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WATERING THE FOREST FOR THE TREES: AN EXAMINATION OF BASIN GROUNDWATER USE AND MANAGEMENT IN ENERGY PRODUCING STATES

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Purpose: The purpose of this paper is to examine groundwater management and use in relation to oil and gas development in Oklahoma, Texas and New Mexico, and to further understand how state laws and regulations impact and affect the various producing basins in those particular states.

I. Introduction

In today's production climate, groundwater use and management has become a critical part of oil and gas development. In basins across the nation, operators are facing new challenges in handling the vast amounts of water necessary for their operations: "the majority (at least 55%) of a well's operating expense can be attributed to water management."[1] Fifteen years

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1. Benjamin Reed, *Permian Basin News: These Facts Suggest That Water "Commoditization" and a Water Price Index is the Future of Upstream Energy Water*

ago, a vertical well required approximately 10,000 barrels of water. Today, the amount of water required and used has increased to 500,000 to 600,000 barrels per well.[2] Oklahoma, Texas, and New Mexico are states at the forefront of industry water management and use.[3] Operators in these states rely on groundwater for hydraulic fracturing, but must also handle the water that is produced as a byproduct of the production zone.

Hydraulic fracturing is "the process of stimulating a well by injecting highly pressurized hydraulic fracturing fluids into a target geologic formation to extract oil or natural gas at higher rates than traditional oil and gas operations."[4] This process depends on the access to and use of water. Combined with sand and chemicals, the mixture is designed to create and maintain the permeability of fissures and fractures within the rock, which permits the oil and/or gas to flow more freely from the subsurface rock.[5] "[T]he amount of water per frac will depend upon: the total length of the lateral wellbore, the number of stages, and the particular characteristics of the shale formation," and in application, "[t]his will require millions of gallons of water per horizontal well."[6] [7]

Industry focus is rapidly shifting to practices surrounding produced water use and management. When water is pumped from a well, it is broadly classified as groundwater. When groundwater is obtained from an oil and gas well, the groundwater is then more narrowly classified as produced water. "Produced Water is the water naturally occurring in the targeted hydrocarbon formation that also flows to the surface through the wellbore during oil and

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Management Cost Reduction, SOURCEWATER (February 25, 2017), at 2 (water hauling was over $15 billion of the water market as of 2016).

2. Michael Anderson & Layne Christensen, Oil & Gas Panel at the Roth Conference (Mar. 2018).

3. *Oklahoma Water for 2060: Produced Water Reuse and Recycling*, OKLAHOMA PRODUCED WATER WORKING GROUP (Apr. 26, 2017), http://www.owrb.ok.gov/2060/PWWG/pwwgfinalreport.pdf.

4. Trey Nesloney, *Fracking Dry: Issues in Obtaining Water For Hydraulic Fracturing Operations in Texas*, 45 TEX. ENVTL. L.J. 197, 198 (2015).

5. *Id*.

6. Joseph B.C. Fitzsimmons, *Rights of the Surface Owner*, TEX. LAND & MIN. OWNERS ASS'NS (2016), http://ufjbwlaw.com/pdfs/SurfaceRights.pdf.

7. Nesloney, *supra* note 4, at 199 (in 2015, the Barnett Shale horizontal wells used up to 3.5 million gallons of water, the Eagle Ford Shale used approximately 3.6 million gallons of water for hydraulic fracturing. For scale, this is equivalent to five and half Olympic-size swimming pools).

gas exploration and production."[8] Moreover, produced water is generally introduced through man-made or artificial activities occurring in the underground formations.[9] [10] "Produced water is a brine water found naturally in oil and gas reservoirs that is produced from the well at an increasing rate as a reservoir is depleted over time."[11] For every barrel of oil produced, there is an estimated 10 barrels of water generated.[12] With shale development on the rise, produced water, a category traditionally treated as a waste product and not a commodity, has drawn more attention from the industry as a product of potentially significant value.

