

# THE EFFECTIVENESS OF WATER RECYCLING EFFORTS BY THE TEXAS RAILROAD COMMISSION

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## I. INTRODUCTION

Water and oil and gas are precious resources, especially in Texas. Because of Texas's semi-arid nature and recent climate shifts, fresh water can be difficult to obtain and may become increasingly sparse across the state in the coming years.<sup>1</sup> Fresh water also plays a role in the oil and gas industry.<sup>2</sup> This paper will focus on a particular process in oil and gas extraction called hydraulic fracturing ("fracking"). Fracking "involves the injection of water containing chemical additives" and other materials, such as sand, under high pressure into rock formations to fracture the rock, usually shale."<sup>3</sup> Once the water fractures the shale, natural gas may then be pumped up through the wells.<sup>4</sup> Flowback fluid, comprised of water, chemicals, and sand, travels back up through the wells with the gas.<sup>5</sup>

Because the flowback fluid contains other chemicals, generally oil and gas companies cannot reuse the fluid.<sup>6</sup> Because fracking has grown over the last five years, the Texas Railroad Commission amended its rule governing water recycling to clarify what may be recycled and to make recycling an

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<sup>1</sup> See JOHN W. NIELSEN-GAMMON, THE 2011 TEXAS DROUGHT: A BRIEFING PACKET FOR THE TEXAS LEGISLATURE 42-43 (2011).

<sup>2</sup> GROUND WATER PROT. COUNCIL & ALL CONSULTING, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER, 52 (2009), available at [http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimer\\_Online\\_4-2009.pdf](http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimer_Online_4-2009.pdf)

<sup>3</sup> Jean-Phillippe Nicot & Bridget R. Scanlon, *Water Use for Shale-Gas Production in Texas*, U.S., ENVTL. SCI. & TECH. Mar. 2, 2012, at 3580 (2012), available at <http://pubs.acs.org/doi/pdf/10.1021/es204602t>.

<sup>4</sup> *Id.*

<sup>5</sup> See *Legal Envtl. Assistance Found., Inc. v. U.S. EPA*, 118 F.3d 1467, 1471 (11th Cir. 1997).

<sup>6</sup> *Id.*

easier process.<sup>7</sup> This article analyzes the amendments to the Texas Railroad Commission rule regarding recycling of flowback fluids from fracking. It will evaluate the effectiveness of the amended rule in the context of water law and water usage in hydraulic fracturing, and suggest improvements to make the water recycling rules more effective.

Context of Water Law in Texas and the current drought is necessary to understand the implications of the rule. The article will first give an overview of water law in Texas. Then, it will discuss water use in fracking. Finally, it will discuss the Texas Railroad Commission's rule.

## II. OVERLAY OF WATER LAW IN TEXAS

Knowledge of the current water usage and drought plaguing Texas provides context to the Texas Railroad Commission's ("the Commission") rule.<sup>8</sup> To better understand the amendments to the rule, a basic understanding of Texas's approach to water regulation is necessary. Historically, Texas laws lagged behind technology and scientific understanding of water.<sup>9</sup> The laws governing groundwater reflect this lag.<sup>10</sup>

### A. Water Supply, Drought, and Use

Texas is located in the southwestern United States in a semi-arid region, which means that Texas receives a small amount of rainfall and is subject to droughts.<sup>11</sup> A drought beginning in 2011 exacerbated this historically dry region's low levels of precipitation with the most severe drought in a single year since statewide weather records began in 1895.<sup>12</sup> Record low rainfall levels from October 2010 through September 2011, coupled with higher-than-normal average temperatures, depleted reservoirs and water levels across the state.<sup>13</sup> Between Fiscal Years 2012 and 2013, the Texas Water Development Board recorded a depletion in twenty of the thirty-one

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<sup>7</sup> 16 TEX. ADMIN. CODE § 3.8 (2014).

<sup>8</sup> See NIELSEN-GAMMON, *supra* note 1, at 3.

<sup>9</sup> Gerald Torres, *Liquid Assets: Groundwater in Texas*, 122 YALE L.J. ONLINE 143, 147 (2012), available at <http://yalelawjournal.org/forum/liquid-assets-groundwater-in-texas>.

<sup>10</sup> See *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 826 (Tex. 2012); see generally TEX. WATER CODE ANN. ch. 36. (West 2008).

<sup>11</sup> See TEX. WATER DEV. BD., WATER FOR TEXAS 2012 STATE WATER PLAN 144 (2012).

<sup>12</sup> See NIELSEN-GAMMON, *supra* note 1, at 3.

<sup>13</sup> *Id.*

aquifers in Texas.<sup>14</sup> Droughts will likely persist in Texas, as climatologists predict that temperatures in Texas will rise and precipitation may decrease.<sup>15</sup> The continued droughts will result in lowering the freshwater supply throughout the state.<sup>16</sup>

As a highly populated state with many industries to support, Texas records high levels of water usage.<sup>17</sup> The annual statewide water use for industries in Texas in 2011 was 341,988,992,480 gallons.<sup>18</sup> The petroleum and coal manufacturing industry used 92,745,672,547 gallons of water, or about 27% of the water used by Texas industries.<sup>19</sup> A growing population trend in Texas also increases water use.<sup>20</sup> The large amounts of water used in the oil and gas industry, coupled with the growing population in Texas, will further strain the freshwater supply.

The limited freshwater supply and the high usage level motivated lawmakers, industry, and citizens to implement new ways of preserving water. Public concern over the quantity of water used in fracking served as a motivating factor in amending the rule regulating water recycling.<sup>21</sup> The amendments represent a step in the right direction for Texas, as Texas laws regulating water lag behind the technological developments in managing water.<sup>22</sup>

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<sup>14</sup> *Groundwater Data*, TEX. GROUNDWATER DEV. BD., <http://www.twdb.texas.gov/groundwater/data/index.asp> (last visited Dec. 15, 2014) (table showing the change in water levels between fiscal year 2012 and fiscal year 2013).

<sup>15</sup> See TEX. WATER DEV. BD., *supra* note 11, at 152.

