

Toward a Management Doctrine for Texas Groundwater

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The tension between advancing water science and the outdated legal regimes underlying water allocation produces thorny issues for courts, which must apply rules based on outdated assumptions, and water managers, who are tasked with understanding water’s physical behavior, allocating supplies fairly, and preserving the resource for future generations. Texas is legendary for its long-standing commitment to the common law “rule of capture,” which allows landowners to keep as much groundwater as they can pump without liability to nearby landowners whose supplies are depleted. Texas recently took this property rights scheme a step further in Edwards Aquifer Authority v. Day, in which the state Supreme Court concluded that common law provides Texas landowners vested rights in groundwater while it is in place beneath their land, prior to capture. Although the decision has been criticized for expected deleterious effects on groundwater management, this Note argues that the court provided a path supporting more aggressive regulation. Therefore, this flawed ownership doctrine is not determinative of Texas’s ability to manage its groundwater moving for the future. Rather, this Note concludes that Texas must expand its legislative scheme because modern management goals demand more comprehensive, flexible, and expert management than an adjudicatory strategy can produce.

Introduction.....	484
I. Background: Texas Groundwater Law	486
A. Justifications for Early Groundwater Law & the East Case	486
B. Constitutional Authority for Legislative Regulation.....	487
C. Groundwater in the Texas Supreme Court.....	487
D. Groundwater Regulation in Texas	491
1. Chapter 36 Groundwater Districts	491

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2. The Edwards Aquifer Authority	494
II. <i>Edwards Aquifer Authority v. Day</i>	495
A. Factual Background	495
B. The <i>Day</i> Opinion	497
III. Advancing a Management Doctrine	500
A. Conjunctive Management: A Western Imperative.....	501
1. The Importance of Conjunctive Management	501
2. Benefits for Texas and the Edwards	503
B. The Limits of Common Law Adjudication.....	505
1. Struggles With Science: The <i>Day</i> Court’s Oil and Gas Analogy.....	505
2. Struggles With Efficiency: The California Experience	508
C. Benefits of a Management Doctrine	511
D. Addressing Political Opposition to Regulation.....	513
E. Texas’s Path Forward	514
Conclusion	515

INTRODUCTION

In *Edwards Aquifer Authority v. Day*, the Texas Supreme Court resolved “a century-old tug of war” that lies “at the heart of every major groundwater issue” in Texas—who owns the water?¹ The court extended its existing doctrine of absolute ownership of groundwater by holding that landowners own groundwater “in place,” before it is captured.² The court analogized groundwater to oil and gas, reasoning that the two were similar enough that the oil and gas ownership in place rule should apply to groundwater as well.³ However, the court also reaffirmed its long-standing position that groundwater regulation lies properly within the legislative domain, and ultimately endorsed the state’s general groundwater regulatory system.⁴

Water managers have long recognized that conjunctive management of groundwater and surface water, particularly when the two are hydrologically connected, facilitates maximum beneficial use, which is particularly important in water-stressed areas like the Edwards Aquifer basin.⁵ Harmful effects of groundwater pumping on surface water flows and an increasingly sophisticated scientific understanding of groundwater resources have demonstrated the need for conjunctive management of connected waters. Many Texas state officials

1. Morgan Smith, *Lawsuit Could Determine Future of Groundwater*, TEX. TRIBUNE (Apr. 22, 2010), <http://www.texastribune.org/texas-environmental-news/water-supply/lawsuit-could-determine-future-of-groundwater/>.

2. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 832 (Tex. 2012).

3. *Id.* at 831–32.

4. *See id.* at 833.

5. *See, e.g.*, Otis W. Templer, *Hydrology and Texas Water Law: . . . A Logician’s Nightmare*, 2 GREAT PLAINS RES. 27, 38–39 (1992).

and water managers are working to avoid the rule of capture's logical consequences of unrestrained pumping,⁶ suggesting that the state's common law doctrine is outdated and inadequate. The *Day* court missed an opportunity to incorporate advancing scientific knowledge into this common law framework by failing to recognize the fundamental differences between oil and groundwater. Most significantly, the fact that water management must reckon with the hydrologic connections between groundwater and surface water and the divergent legal regimes that govern them undermines the court's analogy.

However, despite the failings of the *Day* court and the rule of capture doctrine, and contrary to the ardent criticism of the ruling's likely effects on regulation,⁷ *Day* need not undermine Texas groundwater management. The state's common law doctrine is less important to its ability to achieve successful conjunctive management than the extent to which it embraces a "management doctrine"—a comprehensive statutory scheme that provides a consistent legal foundation for regulation and supports the flexibility required to manage diverse groundwater basins. A statutory management doctrine that allows managers to limit groundwater pumping and promotes managing hydrologically connected groundwater and surface water as one resource is required to meet the challenges of the future. Texas officials have begun to join other states moving away from reliance on common law groundwater ownership doctrines to facilitate modern management strategies like conjunctive use. And although the *Day* court's decision may appear to jeopardize Texas's ability to regulate groundwater, it ultimately provides a framework for Texas to continue its progress toward a successful regulatory system.

Part I of this Note provides background on early groundwater common law, Texas's constitutional authority to regulate groundwater, the Texas Supreme Court's evolving groundwater case law, and Texas's current regulatory structure. Part II describes *Day*, and argues that despite criticism asserting that the case represents the downfall of groundwater regulation in Texas, *Day* actually provides a framework that supports more aggressive regulation. Part III presents conjunctive management as an example of the type of modern management strategy that our water governance systems must support, and uses Texas and California as illustrations of the weakness of an adjudication-based approach to groundwater management. This Note concludes

6. See Ronald Kaiser & Frank F. Skillern, *Deep Trouble: Options for Managing the Hidden Threat of Aquifer Depletion in Texas*, 32 TEX. TECH L. REV. 249, 291 (2001) (noting that the rule of capture exacerbates aquifer mining); *TAGD GCD Database*, TEX. ALLIANCE OF GROUNDWATER DISTS., <http://www.texasgroundwater.org/resources/tagd-gcd-database.html> (last updated Mar. 2013) (cataloguing the multitude of spacing regulations and pumping limitations implemented by Texas's groundwater conservation districts); *infra* notes 53–64 (describing Texas's statutory modifications to the rule of capture).

7. See, e.g., Mose Buchele, *Taking a Deeper Look at the Texas Supreme Court's Ruling on Water*, NPR STATEIMPACT TEX. (Mar. 1, 2012, 2:49 PM), <http://stateimpact.npr.org/texas/2012/03/01/taking-a-deeper-look-at-the-texas-supreme-courts-ruling-on-water/>; Smith, *supra* note 1.

by asserting that only a “management doctrine” based on comprehensive legislation can overcome the weaknesses of an adjudicative approach.

I. BACKGROUND: TEXAS GROUNDWATER LAW

A. *Justifications for Early Groundwater Law & the East Case*

Early American cases viewed groundwater as a “secret, occult” resource, deep beneath the ground, hidden and unknowable.⁸ American courts in the nineteenth century imported English common law,⁹ which rejected the argument that groundwater and surface water should be governed by the same doctrine because a “marked and substantial difference” existed between “running streams” and “springs beneath the surface.”¹⁰ Since groundwater was so poorly understood, courts reasoned that “an attempt to administer any set of legal rules . . . would . . . be practically impossible” and would lead to uncertainty that would undermine economic development.¹¹ Because courts could not establish such rules, the reasoning went, any rights that would allow others to sue a landowner for harm to their property caused by his pumping should be denied.¹²

The Texas Supreme Court relied on this reasoning when it adopted the “rule of capture,” in 1904’s *Houston & T.C. Railway v. East*.¹³ Under the rule of capture, a landowner legally owns as much groundwater as he can pump, subject to prohibitions against waste and malice, without liability to any neighbors whose wells go dry as a result, “even if the water originated beneath the land of another.”¹⁴ Despite its origination as a tort rule,¹⁵ the rule of capture has been interpreted over time as a property rule, granting the landowner “absolute ownership” of captured water.¹⁶

8. *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861), overruled by *Cline v. Am. Aggregates Corp.*, 474 N.E.2d 324 (Ohio 1984); *Roath v. Driscoll*, 20 Conn. 533, 541 (1850).

9. *See, e.g., Zachary A. Smith, Centralized Decisionmaking in the Administration of Groundwater Rights: The Experience of Arizona, California and New Mexico and Suggestions for the Future*, 24 NAT. RESOURCES J. 641, 641–42 (1984).

10. *Acton v. Blundell*, 152 Eng. Rep. 1123, 1233 (Exch. 1843).

11. *Frazier*, 12 Ohio St. at 311.

12. *See id.; Acton*, 152 Eng. Rep. at 1235.

13. *Houston & T.C. Ry. v. East*, 81 S.W. 279 (Tex. 1904).

14. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 826 (Tex. 2012); *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 801 (Tex. 1955) (“wanton[] and willful[]” waste and malice are exceptions to the rule of capture). Later, the court adopted another exception in *Friendswood Dev. Co. v. Smith-Sw. Indus.*, 576 S.W.2d 21 (Tex. 1978) (establishing negligent over-pumping as a cause of action for subsidence claims).

15. *See Eric Opiela, The Rule of Capture in Texas: An Outdated Principle Beyond Its Time*, 6 U. DENV. WATER L. REV. 87, 92 (2002) (arguing that because the *Acton* court “appl[ie]d the tort principles of duty, breach, and foreseeability to reach its holding,” it “was clearly not recognizing a property right; rather it was merely addressing the impracticality of recognizing a cause of action for well interference”).

16. Some commentators have argued that ownership of groundwater in place gave rise to the rule of capture at the outset. *See, e.g., Edmond R. McCarthy, Jr., Mixing Oil and Gas With Texas Water Law*,

B. *Constitutional Authority for Legislative Regulation*

In 1917, following two droughts,¹⁷ Texans enacted a constitutional amendment known as the Conservation Amendment, which provides:

The conservation and development of all natural resources of this State . . . and the preservation and conservation of all such natural resources of the State are each and all hereby declared public rights and duties; and the Legislature shall pass all such laws as may be appropriate thereto.¹⁸

Although the court's 1904 adoption of the rule of capture was not based on any constitutional or legislative authority,¹⁹ the court has since held that the Conservation Amendment vests primary authority for groundwater governance in the legislature.²⁰

C. *Groundwater in the Texas Supreme Court*

Many states, particularly in the arid West, quickly modified or abandoned absolute ownership,²¹ moving instead toward reasonable use or prior appropriation rules.²² California, for instance, reasoned that the absolute ownership doctrine's lack of protection against a neighbor who could pump "unlimited quantities" of water undermined its economic efficiency rationale²³

44 TEX. TECH L. REV. 883, 900 (2012). However, others reason that the rule arose only as a tort principle, and morphed into a property rule over time, partly due to confusion over the court's terminology in *East* and subsequent rule of capture cases. See, e.g., Opiela, *supra* note 15, at 92, 95.

17. *Barshop v. Medina Cnty. Underground Water Conservation Dist.*, 925 S.W.2d 618, 623, 626 (Tex. 1996).

18. TEX. CONST. art. XVI, § 59(a).

19. *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 76 (Tex. 1998).

20. *Id.* Although the court in *City of Corpus Christi v. Pleasanton* stated that the "duty" of "conservation of the state's natural resources" lay "exclusively" with the state Legislature, 276 S.W.2d 798, 803 (Tex. 1955), elsewhere it has characterized water regulation as "essentially a legislative function," *Barshop*, 925 S.W.2d at 633, and has implied that it would step in if the Legislature "ignored its constitutional charge" to conserve the resource. *Sipriano*, 1 S.W.3d at 80. The court has also continued to alter the common law environment in which the legislature operates. See *id.* at 78–80. Because the court has not completely abdicated authority in this area, I characterize the Legislature's authority as "primary."

21. Texas's "rule of capture" is one example of "absolute ownership," under which each party holds "absolute rights to the water under his own land, but [holds] no rights in the water underlying the other's land. The consequence of this rule . . . [leaves] each landowner unrestricted, but simultaneously unprotected, in the use of groundwater." Antonio Rossmann & Michael J. Steel, *Forging the New Water Law: Public Regulation of "Proprietary" Groundwater Rights*, 33 HASTINGS L.J. 903, 907 (1982) (discussing *Acton v. Blundell*, 152 Eng. Rep. 1123, 1233 (Exch. 1843)).

22. *Smith*, *supra* note 9, at 641 n.2. American states have adopted two principle doctrines instead of absolute ownership of groundwater: the reasonable use doctrine, or American rule, under which a landowner may use only as much groundwater as he can put to a beneficial, reasonable use on his own land; and a modification of the surface water prior appropriation doctrine, under which the first party to divert water to a beneficial use perfects a water right. *Id.* at 641–42. California has a unique correlative rights rule, under which groundwater pumping is "apportioned pro rata" among overlying landowners in times of shortage, often relying on piecemeal adjudications to settle rights. Rossmann & Steel, *supra* note 21, at 908.