When examining the different energy-producing regions in the U.S., most observers tend to look at each state separately, the "Forest" level. However, when examining groundwater management as it pertains to oil and gas development, it can be beneficial to drop down to the "Tree" level and instead examine what impacts each basin individually. This may allow for a more precise analysis of each basin's advantages, disadvantages, risks, and opportunities with water management. If bordering states share geologic basins, implementing *basin-specific* regulations instead of *statewide* laws may allow for some certainty for those pioneering water management across state lines; on the other hand, states must also consider and implement an approach that works best for the *whole*, balancing the needs of a few against the needs of all.

A. Individual State's Water Rights – Forest Level

Oklahoma and Texas are considered "hybrid" water rights states: groundwater is generally owned by the surface owner of the land, while surface water is a public right.[13] In Oklahoma, groundwater is a property right, subject to limitation from the Oklahoma Water Resource Board. In

8. Adam Friedman, *Recycling Flowback and Produced Water: Can Texas Do More to Throw Away Less?*, THE ST. B. OF TEX., 40 SEC. REP. OF THE OIL, GAS & ENERGY SECTION 73, 73 (2016).

9. Gabriel Collins, J.D., *Oilfield Produced Water Ownership in Texas: Balancing Surface Owners' Rights and Mineral Owners' Commercial Objectives*, BAKER BOTTS FELLOW IN ENERGY & ENVTL REG. AFF. (Feb. 2017) https://www.bakerinstitute.org/media/files/files/23bd889f/CES-pub-ProdWaterTX-020817.pdf.

10. Edmond R. McCarthy, Jr., *Mixing Oil and Gas with Texas Water Law*, 44 TEX. TECH L. REV. 883 (2012) (but for the activities of a developer, the water would generally stay in place).

11. Austin C. Whitmore, *Oilfield Recycling in Texas: Why Command and Control Regulations are Stifling the End Goal*, 44 TEX. ENVTL. L.J. 287, 292 (2014).

12. *Id.*; *see also* Reed, *supra* note 2.

13. *See* OKLA.STAT. tit. 82, § 105.1A (2009).

Texas, groundwater is also a property right but is generally only curtailed in certain areas by Ground Water Conservation Districts. Overall, Oklahoma and Texas groundwater are controlled more heavily by private ownership. On the other hand, New Mexico is a "prior appropriation" state: all waters of the state are considered a public right. In New Mexico, the State Engineer administers groundwater rights.[14]

	OKLAHOMA	TEXAS	NEW MEXICO
LEGAL SYSTEM?	HYBRID (TRANSITION STATE)	HYBRID (TRANSITION STATE)	PRIOR APPROPRIATION (FIRST IN TIME, FIRST IN RIGHT)
OWNER OF GROUNDWATER?	LANDOWNER	LANDOWNER	PUBLIC
PERMIT REQUIRED FOR DOMESTIC USE?	NO	NO	YES

[15]

While the rights and governance of groundwater varies, all three states are vital contributors to the energy industry. And where there is oil and gas development, water management and use are sure to follow. Some states have chosen to govern water rights with statewide legislation; other states have chosen to govern in response to basin-specific externalities. While each state and each basin face individual and unique issues, Oklahoma, Texas, and New Mexico are situated so that each may learn not only from within their own borders, but also across state lines.

14. *See generally* M. D. Smolen et al., *Whose Water is it Anyway? Comparing the Water Rights Frameworks of Arkansas, Oklahoma, Texas, New Mexico, Georgia, Alabama, and Florida*, OKLA. COOPERATIVE EXTENSION SERV.: OKLA. ST. U. (Apr. 2017), http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-8459/E-1030%20Water.pdf.

15. *Id.*

II. Oklahoma

A. Water Rights and Legal Governance – Forest Level

In Oklahoma, water management and use vary significantly in comparison to Texas and New Mexico. Oklahoma has not yet felt the drought concerns that its neighboring states are experiencing. Rather, the big issues in Oklahoma are seismicity and disposal.[16] The Oklahoma Water Resource Board ("OWRB") diligently governs Oklahoma's groundwater resources, as does, for energy industry purposes, the Oklahoma Corporation Commission ("OCC"). However, legal regulation and governance over produced water is not completely settled in the state.

