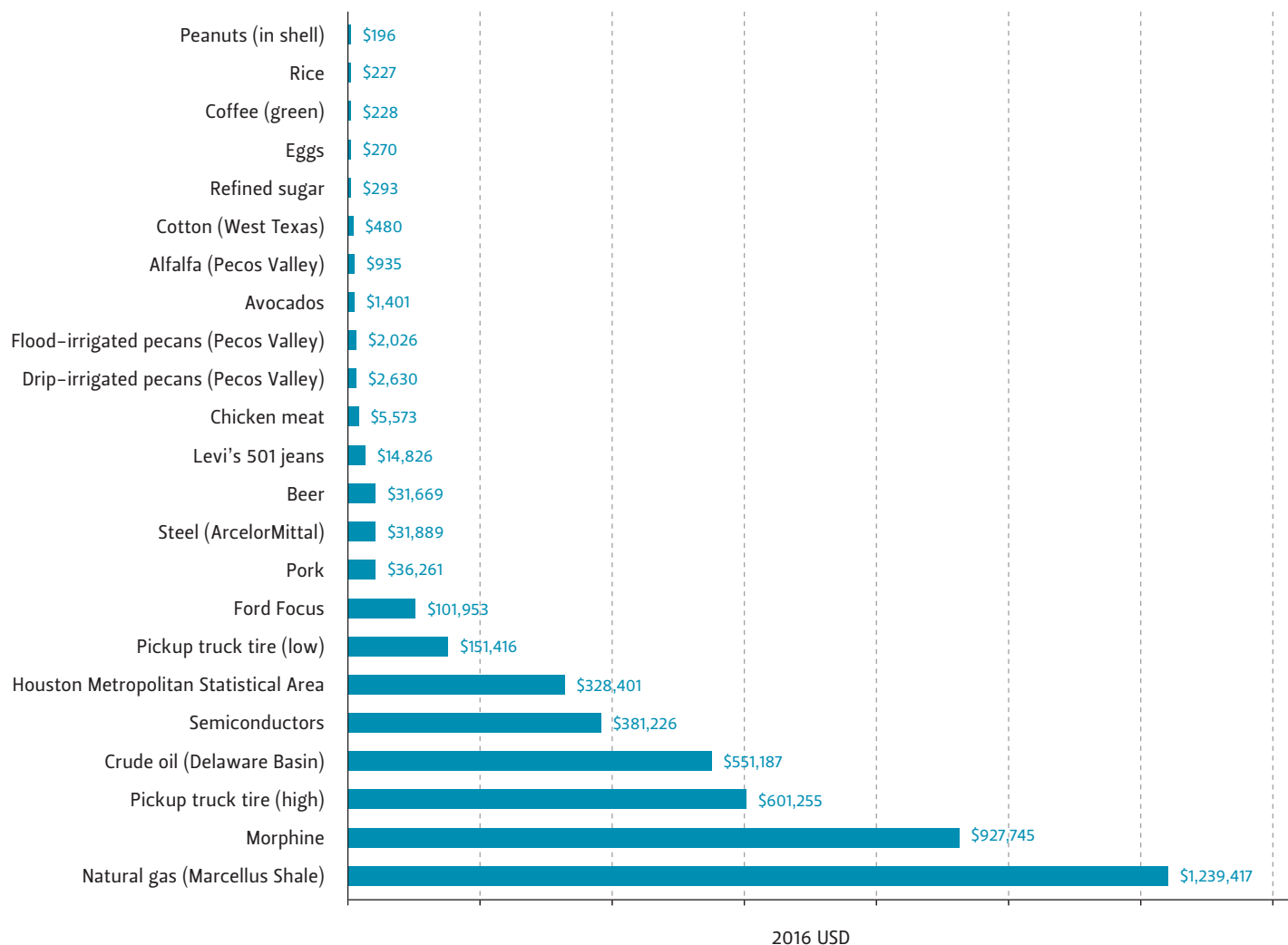
**Factors 1–3: Water location, the existence of production and delivery infrastructure, and the cost of such infrastructure.** These factors tend to be closely related to one another, hence the decision to group them together here. Take for instance the Vista Ridge project supplying water from Burleson County to San Antonio. As of February 2017, the project’s expected water production costs breaks out as follows: \$460 per acre-foot to purchase the water from Bluewater Systems, \$1,146 per acre-foot to finance infrastructure costs, \$191 per acre-foot in electricity costs, and \$196 per acre-foot in operations and maintenance costs, for a final delivered water price of \$1,993 per acre-foot.<sup>18</sup> In simple terms, infrastructure and debt service costs alone account for nearly 60% of the final delivered water price.