23. *Katz v. Walkinshaw*, 141 Cal. 116, 133 (1903); see also *id.* at 137 (characterizing absolute ownership as "leaving property without any protection from the law").

and failed to account for the dry conditions and competition for water that characterized the state.²⁴ Texas courts, however, have held fast to absolute ownership. The Texas Supreme Court has consistently reaffirmed its support of the doctrine and rejected alternatives, despite acknowledging that the rule of capture produces “harsh and outmoded” results²⁵ and a widespread recognition that the legal division between groundwater and surface water is often no longer justifiable on a scientific basis.²⁶ Nonetheless, the state courts have also recognized that the legislature could use its police power²⁷ and its constitutional authority under the Conservation Amendment²⁸ to limit “excessive” pumping.²⁹

Throughout its decisions upholding the rule of capture, the court has identified instances in which the legislature could involve itself to address management problems that the common law failed to solve. In *City of Corpus Christi v. City of Pleasanton*, for instance, Corpus Christi transported millions of gallons of groundwater 118 miles downstream, allowing up to 74 percent of the water to be lost through evaporation, transpiration, and seepage.³⁰ The court first held that the common law provided no protection against Corpus Christi’s use, because the common law did not restrict transportation methods.³¹ The court reasoned that the state’s constitutional authority under the Conservation Amendment meant that the duty to preserve water “belong[ed] exclusively to the legislative branch, not the courts,” and thus the court would not alter the common law doctrine,³² even though it knew that the movement of

24. *Id.* at 126–28, 133 (noting that although the court had previously, in dictum, suggested support for the absolute ownership doctrine, the arid conditions of California were “radically opposite to those prevailing where the doctrine arose”).

25. *Friendswood Dev. Co. v. Smith-Sw. Indus.*, 576 S.W.2d 21, 28–29 (Tex. 1978); *Sipiano*, 1 S.W.3d at 75 (affirming the rule of capture and refusing to adopt the reasonable use doctrine or the rule articulated in the Restatement (Second) of Torts § 858); *Sherman v. Pub. Util. Comm’n*, 643 S.W.2d 681, 686 (Tex. 1983). *See also* Templer, *supra* note 5, at 43.

26. *See, e.g.*, W. F. Hardt, *Hydrology and Water Law—Cooperation for the Future*, in WATER RESOURCES LAW: PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WATER RESOURCES LAW, DEC. 15–16, 1986, HYATT REGENCY, CHICAGO, ILL. 221 (1986) (“Of particular hydrologic significance is the relation between surface water and ground water. Surface water and ground water in many court decisions were considered as separate hydrologic and legal entities. This concept has largely been refuted as a result of comprehensive hydrologic studies.”).

27. *See Houston & T.C. Ry. v. East*, 81 S.W. 279, 280 (Tex. 1904) (“In the absence of . . . positive authorized legislation, as between proprietors of adjoining land, the law recognizes no correlative rights in respect to underground waters percolating, oozing, or filtering through the earth” (quoting *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861))).

28. TEX. CONST. art. XVI, § 59(a).

29. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 827 (Tex. 2012). The court has also acknowledged the legislature’s ability to create correlative rights in both oil and groundwater, although the state’s common law does not recognize them. *See id.* at 830.

30. *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 799–800 (Tex. 1955).

31. *Id.* at 802.

32. *Id.* at 803. However, the court did create a judicial exception to the common law doctrine in *Friendswood Development Co. v. Smith-Southwest Industries, Inc.*, in which it held that a pumper could be liable to a neighbor for negligent pumping that caused subsidence. 576 S.W.2d 21, 30 (Tex. 1978).

groundwater was no longer quite so “occult.”³³ “Undoubtedly,” the court stated, “the Legislature could prohibit the use of any means of transportation of percolating or artesian water which permitted the escape of excessive amounts, but it has not seen fit to do so.”³⁴ Indeed, the court recognized that its ruling would have negative consequences for water management, and essentially implored the legislature to get involved:

The Legislature is now in session. It will have this opinion before it before adjournment. It will recognize the problem. If it wishes to declare that such transportation of water in conduits which permit the escape of a large percentage is wasteful and unlawful it will have ample time in which to do it.³⁵

The court echoed this sentiment in *Sipriano v. Great Spring Waters of America, Inc.*, its most recent case reaffirming the rule of capture. *Sipriano* argued that the court should abandon the rule of capture and adopt the reasonable use doctrine after *Ozarka Spring Water* began pumping 90,000 gallons of groundwater per day for bottling, depleting his wells.³⁶ The court, however, determined that the Conservation Amendment “made clear that in Texas, responsibility for the regulation of natural resources, including groundwater, rests in the hands of the Legislature,”³⁷ a power it characterized as both broad and necessary.³⁸ The court reasoned that it saw “no reason . . . for the Legislature to feel constrained from taking appropriate steps to protect groundwater,”³⁹ and emphasized that the Legislature had recently used this authority by passing Senate Bill 1, a comprehensive water planning bill that significantly enhanced the state’s regulatory framework for water.⁴⁰ In light of the legislature’s activity, the court reasoned that although it would not “shy away from change when it is appropriate,” “[g]iven the Legislature’s recent efforts to regulate groundwater, we are not persuaded that it is appropriate today for this Court to insert itself into the regulatory mix by substituting a rule of reasonable use for the current rule of capture.”⁴¹ Thus, ironically, the

33. *Corpus Christi*, 276 S.W.2d at 805 (Wilson, J., dissenting) (“These cases [*East* and *Frazier v. Brown*] were decided (1843–1904) before the development of most of our present knowledge of geology and hydrology It is understandable that [*Frazier’s* rationale] should appeal to this court in 1904 but I regret to see us reaffirm it now, as the majority does, in 1955 I am convinced that the rationale of [*Frazier v. Brown*] has been rebutted and answered by the course of our history and the entire trend of our jurisprudence since that decision and since the [*East*] case. Although this court can close its eyes to the advancement of scientific and legal knowledge and governmental techniques by reaffirming this rationale as the majority do here, I do not believe that this court will always do so”).

34. *Id.* at 803 (majority opinion). Although Texas had passed a statute prohibiting waste, the court held that evaporation did not meet the statutory definition. *Id.* at 800, 802.

35. *Id.* at 803.

36. *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75 (Tex. 1998).

37. *Id.* at 77.

38. *Id.* at 78, 79.

39. *Id.* at 79.

40. *Id.* at 79–80; Act of June 2, 1997, 75th Leg., R.S., ch. 1010, 1997 Tex. Gen. Laws 3610.

41. *Sipriano*, 1 S.W.3d at 80.

legislature's efforts to regulate and conserve groundwater may provide an explanation for the longevity of the rule of capture in Texas.

The court also upheld the legislature's authority to cap Edwards Aquifer⁴² withdrawals against a series of facial constitutional challenges, including a facial takings claim, in *Barshop v. Medina County Underground Water Conservation District*.⁴³ First, the court recognized the long history of regulation of the Edwards Aquifer and the importance of conserving the resource⁴⁴ before reaffirming the Legislature's role in groundwater regulation.⁴⁵ The court rejected the plaintiff's takings claim because any violation of the state's takings clause was "hypothetical," since the Edwards Aquifer Authority Act (EAAA), which capped pumping from the aquifer and established the Edwards permitting scheme, had yet to go into effect.⁴⁶ Although the court did not decide whether landowners had a vested property right in groundwater in place beneath their land, it reasoned that even assuming such a right existed, the EAAA did not violate the takings clause so long as compensation was provided for any future taking.⁴⁷ However, the court left open the possibility that future as-applied challenges to the EAAA could be successful if a landowner could establish a vested property right to groundwater in place, prove damages, and demonstrate the state's failure to compensate.⁴⁸ The court also upheld the EAAA's pumping cap against a substantive due process claim, reasoning that "[t]he specific provisions of the Act, such as the grandfathering of existing users [and] the caps on water withdrawals . . . are all rationally related to legitimate state purposes in managing and regulating this vital resource" under the Conservation Amendment.⁴⁹ Thus, at least as a general matter, the court has evidenced its support for regulation of pumping in the Edwards specifically as well as groundwater more generally.

The court's past decisions demonstrate its unwillingness to abandon the absolute ownership doctrine, largely out of concerns about stability and proper deference to the legislature.⁵⁰ Nonetheless, it has also acknowledged the value of groundwater regulation⁵¹ and has consistently upheld the legislature's authority to act under its constitutional authority to preserve groundwater by

42. The Edwards Aquifer is the highly used Central Texas aquifer at the center of the *Edwards Aquifer Authority v. Day* case. See *infra* notes 84–96 and accompanying text for a description of the aquifer's hydrogeology.

43. *Barshop v. Medina Cnty. Underground Water Conservation Dist.*, 925 S.W.2d 618, 633 (Tex. 1996).

44. *Id.* at 625–26.

45. *Id.* at 633 ("Water regulation is essentially a legislative function.").

46. *Id.* at 631.

47. *Id.*

48. *Id.*

49. *Id.* at 633.

50. See *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 80 (Tex. 1998); *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 803 (Tex. 1955).

51. See *Sipriano*, 1 S.W.3d at 79.

limiting pumping.⁵²

D. *Groundwater Regulation in Texas*

1. *Chapter 36 Groundwater Districts*

Under its constitutional authority, the Texas Legislature has modified the rule of capture through an overlying regulatory scheme based on local management by groundwater conservation districts (GCDs).⁵³ GCDs generally have the authority to adopt permitting systems based on a range of considerations, such as effects on existing groundwater or surface water permit holders, how permit applicants will use the water, and historic use.⁵⁴ To protect neighboring landowners, they may require permit holders to follow well spacing guidelines and limit individual well production.⁵⁵ GCDs must also develop management plans for aquifers within their jurisdiction, which are subject to approval by the Texas Water Development Board.⁵⁶

In recent years, the scheme has become more complex and comprehensive. Local districts must work together across specified management areas to manage aquifers based on projected desired future conditions (DFCs) of the groundwater table.⁵⁷ Local districts develop their own DFCs, which are appealable to the state but may vary depending upon the priorities of the individual district.⁵⁸ The legislature has also instructed districts to issue permits “up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition” set by the districts in the management area, which is also known as “modeled

52. *Id.*; *Corpus Christi*, 276 S.W.2d at 803; *Barshop*, 925 S.W.2d at 633.

53. *See* TEX. WATER CODE ANN. §§ 36.001–419 (West 2012) (establishing and defining the authority of groundwater conservation districts). The state established its first GCD in 1951; there are now ninety-seven approved districts operating across the state. *Groundwater Conservation District Facts*, TEX. WATER DEV. BD., https://www.twdb.state.tx.us/groundwater/conservation_districts/facts.asp (last visited Apr. 14, 2013). GCDs are authorized under Chapter 36 of the State Water Code, so are often called Chapter 36 districts.

54. TEX. WATER CODE ANN. § 36.113(d)–(e).

55. *Id.* § 36.116.

56. *See id.* § 36.1072.

57. *See id.* §§ 36.108–1086. The DFC process is fairly new—the first set of DFCs was due to the Texas Water Development Board (TWDB) in September of 2010. *See* Act of May 30, 2005, 79th R.S., ch. 970, 2005 Tex. Gen. Laws 3247, 3254–55 (codified as amended at TEX. WATER CODE ANN. § 36.108(d)). The Legislature updated the statute in 2011 to provide a definition of the previously undefined term “desired future condition.” Act of May 31, 2011, 82d Leg., R.S., ch. 1233, §§ 14, 17, 2011 Tex. Gen. Laws 3294, 3296 (codified as amended at TEX. WATER CODE ANN. §§ 36.001(30), 36.108(d-2)).

58. TEX. WATER CODE ANN. § 36.1083. Although districts within the same management area are required to coordinate their planning efforts pursuant to § 36.108(b), each individual district’s DFC may vary significantly. *See, e.g.*, *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 836 (Tex. 2012) (noting that “[d]istricts may have different rules; indeed, a district may adopt different rules for different areas of the district”).

available groundwater.”⁵⁹ Thus, the legislature has approved the creation of a regulatory cap on the total amount of water that can be subject to ownership within a particular basin.⁶⁰ Although the legislation prevents GCDs from directly choosing to permit below the available groundwater cap, more conservation-minded GCDs can choose a more conservative DFC, which will reduce available groundwater. Conversely, districts can choose GCDs that essentially set a schedule for aquifer mining,⁶¹ as other western states have done.⁶² Despite this risk, this change is critical to the sufficiency of Texas’s regulatory system.⁶³ Critics characterized the previous voluntary system as a “non-management” strategy because of its failure to provide any statutory restrictions on groundwater mining.⁶⁴

The legislature has also taken steps to facilitate conjunctive management. In 2011, the legislature added groundwater-surface water connections as a factor that GCDs should consider in developing DFCs,⁶⁵ one of several statutory elements allowing or requiring GCDs to consider impacts to surface

59. TEX. WATER CODE ANN. § 36.1132. Modeled available groundwater functions as a withdrawal cap on the relevant aquifer. See Deborah Clarke Trejo, *Identifying and Valuing Groundwater Withdrawal Rights in the Context of Takings Claims—A Texas Case Study*, 23 TUL. ENVTL. L.J. 409, 417 (2009).

60. See ROBERT E. MACE ET AL., TEX. WATER DEV. BD., A STREETCAR NAMED DESIRED FUTURE CONDITIONS: GROUNDWATER AVAILABILITY FOR TEXAS 3 (rev. ed. 2008) (“Before House Bill 1763, it was arguable whether or not groundwater conservation districts . . . had the ability to place a cap on groundwater production. With the passage of House Bill 1763, statute now states that ‘[a] district, to the extent possible, shall issue permits up to the point that the total volume of groundwater permitted equals the managed available groundwater . . . [.]’ Before this time, the majority of districts did not have an overall cap on groundwater production.”). The legislature modified House Bill 1763 in 2011, changing the term “managed” to “modeled.” Act of May 31, 2011, 82d Leg., R.S., ch. 1233, § 17, 2011 Tex. Gen. Laws __ (codified as amended at TEX. WATER CODE ANN. § 36.108(d-2)).