When looking for legal guidance on water management and use in the industry, operators turn to the Oklahoma Corporation Commission for rules and regulations.[17] At this time, produced water remains remarkably unregulated, with the exception of the recent opinion in *Oklahoma Oil & Gas Association v. The Kingfisher County Commissioners*.[18] In an effort to move water to and from well sites, Newfield Exploration ("Newfield") laid temporary pipelines in the county right-of-way ditches. In 2018, county officials in Kingfisher County, Oklahoma, passed a rule restricting temporary pipeline use for transportation of produced water.[19] Newfield and others in the industry argued that governance over moving the water by temporary pipeline belonged with the OCC[20] and that the county officials overstepped in their rulemaking. The Court agreed with the industry. Ultimately, this case established that operators should rely on the authority of the OCC when dealing with produced water.

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16. Terri Cook, *Forecasting Seismicity from Wastewater Disposal in Oklahoma*, EOS (Mar. 8, 2019), https://eos.org/research-spotlights/forecasting-seismicity-from-wastewater-disposal-in-oklahoma.

17. *See* OKLA. STAT. tit. 52, 139 (2009).

18. *See* Briefs for Respondent, Oklahoma Oil & Gas Association v. The Kingfisher County Commissioners, No. 117,303, 2018 WL 7202826, 2018 WL7202830, and 2019 WL 453194 (Okla).

19. Adam Wilmoth, *Water fight heats up in Kingfisher County*, THE OKLAHOMAN (July 23, 2018), https://oklahoman.com/article/5602102/water-fight-heats-up-in-kingfisher-county.

20. *See Okla. Oil & Gas Ass'n v. Kingfisher Cty. Comm'rs* (Oklahoma Supreme Court placed exclusive jurisdiction over this matter with the Oklahoma Corporation Commission. The OCC found the ban overly restrictive, as temporary pipelines are industry standard. *See* unpublished order available at https://static1.squarespace.com/static/59bba641cd39c38913f702a0/t/5d66d96fc64ec500017b322d/1567021425992/6-Jon+Miller%2C+Oklahoma+Oil+%26+Gas+Assoc.+v.+Kingfisher+County+Commissioners+-+OK+Supreme+Court+11-12-18.pdf).

Some states have taken steps to reduce the complexities of water management through targeted statewide regulations and legislation.[21] Oklahoma's focus has been geared towards addressing the issues in the basins caused by transporting the water, as well as seismicity and its relation to disposal. Oklahoma has responded to these issues and concerns with the help of the OCC and the EPA's Underground Injection Control ("UIC') program. In that regard, Oklahoma has sought help through regulatory guidance and processes, as well as through local legislation and statewide laws.

Further, in April 2017, the OWRB commissioned a study group to research and better understand produced water with state and industry management of the resource. The Produced Water Working Group ("PWWG")[22] has focused on recycling and re-use and worked to assess "the potential alternatives to current practices of injecting produced water from oil and gas wells into disposal wells" and "opportunities and challenges associated with treating produced water for beneficial uses, such as industrial use or crop irrigation."[23] This group is committed to assisting Oklahoma with long-term research and guidance for improvements to the state's water management practices.

B. Basin Issues – Tree Level

Most operators in Oklahoma are faced with two primary water management questions: (1) how is the water to be disposed of in a safe manner and (2) how is the water transported? For the most part, Oklahoma has addressed these issues through focused regulations.