<sup>16</sup> See *id.*

<sup>17</sup> See *Water Use Survey Historical Use by Industry Type for 2011*, TEX. WATER DEV. BD., <http://www2.twdb.texas.gov/ReportServerExt/Pages/ReportViewer.aspx?%2fWU%2fHistoricalByNAICS&rs:Command=Render> (last visited Dec. 15, 2014). The Texas Water Development Board provides this tool to examine water use by industry. *Id.* It provides information from 2000 through 2011, and the user must select the year they wish to examine. *Id.*

<sup>18</sup> *Id.*

<sup>19</sup> *Id.*

<sup>20</sup> See *Annual Statewide Water Use—Updated August 28, 2014*, TEX. WATER DEV. BD., <http://www.twdb.state.tx.us/waterplanning/waterusesurvey/estimates/data/Texas%20Statewide%20Media%20Report.pdf> (last visited Dec. 15, 2014).

<sup>21</sup> Nicot & Scanlon, *supra* note 3, at 3580.

<sup>22</sup> Torres, *supra* note 9, at 147.

### B. Texas's Approach to Water Regulation Lags Behind Current Water Management

To understand Texas's groundwater management today, knowledge of how and why Texas developed its current approach provides necessary context.<sup>23</sup> In the 1800's, American courts distinguished the regulation of groundwater and surface water.<sup>24</sup> Courts throughout the states adopted the British common law approach to regulating groundwater differently from surface water.<sup>25</sup> Due to lack of scientific knowledge about groundwater, the English courts—as well as the American courts subsequently adopting the English approach—treated groundwater as an unknown quantity.<sup>26</sup> Thus, states did not develop the regulations about groundwater that they eventually began to develop about surface water.<sup>27</sup> The courts denied any rights of a person to sue a neighboring landowner for pumping water that caused harm to the land of the injured person.<sup>28</sup>

#### 1. Texas Adopts the Rule of Capture to Regulate Groundwater

Texas followed the trend of denying the injured party rights to sue neighboring landowners by adopting the rule of capture in 1904.<sup>29</sup> In *Houston & T.C. Railway Co. v. East*, the Supreme Court of Texas examined the effect of the railway company's groundwater pumping on the adjacent landowners.<sup>30</sup> The railway company drilled a well measuring sixty-six feet

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<sup>23</sup>For a general overview of the development of groundwater in Texas, see generally Heather Welles, Note, *Toward a Management Doctrine for Texas Groundwater*, 40 Ecology L.Q. 483 (2013).

<sup>24</sup>See, e.g., *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861), overruled by *Cline v. Am. Aggregates Corp.*, 474 N.E.2d 324 (Ohio 1984).

<sup>25</sup>Compare *Acton v. Blundell*, 152 Eng. Rep. 1223, 1235 (Ex. Ch. 1843) (adopting the rule of capture in England for regulating groundwater), with *Tex. Water Rights Comm'n v. City of Dallas*, 591 S.W.2d 609, 613 (Tex. Civ. App.—Austin 1979, writ ref'd n.r.e.) (discussing surface waters in Texas as property of the State pursuant to the Irrigation Act of 1913).

<sup>26</sup>*Frazier*, 12 Ohio St. at 311; *Acton*, 152 Eng. Rep. at 1233; George G. Grover & John F. Mann, Jr., 18 W. St. U. L. REV. 589, 590–91 (1990–1991) (discussing the lack of knowledge about groundwater in England in the 1880's and establishing the rule of capture as the appropriate rule to govern groundwater).

<sup>27</sup>*Frazier*, 12 Ohio St. at 311; *Hous. & T.C. Ry. Co. v. East*, 81 S.W. 279, 281–82 (Tex. 1904).

<sup>28</sup>*Id.*

<sup>29</sup>*Hous. & T.C. Ry. Co.*, 81 S.W. at 281–82.

<sup>30</sup>*Id.* at 280.

deep by twenty feet in diameter.<sup>31</sup> After drilling the large well, the railway company used the well to supply its steam locomotives and machine shops with fresh water in amounts up to twenty-five thousand gallons per day.<sup>32</sup> Only groundwater, not surface water, supplied the well with its reservoir of water.<sup>33</sup> The railway company's use of the significant amounts of water dried up a neighboring landowner's well that he used to supply his home with water.<sup>34</sup>

East, the plaintiff in *Houston & T.C. Railway Company*, alleged that the Court of Civil Appeals should classify the railway company's use of water as an unreasonable use of water.<sup>35</sup> The Court agreed with the plaintiff, holding the railway company's use of the groundwater was unreasonable and damaging to the plaintiff's land.<sup>36</sup> The Court followed the holdings of the New Hampshire Court of Appeals, which reasoned:

That the right of a landowner to draw from his land all water found percolating underground was not absolute, but qualified and limited to the amount necessary for the reasonable use of the land, as land. That the rights of adjoining landowners are correlative, and, from the necessity of the case, the rights of each is [sic] only to a reasonable use.<sup>37</sup>

On appeal to the Supreme Court of Texas, East asked that the Court affirm the lower court, arguing that the reasonable use standard applied equally to groundwater in Texas as to surface water.<sup>38</sup> Reversing the judgment of the Court of Civil Appeals, the Court disagreed with the lower court's reasoning and relied on the Supreme Court of Ohio's interpretation of groundwater management:

In the absence of express contract and a positive authorized legislation, as between proprietors of adjoining land, the law recognizes no correlative rights in respect to underground waters percolating, oozing, or filtrating

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<sup>31</sup> *Id.*

<sup>32</sup> *Id.*

<sup>33</sup> *Id.*

<sup>34</sup> *Id.*

<sup>35</sup> *Id.*

<sup>36</sup> *East v. Hous. & T. Cent. R. Co.*, 77 S.W. 646, 648 (Tex. Civ. App. 1903).

<sup>37</sup> *Id.* at 647.