61. Groundwater mining occurs when pumping consistently outpaces recharge, lowering the water table over time. Hugo A. Loáiciga, *Groundwater Mining*, in ENCYCLOPEDIA OF WATER SCIENCE 345 (B. A. Stewart & Terry A. Howell eds., 2003).

62. Jacque L. Emel, *Groundwater Rights: Definition and Transfer*, 27 NAT. RESOURCES J. 653, 659 (1987).

63. See Kaiser & Skillern, *supra* note 6, at 291 (“The issue is whether the state will provide aquifer-sustainable use standards for local groundwater management districts to follow.”).

64. See Z.A. Smith, *Groundwater Collective Management Systems: The United States Experience*, in INTENSIVE USE OF GROUNDWATER: CHALLENGES AND OPPORTUNITIES 265 (Ramón Llamas & Emilio Custodio eds., 2003); Robert Emmet Clark, *The Role of State Legislation in Ground Water Management*, 10 CREIGHTON L. REV. 469, 475 (1977).

65. Act of May 31, 2011, 82d Leg., R.S., ch. 1233, § 17, 2011 Tex. Gen. Laws __ (codified as amended at TEX. WATER CODE ANN. § 36.108(d)(4) (West 2012)). Although the statute characterizes these connections as “environmental impacts,” it also contains a provision instructing GCDs to consider “the impact on the interests and rights in private property.” TEX. WATER CODE ANN. § 36.108(d)(7). In July 2012, a nonprofit group filed a lawsuit alleging that a DFC approval did not properly consider impairment of surface water property rights. See *Environmental Stewardship Sues to Appeal Decision by the Texas Water Development Board*, ENVTL. STEWARDSHIP (July 20, 2012), <http://www.environmentstewardship.org/2012/07/20/environmental-stewardship-sues-to-appeal-decision-by-the-texas-water-development-board/>. Districts are also required to consider whether “the proposed use of water unreasonably affects existing groundwater and surface water resources or existing permit holders” before granting any permit. TEX. WATER CODE ANN. § 36.113(d)(2).

water.⁶⁶ Similarly, the Texas Commission on Environmental Quality, which manages surface water permitting, must “consider the effects, if any, on groundwater or groundwater recharge” before granting a surface water diversion permit.⁶⁷ Texas has also adopted statutes to facilitate aquifer storage and recovery projects,⁶⁸ including the development of pilot projects⁶⁹ and eligibility for grant funding.⁷⁰ To be successful, however, these projects require water usage rights to translate into rights to withdraw the stored water, something that is unsettled under the current system.⁷¹

Despite recent improvements, the decentralized nature of Texas’s system leaves it vulnerable to capture by local interests that favor unsustainable pumping for short-term economic gain.⁷² Districts also struggle with uneven enforcement, limited technical ability, and insufficient resources.⁷³ Although legislators and managers have recognized the negative effects of these problems on the state’s ability to conduct effective and coordinated water supply policy,⁷⁴ a decentralized system is likely the only politically tenable groundwater management strategy in Texas,⁷⁵ and theoretically supports the

66. See TEX. WATER CODE ANN. § 36.1071 (requiring districts’ management plans to address conjunctive management and include an estimate of aquifer discharge into surface water bodies); TEX. WATER CODE ANN. § 36.1086 (allowing joint GCD studies of groundwater-surface water interaction).

67. *Id.* § 11.151.

68. See *id.* §§ 11.153–155.

69. *Id.* § 11.153(a).

70. *Id.* § 11.153(e).

71. See William Blomquist et al., *Institutions and Conjunctive Water Management among Three Western States*, 41 NAT. RESOURCES J. 653, 659 (2001). The legislature has attempted to address this concern by instructing Texas Commission on Environmental Quality to consider whether “reasonable diligence will be used to protect the water stored in the receiving aquifer from unauthorized withdrawals to the extent necessary to maximize the permit holder’s ability to retrieve and beneficially use the stored water without experiencing unreasonable loss of appropriated water” before granting an aquifer storage project permit. TEX. WATER CODE ANN. § 11.154(c)(3).

72. See Ciara O’Rourke, *Water Supply, Property Rights Concerns Fuel Groundwater District Election*, AUSTIN AMERICAN-STATESMAN (Nov. 1, 2012), <http://www.statesman.com/news/news/local/water-supply-property-rights-concerns-fuel-groundw/nStkW/> (illustrating the conflict between local interests favoring a DFC that maintains a higher water table versus interests that support more pumping to promote economic growth); Joe Nick Patoski, *Playing by the Rule*, TEX. OBSERVER (June 24, 2010), <http://www.texasobserver.org/playing-by-the-rule/> (describing efforts by large West Texas landowners to pump and export significant amounts of groundwater over local opposition).

73. See Paul Burka, *Troubled Waters*, TEX. MONTHLY (Mar. 2004), available at <http://www.texasmonthly.com/2004-03-01/btl.php>.

74. See Asher Price, *State Aims to Make Groundwater Rules More Uniform*, AUSTIN AMERICAN-STATESMAN (Feb. 27, 2010), <http://www.statesman.com/news/news/local/state-aims-to-make-groundwater-rules-more-uniform/nRqtD/>; SAN ANTONIO WATER SYSTEM, 2012 WATER MANAGEMENT PLAN 4 (2012), available at http://www.saws.org/your_water/waterresources/2012_WMP/docs/20121204_2012WMP_BoardApproved.pdf (explaining that “regulatory hurdles” involved with inconsistent GCD policy and conflicting interests have made developing water supply projects outside the Edwards Aquifer more difficult).

75. See, e.g., Elliott Blackburn, *Farmers Could Face Water Limits*, LUBBOCK AVALANCHE-JOURNAL (Aug. 7, 2010), <http://lubbockonline.com/local-news/2010-08-08/farmers-could-face-water-limits#.UTGVtRmY4YQ> (discussing how “worries over how someone hundreds of miles away might

significant geographical variance in both hydrologic structures and water needs.⁷⁶ To continue to improve its system, the state must determine how it will address these challenges within its decentralized framework.

2. *The Edwards Aquifer Authority*

The Edwards Aquifer Authority, which governs groundwater withdrawals from the Edwards Aquifer in Central Texas, is a unique body under Texas state law,⁷⁷ with different statutory directives than the general, or Chapter 36, GCDs. The state legislature passed the EAAA⁷⁸ in 1993 specifically to limit groundwater withdrawals from the Edwards Aquifer in response to an endangered species lawsuit prosecuted by the Sierra Club.⁷⁹ To advance the pumping limit required to preserve endangered species habitat in the aquifer's discharge springs, the EAAA directs the Authority to issue permits prioritizing existing users who "'withdr[ew] and beneficially used'" aquifer water prior to 1993.⁸⁰ "[T]otal withdrawals under all permits must be reduced proportionately as necessary so as to not exceed the statutory maximum annual withdrawal from the aquifer."⁸¹ Because Texas law also protects tributary groundwater

tinker with a landowner's ability to draw from the [Ogallala A]quifer" has driven West Texas landowners to participate in local groundwater management).

76. See Ann W. Peralta & Richard C. Peralta, *Sustained Groundwater Yield and Consumptive Use Via Target Levels in a Reasonable Use State*, in WATER RESOURCES LAW: PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WATER RESOURCES LAW 241 (1986) (noting that regional water supply models "can be created to develop water use strategies that maximize achievement of predetermined regional objectives," including the ability to "successfully coordinate the use of groundwater and surface water resources that hydrologically interact with each other"); Smith, *supra* note 64, at 268 (noting that centralized permit systems can be "dysfunctional" if they lack "the flexibility to take into consideration changing geological and social conditions" and "local stakeholder input").

77. See *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 818 (Tex. 2012). The Authority manages an eight-county area that includes most of the aquifer's recharge and artesian zones. *Where Is the Aquifer Located*, EDWARDS AQUIFER AUTHORITY, http://www.edwardsaquifer.org/index.php/aquifer_education/discover_the_edwards_aquifer/about_the_aquifer/where_is_the_aquifer_located/ (last visited Oct. 5, 2012).

78. Act of May 30, 1993, 73d Leg., R.S., ch. 626, 1993 Tex. Gen. Laws 2350, amended by Act of May 16, 1995, 74th Leg., R.S., ch. 524, 1995 Tex. Gen. Laws 3280; Act of May 29, 1995, 74th Leg., R.S., ch. 261, 1995 Tex. Gen. Laws 2505; Act of May 6, 1999, 76th Leg., R.S., ch. 163, 1999 Tex. Gen. Laws 634; Act of May 25, 2001, 77th Leg., R.S., ch. 1192, 2001 Tex. Gen. Laws 2696; Act of May 28, 2001, 77th Leg., R.S., ch. 966, §§ 2.60–.62 and 6.01–.05, 2001 Tex. Gen. Laws 1991, 2021–2022, 2075–2076; Act of May 25, 2001, 77th Leg., R.S., ch. 1192, 2001 Tex. Gen. Laws 2696; Act of June 1, 2003, 78th Leg., R.S., ch. 1112, § 6.01(4), 2003 Tex. Gen. Laws 3188, 3193; Act of May 23, 2007, 80th Leg., R.S., ch. 510, 2007 Tex. Gen. Laws 900; Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.01–2.12, 2007 Tex. Gen. Laws 4612, 4627–4634; Act of May 28, 2007, 80th Leg. R.S., ch. 1430, §§ 12.01–12.12, 2007 Tex. Gen. Laws 5848, 5901–5909; Act of May 21, 2009, 81st Leg., R.S., ch. 1080, 2009 Tex. Gen. Laws 2818. The Act remains uncodified, but an unofficial compilation is available on the Authority's website at <http://www.edwardsaquifer.org/files/EAAact.pdf>.

79. *Day*, 369 S.W.3d at 836; *Sierra Club v. Lujan*, No. MO-91-CA-069, 1993 WL 151353 (W.D. Tex., Feb. 1, 1993).

80. *Day*, 369 S.W.3d at 819 (quoting *Edwards Aquifer Auth. v. Chem. Lime, Ltd.*, 291 S.W.3d 392, 395 (Tex. 2009)).

81. *Id.* at 820.

pumpers from any liability for damage done to surface water users,⁸² the legislature set maintenance of the surface springs supported by Edwards Aquifer discharge as the effective DFC for the aquifer in addition to establishing an absolute cap on withdrawals.⁸³

II. *EDWARDS AQUIFER AUTHORITY V. DAY*

A. *Factual Background*

The Edwards Aquifer is a highly productive limestone karst aquifer located in south central Texas.⁸⁴ The aquifer's groundwater migrates steadily from its northwest recharge zone toward discharge springs and streams in the southeast.⁸⁵ Its fairly rapid rate of recharge and discharge is characteristic of karst aquifers,⁸⁶ which are formed by the gradual dissolution of carbonate rock.⁸⁷ Karst aquifers feature conduits that recharge very efficiently⁸⁸ and their discharge often supports sizeable surface water springs.⁸⁹ This rapid, dynamic recharge results in a renewable resource that can be sustainably pumped without mining,⁹⁰ unlike fossilized groundwater systems formed by thousands

82. See *Denis v. Kickapoo Land Co.*, 771 S.W.2d 235, 238–39 (Tex. App. 1989) (Texas follows the English rule whereby “percolating waters tributary to springs were treated the same as all other percolating waters as part of the soil where found” and “it is immaterial that the springs so supplied with water were the sources of a stream or surface water course upon which riparian rights had vested.”). Once again, Texas is in the minority with this rule; western states more commonly regard tributary groundwater as connected to the surface water right. See M. W. Bittinger, *The Problem of Integrating Ground-Water and Surface Water Use*, 2 *GROUND WATER* 33, 34 (1964).

83. Act of May 30, 1993, 73rd Leg., R.S., ch. 626, § 1.14(h), 1993 Tex. Gen. Laws 2350, 2360, as amended by Act of May 28, 2007, 80th Leg., R.S., ch. 1351, § 2.02, 2007 Tex. Gen. Laws 4612, 4627; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 12.02, 2007 Tex. Gen. Laws 5848, 5901.

84. ROBERT W. MACLAY, U.S. GEOLOGICAL SURVEY, WATER-RESOURCES INVESTIGATIONS REPORT 95-4186, *GEOLOGY AND HYDROLOGY OF THE EDWARDS AQUIFER IN THE SAN ANTONIO AREA, TEXAS 2* (1995). The Texas Legislature has statutorily limited pumping from the Edwards Aquifer to 572,000 acre-feet per year. Act of May 28, 2007, 80th Leg. R.S., ch. 1430, § 12.02(c), 2007 Tex. Gen. Laws 5848, 5902.

85. RENÉ A. BARKER & ANN F. ARDIS, U.S. GEOLOGICAL SURVEY, PROFESSIONAL PAPER 1421-B, *HYDROGEOLOGIC FRAMEWORK OF THE EDWARDS-TRINITY AQUIFER SYSTEM, WEST-CENTRAL TEXAS B35* (1996). Recharge sources include surface precipitation and losing streams. See also Kaiser & Skillern, *supra* note 6, at 302.