In 2015, seismic activity reached a high in Oklahoma. That year, the state experienced 903 earthquakes with a magnitude of 3.0 or higher.[24] After implementation of regulations and procedures from the OCC and the UIC, operators now have guidelines in place to more adequately respond to and effectively reduce seismic events. By the end of 2017, the number of seismic events in the state had been reduced to 304 earthquakes with a magnitude of 3.0 or higher, and that number has continued to decrease.[25]

In response to concerns surrounding disposal and supply, water management companies have found room to expand and grow in Oklahoma. While some are private businesses, operators are also expanding internally to

21. Oklahoma Produced Water Working Group, *supra* note 3.
22. *Id.*
23. *Id.*
24. EARTHQUAKES IN OKLA., https://earthquakes.ok.gov/ (last visited Jan. 19, 2020).
25. *Id.*

manage industry-produced water. In 2017, Newfield Exploration announced its intent to open a permanent recycling facility in Kingfisher County, Oklahoma.[26] The Barton Water Recycling Facility covers approximately 30 acres and is capable of processing 7 million barrels of water in a year's time, or approximately 30,000 barrels per day.[27] Newfield continues to recycle and re-use produced water, and it is joined by several other operators and business entities in the state.[28]

Although Oklahoma's regulations are viewed as loosely constructed in regard to produced water when contrasted to Texas and New Mexico, the state has responded to groundwater management concerns through targeted regulations. At the same time, operators have taken proactive steps to hedge drought concerns. As the industry progresses and as water use and management evolves, Oklahoma can be viewed as an example of successful internal processes and progressive practices for managing the state's water supply.

III. Texas

A. Water Rights and Legal Governance – Forest Level

In Texas, water of any category and in any form is a limited resource that is not always easily obtained. In areas where drought is prominent, water has become a valued commodity and, in turn, a dwindling and priceless necessity. In areas such as the Delaware Basin and Permian Basin, oil and gas development is embedded in the culture and community. Texas is at an interesting crossroads where oil, gas, *and* groundwater are all viewed as valuable resources, sought-after by landowners and operators alike.

The laws of Texas recognize groundwater as part of the real property that is owned by the surface estate, unless the right has been severed or reserved.[29] Groundwater in place belongs to the owner of the surface but can be severed

26. Michael Dunkel, *Oklahoma Governor's Water Conference: Water Management in Oklahoma Oil and Gas* (Oct. 31, 2017), https://www.owrb.ok.gov/GWC/presentations/2017/dunkel.pdf (Newfield owns approximately 160 miles of permanent water pipelines for hook up).

27. Mark Green, *Technologies, Innovations Advance Water Stewardship*, ENERGY API (Aug. 29, 2018), https://www.api.org/news-policy-and-issues/blog/2018/08/29/technologies-innovations-advance-water-stewardship.

28. Dunkel, *supra* note 26 (Continental Resources Inc. and Devon Energy have also taken steps towards recycling and re-use for Oklahoma water).

29. *See* Edwards Aquifer Auth. v. Day, 369 S.W.3d 814 (Tex. 2012).

and sold separately from the surface estate.[30] Salt water[31] is also held as groundwater that is attached to the surface estate.[32] Salt water can be harder to capture as it is generally found in deeper, less productive areas that tend to be more difficult to reach.[33] Often though, brackish salt-water is produced, coming up with and as a part of the oil and gas.[34]

Texas property rights are traditionally governed by common law principles. However, more recently, the Texas Legislature worked to carve out specific laws pertaining to produced water governance. Texas House Bill 3246,[35] which amended Texas Natural Resources Code § 122.002 and became effective September 1, 2019, clearly established that "when a person takes possession of 'fluid oil and gas waste' (in this case, produced water) to treat it for a 'subsequent beneficial use', the produced water becomes that person's property and can be transferred to third parties for disposal or use in treated or untreated form."[36] In essence, ownership of the "waste," when used for a beneficial purpose, belongs to the possessor, *i.e.* the operator in oil and gas development.[37] This provision was purportedly implemented to encourage recycling and reuse of the water resource.[38] However, applying a possession standard to the ownership of the water may have adverse consequences for landowners and may conflict with the common law principles of the state.

In addition, Texas House Bill 726,[39] passed in 2019 to amend Texas Water Code § 36.113(d), now permits transportation of produced water without operators or producers having to undertake additional permits, an issue that was previously unsettled. This Bill also provides some legal certainty, as it

30. McCarthy, *supra* note 10 at 888.

31. Commonly referred to as "brine water, brackish water, and more narrowly, Santa Rosa water."

32. Robinson v. Robbins Petroleum Corp., 501 S.W.2d 865 (Tex. 1973) (refusing to delineate between fresh groundwater and salt groundwater).