<sup>38</sup> *Hous. & T.C. Ry. Co.*, 81 S.W. at 280.

through the earth; and this mainly from considerations of public policy: (1) Because the existence, origin, movement, and course of such waters, and the causes which govern and direct their movements, are so secret, occult, and concealed that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty, and would, therefore, be practically impossible. (2) Because any such recognition of correlative rights would interfere, to the material detriment of the commonwealth, with drainage and agriculture, mining, the construction of highways and railroads, with sanitary regulations, building, and the general progress of improvement in works of embellishment and utility.” The mere quantity of water taken by the owner from his land has nowhere been held to affect the question. Exhaustion resulting from excavating and pumping for mining purposes has been considered in several cases to give rise to no liability. So the authorities generally state that the use of the water for manufacturing, brewing, and like purposes is within the right of the owner of the soil, whatever may be its effect upon his neighbor’s wells and springs.<sup>39</sup>

The effect of the decision in *Houston & T.C. Railway Company* was to give the railway company “ownership of the water pumped from its well *at the surface* [of the land].”<sup>40</sup> The Supreme Court of Texas and the Texas Legislature continue to follow the rule of capture.<sup>41</sup> In 2011, the Texas

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<sup>39</sup>*Id.* at 280–81 (citing *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861)).

<sup>40</sup>*See* *Edwards Aquifer Auth. v. Day*, 369 S.W. 3d 814, 826 (Tex. 2012) (emphasis in original).

<sup>41</sup>*See* TEX. WATER CODE ANN. § 36.002 (West 2008 & Supp. 2014); *see generally* *Edwards Aquifer Auth.*, 369 S.W.3d 814. The relevant language of § 36.002 is as follows:

- (a) The legislature recognizes that a landowner owns the groundwater below the surface of the landowner’s land as real property.
- (b) The groundwater ownership and rights described by this section:
  - (1) entitle the landowner, including a landowner’s lessees, heirs, or assigns, to drill for and produce the groundwater below the surface of real property, subject to Subsection (d), without causing waste or malicious drainage of other property or negligently causing subsidence, but does not entitle a

Legislature amended the *Texas Water Code* to recognize that a landowner's ownership of real property extends to any groundwater below the surface of the land.<sup>42</sup> The most recent instance of adhering to the rule of capture was the Supreme Court of Texas's decision in *Edwards Aquifer Authority v. Day*.<sup>43</sup>

In *Edwards Aquifer Authority v. Day*, Plaintiffs, Burrell Day and Joel McDaniel, purchased about 380 acres of land in 1994 to grow crops and raise cattle.<sup>44</sup> The land was located over the Edwards Aquifer, an area containing water-bearing rock that supplies South Texas with a significant amount of its water.<sup>45</sup> A water well located on their land operated correctly until the 1970s, but needed a new pump and casing to meet Plaintiffs' needs.<sup>46</sup> To continue using the well or drill a replacement well, Plaintiffs needed a permit from the Edwards Aquifer Authority ("the Authority").<sup>47</sup> The Texas Legislature created the Authority in 1993, the year prior to Plaintiffs purchasing the land.<sup>48</sup> The Authority controls the water in the Edwards Aquifer and "prohibits withdrawals of water from the aquifer without a permit issued by the Authority."<sup>49</sup> The Authority grants permits for a yearly allowance for each user by calculating the beneficial use of water without waste from June 1, 1972, to May 31, 1993.<sup>50</sup>

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landowner, including a landowner's lessees, heirs, or assigns, to the right to capture a specific amount of groundwater below the surface of that landowner's land; and

(2) do not affect the existence of common law defenses or other defenses to liability under the rule of capture.

(c) Nothing in this code shall be construed as granting the authority to deprive or divest a landowner, including a landowner's lessees, heirs, or assigns, of the groundwater ownership and rights described by this section.

TEX. WATER CODE ANN. § 36.002.

<sup>42</sup>TEX. WATER CODE ANN. § 36.002.

<sup>43</sup>*Edwards Aquifer Auth.*, 369 S.W.3d at 831–32.

<sup>44</sup>*Id.* at 817.

<sup>45</sup>*Id.*

<sup>46</sup>*Id.*

<sup>47</sup>*Id.*

<sup>48</sup>*Id.*

<sup>49</sup>*Id.*

<sup>50</sup>*Id.* at 819.

Plaintiffs petitioned the Authority for permission to withdraw 700 acre-feet annually from the well for irrigation.<sup>51</sup> The Authority denied Plaintiffs' application.<sup>52</sup> After an administrative hearing, the Administrative Law Judge "found that the maximum beneficial use of groundwater shown by [Plaintiffs] during the historical period was for the irrigation of seven acres of grass and concluded that [Plaintiffs] should be granted an allowance of [fourteen] acre-feet of water."<sup>53</sup> The Authority agreed.<sup>54</sup>

Plaintiffs appealed the Authority's decision to district court to contest the denial, and, in addition, sued the Authority for a taking of property without compensation, violating Article I, section 17(a) of the Texas Constitution.<sup>55</sup> In deciding the takings issue, the Supreme Court of Texas first had to decide whether landowners own the groundwater located beneath their property.<sup>56</sup>

When analyzing that issue, the Court compared one of Texas's most revered precious resources, oil and gas, with another precious resource: water. Whether groundwater could be owned in place was an issue of first impression, but the Court "held long ago that oil and gas are owned in place, and . . . find[s] no reason to treat groundwater differently."<sup>57</sup> The Court referred to *Texas Co. v. Daugherty* to explain its reasoning:

[A] landowner's "right to the oil and gas beneath his land is an exclusive and private property right . . . inhering in virtue of his proprietorship of the land, and of which he may not be deprived without a taking of private property." Ownership of oil and gas in place is the prevailing rule among the states.<sup>58</sup>

Groundwater and oil and gas exist below the ground.<sup>59</sup> The Court characterized oil and gas and groundwater as essential for daily life, and, despite some differences between them, saw "no basis in these differences to conclude that the common law allows ownership of oil and gas in place

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<sup>51</sup> *Id.* at 820.

<sup>52</sup> *Id.* at 820–21.

<sup>53</sup> *Id.* at 821.

<sup>54</sup> *Id.*

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> *Id.* at 823.

<sup>58</sup> *Id.* at 829 (citing *Tex. Co. v. Daugherty*, 176 S.W. 717, 722 (Tex. 1915)).