**4: Water quality.** The price of water may vary based on its quality. For instance, in agreements to supply municipal drinking water, producers may be entitled to higher royalty payments for water volumes with lower total dissolved solids (TDS) content—a proxy for salinity—while higher TDS water yields lower royalty payments.<sup>19</sup> Conversely, oilfield water supply agreements in Texas have been designed to incentivize the use of high-TDS, non-potable water for frac fluid by prohibiting the production of water below a specific TDS level and requiring a lessee

FIGURE 1 — VISTA RIDGE DELIVERED WATER COST



SOURCE San Antonio Water System

**FIGURE 2 — ECONOMIC VALUE GENERATED PER ACRE-FOOT OF WATER USED**

**SOURCES** Agricultural Extension data, company reports, FracFocus, Mekonnen and Hoekstra, U.S. Census Bureau, U.S. Department of Agriculture, and author's estimates

to effectively forfeit the gross revenues earned from any sales of water below a certain TDS level.<sup>20</sup>

**5: The cost of physically extracting and treating the water (i.e., the production discount).** In the simplest terms, this means a third-party water seller will likely have to discount the price of water they are selling if it has a quality impairment that requires a customer to spend additional money on treatment. Quality-related premiums and discounts abound in the oil and gas world and provide ample precedent for parties valuing water and structuring sales and purchase agreements.

#### **6: The intended use of the water.**

Agricultural users are the largest users of water per unit of economic output produced but also generally have the least capacity to pay. Municipal users have a medium capacity to pay and contract the largest steady volumes of water for the longest periods. Specialty users such as oilfield frac users have much smaller volume requirements and the most inconsistent and unpredictable demand patterns, but can pay premium rates that may be an order of magnitude higher than what a municipality or factory can afford (Figure 2).



**Data from actual sales shows three fundamental pathways in which buyers acquire access to groundwater in Texas. One method is to purchase the groundwater in place outright. The second method involves purchasing surface acreage in order to acquire the accompanying groundwater. The third method is to lease groundwater rights.**

**7: Protection from drainage by neighboring pumpers.** Texas currently governs groundwater under “rule of capture” principles that in practice mean water owners do not have access to a given volume of water, nor do they have practical recourse to avoid being pumped out by neighboring users.<sup>21</sup> The implication is that water sourced from very large contiguous tracts or pooled leases is the most “protected” and, all else held equal, will likely command the highest valuations for groundwater in place in that particular area.

**8: Political, legal, and regulatory barriers that could impede development of the resource.** Developing water resources for off-tract use generally requires obtaining some—or at times, all—of the following permissions: governmental permits, the consent of third parties whose property must be crossed, and the consent of other parties who may hold a property interest in the groundwater resource in question. These “above ground factors” often present the greatest challenge to developing a water asset and, accordingly, can exert great influence on what a given groundwater asset is actually worth to a potential buyer.

**9: Time sensitivity of the water use.** In practice, time sensitivity is often inversely correlated with the length of the period in which the consumer will need the water. For instance, sourcing water for hydraulic fracturing completions of oil and gas wells is the epitome of a “time is of the essence” transaction, but such purchases often occur on an irregular schedule and energy companies are generally unwilling to enter into longer term or take-or-pay water procurement agreements.<sup>22</sup> In contrast, cities that need water for the next 30 to 50 years will not pay as much as a frac user and will not move as quickly to seal up a deal; however, such purchase agreements typically involve a multi-decade arrangement. The most rapidly implemented municipal water development and acquisition transactions typically occur when a city already owns an anchor

water property—such as Midland’s T-Bar Ranch—then patches satellite properties like the Roark and Clearwater Ranches into the supply corridor linking the city with the original anchor source of water supply.

**10: Drought resistance.** Groundwater resources are generally much more insulated from drought than surface water sources. Rivers and lakes respond within a matter of weeks to a lack of rainfall, whereas in most Texas aquifers (perhaps excepting the Edwards), the effects of drought can take years to show up because recharge rates are typically slow. As such, access to groundwater resources can help cities and other water users hedge against a drought by offering them an alternative water source that replaces supplies lost from surface water sources, and also helps buy time for demand-side reforms aimed at optimizing water conservation.

