

ENTRUSTING GROUNDWATER

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Groundwater is a precious—and all too often scarce or polluted—resource. As groundwater withdrawals continue apace, challenges have emerged around groundwater quality and quantity. In the past several years, courts and legislatures have increasingly been called on to resolve disputes involving groundwater.

One recourse is the public trust doctrine—the principle that certain natural resources are held in trust by the state for the benefit of the public. But is groundwater a public trust asset? Should it be? And what does a groundwater trust look like?

This Article seeks to answer these questions, exploring the relationship between groundwater and the public trust doctrine. It makes three contributions: (1) a catalog of the recent state-level debates over whether groundwater is a public trust asset; (2) a normative case for why groundwater should be a public trust asset; and (3) an articulation of how to entrust groundwater.

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Facing our current reality, it's time to update groundwater management tools and protect groundwater supplies – particularly in our rural communities. We must take these actions today because in many parts of our state, there are effectively no restrictions on groundwater pumping and local communities have little-to-no support to manage water supplies. As a result, a new water user can move in, dig a well, and pump as much water as possible – even if it dries up the community's aquifer.

—Arizona Governor Katie Hobbs, January 9, 2023¹

INTRODUCTION

In March 2022, Michigan lawmakers introduced a bill aimed at protecting and preserving groundwater.² This bill is nothing new in itself;

1. Katie Hobbs, Ariz. Governor, Arizona State of the State Address (Jan. 9, 2023), <https://azgovernor.gov/office-arizona-governor/news/2023/01/transcript-governor-hobbs-2023-state-state-address> [<https://perma.cc/9WFW-WBBY>].

2. See Shay Elbaum, *Michigan's Groundwater and the Public Trust Doctrine*, MICH. BAR J., June 2022, at 40, 40; see also Sarah Cwiek, *House Democrats Introduce Bills To Protect Michigan Groundwater*, MICH. PUB. (Mar. 21, 2022, 2:44 PM), <https://www.michiganpublic.org/environment-climate-change/2022-03-21/house-democrats-introduce-bills-to-protect-michigan-groundwater> [<https://perma.cc/FDB6-KZ7L>].

nearly every state has some form of legislation dealing with the extraction and use of groundwater.³

But the particular means by which Michigan lawmakers sought to protect groundwater is novel. The bill declares that “[t]he waters of this state, including groundwater, are held in the public trust by this state. The public trust in the waters of this state applies to the quantity and quality of the water.”⁴ The bill casts the public trust doctrine—the ancient, often common law doctrine that protects certain natural resources for the benefit of the public⁵—as groundwater’s savior. More than just a declaratory statement, the bill also instructs several state agencies to “review” the rules they administer and “ascertain whether the rules sufficiently ensure the protection of the public trust in the waters of this state.”⁶ If not, the agency “shall promulgate new or revised rules.”⁷

Like previously introduced groundwater bills in Michigan’s Legislature, this bill went nowhere, not even garnering a committee vote.⁸ Perhaps that result was foreseeable; Republican control of the Michigan House and Senate in 2022 stymied environmental legislation.⁹ And the bill itself faced stiff opposition; opponents published pieces with hyperbolic titles like: “Bill would restrict property owners from using their own water.”¹⁰

The bill raises important questions about the intersection of groundwater protection and the public trust doctrine. Michigan, after all, is not the only state interested in connecting its public trust doctrine with groundwater; a growing number of states and localities have explored

3. See Jack Tuholske, *Trusting the Public Trust: Application of the Public Trust Doctrine to Groundwater Resources*, 9 VT. J. ENV’T L. 189, 211 (2008) (noting that “every state has some type of regulatory overlay applicable to groundwater”).

4. H.R. 5953, 101st Leg., Reg. Sess. (Mich. 2022).

5. See generally Joseph L. Sax, *The Public Trust Doctrine in Natural Resources Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970).