<sup>59</sup> *Id.* at 829.



but not groundwater.”<sup>60</sup> The Court held the following language regarding ownership of oil and gas in place correctly stated the common law regarding groundwater ownership in place:

In our state the landowner is regarded as having absolute title in severalty to the oil and gas in place beneath his land. The only qualification of that rule of ownership is that it must be considered in connection with the law of capture and is subject to police regulations. The oil and gas beneath the soil are considered a part of the realty. Each owner of land owns separately, distinctly and exclusively all the oil and gas under his land and is accorded the usual remedies against trespassers who appropriate the minerals or destroy their market value.<sup>61</sup>

After deciding the rule of capture continues to apply to groundwater, the Court eventually held that the limitations imposed by the Authority, without compensation to the landowners, could amount to a compensable taking by the government.<sup>62</sup> The Supreme Court’s holding in *Day* has a far-reaching effect. For the purposes of this comment, however, the continued approval of the rule of capture comprised the most important implication. In reference to the rule of capture, the Court stated: “[A]bsent malice or willful waste, landowners have the right to take all the water they can capture under their land and do with it what they please, and they will not be liable to neighbors even if in so doing they deprive their neighbors of the water’s use.”<sup>63</sup>

## 2. Texas’s Continued Approval of the Rule of Capture Conflicts with Current Scientific Knowledge Regarding Water Cycles

The Texas government’s adherence to the rule of capture contradicts current scientific information stating that groundwater and surface water do not exist as separate entities. Both surface water and groundwater comprise one water system, where surface water and groundwater interconnect and

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<sup>60</sup> *Id.* at 831.

<sup>61</sup> *Id.* at 831–32.

<sup>62</sup> *Id.* at 843–44.

<sup>63</sup> *Id.* at 828 (citing *Sipriano v. Great Spring Waters of Am.*, 1 S.W.3d 75, 76 (Tex. 1999)).

depend on one another to continue the water cycle.<sup>64</sup> While the legal treatment of water lags behind the knowledge of the water cycle, most recognize that the water cycle links together all water, regardless of the water's location in the water cycle.<sup>65</sup> “The legal regimes that treat groundwater and surface water as distinct resources are based on primitive understandings of the water cycle,” which have formed complicated laws distinguishing between the type and amount of water rights based on the location of the water in the water cycle.<sup>66</sup> The extent to which the State of Texas can govern and control the water depends on how the State classifies the type of water.<sup>67</sup> Texas has plenary power to regulate surface water in the state, but relegates itself limited ability to regulate groundwater.<sup>68</sup>

### C. Surface Water Management in Texas

Texas has long classified surface water as property of the state.<sup>69</sup> The Texas Constitution allows the State to regulate and develop “all natural resources of this State,” including “the waters of [Texas's] rivers and streams.”<sup>70</sup> This provision delegates the power and authority to the Texas Legislature to pass all laws necessary to carry out the purpose of the constitutional amendment.<sup>71</sup> The legislature did just that by classifying the water designated property of the state in the *Texas Water Code*:

(a) The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state.

(b) Water imported from any source outside the boundaries of the state for use in the state and which is transported

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<sup>64</sup> *Groundwater Discharge—The Water Cycle*, U.S. GEOLOGICAL SURVEY, <http://water.usgs.gov/edu/watercyclegwdischarge.html> (last updated Apr. 15, 2014).

<sup>65</sup> *Id.*; Torres, *supra* note 9, at 147.

<sup>66</sup> *Id.*

<sup>67</sup> *Id.*

<sup>68</sup> *Id.* at 148–49.

<sup>69</sup> See TEX. WATER CODE ANN. § 11.021 (West 2008); Irrigation Act of 1917, ch. 88, 1917 Tex. Gen. Laws 211.

<sup>70</sup> TEX. CONST. art. XVI, § 59(a).

<sup>71</sup> TEX. CONST. art. XVI, § 59.

through the beds and banks of any navigable stream within the state or by utilizing any facilities owned or operated by the state is the property of the state.<sup>72</sup>

The State also controls how people in Texas may use the surface water and how they may acquire it.<sup>73</sup> Texas holds water of the state in trust for the public.<sup>74</sup> The Texas Legislature recognizes that the “greater pressures and demands” placed on the water system requires regular evaluation and regulation of surface water and calls for environmental studies to protect the water for future generations.<sup>75</sup>

#### *D. Groundwater Management in Texas*

Texas manages groundwater in a completely different manner than surface water.<sup>76</sup> The Texas Constitution allows the State to establish conservation and reclamation districts.<sup>77</sup> The power to establish conservation and reclamation districts includes the power to create groundwater conservation districts.<sup>78</sup> The State, however, “was slow to establish groundwater districts.”<sup>79</sup> The delay arose from conflict over natural and political boundaries, and the “different characterization of the private interests in the water being regulated.”<sup>80</sup> The lesser number of regulations regarding groundwater results from this slow uptake of establishing groundwater conservation districts, as landowners believed they had a right to groundwater in place.<sup>81</sup>

The Texas Legislature, in addition to regulating state-controlled waters, established groundwater conservation districts (“the districts”) in the *Texas Water Code*.<sup>82</sup> The groundwater conservation districts exist to conserve,

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<sup>72</sup>TEX. WATER CODE ANN. § 11.021.

<sup>73</sup>*Id.* § 11.0235(a).

<sup>74</sup>*Id.*

<sup>75</sup>*Id.* § 11.0235(e).

<sup>76</sup>*Id.* § 35.003 (stating that laws governing surface water do not apply to regulating groundwater).

<sup>77</sup>TEX. CONST. art. XVI, § 59.

<sup>78</sup>*Id.*

<sup>79</sup>Torres, *supra* note 9, at 149.