86. William B. White, *Karst Hydrology: Recent Developments and Open Questions*, 65 *ENGINEERING GEOLOGY* 85, 86–87 (2002). “Recharge” describes water that flows into an aquifer from surface water sources, while “discharge” describes water that exits an aquifer in the form of surface water or leakage into other aquifers. *Groundwater Glossary*, THE GROUNDWATER FOUND., <http://www.groundwater.org/gi/gwglossary.html> (last visited Oct. 5, 2012).

87. THOMAS C. WINTER ET AL., U.S. GEOLOGICAL SURVEY, CIRCULAR 1139, *GROUND WATER AND SURFACE WATER: A SINGLE RESOURCE* 50 (1998).

88. *Id.*; Michel Bakalowicz, *Karst Groundwater: A Challenge for New Resources*, 13 *HYDROGEOLOGY J.* 148, 151 (2005).

89. White, *supra* note 86, at 86–87.

90. See, e.g., Zbigniew W. Kundzewicz & Petra Döll, *Will Groundwater Ease Freshwater Stress Under Climate Change?*, 54 *HYDROLOGICAL SCI.* 665, 666 (2009) (“[R]enewable groundwater resources can be defined as being equal to long-term average groundwater recharge.”). However,

of years of stored recharge.⁹¹

The Edwards is also highly stressed⁹² and, therefore, closely managed. It serves as the primary water source for the city of San Antonio,⁹³ which is heavily dependent on groundwater,⁹⁴ in addition to supplying many private wells throughout the basin.⁹⁵ It also provides habitat for eight different threatened or endangered species.⁹⁶

R. Burrell Day and Joel McDaniel (collectively “Day”) purchased land within the Authority’s jurisdiction in 1994.⁹⁷ A well on the property flowed under artesian pressure into a lake, which the prior owners had used for irrigation and recreation.⁹⁸ Based on the prior owners’ use, Day applied for a permit to pump 700 acre-feet of groundwater per year, which the Authority denied.⁹⁹ When Day protested the decision, an administrative law judge concluded that the water from the lake was state surface water, limiting Day’s

because the Edwards is heavily used, it also experiences rapid drawdown, especially during drought. Kaiser & Skillern, *supra* note 6, at 260–61.

91. Bridget R. Scanlon et al., *Groundwater Depletion and Sustainability of Irrigation in the U.S. High Plains and Central Valley*, PROC. OF THE NAT’L ACAD. OF SCIENTISTS EARLY EDITION 3–4 (May 29, 2012), available at <http://www.pnas.org/content/early/2012/05/24/1200311109>.

92. A. Garrido & M.L. Livingston, *Economic and Financial Perspectives on Intensive Groundwater Use*, in INTENSIVE USE OF GROUNDWATER: CHALLENGES AND OPPORTUNITIES 221 (Ramón Llamas & Emilio Custodio eds., 2003) (characterizing the Edwards as “clearly[] one of the most stressed aquifers in Texas”).

93. *Current Water Supply Projects: Edwards Aquifer*, SAN ANTONIO WATER SYSTEM, http://www.saws.org/your_water/waterresources/projects/edwards.cfm (last visited Oct. 5, 2012) (noting that “[c]urrently more than 90 percent of drinking water used by SAWS customers comes from the Edwards Aquifer”). San Antonio has been relying on groundwater pumped from the Edwards since 1911. ROBERT GLENNON, WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA’S FRESH WATERS 88 (2002).

94. San Antonio has long been famous for being the largest U.S. city to be completely reliant on groundwater. See, e.g., Robert Glennon, Remarks, *Tales of French Fries and Bottled Water: The Environmental Consequences of Groundwater Pumping*, 37 ENVTL. L. 3, 9 (2007). However, the San Antonio Water System (SAWS) has purchased some surface water rights, S. CENT. TEX. REG’L WATER PLANNING GRP., 2011 SOUTH CENTRAL TEXAS REGIONAL WATER PLAN 4C.32-3 (2010), available at http://www.regionltexas.org/2011_rwp2.php, and SAWS plans to incorporate surface water from Canyon Lake into its supply by 2030. SAN ANTONIO WATER SYSTEM, 2012 WATER MANAGEMENT PLAN FACT SHEET (2012), available at http://www.saws.org/your_water/WaterResources/2009wmp/docs/2009SAWSWaterManagementPlanFact.pdf.

95. See, e.g., Colin McDonald, *Dry Conditions Lead to More Water Woes*, SAN ANTONIO EXPRESS NEWS (June 28, 2012), <http://www.mysanantonio.com/news/environment/article/Edwards-Aquifer-nears-Stage-3-level-3668214.php>.

96. *Covered Species*, EDWARDS AQUIFER HABITAT CONSERVATION PLAN, EDWARDS AQUIFER AUTHORITY, http://www.eahcp.org/index.php/about_eahcp/covered_species (last visited Oct. 5, 2012). Regional stakeholders, including the Authority, recently completed a habitat conservation plan to govern the preservation and maintenance of endangered species habitat. See Tracy Idell Hamilton, *Final Piece of Aquifer Plan Approved*, SAN ANTONIO EXPRESS NEWS (Dec. 28, 2011), <http://www.mysanantonio.com/default/article/Final-piece-of-aquifer-plan-approved-2429538.php>. For a general discussion of groundwater’s importance as habitat, see Barton H. Thompson Jr., *Beyond Connections: Pursuing Multidimensional Conjunctive Management*, 47 IDAHO L. REV. 273, 287–91 (2011).

97. *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814, 818 (Tex. 2012).

98. *Id.*

99. *Id.* at 820–21.

permit to seven acres that the prior owners had irrigated directly from the well, a total of fourteen acre-feet of groundwater.¹⁰⁰ Day then sued the Authority, alleging that the Authority had taken his property without just compensation in violation of the Texas Constitution's takings clause by prohibiting him from pumping enough water to irrigate the full acreage.¹⁰¹

B. *The Day Opinion*

Despite its past concerns about the effects of the rule of capture,¹⁰² the Texas Supreme Court further solidified its commitment to the rule in *Edwards Aquifer Authority v. Day*. The court held that landowners have a vested property interest in groundwater in place under their land, prior to capture, and that the vested right could provide the basis for a takings claim under the state Constitution.¹⁰³ However, the court also reaffirmed its prior statements regarding the legislature's authority to regulate groundwater¹⁰⁴ and seemingly endorsed the Chapter 36 permitting process,¹⁰⁵ leaving the door open for the Texas Legislature to continue to advance a "management doctrine" for groundwater¹⁰⁶ in Texas in spite of the state's flawed common law foundation.

Despite the rule of capture's long history, Texas had not yet determined whether landowners owned groundwater in place prior to being pumped to the surface.¹⁰⁷ It had previously decided, however, that oil and gas, which are also governed by the rule of capture, are owned in place.¹⁰⁸ Under its oil and gas precedent, "[o]wnership of gas in place [does] not entitle the owner to specific molecules of gas that might move beneath the surface tracts but to volumes

100. *Id.* at 821.

101. *Id.*

102. *See, e.g.,* Sipriano v. Great Spring Waters of Am., Inc., 1 S.W.3d 75, 77–80 (Tex. 1998).

103. *Day*, 369 S.W.3d at 831–33.

104. *See id.* at 833–37.

105. *See id.* at 841–43. Although the court did not explicitly state that the Chapter 36 process could not result in a taking in an applied challenge, it emphasized that by "requir[ing] that all relevant factors be taken into account," as under the Chapter 36 process, "[t]he Legislature can discharge its responsibility under the Conservation Amendment without triggering the Takings Clause." *Id.* at 843 (internal quotations omitted).

106. I have borrowed the term "management doctrine" from George Gould, who described it thus:

The term 'management doctrine' is my own. Technically, most states in [the management doctrine] group apply surface water statutes to groundwater or have adopted a groundwater code which superficially resembles the appropriation doctrine. However, differences in the nature of groundwater and surface water require substantial modifications in actual operation. . . . What results is a system managed by a government official or commission which has considerable flexibility to regulate groundwater withdrawals to achieve objectives suitable to the particular aquifer.

George A. Gould, *Water Law in 1986: Selected Issues*, in *WATER RESOURCES LAW: PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON WATER RESOURCES LAW* 17 (1986). This approach has also been described as an "integrated administration" approach. *See* A. DAN TARLOCK, JAMES N. CORBRIDGE, JR., & DAVID H. GETCHES, *WATER RESOURCE MANAGEMENT* 545 (2002).

107. *Day*, 369 S.W.3d at 823.

108. *Id.* at 823.

that, while they could be diminished through drainage, with ‘proper diligence,’ could also be replenished through drainage” from other neighboring lands overlying the same reservoir.¹⁰⁹ Despite “‘the fugitive nature of oil and gas,’” the court has held that “‘the rule of capture provide[s] no ‘substantial ground’” for treating it differently than “‘non-fugacious minerals’” that are subject to ownership in place, such as coal.¹¹⁰ The *Day* court reasoned that the same rule should apply to groundwater despite the significant differences between groundwater and hydrocarbons, concluding that it saw “no basis in these differences to conclude that the common law allows ownership of oil and gas in place but not groundwater”¹¹¹ despite the fact that it acknowledged that the differences between oil and water would provide justification for different regulatory strategies.¹¹²

The court further held that because the Authority’s method of permitting, based only on historical use, was “more restrictive” than the Chapter 36 provisions governing general groundwater permitting, the Authority’s permit restrictions could constitute a taking under the Texas Constitution.¹¹³ Using the three-factor *Penn Central Transportation Co. v. New York City* analysis,¹¹⁴ the court reasoned that although *Day* had adequate information to analyze whether investing in the property made sense in light of the EAAA’s restrictions on groundwater pumping, the state could not “immunize itself” from a takings claim “merely by discouraging investment.”¹¹⁵ Thus, it “[could not] say that [Day] should necessarily have expected that his access to groundwater would be so severely restricted.”¹¹⁶

Turning to the “nature” of the challenged restriction, the court first stated that groundwater regulation was “essential to its conservation and use.”¹¹⁷ It reasoned that fair regulation should take into account more than land surface area, and that historical use was a proper factor for consideration.¹¹⁸ However, the court found that historical use alone could not serve as a fair basis for

109. *Id.* at 828 (quoting *Stephens Cnty. v. Mid-Kan. Oil & Gas Co.*, 254 S.W. 290, 292 (Tex. 1923)).

110. *Id.* at 829 (quoting *Tex. Co. v. Daugherty*, 176 S.W. 717, 719–20, 722 (Tex. 1915)).

111. *Id.* at 831.

112. *Id.* at 840–41.

113. *Id.* at 842–43. Texas takings doctrine “has generally been guided by the United States Supreme Court’s construction and application” of the Fifth Amendment. *Id.* at 838.

114. The court used the *Penn Central* analysis after concluding that the restriction did not constitute a physical invasion and that although the record was “inconclusive,” it “may be doubted” that the permit restriction constituted a deprivation of all economically beneficial use of *Day*’s property. *Id.* at 839–40. The *Penn Central* factors are: (1) “[t]he economic impact of the regulation on the claimant,” (2) “the extent to which the regulation has interfered with distinct investment-backed expectations,” and (3) the “character of the governmental action.” *Penn Cent. Transp. Co. v. New York City*, 438 U.S. 104, 124 (1978).

115. *Day*, 369 S.W.3d at 840.

116. *Id.*

117. *Id.*

118. *Id.* at 840–41.

permitting, because it would incentivize waste rather than conservation.¹¹⁹ Although the court did not reach a conclusion regarding whether a taking had occurred in Day's case,¹²⁰ it implied that it would find a taking if a landowner was "deprived of all beneficial use of the groundwater below his property merely because he did not use it during an historical period and supply is limited."¹²¹

Despite significant problems with the court's oil and gas analogy,¹²² the court ultimately demonstrated its support for the state's general regulatory system. The court first reaffirmed that "the responsibility for the regulation of natural resources, including groundwater, rests in the hands of the Legislature."¹²³ It then noted that GCDs created under Chapter 36 "are the state's preferred method of groundwater management,"¹²⁴ and described with seeming approval the general GCD permitting scheme, under which GCDs can regulate well spacing, issue permits, limit production, and manage total groundwater production from an aquifer.¹²⁵ The court specifically noted that the general regulatory scheme gives local authorities the ability to consider management challenges related to conjunctive use, like the effect of groundwater pumping on surface water right holders and long-term water supply, when deciding whether to grant well permits.¹²⁶ The court noted that "[t]he Legislature's general approach to [groundwater] regulation has been to require that all relevant factors be taken into account," allowing it to "discharge

119. *Id.* at 841. The Authority argued that basing permits on historical use "is sound policy because it recognizes the investment landowners have made in developing groundwater resources." *Id.* However, the court reasoned that "had the permit limitation been anticipated before the EAAA was passed, landowners would have been perversely incentivized to pump as much water as possible, even if not put to best use, to preserve the right to do so going forward. Preserving groundwater for future use has been an important strategy for groundwater rights owners." *Id.* Thus, it concluded, "[t]he Authority's policy argument is flawed." *Id.*

120. *Id.* at 842–43.

121. *Id.* at 843.

122. *See infra* notes 169–84 and accompanying text.