33. *See id.* (the salinity of the water produced from a deep formation of oil and gas bears "no consequence upon ownership." Additionally, depths in which the salty groundwater is found has no bearing on the classification of the resource as groundwater belonging to the surface owner).

34. Whitmore, *supra* note 11.

35. H.B. 3246, 86th Leg. (Tex. 2019).

36. Collins, *supra* note 9. *See also* TEX. NAT. RES. CODE ANN. § 112.002.1 (West).

37. Collins, *supra* note 9. However, the statutes remain silent as to water sales which create revenue, suggesting that the parties who must contract in this area are still governed by the common law.

38. Friedman, *supra* note 8.

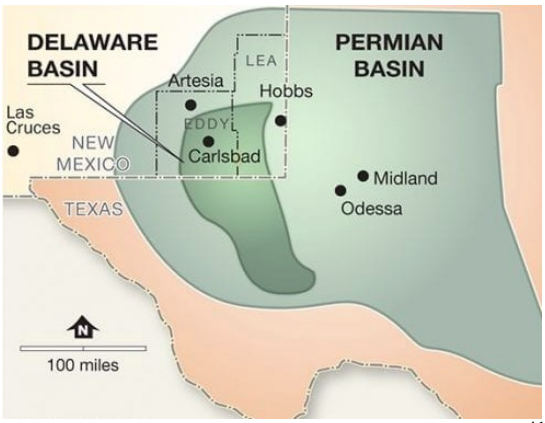
39. H.B. 726, 86th Leg. (Tex. 2019).

was drafted to insulate operators from a risk of denial on permit applications when one intends to transport the resource.

Finally, recent Texas cases "illustrate that landowners with groundwater underneath their property are gradually receiving increased protection under Texas law when their access and rights to the groundwater are impaired or destroyed."[40] However, many of the issues still require clarification. While landowners, operators, and state legislators work to address the legal issues, the fact remains that the groundwater supply in Texas is deteriorating.

B. Basin Issues – Tree Level

The big externalities that are pushing water use and management in Texas are somewhat obvious: (1) drought and drainage and (2) bottleneck and transportation. Texas has a high demand for water sources, but also faces diminishing supplies. Drought and drainage are the main concerns for the Permian and Delaware basins in Texas, and the same can be said for these basins located in parts of New Mexico. From a "Tree" level perspective, these particular basins are located in the middle of the Chihuahuan desert, where every source of water is valued.



[41]

The Texas drought has created an environment where some landowners have elected to sell their water and grant disposal rights as a form of supplemental income, as opposed to keeping the water for agricultural or

40. Justin Hodge & Graham Taylor, *Groundwater Law*: A Look at the Ancient Rule of Capture and the Modern Accommodation Doctrine, 80 TEX. B.J. 761, 761 (2017).

41. *ExxonMobil to increase Permian output to 1 million barrels per day by 2024*, OIL NOW (Mar. 5, 2019), https://oilnow.gy/featured/exxonmobil-to-increase-permian-output-to-1-million-barrels-per-day-by-2024/.

other industrial purposes.[42] Surface owners in drought-prone areas can often earn significant revenue by selling their groundwater to operators in need, earning more than $100,000 for every 200,000 barrels of water supplied.[43] Historically, produced water has not been economically reusable[44] and has traditionally been disposed of into underground wells. Presently, "[w]ater in Texas oil fields is enormously valuable, selling for five or more times what even water-desperate cities can afford to pay for it,"[45] opening the door for some landowners to capitalize on profits and returns.