6. H.R. 5953, 101st Leg., Reg. Sess. (Mich. 2022).

7. *Id.*

8. See Elbaum, *supra* note 2, at 41 (“Similar bills have been introduced in past sessions without success.”); see also *House Bill 5953 of 2022*, MICH. LEGISLATURE, <https://www.legislature.mi.gov/Bills/Bill?ObjectName=2022-HB-5953> [<https://perma.cc/9NXH-5U48>].

9. See, e.g., Kelly House, *Michigan Democrats Aim To Tighten Environmental Regs, Reduce Industry Control*, BRIDGE MICH. (Jan. 24, 2023), <https://www.bridgemi.com/michigan-environment-watch/michigan-democrats-aim-tighten-environment-regs-reduce-industry-control> [<https://perma.cc/5N54-84ZP>].

10. Jamie A. Hope, *Bill Would Restrict Property Owners from Using Their Own Water*, MICH. CAPITOL CONFIDENTIAL (Sept. 15, 2022), <https://www.michigancapitolconfidential.com/news/bill-would-restrict-property-owners-from-using-their-own-water> [<https://perma.cc/LU7M-256T>].

protecting groundwater in this way.¹¹ And, accordingly, a growing body of judicial precedent has answered—sometimes in the affirmative, sometimes in the negative—whether groundwater is a public trust asset.¹²

Unanswered, however, is *how* the doctrine would protect groundwater. Is groundwater like any other asset of the public trust doctrine? Should it be? What does a groundwater trust look like?

These questions arise at the confluence of two interrelated trends. First is the increasing turn toward the public trust doctrine to respond to new environmental threats. The public trust doctrine is an old one, but it has lately been learning new tricks, appearing in a wave of climate change lawsuits brought by children,¹³ state climate-deception lawsuits,¹⁴ and recent toxic tort cases, including litigation concerning per- and polyfluoroalkyl substances (PFAS)¹⁵ and methyl tert-butyl ether

11. For example, Vermont passed legislation in 2008 that declared groundwater a public trust resource. *See* S. 304, 2007–08 Gen. Assemb., Reg. Sess. (Vt. 2008); *see also* *Declaring Groundwater as a Public Trust*, VT. NAT. RES. COUNCIL, <https://vnrc.org/groundwater/> [<https://perma.cc/B3UK-LSKY>]. In 2019, a Maine bill proposed convening a working group to authorize a public trust for groundwater. *See* H.R. 160, 129th Legis., 1st Reg. Sess. (Me. 2019). A 2022 proposed ordinance in Sonoma County, California, defines certain wells as requiring “a public trust review.” *See* Press Release, Permit Sonoma, Permit Sonoma Announces New Revisions to Draft Well Permit Ordinance (Sept. 9, 2022), <https://permitsonoma.org/permitsonoma-announcesnewrevisionstodraftwellpermitordinance>. [<https://perma.cc/HF5C-CENK>]

12. *See, e.g., Env’t Law Found. v. State Water Res. Control Bd.*, 237 Cal. Rptr. 3d 393, 399–408 (Cal. Ct. App. 2018) (holding that the public trust applies to groundwater extractions that impact navigable waterways); *Mineral County v. Lyon County*, 473 P.3d 418, 421–22 (Nev. 2020) (holding that the public trust doctrine covers all state waters, including groundwater); *White Bear Lake Restoration Ass’n ex rel. State v. Minn. Dep’t of Nat. Res.*, 946 N.W.2d 373, 386–87 (Minn. 2020) (declining to extend the public trust doctrine to groundwater).

13. *See* *State Legal Actions*, OUR CHILD.’S TR., <https://www.ourchildrenstrust.org/state-legal-actions> (last visited Oct. 12, 2024) (“Our Children’s Trust has launched youth-led climate lawsuits and legal actions in all 50 states over the past decade.”).

14. *See, e.g.,* Complaint at 135–38, *State v. Chevron Corp.*, No. PC-2018-4716 (R.I. Super. Ct. July 2, 2018) (Count VII alleges “Impairment of Public Trust Resources”); Complaint at 167–69, *Platkin v. Exxon Mobil Corp.*, MER-L-001797-22 (N.J. Super. Ct. Oct. 18, 2022) (Count III alleges “Impairment of the Public Trust”).