123. *Day*, 369 S.W.3d at 833 (quoting *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 77 (Tex. 1999)). Indeed, although the court grounded its extension of groundwater ownership in common law, it justified its holding in part based on the legislature's recent passage of Senate Bill 332, which affirmed the state's recognition of absolute groundwater ownership, and on a provision in the EAAA affirming that the state intended that just compensation be paid for any taking effectuated by the Act. *Id.* at 832, 837–38, 842–43; Act of May 27, 2011, 82d Leg., R.S., ch. 1207, 2011 Tex. Gen. Laws 3224; *see also* McCarthy, *supra* note 16, at 908–09 (discussing the passage of Senate Bill 332). However, the court failed to acknowledge the import of other recent legislative actions that arguably strengthened GCDs' regulatory authority, particularly the imposition of the "modeled available groundwater" cap. *See Day*, 369 S.W.3d at 833–36 (discussing Chapter 36's regulatory scheme without discussion of the modeled available groundwater's function).

124. *Day*, 369 S.W.3d at 835 (quoting TEX. WATER CODE ANN. § 36.0015 (West 2012)).

125. *Id.* at 835–36. In his *Sipriano* concurrence, Justice Hecht explicitly favored a legislative management doctrine over common law governance of groundwater, which indicates that the court will continue to support legislative innovation in this area. *See Sipriano*, 1 S.W.3d at 83 ("[N]either [Restatement (Second) of Torts] section 858 nor any other common law rule of water regulation is preferable to almost any effective legislative solution . . .").

126. *Day*, 369 S.W.3d at 835.

its responsibility under the Conservation Amendment without triggering the Takings Clause”¹²⁷ under the Chapter 36 regulatory scheme. Thus, the court recognized the legitimacy and importance of groundwater regulation and management while cabining that regulatory capacity within the framework of the state Constitution in a way that preserved significant power for courts to check future legislative actions.¹²⁸

The court’s ultimate support for regulation is not surprising in light of previous decisions. Justice Hecht, who authored the *Day* opinion, has very clearly stated his support for regulation of groundwater. In his *Sipriano* concurrence, Justice Hecht only reluctantly upheld the rule of capture, reasoning that “[i]n the past several decades it has become clear, if it was not before, that it is not regulation that threatens progress, but lack of it.”¹²⁹ He concluded that *East* should not be overruled “only for now” because Senate Bill 1 “together with the increasing demands on the State’s water supply, may result before long in a fair, effective, and comprehensive regulation of water use that will make the rule of capture obsolete.”¹³⁰ Justice Hecht thus signaled that his deference to the legislature would be tested not by its development of a cohesive regulatory scheme, but by its failure to pursue regulation.¹³¹ The concurrence also demonstrates Justice Hecht’s belief that the state can produce a “fair, effective, and comprehensive” regulatory system within the bounds of the Takings Clause—something his decision in *Day* indicates the legislature may have achieved through the Chapter 36 system.¹³²

III. ADVANCING A MANAGEMENT DOCTRINE

Despite its recognition of the importance of groundwater regulation, the *Day* court’s analogy between groundwater and oil and gas further exacerbates the artificial legal division of groundwater and surface water by failing to account for their scientific connection. Although Texas courts have continually reinforced the doctrine, the legislature and water managers have moved toward a reliance on regulation to avoid uncontrolled pumping.¹³³ As Texas legislators

127. *Id.* at 843.

128. See Susana Elena Canseco, *Landowners’ Rights in Texas Groundwater: How and Why Texas Courts Should Determine Landowners Do Not Own Groundwater in Place*, 60 BAYLOR L. REV. 491, 525 (2008) (arguing that a decision against groundwater ownership in place “best serves [the] state groundwater policy goal of deference to the Legislature because it keeps courts from making groundwater decisions”).

129. *Sipriano*, 1 S.W.3d at 82 (Hecht, J., concurring).

130. *Id.* at 83.

131. See *id.*; see also *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 805 (Tex. 1955) (Wilson, J., dissenting) (warning that the court would not always “close its eyes to the advancement of scientific and legal knowledge” by reasoning that groundwater regulation is a “primarily legislative” problem).

132. See *Day*, 369 S.W.3d at 843.

133. *Smith*, *supra* note 64, at 263 (“In states that still follow the absolute ownership doctrine, like Texas, competition has ultimately led to the depletion of the resource—overdrafting to the point of the water becoming useless for most economic purposes.”).

and water managers are coming to realize,¹³⁴ a management scheme grounded in comprehensive legislation provides a necessary foundation for the active management that conjunctive use requires,¹³⁵ minimizing the importance of debates over common law rules.

A. *Conjunctive Management: A Western Imperative*

1. *The Importance of Conjunctive Management*

Water managers have long recognized the potential benefits of managing groundwater and surface water together as a single resource, particularly in regions with significant hydrologic connection between groundwater and surface water sources.¹³⁶ Legal commentators have also noted the benefits of conjunctive management, especially where use of surface water or groundwater affects the availability of the other.¹³⁷ Critics have consistently lambasted state law for failing to promote conjunctive management.¹³⁸ Harm to interconnected systems caused by groundwater pumping and an increasingly sophisticated scientific understanding of the connection between groundwater and surface water dictate that legal reforms are required to cohesively manage the resource. At the same time, decisions like *Day* demonstrate the difficulties courts have with integrating these concerns into common law doctrine.

The term “conjunctive management” can be used to describe a range of

134. See *supra* notes 65–71; Otis W. Templer & Lloyd V. Urban, *Conjunctive Use of Water on the Texas High Plains*, 13 J. CONTEMP. WATER RES. & EDUC. 102 (2011).

135. Active groundwater management includes “planned and coordinated monitoring, operation, and administration” of groundwater basins to advance particular policy goals. See CAL. DEP’T OF WATER RES., CALIFORNIA’S GROUNDWATER—BULLETIN 118, UPDATE 2003 32 (2003), available at <http://www.water.ca.gov/groundwater/bulletin118/bulletin118update2003.cfm> [hereinafter BULLETIN 118]; Smith, *supra* note 64, at 264 (noting that management schemes that include “[g]overnment controls of type and rate of extraction” “are those that are most likely to have the tools necessary to actively manage groundwater (by doing things such as setting up recharge systems, importing and injecting water or regulating pumping)”).

136. See, e.g., S. McClurg & R.S. Sudman, *Public and Stakeholder Education to Improve Groundwater Management*, in INTENSIVE USE OF GROUNDWATER: CHALLENGES AND OPPORTUNITIES 276–77 (Ramón Llamas & Emilio Custodio eds., 2003) (noting that “as water managers seek to make the best use of existing water facilities and wet-year flows,” conjunctive management has become an increasingly important management strategy); Robert A. Young & John D. Bredehoeft, *Digital Computer Simulation for Solving Management Problems of Conjunctive Groundwater and Surface Water Systems*, 8 WATER RESOURCES RES. 533, 534 (1972); NAT’L WATER COMM’N, WATER POLICIES FOR THE FUTURE 230–46 (1973).

137. See, e.g., Templer, *supra* note 5, at 39 (“It is generally agreed, considering the substantial interconnections between the phases of the hydrologic cycle, that conjunctive management is a desirable objective, especially where it can be demonstrated that unregulated water use in one phase has appreciable effects on established water rights and opportunities for water use in other phases.”).

138. See, e.g., WATER POLICIES FOR THE FUTURE, *supra* note 136, at 233; MAC TAYLOR, CAL. LEGISLATIVE ANALYST’S OFFICE, LIQUID ASSETS: IMPROVING MANAGEMENT OF THE STATE’S GROUNDWATER RESOURCES (2010), available at http://www.lao.ca.gov/reports/2010/rsrc/groundwater/groundwater_032410.aspx (“The erroneous distinction now reflected in California law between surface water and groundwater is an impediment to the establishment of surface water rights that accurately reflect the science of water.”).

management strategies and projects. In essence, however, it means optimizing the use of multiple water sources over time in response to changing conditions. At a basic level, water users can turn to groundwater supplies when surface water runs short in a dry year, with reliance on surface water increasing during wetter years.¹³⁹ More complex strategies include injecting excess surface water into aquifer formations for later storage (“aquifer storage and recovery” or “water banking”).¹⁴⁰ Conjunctive management also has the potential to make water resource supply planning more comprehensive while addressing supply uncertainty by integrating understanding of all available resources within a single basin,¹⁴¹ although it also requires more extensive data collection and analysis than nonintegrated planning.¹⁴²

The chief benefit of conjunctive management for water authorities is that it allows for the production of the most water at the lowest cost,¹⁴³ because users can take advantage of wet conditions while avoiding costs associated with surface water supply construction.¹⁴⁴ Particularly in aquifers with significant surface recharge potential, relatively slow inflow allows water users to take advantage of the aquifer’s natural capacity to store surface runoff in wet years.¹⁴⁵ In addition to saving runoff that might otherwise be wasted, the system benefits from reduced evaporation compared with surface storage strategies.¹⁴⁶ The potential for enhanced production is especially important to

139. A. Sahuquillo & M. Lluria, *Conjunctive Use as Potential Solution for Stressed Aquifers: Social Constraints*, in INTENSIVE USE OF GROUNDWATER: CHALLENGES AND OPPORTUNITIES 159 (Ramón Llamas & Emilio Custodio eds., 2003). However, Sahuquillo and Lluria also note that “[s]urprisingly enough, this obvious possibility of regularly using more surface water in wetter periods has not been applied very often,” perhaps because the differing legal regimes applied to each stage impede this flexibility. *Id.* at 160.

140. *Id.* at 167–68.

141. *See id.* at 171–72.

142. *See id.*

143. *See, e.g.*, Douglas L. Grant, *The Complexities of Managing Hydrologically Connected Surface Water and Groundwater Under the Appropriation Doctrine*, 22 LAND & WATER L. REV. 63, 64 n.4 (1987). This is true even when accounting for increased monitoring and data collection costs, since those investments allow managers to avoid costs associated with uncertainty and unnecessary water supply project construction. *See Sahuquillo & Lluria, supra* note 139, at 172.

144. Political difficulties, a lack of suitable sites, construction expenses, and difficulties obtaining water rights associated with surface water storage construction can make these projects very expensive. *See Miguel A. Mariño, Conjunctive Management of Surface Water and Groundwater*, in REGIONAL MANAGEMENT OF WATER RESOURCES: PROCEEDINGS OF AN INTERNATIONAL SYMPOSIUM (SYMPOSIUM S2) HELD DURING THE SIXTH SCIENTIFIC ASSEMBLY OF THE INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES (IAHS) 165 (A. H. Schumann ed., 2001); J. David Aiken, *Commentary, The National Water Policy Review and Western Water Rights Law Reform: An Overview*, 59 NEB. L. REV. 327, 343 (1980). Cost savings from avoided surface water storage construction is “especially valuable” when it avoids construction “that would be used only occasionally to meet peak or emergency demands.” Blomquist et al., *supra* note 71, at 657. These cost savings can extend beyond storage site construction to include savings from reduced water treatment (owing to “natural, biological, physical, and chemical processes” within the aquifer that can improve water quality), and “natural water conveyance to wells.” Sahuquillo & Lluria, *supra* note 139, at 167.

145. Bittinger, *supra* note 82, at 38.

146. Smith, *supra* note 9, at 670.

managers attempting to address population growth and seasonal water demands that are not compatible with water supply availability.¹⁴⁷

Conjunctive management also allows managers to address legal, economic, and environmental problems that arise from intensive use of hydrologically connected water systems.¹⁴⁸ Groundwater pumping can interfere with surface water flow, produce land subsidence, and destroy aquatic habitat.¹⁴⁹ By changing the direction of water flow between aquifers and surface water sources, groundwater pumping can turn “gaining streams” (which gain flow from groundwater discharge) into “losing streams” (from which surface water is drawn into groundwater formations).¹⁵⁰ Examples of harms to surface water resources from groundwater pumping abound, including the elimination of base flow from Arizona’s Santa Cruz River¹⁵¹ and the Cosumnes River in Sacramento.¹⁵² Similarly, surface water use can diminish groundwater recharge.¹⁵³ A legal framework that facilitates conjunctive management is a necessary foundation for planning and organizational functions of comprehensive management systems for these resources.¹⁵⁴

2. *Benefits for Texas and the Edwards*

Texas’s rapidly growing population is putting increasing pressure on the state’s water supplies, particularly in its more arid central and western regions.¹⁵⁵ This increased pressure has led to groundwater overdraft in many parts of the state,¹⁵⁶ including the Edwards basin.¹⁵⁷ The state’s current drought has focused the entire state’s attention on water supply, leading lawmakers to advocate for everything from increased conservation to the development of an extensive desalination infrastructure.¹⁵⁸ However, Texas has also systemically underfunded proposed water supply projects,¹⁵⁹

147. Blomquist et al., *supra* note 71, at 655–56.

148. See Sahuquillo & Lluria, *supra* note 139, at 158, 172.

149. *Id.* at 158; Bittinger, *supra* note 82, at 36; Young & Bredehoeft, *supra* note 136, at 535.

150. See William M. Alley et al., U.S. GEOLOGICAL SURVEY, CIRCULAR 1186, SUSTAINABILITY OF GROUND-WATER RESOURCES 30–32 (1999), available at <http://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf>.

151. See Glennon, *supra* note 93, at 45–50.

152. See Jan Fleckstein et al., *Managing Surface Water-Groundwater to Restore Fall Flows in the Cosumnes River*, 130 J. WATER RESOURCES PLAN. & MGMT. 301 (2004).