While the Texas Legislature has labeled produced water as "waste,"[46], water ownership has caused landowners and operators in areas subject to water stresses, such as drought, high demand, and low supply, value it more than other regions.[47] Brackish groundwater – water that has lacked beneficial use outside of the oil and gas industry – is prominent in areas of west Texas and has proven to be a viable option for fracking operations where fresh, potable water is a scarcity.[48]

From the "Forest" level, it is evident that most of the basins in Texas are faced with drought conditions, and all of the basins struggle to transport, store and dispose of the water. In West Texas, transportation has become a prominent issue due to the high volume of water used by the industry in this specific region.[49] By 2023, Permian basin production in West Texas is

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42. Jeff Falk, *Recycling water produced during development of Texas oil fields threatens landowners' profits*, RICE NEWS (Oct. 20, 2017), https://news.rice.edu/2017/10/20/recycling-water-produced-during-development-of-texas-oil-fields-threatens-landowners-profits/.

43. Collins, *supra* note 9, at 13.

44. Falk, *supra* note 41. (produced water and frac water considered contaminated with dissolved chemicals, oil, solids thought to be too expensive to remove).

45. *Id*. (quoting Gabriel Collins, *Frac Ranching Versus Cattle Ranching: Exploring the Economic Motivations Behind Operator-Surface Owner Conflicts Over Produced-Water Recycling Projects*, ISSUE BRIEF, (Oct. 17, 2017)).

46. H.B. 3246, 86th Leg. Sess. (Tex. 2019).

47. *See, e.g.,* Nesloney, *supra* note 4 (In 2015, 70% of the wells in the Permian Basin were located in extreme water stress areas); Mark McPherson, Presentation at the 2017 Texas Continuing Legal Education Course Changing Face of Water Law: The Four Foundational Differences Between Minerals and Groundwater (Location of groundwater to pad site, competition of available surface water supplies both impact the use and price for use of groundwater; this varies between the different shale plays but is considered a commodity in all)

48. Nesloney, *supra* note 4.

49. *See* John Detrixhe, *Entrepreneurs are thriving along West Texas "Death Highway,"* QUARTZ (May 13, 2019), https://qz.com/1552685/entrepreneurs-thrive-on-us-highway-285-amid-permian-fracking-boom/.

expected to reach 5.4 million barrels per day.[50] In January of 2019, Texas produced a little over 96 million barrels of crude and almost 680 million cubic feet of natural gas; in June of 2019, Texas produced approximately 94 million barrels of crude.[51] Based on these numbers, the estimated amount of water produced could quintuple, creating an exorbitant amount of water for operators to manage with drilling operations.

Transporting and moving industry water is a statewide issue[52] and an area of high cost for water management; many operators and producers struggle to efficiently use trucks to transport water to and from well sites. Consequently, if truck and road use is to be reduced, Texas needs a more permanent infrastructure system to help move and manage the water. Water trucks are designed to carry approximately 100 barrels each, and operators spend approximately $2.00 per barrel to have the water trucked to a site. Considering how much water is needed for a single well, the cost of transportation alone may incentivize the development of less cumbersome processes, such as the construction and utilization of permanent pipelines. Compared to transporting the water by truck, pipeline costs are pennies per barrel.[53] Building, integrating, and connecting pipelines to recycling infrastructures may also create a new market for both landowners and operators.

Texas presents significant challenges and opportunities when it comes to water management due to the differing landscape and basins. Depending on the region within the state, water concerns may seem daunting and expansive. However, Texas is not alone when it comes to drought and transportation constraints: its sister state, New Mexico, faces many of the same issues. Due to similar demographics and shared basins, there is overlap when it comes to water use and management, creating a cooperative environment to help both states overcome their hurdles.

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50. Mella McEwen, *Permian expected to experience 'stunning' growth*, MIDLAND REP. TELEGRAM (June 15, 2018), https://www.mrt.com/business/oil/article/Permian-expected-to-experience-stunning-growth-12995558.php.

51. *Texas Monthly Oil & Gas Production*, R.R. COMM'N OF TEX., (Dec. 19, 2019, 12:24:12 PM), https://www.rrc.texas.gov/oil-gas/research-and-statistics/production-data/texas-monthly-oil-gas-production/\.