15. *See, e.g., N.J. Dep’t of Env’t Prot. v. E.I. du Pont de Nemours & Co.*, Nos. 19-14766, 19-14767, 2021 WL 6144081, at *4, *9 (D.N.J. Dec. 30, 2021) (agreeing with the State’s argument in a PFAS contamination case that New Jersey’s failure to warn claim “stem[s] from its role as *parens patriae* and as trustee of New Jersey’s environment and natural resources”); *State ex. rel. Stein v. EIDP, Inc.*, No. 20-CVS-5612, 2023 WL 2326101, at *6 (N.C. Super. Ct. Mar. 2, 2023) (finding in a PFAS contamination suit that “[a]s trustee of North Carolina’s lands and waters, both public and private, the State ha[d] brought a suit that it alone [was] entitled to bring”).

(MTBE).¹⁶ The doctrine is thus as present as ever, on the cutting edge of the most pressing environmental problems.

The doctrine's continued vitality is symptomatic of a broader resort to state and local law—and away from federal law—to address environmental harms.¹⁷ The aging federal environmental statutory canon,¹⁸ the low likelihood of new federal environmental legislation,¹⁹ and the federal court system's seeming hostility toward administrative approaches to address new environmental problems²⁰ have made for slow environmental progress on the federal front. States and localities have sought to pick up the slack.²¹ From new legislation to innovative litigation, states and localities have become the pioneers of environmental

16. See, e.g., *Rhode Island v. Atl. Richfield Co.*, 357 F. Supp. 3d 129, 144–45 (D.R.I. 2018) (dismissing the State's public trust claim for impairment of groundwater through MTBE contamination); *State v. Hess Corp.*, 20 A.3d 212, 217 (N.H. 2011) (noting in MTBE contamination case that “the State d[id] not explicitly rely upon the public trust doctrine as a separate cause of action, and instead assert[ed] that it must act in the citizens' interest as the trustee of the statewide water supply”).

17. See John R. Nolon, *In Praise of Parochialism: The Advent of Local Environmental Law*, 26 HARV. ENV'T L. REV. 365, 365, 377–413 (2002); see also Katrina M. Wyman & Danielle Spiegel-Feld, *The Urban Environmental Renaissance*, 108 CALIF. L. REV. 305, 350–63 (2020); Joel A. Mintz, *The Uncertain Future Path of Environmental Enforcement and Compliance*, 33 ENV'T L. 1093, 1094 (2003) (book review) (noting the “‘devolution’ of responsibility for environmental enforcement” in the 1990s).

18. See Richard J. Lazarus, *Environmental Law at the Crossroads: Looking Back 25, Looking Forward 25*, 2 MICH. J. ENV'T & ADMIN. L. 267, 271–72 (2013) (noting the lack of new environmental laws since the 1990 Clean Air Act Amendments); see also Gregg Easterbrook, Opinion, *Let's Modernize Our Environmental Laws*, N.Y. TIMES (Oct. 7, 2015), <https://www.nytimes.com/2015/10/08/opinion/why-can-the-epa-regulate-smog-but-not-greenhouse-gases.html> (“Our major environmental laws are a generation or more out of date — written for conditions of the past, not the present.”).

19. See Sung Eun Kim & Johannes Urpelainen, *The Polarization of American Environmental Policy: A Regression Discontinuity Analysis of Senate and House Votes, 1971–2013*, 34 REV. POL'Y RSCH. 456 (2017). But see Gayathri Vaidyanathan & Nature Magazine, *Biden Signs Historic Climate Bill as Scientists Applaud*, SCI. AM. (Aug. 17, 2022), <https://www.scientificamerican.com/article/biden-signs-historic-climate-bill-as-scientists-applaud/> [<https://perma.cc/HEW4-GDJS>].