These factors are not rank-ordered because their relative importance may differ under various circumstances. For instance, a rapidly growing city in a drier part of Texas may be most concerned about a resource’s drought resistance and water quality, while an oilfield or factory user may be most concerned with how quickly water can be brought online and the availability of right of ways and infrastructure to get it to market.

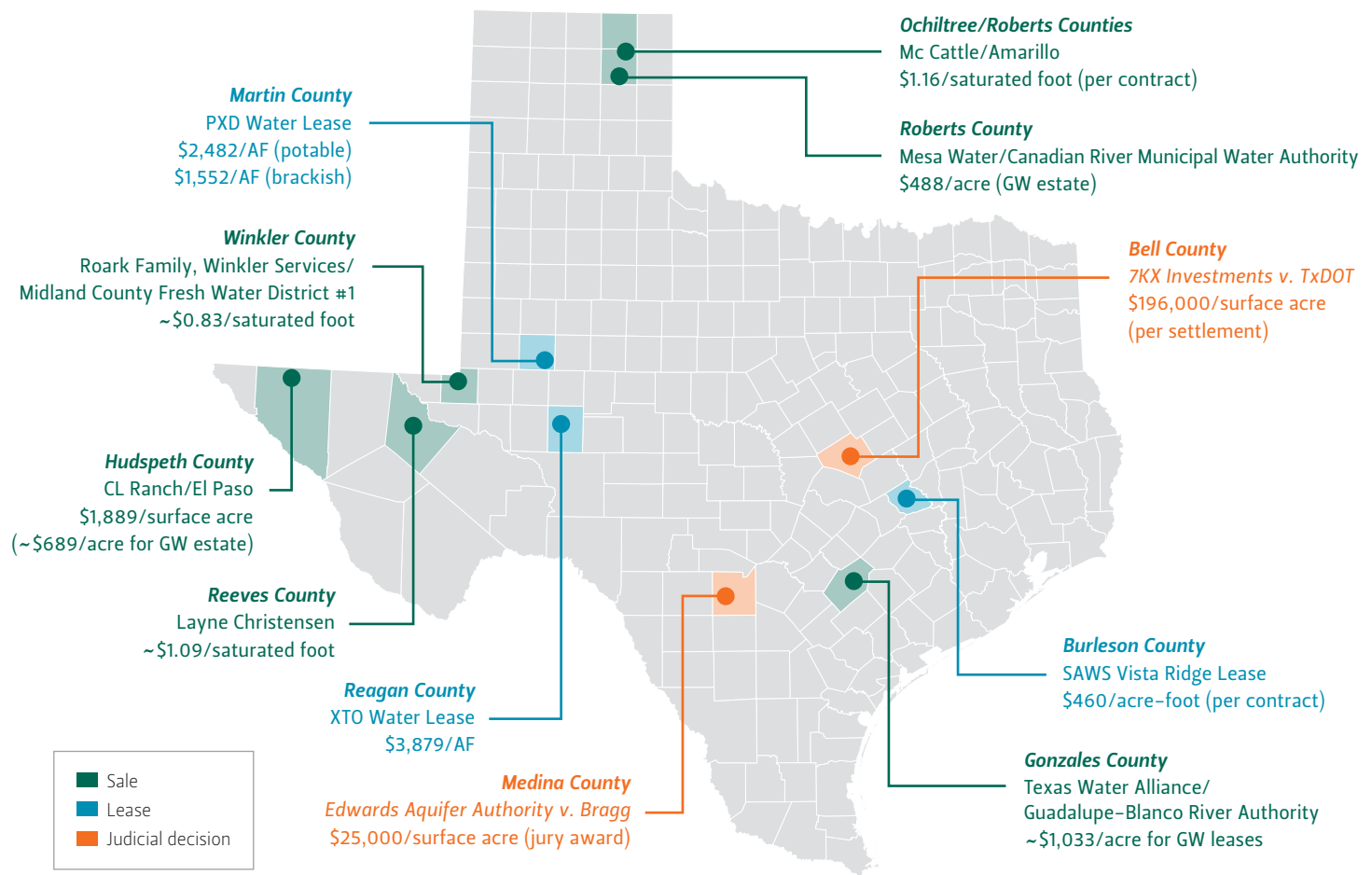
It should also be noted that analysts may need to apply a number of additional criteria to properly evaluate the potential economic value of oilfield water assets, an important subset of the market in the Permian Basin and parts of South Texas. First, how close is the asset to a state-owned highway that offers a potential right of way for temporary pipelines or layflat hoses to be laid next to the road? Second, how many drilling permits have been approved for the next six to 12 months within a 20-mile radius of the asset? Third, how intense is the competition from other water suppliers in the area? Is there a larger supplier whose “zone of influence” curtails the potential market opportunities that the asset under evaluation might otherwise enjoy?<sup>23</sup>