52. Trucking water in and out has become expensive and presents potential damages and dangers when moving the substance, such as spills and other environmental or economic impacts that occur when the water accidentally comes into contact with land.

53. Anderson & Christensen, *supra* note 2.

IV. New Mexico

A. Water Rights and Legal Governance – Forest Level

The main difference between New Mexico and Texas stems from their regulatory structures. While Texas continues to manage water on a more privatized, loosely regulated level, New Mexico has pushed for a regulatory structure with federal assistance. These two states have similar operational constraints but are traditionally viewed as being on opposite ends of the spectrum when it comes to their water laws. This divergence should not come as a surprise; New Mexico maintains that water is a public right, while Texas generally treats groundwater as a private right. While their demographics may be similar, the legal arguments behind the issues within these states are different. As for the oil and gas industry, produced water in New Mexico is subject to regulation from the state Oil Conservation Division,[54] and water rights are determined and adjudicated through the State Engineer's Office.[55]

In July 2018, New Mexico entered into a Memorandum of Understanding with the Environmental Protection Agency ("EPA"),[56] joining regulators, scientists, and lawmakers from both the state and federal levels to study and develop a plan focused on oilfield water recycling practices throughout the entire state.[57] The main goal behind this study has been to cut back on freshwater use throughout New Mexico, while also helping the oil and gas industry thrive through integration of water re-use practices. Additionally, New Mexico's Fluid Oil and Gas Waste Act, which went into effect in July 2019, gives the state "a statutory framework to address beneficial use of [produced water] outside of the oilfield."[58]

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54. *New Mexico Water Basics and an Introduction to Water Markets*, THE BUS. WATER TASK FORCE (2010), https://aquadoc.typepad.com/files/nm-water-brochure-final.pdf.

55. *Id*. at 2

56. *Oil and Natural Gas Produced Water Governance in the State of New Mexico – Draft White Paper*, NEW MEXICO & THE U.S. ENVT'L PROTECTION AGENCY (Nov. 9, 2018), http://www.emnrd.state.nm.us/wastewater/documents/Oil%20and%20Gas%20Produced%20Water%20Goverance%20in%20the%20State%20of%20New%20Mexico%20Draft%20White%20Paper.pdf.

57. Blythe Lyons et al., *Sustainable Produced Water Policy, Regulatory Framework, and Management in the Texas Oil and Natural Gas Industry: 2019 and Beyond*, White Paper (Sept. 16, 2019), https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ascds%3AUS%3A2c7b5154-f581-47dc-9c19-314d82c8de05 (describing the partnership as created "in the 'spirit of cooperative federalism'").

58. *Id*. at 32 (the New Mexico Quality Control Commission establishes discharge rules and standards).

More recently, the New Mexico Legislature passed House Bill 546, referred to as the Produced Water Act ("PWA"), to go into effect on January 1, 2020, as a bipartisan effort to "encourage and facilitate the recycling and reuse of produced water by oil and gas producers."[59] The PWA is also intended to provide for "legal certainty,"[60] in that the Act vests ownership of produced water in the person or entity in possession of that water. Furthermore, the Act provides that liability is limited to the possessor[61] and provides for free-of-charge transfer of the resource across state lands.[62] In many ways, the PWA and HB 3246[63] and HB 726[64] from the Texas Legislature can be viewed as sister, or companion laws. When viewed together, it would appear that both states have responded to their overall needs in their individual ways, while also finding common ground for cooperative efforts across state lines.

B. Basin Issues – Tree Level

New Mexico's externalities impacting water management and use resemble those of Texas: drought (or lack of water) is a glaring issue; "most of New Mexico receives less than 10 inches of precipitation per year."[65] While dealing with an ever-present drought, New Mexico also combats issues with transportation, storage and disposal.