20. See, e.g., *West Virginia v. EPA*, 124 S. Ct. 2587 (2022).

21. See Kari Lydersen, *As EPA Backs Off Enforcement, States and Cities Have Little Capacity To Fill Gap*, ENERGY NEWS NETWORK (Apr. 27, 2020), <https://energynews.us/2020/04/27/as-epa-backs-off-enforcement-states-and-cities-have-little-capacity-to-fill-gap/> [<https://perma.cc/L663-PS8Z>] (describing the potential state agency role in environmental regulation in light of the EPA's lax approach to enforcement under the Trump administration); INST. FOR POL'Y INTEGRITY, N.Y. UNIV. SCH. OF L., IRREPLACEABLE: WHY STATES CAN'T AND WON'T MAKE UP FOR INADEQUATE FEDERAL ENFORCEMENT OF ENVIRONMENTAL LAWS (2017), https://policyintegrity.org/files/media/EPA_Enforcement_June2017.pdf [<https://perma.cc/5FCR-VTPU>] (noting the financial and political barriers to effective policing of environmental violations by the states).

law.²² It is little wonder, then, that a doctrine wholly beholden to state law²³—the public trust doctrine—is seeing a resurgence.

The second trend that arises is the increasing scarcity of groundwater, particularly in the arid west, and the resulting disputes over what is left. Although overuse and extraction of groundwater have been on the radar of many scientists for years, the problem has escalated in the past several years.²⁴ In every corner of the United States, groundwater disputes are cropping up, catapulting the issue into the public's consciousness.²⁵ For example, a recent scan of news sources reveals groundwater depletion woes in California,²⁶ drought emergencies affecting groundwater in Oregon,²⁷ and vows to crack down on

22. See Nolon, *supra* note 17, at 365, 377–413; Wyman & Spiegel-Feld, *supra* note 17, at 350–63; Katrina M. Wyman, *From Why to How Subnational Jurisdictions Are Mitigating Climate Change*, 83 OHIO ST. L.J. ONLINE 63, 70–71 (2022).

23. See Robin Kundis Craig, *A Comparative Guide to the Eastern Public Trust Doctrines: Classifications of States, Property Rights, and State Summaries*, 16 PENN ST. ENV'T L. REV. 1, 3 (2007) (emphasizing the state-specific nature of the public trust doctrine and disclaiming the tendency to discuss it “as if a single public trust doctrine governs throughout the United States”).

24. See, e.g., Kirsten Engel, Esther Loiseleur & Elise Drillhon, *Arizona's Groundwater Management Act at Forty: Tackling Unfinished Business*, 10 ARIZ. J. ENV'T L. & POL'Y 187, 192 (2020) (noting that Arizona's 1980 Groundwater Management Act and 1948 Groundwater Code sought to deal with the issue of groundwater overdraft, but several areas of the state still exhibit severe problems); Alastair Bland, *Ground Zero: Rain Brings Little Relief to California's Depleted Groundwater*, CALMATTERS (Feb. 7, 2023), <https://calmatters.org/environment/water/2023/02/california-depleted-groundwater-storms/> [<https://perma.cc/GYL6-PHBW>] (explaining that “Tulare County alone has seen 1,810 wells go dry since 2014”); Gianna Melillo, *How Arizona, California, and Other States Are Trying To Generate a Whole New Water Supply*, THE HILL (Jan. 22, 2023, 5:00 PM), <https://www.thehill.com/policy/equilibrium-sustainability/3824483-how-arizona-california-and-other-states-are-trying-to-generate-a-whole-new-water-supply/> (“[G]rowing demand for water coupled with climate change has resulted in shortages as states pump out water from aquifers faster than they can be replenished.”).

25. A Google Trends search in the United States for “lack of water” shows a marked increase over the past twenty years. *Lack of Water*, GOOGLE TRENDS, <https://trends.google.com/trends/explore?date=all&geo=US&q=lack%20of%20water> (last visited Nov. 5, 2024). In academia, too, groundwater has garnered considerable interest; a Westlaw search indicates 1,211 law journal articles that mention “groundwater” between October 2019 and October 2024.