<sup>80</sup>*Id.*

<sup>81</sup>*Id.*

<sup>82</sup>TEX. WATER CODE ANN. § 35.001 (West 2008).

preserve, protect, recharge, and prevent groundwater waste.<sup>83</sup> The districts meet this purpose by regulating the spacing of water wells, the water production from water wells, or both the spacing and production of water wells.<sup>84</sup>

However, the districts' management scheme provides for regulation primarily at a local level as opposed to statewide regulations.<sup>85</sup> The districts are "essentially an alliance of groundwater users" that the State grants authority to "locally manage and protect groundwater supplies within a defined jurisdiction."<sup>86</sup> A majority of voters in each district must vote to create the district.<sup>87</sup> The districts must create groundwater management plans to provide for the most efficient use of groundwater and prevent waste and depletion.<sup>88</sup>

The districts have met problems in regulating groundwater usage. Already limited by the State's adherence to the rule of capture, the districts' local management as opposed to management by the State limits their ability to regulate groundwater on a widespread field.<sup>89</sup> Water needs and uses depend on the geographic region of the state as well as the population.<sup>90</sup> The districts must balance "efforts to conserve and allocate Texas's groundwater . . . between rural, municipal, and industrial consumers."<sup>91</sup>

Groundwater conservation districts issue permits to withdraw water for certain types of wells or activities.<sup>92</sup> A district must require a permit for the "drilling, equipping, operating, or completing of wells or for substantially altering the size of wells or well pumps."<sup>93</sup> However, the *Texas Water Code*

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<sup>83</sup> *Id.*

<sup>84</sup> *Id.* § 35.002. The Texas Water Development Board provides a general overview of groundwater conservation districts in its "Frequently Asked Questions" section. See generally *Groundwater Conservation District (GCD) FAQs*, TEX. WATER DEV. BD., <http://www.twdb.texas.gov/groundwater/faq/index.asp> (last visited Dec. 15, 2014).

<sup>85</sup> Chris Lehman, Comment, *Hung Out to Dry?: Groundwater Conservation Districts and the Continuing Battle to Save Texas's Most Precious Resource*, 35 TEX. TECH L. REV., 101, 103 (2004).

<sup>86</sup> *Id.*

<sup>87</sup> TEX. WATER CODE ANN. § 36.012(e).

<sup>88</sup> *Id.* § 36.012.

<sup>89</sup> Lehman, *supra* note 85, at 103–04.

<sup>90</sup> *Id.* at 118.

<sup>91</sup> *Id.*

<sup>92</sup> TEX. WATER CODE ANN. § 36.113.

<sup>93</sup> *Id.* § 36.113(a).

provides for exemptions from the general requirement of permits.<sup>94</sup> The districts must provide an exemption to the permit requirement for drilling a water well “used solely to supply water for a rig that is actively engaged in drilling or exploration operations for an oil or gas well” permitted by the Texas Railroad Commission, “provided that the person holding the permit is responsible for drilling and operating the water well and the water well is located on the same lease or field associated with the drilling rig . . . .”<sup>95</sup> The exemption that exists regarding an actively engaged drilling rig limits the amount of control the groundwater conservation districts have over wells drilled for fracking purposes.<sup>96</sup> The already limited safeguards in place to control groundwater in general have little effect on water wells drilled to supply oil and gas rigs with the water needed to extract oil and gas.<sup>97</sup> This article discusses water use in fracking, specifically, in more detail below.

Giving groundwater conservation districts more power over water wells drilled for the purpose of providing oil and gas rigs with water to produce oil and gas may be an effective way of balancing the allocation of groundwater to ensure future generations have enough groundwater to survive. The background information about the water scheme, groundwater regulation, and the rule of capture as applied in Texas provides important context to the use of freshwater when conducting hydraulic fracturing.

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<sup>94</sup> *Id.* § 36.117.

<sup>95</sup> *Id.* § 36.117(b)(2).

<sup>96</sup> Carl R. Galant, *In Drought, A Storm Brews: DFCS and the Oil and Gas Exemption*, 44 TEX. TECH L. REV. 817, 829–30 (2012) (“When read in conjunction with § 36.117(d)(2), § 36.117(b)(2) provides an exempt amount of production from exempt oil and gas water wells: It is an amount that is reasonably necessary to supply a rig actively drilling or exploring for oil and gas on the same lease or field as the water well.”). For clarity, the text of § 36.117(d)(2) states as follows:

(d) A district may cancel a previously granted exemption, and may require an operating permit for or restrict production from a well, if . . . (2) the groundwater withdrawals that were exempted under Subsection (b)(2) are no longer used solely to supply water for a rig that is actively engaged in drilling or exploration operations for an oil or gas well permitted by the Railroad Commission of Texas . . . .

TEX. WATER CODE ANN. § 36.117(d)(2) (West 2008).

<sup>97</sup> See Galant, *supra* note 96, at 829–32.

### III. WATER USE IN HYDRAULIC FRACTURING

The previous discussion about water law in Texas and how Texas manages water is important to keep in mind when analyzing new developments in hydraulic fracturing because of the significant amount of fresh water required to implement fracking. While fracking has been a method of withdrawing oil and gas from the ground for over half a century, its recent surge in use merits new consideration as to the environmental impact fracking has on Texas's water supply.

#### A. *The Development of Hydraulic Fracturing and Prevalence in Texas*

Hydraulic fracturing, or “fracking,” is a method of withdrawing gas from shale rock formations.<sup>98</sup> Fracking developed in Texas in the 1950s on a large scale, and has been “commonplace in the oil and gas industry for over sixty years.”<sup>99</sup> While fracking occurred in Texas in the mid-twentieth century, its use skyrocketed when horizontal drilling developed.<sup>100</sup> The 1990s and 2000s saw a surge in fracking using horizontal drilling as a drilling technique.<sup>101</sup>

Fracking involves the “pumping of a fracturing fluid under high pressure into a shale formation to generate fractures or cracks in the target rock formation.”<sup>102</sup> The rock formation of shale acts as a reservoir for natural gas.<sup>103</sup> Shale's low-permeability formation, created by very fine, sheet-like layers of sediment, prevented traditional drilling in the rock.<sup>104</sup> Fracking and horizontal drilling allow the fracking fluid to crack the layers of shale, which facilitates the withdrawal of the reserves of gas.<sup>105</sup> The fluid consists of mainly water and a proppant (usually sand), along with chemical additives.<sup>106</sup> Once the rock fractures, gas flows into the drilled well, and the

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<sup>98</sup>U.S. DEP'T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 13 (2009), available at [http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimer\\_Online\\_4-2009.pdf](http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimer_Online_4-2009.pdf).

<sup>99</sup>Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 17 (Tex. 2008).

<sup>100</sup>U.S. DEP'T OF ENERGY, *supra* note 98, at 13.

<sup>101</sup>*Id.*

<sup>102</sup>*Id.* at ES-4.

<sup>103</sup>*Id.* at 14.

<sup>104</sup>*Id.*

<sup>105</sup>*Id.* at 56.