New Mexico has recently focused heavily on implementing recycling and re-use options for the energy industry, shifting many resources towards a conservation effort to thwart drought conditions. This drought is a concern not only for energy professionals in this state, but also for local citizens and their communities. Recycling and reuse of water is an option that oil and gas operators may consider before undertaking major operations in water-desolate areas.[66] The cost, sheer amount of water required for operations,

59. Sarah M. Stevenson, *New Mexico Produced Water Act*, XXXVI Min. L. Newsl. 3, ROCKY MOUNTAIN MIN. LAW FOUND., (2019), https://www.rmmlf.org/publications/bookstore/secure/mln3-2019vne/nmog. *See* H.B. 546, 54th Leg., 1st Reg. Sess. (N.M. 2019).

60. Stevenson, *supra* note 61.

61. H.B. 546, § 4(A).

62. *Id.* § 5.

63. *Id. See also* H.B. 3246, 86th Leg. Sess. (Tex. 2019) *and* H.B. 726, 86th Leg. Sess. (Tex. 2019).

64. H.B. 546, § 5.

65. *See New Mexico Water Basics and an Introduction to Water Markets, supra* note 56, at 5.

66. Nesloney, *supra* note 4 (in 2011, 2% of water in Permian Basin was recycled).

and other environmental concerns[67] subject the hydrocarbon industry to immense public scrutiny. Going forward, advances in technology may ease some of the burdens,[68] especially as operators work to recycle more and more water to meet the growing demands.[69] For New Mexico, recycling and re-use may help provide answers for all.

V. Conclusion

Producers and operators are adapting and learning to utilize saltier water for the production processes associated with drilling.[70] The time may be right for the fluid to be viewed as a transferrable commodity for value, rather than just fluid to be disposed of by transfer down a pipeline or wellbore.[71] Because management of the produced water resource may not be capable of a "one size fits all" approach, those in the energy industry may find value in better understanding what each state faces and how each state is responding.

It is important to remember that the basins may deploy their own unique water management solutions, taking into account the distinct issues, needs, constraints, and other strategic considerations affecting each specific basin. However, states are responding in ways that are appropriate for their overall needs. Beyond the states, federal research and understanding is also underway. In 2018, the EPA embarked on its own national study of produced water.[72] Additionally, the Interstate Oil and Gas Compact Commission has embarked on a multi-state study of produced water.[73] These events evidence collective efforts and involvement across several states at both the state and federal level.

There are also correlations between these three states and others. As Oklahoma addresses issues with disposal, operators in eastern states are also addressing disposal and infrastructure transportation constraints. For some eastern states, water management remains largely unregulated, and the

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67. Friedman, *supra* note 8 (growing link between oil and gas waste disposal and earthquakes should motivate states to recycle water rather than inject downhole).

68. Neena Staija & Jim Malewitz, *Momentum for Water Recycling on Oilfields, but Still a Long Way to Go*, THE TEX. TRIB. (Nov. 22, 2013) https://www.texastribune.org/2013/11/22/water-recycling-minimal-growing-texas-oilfields/.

69. Anderson & Christensen, *supra* note 2.

70. *Id.*

71. Collins, *supra* note 9.

72. *Oil and Natural Gas Produced Water Governance in the State of New Mexico*, *supra* note 58.

73. *See Produced Water*, INTERSTATE OIL & GAS COMPACT COMM'N, http://iogcc.ok.gov/produced-water (last visited Jan. 19, 2020).

industry may be moving too fast for effective regulations. New Mexico, and more recently, Colorado has placed more focus on conservation. While Texas fights drainage, states in the Midwest that are focused on agriculture development have the same concerns. Drought remains an issue in both Texas and New Mexico, something southwestern states are also addressing on a large scale. There is much to be shared among the states.

Understanding the externalities that each basin faces, in addition to the differing laws and regulations that govern each state, will not only help protect the water resource supply, but may also provide some clarity and certainty for those who work with the resource within the energy industry.[74] Cooperative learning and investigation of the challenges related to water management and use should be encouraged throughout the process, so as not to lose sight of the trees from the forest.

74. Lyons et al., *supra* note 57 (sustainable water management may also provide industry jobs, additional sources of income, may extend the life of wells, and may assist in reducing seismicity).