26. See, e.g., Raymond Zhong, *Parched California Misses a Chance To Store More Rain Underground*, N.Y. TIMES (Feb. 21, 2023), <https://www.nytimes.com/2023/02/21/climate/california-storms-groundwater-aquifer-recharge.html>; see also *Reservoirs Rise, but Groundwater Woes Remain*, NASA EARTH OBSERVATORY (Jan. 29, 2023), <https://earthobservatory.nasa.gov/images/150953/reservoirs-rise-but-groundwater-woes-remain> [<https://perma.cc/FXG2-XTKS>].

27. See, e.g., Jane Vaughan, *Water Managers Could Withhold Klamath County Drought Permits This Year*, OR. PUB. BROAD. (Feb. 14, 2023, 8:00 AM),

groundwater extraction in Arizona.²⁸ In the wetter East, Maine faces PFAS contamination in its groundwater,²⁹ and New York grapples with rising groundwater levels and their potential to flood.³⁰ From sea to shining sea, groundwater disputes are inescapable.

This trend has, inevitably, resulted in legislative and litigative responses. Although many states have legislated groundwater use for decades, a sizable number passed new groundwater legislation or regulations in just the past decade: California's Sustainable Groundwater Management Act was enacted in 2014,³¹ Minnesota's Groundwater Protection Rule became effective in 2019,³² and New Jersey's rules on maximum contaminant levels for PFAS in groundwater were adopted in 2020.³³ More states are considering new groundwater efforts too.³⁴

In tandem, state and federal courts have increasingly been called upon to settle groundwater disputes. The past several years have seen a

<https://www.opb.org/article/2023/02/14/water-managers-could-withhold-klamath-county-drought-permits-this-year/> [<https://perma.cc/N6QY-FB8C>].

28. See, e.g., William Pitts, *Saudi Farms Are Sucking Arizona's Groundwater Dry. The State's New AG Vows To Stop Them*, 12 NEWS, <https://www.12news.com/article/news/local/water-wars/mayes-vows-repeal-saudi-farm-deal/75-b2d6bb89-8973-40dd-85d3-5f983a28911a> (Jan. 6, 2023, 3:15 PM).

29. See Kaitlyn Budion, *Initial Round of PFAS Testing of Groundwater Finds 75% of Maine Sites Within Safe Levels*, CENT. ME., <https://www.centralmaine.com/2023/01/11/initial-round-of-pfas-testing-of-groundwater-finds-about-75-of-maine-sites-with-safe-levels/> [<https://perma.cc/74RJ-5YUX>] (Jan. 12, 2023).

30. See Samantha Maldonado, *Rising Groundwater Threatens New York City – Researchers To Study How Much*, CITY (Jan. 18, 2023, 5:00 AM), <https://www.thecity.nyc/2023/1/18/23559815/rising-groundwater-threatens-new-york-city> [<https://perma.cc/76TW-9EDL>].

31. *Sustainable Groundwater Management Act (SGMA)*, CAL. DEP'T WATER RES., <https://water.ca.gov/programs/groundwater-management/sgma-groundwater-management> [<https://perma.cc/N97F-27U3>].

32. *Groundwater Protection Rule*, MINN. DEP'T AGRIC., <https://www.mda.state.mn.us/part-1-groundwater-protection-rule> [<https://perma.cc/57L7-D9DC>].

33. Press Release, N.J. Dep't of Env't Prot., *Affirming National Leadership Role, New Jersey Publishes Formal Stringent Drinking Water Standards for PFOA and PFOS* (June 1, 2020), https://dep.nj.gov/newsrel/20_0025/ [<https://perma.cc/SGZ3-ENZD>].