153. Sahuquillo & Lluria, *supra* note 139, at 158.

154. See *id.*

155. See TEX. WATER DEV. BD., WATER FOR TEXAS: 2012 STATE WATER PLAN 130, 135–42 (2012).

156. See Kaiser & Skillern, *supra* note 6, at 261.

157. ROBERT SANDFORD, RESTORING THE FLOW: CONFRONTING THE WORLD’S WATER WOES 205 (2009).

158. Kate Galbraith, *Texas Lawmakers Mull Water Options for State*, TEX. TRIBUNE (Mar. 22, 2012), <http://www.texastribune.org/texas-environmental-news/water-supply/texas-lawmakers-mull-water-options-texas/>.

159. See Farzad Mashhood, *Is the State Water Plan Unfunded? No*, AUSTIN AM.-STATESMAN SALSA VERDE BLOG (Jan. 5, 2012, 12:51 PM), <http://www.statesman.com/blogs/content/shared->

demonstrating the state's historic failure to appropriate consistent funding for water infrastructure.¹⁶⁰ More recently, efforts to fund the state's \$53 billion water plan have gained momentum in the state legislature, with key lawmakers drafting comprehensive legislation to create a state water infrastructure bank and fund conservation projects.¹⁶¹ The extensive water supply issues facing the state argue for the most comprehensive management possible of the state's limited water resources, especially as the state appears poised to make significant investments in water supply infrastructure.

Karst aquifers like the Edwards are especially suited for conjunctive management because their relatively high recharge rate and dynamic flow means that they generally have significant hydrologic connection to surface water sources,¹⁶² like the Edwards Aquifer system's San Marcos, Comal, and Barton Springs.¹⁶³ Importantly for the Edwards Aquifer, one of the benefits of conjunctive management is "enhanced protection of aquatic life and habitat," since managers are more able to control the amount of water available at

gen/blogs/austin/green/entries/2012/01/05/is_the_state_water_plan_unfund.html/ (noting that funding appropriated toward the state water plan in 2011 represented "less than 0.2 percent" of the plan's identified needs and characterizing the plan as "hugely underfunded," despite some recent infrastructure appropriations). However, voters approved a constitutional amendment in November 2011 authorizing an additional \$6 billion bond issuance to support water infrastructure and Texas legislators are currently considering pulling \$1 billion or more from the state's oil-and-gas-funded "Rainy Day Fund," a sign that Texas's ongoing drought may be influencing public sentiment about water-related spending. See Kate Galbraith, *Texas Water Propositions Meet Different Fates*, TEX. TRIBUNE (Nov. 9, 2011), <http://www.texastribune.org/texas-environmental-news/water-supply/texas-water-propositions-meet-different-fates/>; Kate Galbraith, *Business Groups Back Texas Water Ballot Measure*, TEX. TRIBUNE (Oct. 5, 2011), <http://www.texastribune.org/texas-environmental-news/water-supply/business-groups-back-texas-water-ballot-measure/>; Kate Galbraith, *Texas Lawmakers Prepare to Take on Water Projects*, TEX. TRIBUNE (Dec. 1, 2012), <http://www.texastribune.org/2012/12/21/texas-lawmakers-prepare-take-water-projects/>.

160. See TEX. COMPTROLLER OF PUB. ACCOUNTS, LIQUID ASSETS: THE STATE OF TEXAS' WATER RESOURCES 59–62 (2009), available at <http://www.window.state.tx.us/specialrpt/water/PDF/96-1360-LiquidAssets.pdf> (discussing a series of one-time state expenditures for bonds to finance water infrastructure projects and noting that the Legislature "has considered establishing a dedicated funding mechanism for water programs" since 1997, but that no such program currently exists). As of 2008, the TWDB had authority to issue nearly \$5 billion in general obligation bonds to fund a projected \$30.7 billion in need (as identified by the 2007 State Water Plan). *Id.* at 59. However, because the TWDB relies on the Legislature to fund debt service on issued bonds, only \$2.5 billion had been issued as of August 2008, with another \$110.7 million in debt service approved for fiscal years 2008 and 2009. *Id.*

161. See Forrester Wilder, *Everyone Supports the State Water Plan, So Now What?*, TEX. OBSERVER (Feb. 19, 2013), <http://www.texasobserver.org/everyone-supports-the-state-water-plan-so-now-what/>; Emily Mathis, *Texas House Advances Big-Dollar Water Fund Bill*, TEX. OBSERVER (Mar. 27, 2013), <http://www.texasobserver.org/texas-house-advances-big-dollar-water-fund-bill/>.

162. See White, *supra* note 86, at 86–87. Karst system hydrogeology bears similarities to surface water systems, which makes coordinated management of the groundwater and surface water in the system even more logical. See Bakalowicz, *supra* note 88, at 153; Peter W. Hantoon, *Is It Appropriate to Apply Porous Media Groundwater Circulation Models to Karstic Aquifers?*, in GROUNDWATER MODELS FOR RESOURCES ANALYSIS AND MANAGEMENT 350 (Aly I. El-Kadi ed., 1995).

163. See, e.g., Larry F. Land et al., *Hydrologic Connection of the Edwards Aquifer between San Marcos Springs and Barton Springs, Texas*, 60 GULF COAST ASS'N OF GEOLOGICAL SOCIETIES TRANSACTIONS 401 (2010).

different parts of the system.¹⁶⁴ Water managers relying on Edwards Aquifer water have recognized the potential benefits of conjunctive management and have begun to develop innovative conjunctive supply projects in the basin.¹⁶⁵

B. The Limits of Common Law Adjudication

Although Texas's rule of capture produces particularly harsh results, ultimately other common law doctrines also require statutory intervention to address modern management goals such as conjunctive management.¹⁶⁶ Texas provides an example of the ways in which courts have wrestled with the ignorant roots of groundwater common law. However, as demonstrated by California's experience, even when courts have recognized the effects of groundwater pumping on surface water resources, their institutional expertise does not encompass the development of a comprehensive management regime.¹⁶⁷ Common law also fails to provide adequate guidance for merging the divergent legal regimes governing groundwater and surface water, leading to uncertainty that undermines conjunctive management efforts.¹⁶⁸

1. Struggles With Science: The Day Court's Oil and Gas Analogy

By further reinforcing the unfortunate legal dichotomy between groundwater and surface water, the *Day* decision demonstrates the difficulties

164. Blomquist et al., *supra* note 71, at 654; *see also* Kaiser & Skillern, *supra* note 6, at 262 (identifying harms to "ecological resources," including river, spring, and wetland habitat, as an effect of groundwater pumping).

165. These include a 2004 project by the San Antonio Water System to store groundwater pumped from the Edwards in wet years (which would otherwise be discharged to surface springs) in the nearby Carrizo-Wilcox Aquifer. 2009 *Water Plan Update: Managing San Antonio's Water Resources*, SAN ANTONIO WATER SYSTEM, http://www.saws.org/Your_Water/WaterResources/2009wmp/source_management.cfm (last updated July 2010). As of August 2012, the project had more than 90,000 acre-feet in storage. Kelley Neumann, *ASR: A Tool in Drought Management*, Presentation to the 2012 Texas Alliance of Groundwater Districts Texas Groundwater Summit (Aug. 28–30, 2012), available at <http://www.slideshare.net/TXGroundwaterSummit/aquifer-storage-and-recovery-kelley-neumann>.

166. *See* Bittinger, *supra* note 82, at 37 (demonstrating that even if common law integrates surface water and groundwater rights, regulatory management is still required to achieve maximum beneficial use of the resource); Kaiser & Skillern, *supra* note 6, at 270 ("Experiences from other states indicate that one or a combination of these four [common law] allocation rules cannot resolve all groundwater problems. Instead, states . . . have adopted critical area legislation to supplement state allocation rules.").

167. *See* Joseph L. Sax, *We Don't Do Groundwater: A Morsel of California Legal History*, 6 U. DENV. WATER L. REV. 269, 305 (2003) (opining that the California Legislature "designed [1913 groundwater] legislation to create an impact test (impact of pumping on surface stream flows), and to extend the Board's jurisdiction to pumping that has an appreciable and direct impact upon a surface stream" and that "any such line drawing represents a policy judgment, not a technical one" because "any test intended to separate one part of the groundwater from another inescapably requires a judgment that reflects a purposive goal").

168. *See, e.g.,* Ella Foley-Gannon, *Institutional Arrangements for Conjunctive Water Management in California and Analysis of Legal Reform Alternatives*, 14 HASTINGS W.-NW. J. ENVTL L. & POL'Y 1105, 1117–21 (2008) (discussing potential implications of conjunctive use projects on common law groundwater rights, surface water rights, and other externalities, including flooding, loss of storage capacity, and degradation of water quality).

courts have incorporating increasingly sophisticated scientific knowledge into outdated common law frameworks. Despite the court's assertion that the differences between oil and gas and groundwater provide "no basis . . . to conclude that the common law allows ownership of oil and gas in place but not groundwater,"¹⁶⁹ the hydrologic connection between groundwater and surface water undermines the court's oil and gas analogy. While the court acknowledged that groundwater is recharged from surface sources,¹⁷⁰ it failed to discuss effects of groundwater pumping on surface water discharge,¹⁷¹ even though it recognized that the legislature had seen fit to address this issue by statute.¹⁷² Oil and water do share a transient nature, and may flow from under one landowner's land to another part of the reservoir through drainage. However, a single property law scheme governs oil and gas through all stages of development.¹⁷³ This feature of oil and gas law stands in stark contrast to water, which may flow from a stream or surface precipitation into the ground, and exit again as a surface spring, transitioning between distinct bodies of law at each step.¹⁷⁴ The artificial legal division of the water cycle serves as a significant barrier to "more unified and efficient" water management and has been "perceptively described . . . as 'a lawyer's paradise and a logician's nightmare.'"¹⁷⁵ However maligned this division, the court's failure to address it demonstrates the court's struggle with the scientific principles that should underlie water management.¹⁷⁶

The state's extensive experience with oil and gas regulation likely convinced the court that a similar common law foundation would not undermine groundwater regulation, providing the court with a legal scheme that

169. Edwards Aquifer Auth. v. Day, 369 S.W.3d 814, 831 (Tex. 2012).

170. *Id.* ("Unlike oil and gas, groundwater in an aquifer is often being replenished from the surface . . .").

171. The court did make a vague reference to "environmental impacts" of groundwater pumping, which it could have intended to reference surface discharge, but also characterized these impacts as "unrelated to use." *Id.*

172. *See id.* at 835. The court's failure to more thoroughly analyze hydrologic connections in the Edwards is particularly surprising in light of the court's opinion in *Barshop*, in which it acknowledged that "[t]he Edwards Aquifer is a unique underground system of water-bearing formations in Central Texas. Water enters the aquifer through the ground as surface water and rainfall and leaves the aquifer through well withdrawals and springflow." *Barshop v. Medina Cnty. Underground Water Conservation Dist.*, 925 S.W.2d 618, 623 (Tex. 1996).

173. *See* Robert E. Hardwicke, *The Rule of Capture and Its Implications As Applied to Oil and Gas*, 13 TEX. L. REV. 391, 395 (1935).

174. *See, e.g.*, A. DAN TARLOCK, LAW OF WATER RIGHTS AND RESOURCES § 2:4 (2012) (discussing the relationship between the hydrologic cycle and water law).

175. Templer, *supra* note 5, at 30, 36–37 (quoting H.E. THOMAS, WATER RIGHTS IN AREAS OF GROUND-WATER MINING, U.S. GEOLOGICAL SURVEY, CIRCULAR NO. 347 (1955)); *see also* Rossmann & Steel, *supra* note 21, at 905.

176. Andrew Sansom, the executive director of the River Systems Institute at Texas State University and former director of the Texas Parks and Wildlife Department, has suggested that the "irreconcilable disconnect" between hydrology and the court's oil and gas analogy may force the state Legislature to overhaul the state's water management laws in light of the *Day* decision. *See* Buchele, *supra* note 7.

protected landowners' property rights while giving the state room to develop the regulatory regime for which Justice Hecht has long advocated.¹⁷⁷ Indeed, commentators have suggested that oil and gas regulation could provide some foundation for groundwater regulation.¹⁷⁸ However, the necessary coherent legal basis for managing interacting groundwater and surface water is absent from this scheme, demonstrating that the court failed to appreciate the significance of scientific differences between oil and water.¹⁷⁹ The failure to adequately grapple with water science and the consequent flaws with the court's oil and gas analogy demonstrate the difficulties courts face when confronted with deeply ingrained common law rules that do not reflect scientific reality.

Even if the court had attempted a more sophisticated scientific analysis, however, its lack of institutional competence would limit its effectiveness.¹⁸⁰ Policy decisions regarding how much water should be used from Texas's variety of water sources are so closely linked to scientific information; thus, scientific expertise is a necessary component of competent management. Although courts can appoint watermasters to administer decisions¹⁸¹ and consider scientific testimony from party experts, these avenues are inadequate from a management perspective because they do not develop expertise within a standing institutional body.¹⁸² Adequate scientific information about resource conditions is particularly important in highly complex ecosystems like the Edwards that serve large populations, where multiple institutions need to cooperate.¹⁸³ The Edwards and Ogallala Aquifers demonstrate the significant

177. See *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 82 (Tex. 1998) (Hecht, J., concurring) ("The extensive regulation of oil and gas production proves that effective regulation of migrant substances far below the surface is not only possible but necessary and effective."). Justice Hecht also authored the *Day* opinion. *Day*, 369 S.W.3d 814 (Tex. 2012).