### C. HOW HAS GROUNDWATER ACTUALLY BEEN PRICED TO DATE IN TEXAS?

Data from actual sales shows three fundamental pathways in which buyers acquire access to groundwater in Texas. One method is to purchase the groundwater in place outright. The second method involves purchasing surface acreage in order to acquire the accompanying groundwater. The third method is to lease groundwater rights. The following section will offer case examples of how groundwater resources were priced under each scenario.

Under Texas law, a separate groundwater estate can be severed from the surface land and bought and sold as an independent asset. The Texas Supreme Court affirmed in the landmark May 2016 *Coyote Lake Ranch* decision that the groundwater estate is not only a stand-alone real property interest, but also dominant relative to the surface estate. Thus, without specific contractual provisions to the contrary, a surface owner generally cannot prevent a groundwater estate owner from making reasonable use of the surface in order to develop his/her asset.<sup>24</sup>

**FIGURE 3 — SELECTED PRICES FOR GROUNDWATER (GW) RESOURCES IN TEXAS**



**NOTE** In sales transactions listed above, seller is listed first followed by the buyer (i.e., seller/buyer) where applicable.

**SOURCES** Canadian River Municipal Water Authority, water supply agreements, company reports, local newspapers and author's model (Layne Christensen asset)

**Income-based value approaches are likely to become more prominent if and when institutional investors become more interested in Texas water assets, whether businesses that directly sell water or entities that use water as a critical intermediate input (like farms).**

Groundwater can be priced and sold while in place in the aquifer; large-scale sales of and leases for groundwater in place have regularly occurred in Texas over approximately the past 50 years. For instance, University Lands in 1969 leased all of its groundwater rights on an 11,500-acre tract in Ward County—down to a 1,200-foot depth—for up to 50 years to an entity called Duval Corporation, which subsequently transferred its interest to the Colorado River Municipal Water District.<sup>25</sup> In addition, in a 1986 transaction, University Lands leased all potable groundwater under a 1,319-acre tract in Upton County to the Upton County Water District, also for a potential lease life of 50 years.<sup>26</sup>

The Vista Ridge project is perhaps the signature groundwater lease project in Texas at present. Vista Ridge LLC aims to begin supplying water to San Antonio in 2020 through a 142-mile pipeline from Bureson County. The San Antonio Water System (SAWS) will purchase groundwater from a trust controlled by Blue Water Systems at a price of \$460 per acre-foot.<sup>27</sup> This groundwater is sourced from a pool of 1,312 individual groundwater leases covering a total of 50,000 surface acres.<sup>28</sup>

Metropolitan Water Company LP amassed these leases over approximately 15 years as part of its Porter's Branch Project, which the company claims "was the first large-scale groundwater lease project in the state of Texas."<sup>29</sup> Metropolitan Water then transferred a portion of the total lease pool to Blue Water, which in turn marketed them to the Vista Ridge project. Landowners who leased their water receive a royalty equal to 10% of the water purchase price, or \$46 for each acre-foot produced.<sup>30</sup>

The author has also located two West Texas agreements under which the groundwater estate was actually sold in place.

In the first instance, the city of Amarillo agreed in 2015 to purchase the entire groundwater estate beneath land owned by the Mc Cattle Company in Roberts and Ochiltree counties, both northwest of Amarillo. The city priced the water resource based on the feet of saturated water available under each acre of the surface

tract, and attached a value premium to the acres above the thickest saturated layer. It paid \$250 per surface acre for acreage over a saturated layer with an average thickness of less than 200 feet, \$300 per acre for land with an average saturated thickness between 200 and 257 feet, and \$1.16 per average saturated foot for each acre above a saturated aquifer strata with an average thickness of 258 feet or more.<sup>31</sup>

In the second agreement, the Midland County Fresh Water Supply District No. 1 paid \$3.2 million to members of the Roark Family and Winkler Services to purchase the groundwater rights underneath approximately 4,500 acres of the Roark Ranch.<sup>32</sup> Data from the Texas Water Development Board show that the average thickness of the Pecos Valley Aquifer under the tract is approximately 850 feet.<sup>33</sup> This suggests a groundwater estate purchase value of approximately 83 cents per water-bearing foot per acre.