34. For example, Nevada is considering a number of bills that could change how the state manages groundwater basins. See, e.g., Daniel Rothberg, *2023 Could Be 'Session of Water Bills' in the Legislature*, NEV. INDEP. (Feb. 9, 2023, 7:30 AM), <https://thenevadaindependent.com/article/2023-could-be-session-of-water-bills-in-the-legislature>. In Arizona, the Governor issued an Executive Order to establish a Governor's Water Policy Council "tasked with modernizing the Arizona Groundwater Management Act." Press Release, Katie Hobbs, *Ariz. Governor, Governor Hobbs Announces Actions To Modernize Arizona's Groundwater Management* (Jan. 9, 2023), <https://azgovernor.gov/office-arizona-governor/news/2023/01/governor-hobbs-announces-actions-modernize-arizonas-groundwater> [<https://perma.cc/P3GA-J8LA>].

number of state supreme courts opining on groundwater-related cases.³⁵ Even the U.S. Supreme Court has not been spared from weighing in on groundwater controversies, resolving two major groundwater-related lawsuits in its recent Terms.³⁶ The result is that the public trust doctrine's potential role in resolving groundwater disputes is more important than ever.

This potential, however, is not exactly new. Scholars have long been interested in the connection between groundwater and the public trust doctrine.³⁷ Groundwater on its own has also remained a perennial area for academic focus.³⁸ There is nonetheless good reason for further exploration. For one thing, the trends discussed above have quickened in the past decade, providing substantial new evidence for both jurisprudence and litigation. New literature that incorporates these recent changes is thus needed.

For another, much of the existing groundwater literature focuses on *why* groundwater should be a public trust asset.³⁹ It often neglects to focus on the *how*—how do you incorporate a hydrologically complex water feature into a pre-existing doctrine? And how do you account for local governments in that structure, given that they are often in positions of authority regarding groundwater use and that localities' roles in the doctrine are often ignored or misunderstood?⁴⁰

This Article seeks to answer these questions, exploring the relationship between groundwater and the public trust doctrine. It makes three contributions: (1) a catalog of the recent state-level debates over

35. See, e.g., cases cited *supra* note 12.

36. See *Mississippi v. Tennessee*, 142 S. Ct. 31 (2021); *County of Maui v. Haw. Wildlife Fund*, 140 S. Ct. 1462 (2020).

37. See, e.g., Jordan Browning, *Unearthing Subterranean Water Rights: The Environmental Law Foundation's Efforts To Extend California's Public Trust Doctrine*, 34 ENVIRONS 231 (2011); Tuholske, *supra* note 3; Danielle Spiegel, *Can the Public Trust Doctrine Save Western Groundwater?*, 18 N.Y.U. ENV'T L.J. 412 (2010); Derek Kliever, *Protecting the Public Trust: How an Ancient Environmental Doctrine and Modern Legislation Can Save California's Groundwater*, 25 U. DENV. WATER L. REV. 27 (2021).

38. See generally Christine A. Klein, *Groundwater Exceptionalism: The Disconnect Between Law and Science*, 71 EMORY L.J. 487 (2022) [hereinafter Klein, *Groundwater Exceptionalism*]; Dave Owen, *Taking Groundwater*, 91 WASH. U. L. REV. 253 (2013); Joseph W. Dellapenna, *A Primer on Groundwater Law*, 49 IDAHO L. REV. 265 (2013); Christine A. Kelin, *Owning Groundwater: The Example of Mississippi v. Tennessee*, 35 VA. ENV'T L.J. 474 (2017); Joseph L. Sax, *We Don't Do Groundwater: A Morsel of California Legal History*, 6 U. DENV. WATER L. REV. 269 (2003); Barton H. Thompson, Jr., *Beyond Connections: Pursuing Multidimensional Conjunctive Management*, 47 IDAHO L. REV. 273 (2011).

39. See generally sources cited *supra* note 38.

40. See Sean Lyness, *The Local Public Trust Doctrine*, 34 GEO. ENV'T L. REV. 1 (2021).

whether groundwater is a public trust asset; (2) a normative case for why groundwater should be a public trust asset; and (3) an articulation of *how* to entrust groundwater. It proceeds in four parts. Part I covers the basic science of groundwater, current groundwater usage in the United States, and challenges to groundwater quantity and quality. Part II sketches the law's approach to groundwater, exploring common law doctrines and the current legislative and regulatory schemes. It concludes that groundwater law fails to protect the resource. Part III explores the public trust doctrine's intersection with groundwater, describing the historical treatment and modern state-level debates over whether groundwater should be a public trust asset. Finally, Part IV argues that groundwater is—or should be—a public trust asset and delineates a series of tenets for how states can entrust groundwater to best preserve and protect it.