<sup>106</sup>*Id.*

gas is then treated and sold.<sup>107</sup> The water that flows back with the gas, comprised of the fracking fluid and naturally occurring water in the rock formation, must be managed.<sup>108</sup>

### *B. Role of Water in Hydraulic Fracturing*

One environmental concern about fracking, among many, involves the amount of fresh water used. “[E]ven in areas of high precipitation, due to growing populations, other industrial water demands, and seasonal variation in precipitation, it can be difficult to meet the needs of shale gas development and still satisfy regional needs for water.”<sup>109</sup> Oil and gas companies with leases over landowner’s property have the right to withdraw however much water they can use, and in fracking that is a large amount.<sup>110</sup> The oil companies withdrawing such large amounts of water can place a significant strain on the groundwater supply in Texas.<sup>111</sup>

The U.S. Department of Energy estimates each well, over its useful operational term, requires two to four million gallons of water on average to produce oil and gas from shale in a horizontal well used in fracking.<sup>112</sup> The Texas Water Development Board predicts an increase in overall water use for fracking in Texas of acre-feet per year to up to 120,000 acre-feet by 2020 through 2030.<sup>113</sup> For context, “approximately 17,000,000 [acre-feet] of water is legally and physically available in Texas today.”<sup>114</sup> The water volume used for fracking comprises less than one percent of total statewide use of water currently, but as fracking becomes more widespread, the amount of water used will increase.<sup>115</sup>

Fracking also raises a significant concern in the “one and done” mentality the process causes in regard to water. The water used to flush out

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<sup>107</sup> *Id.* at 44.

<sup>108</sup> *Id.* at 66.

<sup>109</sup> *Id.* at 65.

<sup>110</sup> *Sun Oil Co. v. Whitaker*, 483 S.W.2d 808, 810–11 (Tex. 1972).

<sup>111</sup> See U.S. DEP’T OF ENERGY, *supra* note 98, at 65.

<sup>112</sup> *Id.* at 64; see also Galant, *supra* note 96, at 818.

<sup>113</sup> JEAN-PHILLIPE NICOT ET AL., CURRENT AND PROJECTED WATER USE IN TEXAS MINING AND OIL AND GAS INDUSTRY, 1, 61, 64 tbl.10, 187 (2011), available at [http://www.twdb.state.tx.us/publications/reports/contracted\\_reports/doc/0904830939\\_MiningWaterUse.pdf](http://www.twdb.state.tx.us/publications/reports/contracted_reports/doc/0904830939_MiningWaterUse.pdf); Galant, *supra* note 96, at 818. One acre-foot of water equals 325,851.4 gallons. Galant, *supra* note 96, at 818 n.5.

<sup>114</sup> NICOT ET AL., *supra* note 113, at 187; Galant, *supra* note 96, at 818.

<sup>115</sup> Galant, *supra* note 96, at 818.

the oil and gas contains chemicals and other byproducts and becomes unfit for human consumption through the salinity of the water.<sup>116</sup> Because of the nature of the used water, companies typically only use the water to frack one time.<sup>117</sup> The company then disposes of the water through an injection well.<sup>118</sup> In an injection well, the company drills deep under groundwater sources, to prevent contamination with the used fracking water, and injects the used fracking water into the disposal well.<sup>119</sup> The one-time use of fresh groundwater to frack leads to more drilling for fresh groundwater, consuming more fresh water in the hydraulic fracturing process.<sup>120</sup>

The amount of water used in fracking has an important interaction with the permit and exemption requirements set forth by the *Texas Water Code* discussed above. The water well permit exemption must be located on the “same lease or field associated with the drilling rig.”<sup>121</sup> One must examine the exemption in the context of the rights and use of groundwater, also provided by section 36.002 of the *Texas Water Code*:

(b) The groundwater ownership and rights described by this section:

(1) entitle the landowner, *including a landowner’s lessees, heirs, or assigns*, to drill for and produce the groundwater below the surface of real property, subject to Subsection (d), without causing waste or malicious drainage of other property or negligently causing subsidence, but does not entitle a landowner, including a landowner’s lessees, heirs, or assigns, to the right to capture a specific amount of groundwater below the surface of that landowner’s land; and

(2) do not affect the existence of common law defenses or other defenses to liability under the rule of capture.<sup>122</sup>

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<sup>116</sup>U.S. DEP’T OF ENERGY, *supra* note 98, at 66–68.

<sup>117</sup>*Id.*

<sup>118</sup>*Id.* at 68.

<sup>119</sup>*Id.* at 67–68.

<sup>120</sup>*Id.* at 66.

<sup>121</sup>TEX. WATER CODE ANN. § 36.117(b)(2) (West 2008).

<sup>122</sup>*Id.* § 36.117(b).



The emphasized portion including a landowner's lessees does not contain language preventing an oil and gas lessee, or, more specifically, a company participating in hydraulic fracturing, from withdrawing as much water from one drilling location as the company can beneficially use for that well.<sup>123</sup> Considering the two to four million gallon use of water per well in fracking, oil and gas companies engaged in fracking can use a significant portion of the groundwater in one location.<sup>124</sup> This elevated use can lead to shortages of water for other necessities of life, including farming and agriculture, raising livestock, and municipal use.<sup>125</sup>

Reading these two code provisions together effectively provides no limit to the amount of water that a rig may use from a well used solely to supply water. Thus, the only limit as to the amount of water a company may withdraw from a water well drilled for an active use in fracking would be if the company caused malicious draining or waste of groundwater, or negligently depleted the amount of groundwater and caused subsidence.<sup>126</sup> Because a fracking procedure may use such a high quantity of freshwater, many states, local governments, and shale gas operators have conducted research into recycling the fracking fluids to be more environmentally conscious.<sup>127</sup> Likewise, the Texas Railroad Commission has implemented regulations regarding recycling the fluid that flows back after completing the fracking process.<sup>128</sup>

#### IV. TEXAS RAILROAD COMMISSION'S WATER RECYCLING REGULATIONS FOR WATER USED IN HYDRAULIC FRACTURING

The Railroad Commission of Texas ("the Commission") has implemented regulations for water recycling for companies using fracking to withdraw gas from shale formations. The Commission intended that these regulations facilitate the administrative portion of recycling fluids from fracking. The Railroad Commission of Texas amended the previous recycling provisions to clarify rules and authorize certain methods of recycling.<sup>129</sup>

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<sup>123</sup> See Galant, *supra* note 96, at 829–30.