178. See, e.g., Robert A. McCleskey, Comment, *Maybe Oil and Water Should Mix—At Least in Texas Law: An Analysis of Current Problems with Texas Ground Water Law and How Established Oil and Gas Law Could Provide Appropriate Solutions*, 1 TEX. WESLEYAN L. REV. 207 (1994).

179. See, e.g., Templer, *supra* note 5, at 41; Opiela, *supra* note 15, at 102–03 n.102; Young & Bredehoeft, *supra* note 136, at 538–39.

180. A thorough analysis of the problems arising from judicial consideration of scientific information is beyond the scope of this Note. Groundwater management is but one instance in which the issue arises. See, e.g., KENNETH R. FOSTER & PETER W. HUBER, *JUDGING SCIENCE: SCIENTIFIC KNOWLEDGE AND THE FEDERAL COURTS* (1997).

181. Although watermasters monitor water use and stream flows, they are generally considered administrative enforcers rather than hydrologists. See, e.g., *Watermasters*, TEX. COMM'N ON ENV'T'L QUALITY, http://www.tceq.texas.gov/permitting/water_rights/wmaster/wmaster.html#about (last updated Feb. 8, 2013).

182. See, e.g., Charles J. Taylor & William M. Alley, U.S. GEOLOGICAL SURVEY, CIRCULAR 1217, *GROUND-WATER-LEVEL MONITORING AND THE IMPORTANCE OF LONG-TERM WATER-LEVEL DATA* 16 (2001) ("Long-term data are fundamental to the resolution of many of the most complex problems dealing with ground-water availability and stability.") (internal citations omitted).

183. See Tanya Heikkila & Andrea K. Gerlak, *The Formation of Large-Scale Collaborative Resource Management Institutions: Clarifying the Roles of Stakeholders, Science, and Institutions*, 33 POL'Y STUD. J. 583, 585 (2005) (explaining that better information about a particular resource can

hydrogeological variability that would make fashioning a scientifically rigorous general rule difficult for a court.¹⁸⁴ The Edwards Aquifer is a high-recharge, fast-flowing aquifer that can be consistently pumped in limited amounts without reducing future supplies, but heavy use can harm hydrologically connected surface water sources.¹⁸⁵ In contrast, the fossilized groundwater in the West Texas Ogallala Aquifer generally recharges very little, meaning that current drawdown is limiting future use, but has less interaction with surface water.¹⁸⁶ The ongoing management needs of these two basins are highly context-dependent and require local, institutional expertise. Judicial decisions cannot be expected to generate the scientific foundation required for these policy decisions.¹⁸⁷

2. *Struggles With Efficiency: The California Experience*

In contrast with the Texas courts, California courts have been attempting to integrate groundwater and surface water rights since 1904.¹⁸⁸ The California Legislature also recognized the connection between groundwater and surface water in 1913, when it drafted the precursor to the state's current governing

increase the likelihood that cooperative institutional arrangements will form to manage common pool resources).

184. Compare descriptions of hydrogeological conditions in the High Plains Ogallala Aquifer, located in West Texas, Scanlon et al., *supra* note 91, at 3–4, and the Edwards Aquifer, MACLAY, *supra* note 84, at 2.

185. See *supra* notes 84–91 and accompanying text.

186. See Scanlon et al., *supra* note 91, at 3–4. The Ogallala does have some interaction with surface water sources, including the Cimarron and Canadian Rivers as well as various creeks. See ALAN R. DUTTON, ROBERT C. REEDY & ROBERT E. MACE, SATURATED THICKNESS IN THE OGALLALA AQUIFER IN THE PANHANDLE WATER PLANNING AREA—SIMULATION OF 2000 THROUGH 2050 WITHDRAWAL PROJECTIONS 28 (2001), available at http://www.twdb.state.tx.us/publications/reports/contracted_reports/doc/2001483392.pdf. However, surface recharge and discharge are both significantly less than in the Edwards system. Compare *id.* at 17 (Ogallala recharge estimates range between 0.01 and six inches per year), and DUTTON ET AL., *supra*, at 20 (the Ogallala provides baseflow in the 30 to 60 cubic feet per second (cfs) range to four surface water sources), with MACLAY, *supra* note 84, at 39 (Edwards surface recharge averaged 635,500 acre-feet per year between 1934 and 1988), and MACLAY, *supra* note 84, at 45 (the Edwards provides baseflow in the 100 to 500 cfs range to multiple springs).

187. The Texas Supreme Court has recognized its own institutional limitations in the groundwater context. See *Friendswood Dev. Co. v. Smith-Sw. Indus.*, 576 S.W.2d 21, 30 (Tex. 1978) (“It is well that the Legislature has assumed its proper role, because our courts are not equipped to regulate ground water uses and subsidence on a suit-by-suit basis.”). But see *Sipriano v. Great Spring Waters of Am., Inc.*, 1 S.W.3d 75, 83 (Tex. 1998) (Hecht, J., concurring) (arguing that “the Court entered the area of water regulation in *East* when it adopted the rule of capture” and that “[i]t is hard to see how maintaining the rule of capture can be justified as deference to the Legislature’s constitutional province when the rule is contrary to the local regulation that is the Legislature’s preferred method of groundwater management”).

188. See *Cohen v. La Canada Land & Water Co.*, 76 P. 47, 48–49 (Cal. 1904) (protecting a surface right holder from harm caused by pumping of tributary groundwater); Sax, *supra* note 167, at 313–15 (discussing the *Cohen* case and arguing that “it may be that the determination of the California Supreme Court to integrate groundwater and surface water rights in litigation explains, at least in part, how California law has been able to endure the ‘non-administration’ of groundwater . . . for so many decades”).

statute.¹⁸⁹ However, the legislature ultimately decided to regulate only surface water, retaining artificial legal divisions that its supreme court had been attempting to discard.¹⁹⁰ Commentators have since continued to criticize the state for failing to “bring its water law into line with contemporary knowledge.”¹⁹¹

Although California follows a progressive common law doctrine that allows courts to protect all landowners in individual adjudications,¹⁹² its lack of comprehensive management legislation makes groundwater management in the state piecemeal and inefficient.¹⁹³ California and Texas are often lumped together by commentators because neither state has a statewide permitting system,¹⁹⁴ especially in comparison to states like New Mexico that have centralized state officers who oversee groundwater management.¹⁹⁵ However, a closer look reveals significant differences. California follows its own common law doctrine, known as correlative rights, which provides each landowner overlying an aquifer equal rights to reasonable and beneficial use of the water that is reduced pro rata if shortage occurs.¹⁹⁶ California’s correlative rights doctrine provides a common law enforcement mechanism against unrestrained pumping by any one individual, which, unlike the rule of capture, supplies a judicial remedy against the worst offenders.¹⁹⁷ However, this

189. Sax, *supra* note 167, at 291.

190. *Id.* at 282–83, 297. Interestingly, Professor Sax argues that concern about the constitutionality of restricting groundwater pumping may have been at the heart of the California Legislature’s decision to abandon groundwater permitting in the 1913 legislation. *Id.* at 293–97.

191. *Id.* at 270; *see also id.* at 300–04 (noting that “[a]lmost as soon as the [1913] Water Commission law was enacted, proposals emerged to revise it and create an integrated management system for surface and groundwater” and describing subsequent criticisms and attempts to reform the law); M. RHEAD ENION, *UNDER WATER: MONITORING AND REGULATING GROUNDWATER IN CALIFORNIA* 14–17 (2011), available at http://cdn.law.ucla.edu/SiteCollectionDocuments/Centers%20and%20Programs/Emmett%20Center%20on%20Climate%20Change%20and%20the%20Environment/Pritzker_01_Under_Water.pdf.

192. *See supra* notes 23–24 and accompanying text.

193. *See, e.g.*, BULLETIN 118, *supra* note 135, at 33–34 (noting that more than twenty types of local agencies have statutory authority to deliver water, “[m]any” of which can also “institute some form of groundwater management,” and that “[g]reater authority to manage groundwater has been granted to a small number of agencies or districts created through special acts of the Legislature” with varying types and levels of authority).

194. *See, e.g.*, Smith, *supra* note 64, at 261.

195. *See* Smith, *supra* note 9, at 684 (describing the New Mexico state engineer’s role in groundwater management).

196. Rossmann & Steel, *supra* note 21, at 908. However, California courts do take historical use into account during groundwater adjudications, reasoning that equity requires consideration of historical use if these uses are not unreasonable. *City of Barstow v. Mojave Water Agency*, 23 Cal. 4th 1224, 1250–51 (2000). All water in California is owned by the state, so groundwater rights are usufructuary only. *See id.* at 1240.

197. *See* Sax, *supra* note 167, at 282 (“*Katz* essentially determined the resolution of conflict between contending water users should be based upon the impact of one use upon another, rather than upon some ex-ante classification of the source.”).

mechanism is inadequate to support comprehensive management.¹⁹⁸

California's adjudication-based strategy¹⁹⁹ undermines conjunctive management in a variety of ways. It limits management authority for stressed basins prior to adjudication,²⁰⁰ which causes unnecessary degradation of groundwater basins.²⁰¹ A near-complete reliance²⁰² on adjudication also increases transaction costs for would-be project developers.²⁰³ Significant inefficiency and unclear rights based on confusing case law²⁰⁴ disincentivize project development.²⁰⁵ Further, adjudication limits the scope of decision making to an individual controversy. Because each suit focuses on the particular parties at hand, the system fails to provide a central clearinghouse for information sharing among water managers,²⁰⁶ a critical component of an

198. Rossmann & Steel, *supra* note 21, at 914 (noting that water regulation “can result in control superior to that achieved through piecemeal adjudication of individual rights,” and that “[n]either the courts nor the State Board . . . has addressed groundwater management in terms of the entire state”); Foley-Gannon, *supra* note 168, at 1149–52 (concluding that it is “possible” for California water agencies to develop conjunctive use projects by relying on contracts, but suggesting numerous legal reforms).

199. For a description of California's groundwater adjudication process, see Foley-Gannon, *supra* note 168, at 1126–31.

200. Deborah A. de Lambert, Note, *District Management for California's Groundwater*, 11 *ECOLOGY L.Q.* 373, 387 (1984) (noting that the “general rule in California” has been that “[u]sers pump without restraint until overdraft occurs and then resort to the courts for allocation of an insufficient resource” because “until overdraft begins there is little else that can be done because there are generally no entities with pre-litigation management authority”).

201. Foley-Gannon, *supra* note 168, at 1131.

202. Although local agencies in California can develop groundwater management plans, their administrative authority is quite limited and many plans have never been implemented. See BULLETIN 118, *supra* note 135, at 35, 44. As of 2003, twenty-seven counties had passed local groundwater management ordinances under their police power, largely in reaction to groundwater export proposals. *Id.* at 36–39. Groundwater mining is rarely addressed. See *id.* at 39. This leaves adjudications as “one of the strongest forms of groundwater management in California.” *Id.* at 40.

203. Smith, *supra* note 64, at 266 (“[I]n some cases, notably California, the transaction costs of stable management . . . have been great and hence these situations cannot be recommended.”).

204. TAYLOR, *supra* note 138, at 20 (identifying the fact that “[g]roundwater use and rights [are] unclear, leading to distribution and management issues” as a groundwater management problem).

205. Blomquist et al., *supra* note 71, at 668 (noting that “California's groundwater governance can hamper conjunctive management programs” because “overlying landowners and appropriators have insufficient assurance that the water they place in storage will be available for later pumping and delivery” and that the increased transaction costs imposed by California's lack of statutory governance “help to explain why conjunctive management has not been implemented in many actively used groundwater basins, even where it would be physically feasible and arguably desirable”).

206. TAYLOR, *supra* note 138, at 16, 20–21 (noting that “the state's water planning efforts are impeded by weaknesses in the statewide management of groundwater,” such as data collection, and that “[t]he state needs, but now lacks, comprehensive data on groundwater extraction, groundwater levels, and groundwater quality”); REBECCA NELSON, UNCOMMON INNOVATION: DEVELOPMENTS IN GROUNDWATER MANAGEMENT PLANNING IN CALIFORNIA 10 (2011), available at <http://www.stanford.edu/group/waterinthewest/cgi-bin/web/sites/default/files/RNelson%20Water%20Paper.pdf> (noting that although some groundwater managers in California are pursuing innovative projects and management strategies, “few know about them” because “there is no comprehensive State-wide database” of management plans, and “information barriers sometimes prevent even neighboring agencies from finding out about planning activities”).

effective conjunctive use program.²⁰⁷ Although California was initially a conjunctive-management pioneer,²⁰⁸ these flaws have blunted its progress.

California state officials have long recognized the need for a more robust management approach,²⁰⁹ but the legislature thus far has been unable or unwilling to pass the required legislation.²¹⁰ A lack of coordinated authority renders existing groundwater planning legislation inadequate and ineffectual.²¹¹ However, the state recently passed a legislative package to improve groundwater monitoring,²¹² which many see as a positive (if limited) step toward more cohesive management.²¹³ Special districts may also have the power to regulate groundwater at the local level,²¹⁴ and many of these districts have developed innovative management strategies and projects.²¹⁵ However, California's groundwater administration remains far behind other states.²¹⁶

C. Benefits of a Management Doctrine

A regulatory management system allows for needed innovation and

207. See McClurg & Sudman, *supra* note 136, at 277.

208. Sahuquillo & Lluria, *supra* note 139, at 167.

209. See generally GOVERNOR'S COMM'N TO REVIEW CALIFORNIA WATER RIGHTS LAW, FINAL REPORT (1978) (concluding that California's water is inadequately protected by law); see also TAYLOR, *supra* note 138, at 3 (recommending that the state "[e]stablish Active Management Areas . . . in circumstances where groundwater overdraft potential or the extent of pollution problems are the highest," "modernize groundwater law to accurately reflect the physical interconnection of surface water and groundwater," and "[c]onsider phasing in statewide groundwater permitting").