## CONCLUSION

Comparable transaction pricing has, to date, been the preferred method of valuing groundwater sold in Texas. Income-based value approaches are likely to become more prominent if and when institutional investors become more interested in Texas water assets, whether businesses that directly sell water or entities that use water as a critical intermediate input (like farms). In Australia, the executive director of BDO, a prominent firm that represents institutional buyers of agricultural assets, noted in a 2014 interview that "The comparable sales methodology is not the valuation methodology expected to be used by sophisticated investors... Instead, they are more likely to adopt an income approach when valuing agricultural businesses for acquisition, divestment, and general reporting."<sup>34</sup>

Nevertheless, the comparable transactions method is likely to continue serving as an important valuation tool for buyers and sellers of groundwater assets in Texas, for at least two reasons. First, the final sale price of a given groundwater asset is likely to incorporate the influence



of income-based valuation methods, particularly in cases where water drives both the value and income generation potential of a given tract of land. Second, buyers and sellers of an asset generally will want to see what similar assets fetched on the market. In turn, this information will, in many cases, anchor their own subsequent value perceptions and expectations.

## ENDNOTES

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20. See, for instance, the Groundwater Lease signed on November 1, 2017 between the Texas General Land Office and Layne Water Midstream, LLC. Available via open records request.

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22. “Take-or-pay” contracts are often used in situations requiring expensive infrastructure to supply a good. If the consumer does not—or cannot—take at least the minimum volume specified in the agreement between the parties, then it must nevertheless pay the supplier the amount of money it would have paid had it actually taken delivery of the good. This allows a predictable cash flow that serves as the basis for long-term financing of expensive projects.

23. For these points, the author draws on insights shared in personal communications with a large Delaware Basin frac water supplier in October 2017.

24. *Coyote Lake Ranch, LLC v. City of Lubbock*, 498 S.W.3d 53, 65 (Tex. 2016), reh’g denied (Sept. 23, 2016). The principle, absent an agreement to the contrary, that a severed mineral estate’s implied right to use the surface must be exercised with due regard for the surface estate’s rights and the rules common to mineral and groundwater estates, compel the conclusion that the accommodation doctrine extends to groundwater estates.

25. Agreement available via open records request. Copy on file with author.

26. Agreement available via open records request. Copy on file with author.

27. “Vista Ridge Regional Supply Project Water Transmission and Purchase Agreement,” April 5, 2017, SAWS, [http://www.saws.org/your\\_water/waterresources/projects/vistaridge/docs/20170426\\_VistaRidge\\_WTPA\\_EXECUTED\\_CAM\\_and\\_Conformed\\_3rd\\_Amendment.pdf](http://www.saws.org/your_water/waterresources/projects/vistaridge/docs/20170426_VistaRidge_WTPA_EXECUTED_CAM_and_Conformed_3rd_Amendment.pdf).

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31. See contract of sale, groundwater rights between McCattle Company and M&D McLain Family (sellers) and City of Amarillo (purchaser).

32. Winkler Services also retained a royalty interest in water sold, with a scaled system that included premium prices for water from the ranch based on its quality as measured by total dissolved solids content.

33. This figure was calculated by using a shapefile of the Pecos Valley Aquifer created by the Texas Water Development Board that contained approximately 6,800 data points, including the thickness of the water-saturated strata, finding the 14 cells that completely or partially underlay the relevant sections of the Roark Ranch in Winkler County, then averaging the thickness of those cells and using that number as the denominator to calculate the price paid for the groundwater estate.

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## AUTHOR

**Gabriel Collins, J.D.**, is the Baker Botts Fellow in Energy & Environmental Regulatory Affairs for the Baker Institute Center for Energy Studies. He was previously an associate attorney at Baker Hostetler, LLP, and is the co-founder of the China SignPost™ analysis portal. Collins has worked in government and as a private sector global commodity analyst and investment advisor, authoring more than 100 commodity analysis reports for both private clients and publications.

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