<sup>124</sup> U.S. DEP'T OF ENERGY, *supra* note 98, at 64–65.

<sup>125</sup> *Id.*

<sup>126</sup> TEX. WATER CODE ANN. § 36.002(b)(1) (West 2008).

<sup>127</sup> U.S. DEP'T OF ENERGY, *supra* note 98, at 68.

<sup>128</sup> 16 TEX. ADMIN. CODE § 3.8 (West 2014).

<sup>129</sup> 37 Tex. Reg. 7555 (Sept. 28, 2012).

A. *The Texas Railroad Commission's Amended Rule*

The Railroad Commission of Texas, which regulates oil and gas activities in Texas, proposed amending and adding provisions in 2012 regarding recycling in the fracking process.<sup>130</sup> The Commission made two significant changes. First, the Commission amended Chapter 4, Subchapter B of volume 16 of the Texas Administrative Code to allow for a third acceptable method of commercial recycling of solid waste produced by fracking.<sup>131</sup> Second, the Commission proposed and adopted amendments to the section of the Texas Administrative Code regarding non-commercial recycling of fluids.<sup>132</sup> As the first amendment relates to solid waste recycling from oil and gas activities, this article will focus only on the second amendment regarding the new rules for recycling fluids from hydraulic fracturing.

The Commission adopted a new subsection related to non-commercial fluid recycling.<sup>133</sup> The Code defines “non-commercial fluid recycling” as:

The recycling of fluid produced from an oil or gas well, including produced formation fluid, workover fluid, and completion fluid, including fluids produced from the hydraulic fracturing process on an existing commission-designated lease or drilling unit associated with a commission-issued drilling permit or upon land leased or owned by the operator for the purposes of operation of a non-commercial disposal well . . . , where the operator of the lease, or drilling unit, or non-commercial disposal or injection well treats or contracts with a person for the treatment of the fluid, and may accept such fluid from other leases and or operators.<sup>134</sup>

The new subsection, found in section 3.8 of volume 16 of the Texas Administrative Code, carves out exceptions to the general permit requirement for recycling oil and gas wastes.<sup>135</sup> Generally, persons seeking

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<sup>130</sup> *Id.*

<sup>131</sup> 37 Tex. Reg. 7555, 7562–63 (Sept. 28, 2012).

<sup>132</sup> 37 Tex. Reg. 7555 (Sept. 28, 2012).

<sup>133</sup> 38 Tex. Reg. 2323 (April 12, 2013).

<sup>134</sup> *Id.* at 2326.

<sup>135</sup> *Id.*

to recycle oil and gas wastes must obtain a permit to do so.<sup>136</sup> However, the rule does not require a permit in certain authorized situations where the operator seeks to recycle the fracking fluids:

- (i) No permit is required if treated fluid is recycled for use as makeup water for a hydraulic fracturing fluid treatment(s), or as another type of oilfield fluid to be used in the wellbore of an oil, gas, geothermal, or service well.
- (ii) Treated fluid may be reused in any other manner, other than discharge to waters of the state, without a permit from the Commission, provided the reuse occurs pursuant to a permit issued by another state or federal agency.
- (iii) If treatment of the fluid results in distilled water, no permit is required to use the resulting distilled water in any manner other than discharge to waters of the state.<sup>137</sup>

These amendments to the Administrative Code allow for less bureaucratic “red-tape” by allowing oil and gas operators or drilling units that use fracking to recycle the fracking fluids without having to seek a permit. The Commission sought to eliminate confusion over the permit requirement by simplifying the framework of the authorized recycling of fracking fluid.<sup>138</sup> The Commission’s spokesperson, Romona Nye, said “the new rules are designed to ‘help operators enhance their water conservation efforts’ and encourage recycling.”<sup>139</sup>

Allowing the treated water to be used in hydraulic fracturing procedures or as another type of oilfield fluid without a permit allows oilfield operators the option of preserving freshwater resources. As operators generally dispose of fracking fluids in injection wells due to its salinity and chemical contents, reusing the water that could not otherwise be used can have a significant impact on the amount of drilling freshwater operators would need to do. While the new amendment moves in the right direction toward conserving water usage, it is arguable that the Commission could have made the rule more effective to get more drillers to recycle their fracking fluids.

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<sup>136</sup> 16 TEX. ADMIN. CODE § 3.8(d)(7)(A) (West 2014).

<sup>137</sup> *Id.*

<sup>138</sup> 38 Tex. Reg. 2319 (April 12, 2013).

<sup>139</sup> Ramit Plushnick-Masti, *Correction: Fracking-Water Recycling story*, ASSOCIATED PRESS: THE BIG STORY, November 12, 2013, <http://bigstory.ap.org/article/more-oil-and-gas-drillers-turn-water-recycling>.

*B. Ways to Make the Rule More Effective*

While implementing the rule that allows easier recycling of fracking fluids is a positive change, issues still exist that need to be addressed. First, because of the ease, cheapness, and lack of limitations on drilling for groundwater, many companies find it easier to drill for groundwater instead of recycling.<sup>140</sup> Additionally, recycling fracking fluid is optional, not mandatory, and if drilling for groundwater remains more cost-effective than recycling the fracking fluid, companies will not be motivated to recycle the fracking fluid.<sup>141</sup> Finally, injection wells are an easy way to dispose of the fracking fluid, and in Texas, they are plentiful.<sup>142</sup>

Both the Texas Legislature and the Railroad Commission of Texas can address these issues. The Supreme Court of Texas declined to discuss protecting groundwater by overturning Texas's reliance on the rule of capture, but stated that the Texas Legislature can statutorily change the State's reliance on the rule of capture.<sup>143</sup> Because the Texas Constitution vests the Texas Legislature with the power to protect the State's natural resources, the Legislature may adopt a regulatory system for groundwater similar to the state regulation of surface water.<sup>144</sup> Adopting stricter and more centralized regulations for groundwater could help preserve groundwater by eliminating the piecemeal approach of the Groundwater Management Districts.