210. See Rossmann & Steel, *supra* note 21, at 928–29; Smith, *supra* note 9, at 687; Sax, *supra* note 188, at 302–04. This is not to suggest that the state legislature has done nothing to address conjunctive management. For example, California has passed legislation to encourage conjunctive management by protecting existing surface water rights from forfeiture if certain groundwater sources are used to reduce reliance on surface supplies. See CAL. WATER CODE § 1011.5 (West 2012). However, political opposition to more cohesive regulation is often fierce, especially from the state's powerful agriculture industry. See John Hedges, *Currents in California Water Law: The Push to Integrate Groundwater and Surface Water Management through the Courts*, 14 U. DENV. WATER L. REV. 375, 390–91 (2010) (describing the agriculture industry's opposition to groundwater monitoring legislation).

211. TAYLOR, *supra* note 138, at 16 (noting that voluntary groundwater management plans "generally have not been used in state water planning" and "have largely . . . been of little practical use to the department"); BULLETIN 118, *supra* note 135, at 48 (listing "impediments to conjunctive management programs in California," including "[l]ack of statewide leadership in the planning and development of conjunctive use programs as part of comprehensive water resources plans, which recognize local, regional, and other stakeholders' interests").

212. 2009 Cal. Stat. Ch. 1.

213. See, e.g., ENION, *supra* note 191, at 14 (noting that California's passage of SBx7-6 "represents a good first step towards monitoring groundwater, but it is not nearly enough").

214. See GARY BRYNER & ELIZABETH PURCELL, GROUNDWATER LAW SOURCEBOOK OF THE WESTERN UNITED STATES 15–16, 18–19 (2003), available at <http://www.cacoastkeeper.org/document/groundwater-law-sourcebook-of-the-western-united-states.pdf>. For a thorough description of existing statutory and regulatory authority over groundwater in California, see Foley-Gannon, *supra* note 168, at 1131–42.

215. See NELSON, *supra* note 206, at 25–30; McClurg & Sudman, *supra* note 136, at 276–77; BULLETIN 118, *supra* note 135, at 35–44. The State Department of Water Resources has also developed a program by which it offers technical and financial assistance to local authorities. See *id.* at 72–73.

216. See TAYLOR, *supra* note 138, at 16, 20–21.

flexibility while retaining the benefits of consistency.²¹⁷ Management systems can better conserve and protect groundwater resources by capping withdrawals,²¹⁸ while supporting economic efficiency by developing a market for pumping permits²¹⁹ and internalizing costs.²²⁰ Regulation can also help lower costs and address scarcity by providing demand-side alternatives to expensive engineering solutions.²²¹ Legislation may also allow management to better reflect hydrologic conditions by, for example, requiring more stringent management in areas facing particularly acute depletion risk.²²² Technical competence is perhaps the most critical benefit, as a regulatory agency is more likely than a court to have the technical ability to determine the effect one water user is likely to have on others.²²³ Thus, even in a decentralized system, technical complexity produces an “unavoidable need to have a supra-individual authority dictating, or at least sanctioning” significant management decisions²²⁴ and collecting information about water use throughout the basin,²²⁵ which can incur political opposition.²²⁶ However, comprehensive management systems ultimately provide the most likely avenue for achieving robust conjunctive management.²²⁷

Judicial review remains a check on agency permitting decisions under a management doctrine, although courts tend to defer to agencies where technically complex decisions are made by a centralized regulatory

217. See S. Burchi & M. Nanni, *How Groundwater Ownership and Rights Influence Groundwater Intensive Use Management*, in INTENSIVE USE OF GROUNDWATER: CHALLENGES AND OPPORTUNITIES 239 (Ramón Llamas & Emilio Custodio eds., 2003) (“Regulated rights in groundwater provide the regulator with the flexibility needed to adjust allocation patterns to changing circumstances, to restrain the mining of groundwater and to practise conjunctive use of surface and underground water, without detracting from the security of tenure which is desirable for investment decisions.”).

218. See Young & Bredehoeft, *supra* note 136, at 536–37 (noting that “[t]he traditional remedy” for “detrimental external effects” caused by “intensive unregulated exploitation” of groundwater in the West has been “to try to develop additional water supplies by new investments in storage and conveyance facilities,” but “because of increasing scarcity of water, the traditional large-scale intrabasin and interbasin transfer schemes are becoming increasingly expensive, and institutional changes for management and allocation must be developed,” such as “basin authority”).

219. A. Garrido & M.L. Livingston, *Economic and Financial Perspectives on Intensive Groundwater Use*, in INTENSIVE USE OF GROUNDWATER: CHALLENGES AND OPPORTUNITIES 216 (Ramón Llamas & Emilio Custodio eds., 2003).

220. See Young & Bredehoeft, *supra* note 136, at 550–51.

221. See Sahuquillo & Lluria, *supra* note 139, at 172.

222. See Burchi & Nanni, *supra* note 217, at 233.

223. See Charles Howe, *Water Markets in Colorado: Past Performance and Needed Changes*, 15 NATURAL RESOURCE MGMT. & POL’Y 65, 66 (1998).

224. Garrido & M.L. Livingston, *supra* note 219, at 217.

225. Burchi & Nanni, *supra* note 217, at 232; see also Clark, *supra* note 64, at 480–81.

226. See, e.g., Young & Bredehoeft, *supra* note 136, at 536 (“There is strong resistance to regulatory innovation when free access has become an established tradition and when economic surplus is captured by common property resource users and becomes capitalized into land values.”).

227. See, e.g., Sax, *supra* note 167, at 317.

authority.²²⁸ As common law has failed to mitigate aquifer mining in high-use areas, western states have consistently moved away from reliance on common law and toward legislatively adopted regulatory management schemes.²²⁹ As increasing demand on the West's water systems and advancing scientific knowledge put additional pressure on courts to resolve complex groundwater management problems, legislatures will need to fill the gaps left by common law.²³⁰

D. Addressing Political Opposition to Regulation

Political opposition is arguably the most significant barrier to water management reform,²³¹ as demonstrated by California's experience. The need for a centralized authority to address the technical and consistency requirements of a functioning management doctrine²³² stands in tension with the benefits of decentralized decision making, particularly higher levels of political legitimacy and the resulting reduction in enforcement problems.²³³ Participation encourages adherence because it helps educate stakeholders about the problems arising from groundwater mining and empowers them as decision makers.²³⁴ Technical competence may have positive effects on politics as well as management outcomes, because competent groundwater management may actually result in higher net farm income, and agricultural interests are most often opposed to groundwater regulation.²³⁵ Competent management and consistent decision making may even enable more centralized management

228. See Howe, *supra* note 223, at 66 (noting that in Utah and New Mexico, which have centralized permitting through the state engineer, courts almost always accept the engineer's conclusions regarding potential adverse effects on other water users).

229. See, e.g., WILLIAM GOLDFARB, *WATER LAW* 46 (2d ed. 1988); Clark, *supra* note 64, at 481 ("In practically all of the other western states, there is a recognition in legislation and court decisions that there must be a management framework in the law which will enable the market mechanism to work effectively for all classes of users.").

230. See Clark, *supra* note 64, at 484 ("It is clear that legislation plays a major role in ground water management and without legislation there is no adequate ground water management. Good management and the law are what make the market mechanism work. In the semi-arid West supply and demand in relation to water have never operated effectively without a framework of public control as is attested by the 90-year history of the permit system applied to *surface* water management, even though these systems are in need of improvement and expansion to include ground waters.").

231. See Aiken, *supra* note 144, at 344 ("The primary obstacle to [reforms of western water law] is not the absence of legal models to obtain reform objectives, but social, economic, and political objections to those objectives."); Sax, *supra* note 188, at 303 (quoting a 1962 California Assembly Interim Committee report noting robust political opposition to centralized management).

232. See *supra* note 224.

233. Burchi & Nanni, *supra* note 217, at 228.

234. See *id.* at 235–36.

235. See Aiken, *supra* note 144, at 334; Stephen E. Snyder, Comment, *Ground Water Management: A Proposal for Texas*, 51 TEX. L. REV. 289, 298 (1973) (West Texans oppose groundwater regulation "because they fear that production controls would reduce their economic return.").

systems to overcome political opposition.²³⁶ However, self-determination may justify less-centralized management, since different communities may have very different values regarding the importance of groundwater use in the short term versus long-range conservation.²³⁷ Regional governance of groundwater is also technically desirable, because hydrogeology varies dramatically, particularly within large states like Texas and California.²³⁸

Nonetheless, decentralization can be risky if the authorizing legislation does not provide a strong enough conservation mandate.²³⁹ Most significantly, regionalism is subject to capture by powerful local interests that may undermine needed pumping controls.²⁴⁰ By allowing GCDs to permit significant overdraft through their adoption of locally determined DFCs, Texas's system remains vulnerable to this problem, although the updated modeled available groundwater process should ameliorate its worst effects.²⁴¹ Although underenforcement and capture will remain potential pitfalls of decentralized management, district-level management systems have the potential to work well if districts have adequate statutory authority and resources.²⁴²

E. Texas's Path Forward

Although Texas remains beset by an inflexible and outdated common law doctrine and a delayed start to developing a robust statutory framework for groundwater regulation, it has also recently taken significant steps to improve its statutory management scheme.²⁴³ In their current form, GCDs are instructed to base permits on groundwater withdrawal caps determined through the regulatory process,²⁴⁴ although *Day* made clear that they must consider the

236. See Smith, *supra* note 9, at 685–86 (noting that a survey of New Mexico groundwater stakeholders, including major agricultural and mining interests, found “unanimous” support for the state’s centralized permitting system “because of the uniformity and consistency such administration provided,” but that “most respondents qualified their preference for centralized administration by indicating their preference could change quickly when [State Engineer Steve] Reynolds leaves office”).

237. See, e.g., Burke W. Griggs, *Does Groundwater Management Work?*, 15 KAN. J.L. & PUB. POL’Y 391, 402–03 (2006).

238. See *supra* note 76; Smith, *supra* note 64, at 268 (noting that centralized permit systems can be “dysfunctional” if they are missing “the flexibility to take into consideration changing geological and social conditions” and “local stakeholder input”).

239. See Burchi & Nanni, *supra* note 217, at 229 (noting that, as of 2001, most of Texas’s GCDs “have deferred to the rule of capture and have not imposed mandatory restrictions on the affected landowners’ rights to pump and on the amount of water extracted. Most have opted, as a result, for voluntary self-restrain and educational programmes”).

240. *Id.*

241. See *supra* notes 57–64 and accompanying text. Statutory requirements to conserve and protect groundwater resources also restrain this behavior to a certain extent. See TEXAS WATER CODE ANN. § 36.108(d)(2) (West 2012).

242. Smith, *supra* note 64, at 268.

243. See Russell S. Johnson, *Groundwater Law and Regulation*, in *ESSENTIALS OF TEXAS WATER RESOURCES* 115–19 (Mary K. Sahs ed., 2009).

244. See *supra* notes 57–60 and accompanying text.

totality of the circumstances beyond mere historical use in making these decisions.²⁴⁵ Although decentralized aquifer management allows local interests hostile to groundwater conservation to promote more aggressive pumping,²⁴⁶ local managers have a consistent source of statutory authority. Furthermore, the legislature has acted to address conjunctive use and the effect of groundwater pumping on surface water right holders through legislation.²⁴⁷ Current efforts to promote conjunctive use still lack specificity and, because the system is so new, their enforcement has yet to be thoroughly tested. However, Texas is making progress that will hopefully continue as the DFC process begins to bear fruit.

CONCLUSION

By embracing ownership in place and reinforcing its outdated rule of capture common-law system, the *Day* court failed to advance Texas's common law to reflect modern groundwater science. Greater understanding of groundwater-surface water connections has driven ongoing criticism of the fragmented, disparate legal systems that govern groundwater and surface water. However, common law need not serve as a barrier to a robust regulatory framework that provides managers with the tools to address modern management challenges like conjunctive use. Although Texas's regulatory framework has weaknesses, most significantly vulnerability to local capture, it has improved considerably in recent years, both through strengthened statutory mandates to control groundwater pumping and increasing recognition of groundwater-surface water connections.

The rule of capture has been rightly criticized, but its obstinacy is not determinative of Texas's ultimate ability regulate its groundwater successfully. Rather, it will be the extent to which the state embraces a cohesive statutory framework that grants water managers adequate regulatory authority to limit groundwater pumping and promote more sophisticated management strategies like conjunctive management. Despite the problems with its decision, by endorsing the state's efforts to regulate groundwater, the *Day* court affirmed the state's ability to address these challenges through regulation.

245. See *supra* notes 123–28 and accompanying text.

246. See, e.g., Forrest Wilder, *The End of the Hill Country*, TEX. OBSERVER (July 20, 2010), <http://www.texasobserver.org/the-end-of-the-hill-country/>.

247. See *supra* notes 65–71 and accompanying text.