Additionally, the Texas Legislature could eliminate oil and gas operators' ability to withdraw however much water the operators can beneficially use. This limitation on water usage could be accomplished by removing the operators' exemption from having the ability to withdraw an unlimited amount of water.<sup>145</sup> By eliminating the exemption, the Legislature would have the ability to set a reasonable standard of an amount of water

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<sup>140</sup>Jim Malewitz & Neena Satija, *In Oil and Gas Country, Water Recycling Can Be an Extremely Hard Sell*, N.Y. TIMES, Nov. 21, 2013, [www.nytimes.com/2013/11/22/us/in-oil-and-gas-country-water-recycling-can-be-an-extremely-hard-sell.html](http://www.nytimes.com/2013/11/22/us/in-oil-and-gas-country-water-recycling-can-be-an-extremely-hard-sell.html).

<sup>141</sup>38 Tex. Reg. 2321 (April 12, 2013).

<sup>142</sup>Malewitz & Satija, *supra* note 140; *see also* Alison Sider, Russell Gold, & Ben Lefebvre, *Drillers Begin Reusing 'Frack Water'*, WALL STREET J., Nov. 20, 2012, [online.wsj.com/news/articles/SB10001424052970203937004578077183112409260](http://online.wsj.com/news/articles/SB10001424052970203937004578077183112409260).

<sup>143</sup>*See* Edwards Aquifer Auth. v. Day, 369 S.W.3d 814, 826, 831–33 (Tex. 2012).

<sup>144</sup>*See* TEX. CONST. art. XVI, § 59; *see also* TEX. WATER CODE ANN. §§ 11.021–11.053 (West 2013).

<sup>145</sup>*See* TEX. WATER CODE ANN. § 36.117.

for oil and gas operators to withdraw, rather than an unlimited amount of water.

The Railroad Commission of Texas could also aid in regulating groundwater by reexamining the Commission's recent amendments to the recycling of hydraulic fracturing fluids. During the notice and comment process, the Railroad Commission received a comment from the Joint Commenters<sup>146</sup> advising the Commission to "consider mandating the recycling of produced water and/or hydraulic fracturing fluid."<sup>147</sup> The Commission responded, stating: "The Commission does not intend to require oil and gas operators to recycle fluids at this time."<sup>148</sup> The Commission decided that setting up a regulatory system where recycling served as a viable alternative to disposing of the fluids "allowed the operators to make their own water and waste management decisions."<sup>149</sup>

The strain placed on Texas's water from all directions requires a more proactive approach by the Railroad Commission. The Commission has the authority to require the fluids' recycling. While this approach could financially impact smaller oil and gas companies, the Commission could mandate recycling of fracking fluids by a set deadline. Companies would have sufficient time to prepare to implement the regulations. Scientists would have more time to research and perfect recycling methods and appropriate uses for the recycled water. Because scientists have estimated peak fracking production will occur between 2020 and 2030, a significant amount of time exists where operators could recycle the fluids to help preserve groundwater reservoirs.<sup>150</sup> The Commission could also begin to measure the amount of water each company recycled, as the Commission currently does not measure the amount of fluids recycled.<sup>151</sup>

As an alternative to requiring companies to recycle, as that does come with significant costs to the companies, the Railroad Commission could incentivize recycling. In the companion rule amended by the Railroad Commission that added the third acceptable category of commercial recycling of oilfield waste, one comment mentioned that the Commission

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<sup>146</sup> Environmental Texas, Earthworks, Public Citizen, and Sustainable Energy and Economic Development submitted the comment jointly; the Railroad Commission referred to the group collectively as "Joint Commenters." 38 Tex. Reg. 2318-19 (April 12, 2013).

<sup>147</sup> 38 Tex. Reg. 2321 (April 12, 2013).

<sup>148</sup> *Id.*

<sup>149</sup> *Id.*

<sup>150</sup> NICOT ET AL., *supra* note 113, at 2-3.

<sup>151</sup> Malewitz & Satija, *supra* note 140.

could “include in the rules incentives for recyclers with an exceptional history of compliance and/or superior performance, such as streamlined application procedures or reduced monitoring and reporting requirements.”<sup>152</sup>

While the Commission stated that it “cannot establish special or favorable treatment for certain operators in its rules,” in a practical sense the Commission recognized in its response that an experienced recycler will likely have a streamlined application procedure because they will have experience going through the process.<sup>153</sup> To increase participation in hydraulic fluid recycling, the Commission should not exclude the possibility of offering an incentive to participating companies or penalizing non-participants. For example, if the Legislature imposes a limit on the amount of water an oil and gas operator can withdraw, as suggested above, the Commission could impose a lower ceiling on the amount of water a non-participating company could withdraw. Incentivizing companies to recycle by allowing them to withdraw a slightly larger amount of groundwater could cause an increase in participation in recycling of hydraulic fracturing fluids.

While the Railroad Commission does not measure the amount of water recycled, an increase in the amount of recycling permits requested rose from one to two a year in 2011 to thirty approved applications in 2012.<sup>154</sup> Scientists test water and techniques and oil companies remain more receptive to recycling water than in previous years.<sup>155</sup> As the industry moves toward recycling, lawmakers need to push harder to ensure that everyone involved works towards preserving Texas groundwater for future generations.

## V. CONCLUSION

Due to the growing scarcity of water in Texas, Texas must to take steps to protect the groundwater supply. Getting the Texas Legislature to overturn Texas’s reliance on the rule of capture and implementing new laws for statewide management of groundwater would provide one avenue of water

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<sup>152</sup> 38 Tex. Reg. 2338, April 12, 2013.

<sup>153</sup> *Id.*

<sup>154</sup> Malewitz & Satija, *supra* note 140.

<sup>155</sup> See Anna Driver & Terry Wade, *Fracking Without Freshwater at a West Texas Oilfield*, REUTERS, Nov. 21, 2013, <http://www.reuters.com/article/2013/11/21/us-apache-water-idUSBRE9AK08Z20131121>.

preservation. Additionally, the Commission should consider requiring oil and gas companies to recycle the water they use in hydraulic fracturing, or incentivizing companies to participate in recycling hydraulic fracturing fluids, as options to protect groundwater resources. All these possibilities provide viable options as Texas oil and gas law and the water supply in Texas collide.