I. A GROUNDWATER PRIMER

Some background on groundwater is necessary. We cannot understand groundwater's particular legal challenges without understanding it as a subject. Nor can we understand the status quo without exploring groundwater's past and present. Yet this Article does not—and could not—purport to provide a comprehensive explanation of the science.⁴¹ What follows is thus a targeted look at the basic terminology, hydrology, history, and usage of groundwater.

A. Terms and Hydrology

Groundwater is, in some ways, a distinction without a difference. There is nothing chemically distinctive about groundwater as opposed to surface water.⁴² Instead, groundwater is more a temporary physical descriptor—water that exists, at the present, in the pore spaces between rocks and sediment underground.⁴³ But water is seldom static and the water cycle moves water from underground states to surface waters to

41. There are, however, others that expertly explain groundwater as a scientific phenomenon. See generally CHARLES R. FITTS, *GROUNDWATER SCIENCE* (2d ed. 2012); ALAIN DESSARGUES, *HYDROGEOLOGY: GROUNDWATER SCIENCE AND ENGINEERING* (1st ed. 2019).

42. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 493 (“Hydrologists, like lawyers, initially thought that groundwater was distinct from surface water. But by at least the early twentieth century, scientists had developed a firm understanding of the interconnectedness of all water through the hydrologic cycle (also known as the ‘water cycle’).”).

43. See *Encyclopedic Entry: Aquifers*, NAT’L GEO.: EDUC., <https://education.nationalgeographic.org/resource/aquifers/> [https://perma.cc/8DPN-P7Y8] (defining groundwater as “precipitation that has infiltrated the soil beyond the surface and collected in empty spaces underground”).

evaporative gases.⁴⁴ Of course, the speed of that cycle is highly variable—groundwater can remain underground for periods as short as days and as long as millennia.⁴⁵ The key is that thinking of groundwater as “other” or “distinct” from the water that flows from our taps is a misunderstanding of water’s fungibility and of hydrology.⁴⁶

That said, groundwater does have some distinguishing characteristics—chief among them its relative abundance. When groundwater sits in a permeable subsurface layer and it is accessible—*i.e.*, can readily be pumped and used—we call that groundwater an “aquifer.”⁴⁷ Aquifers are particularly important because they contain the vast majority of usable freshwater.⁴⁸ In fact, for a planet that is so covered with water, very little of it is usable and accessible to humans. Almost the entire pie chart of total water on Earth is saline; a meager two-and-a-half percent is freshwater.⁴⁹ Of that, the bulk of freshwater is frozen in the colder parts of the planet.⁵⁰ The remaining sliver of the pie—nonfrozen, freshwater—is almost wholly underground.⁵¹ For a species dependent on accessible freshwater, aquifers are thus enormously important.

But groundwater’s value is more than its relative abundance. Compared to surface waters, groundwater features relatively steady levels over time (including during the warmer months), is fairly evenly geographically dispersed, and is less susceptible to heavily polluted stormwater runoff.⁵² When aquifers flow into adjacent surface waters, groundwater thus plays an underappreciated ecological role, maintaining water levels, temperatures, and quality.⁵³

Further, groundwater’s hidden nature and complex hydrology permit individual exploitation in a way that contested surface waters do not.⁵⁴ Unlike, say, a river where upstream activities can have almost

44. See Owen *supra* note 38, at 261 (“At some point in our education, almost all of us have learned about the water cycle. We are taught how water evaporates from the ocean, precipitates over the land, and flows through streams and rivers back to the ocean, supporting human and ecological systems along the way. What many people do not realize is that much of that cycle happens underground.” (footnotes omitted)).

45. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 493.

46. And it is this misunderstanding, so argues Professor Christine Klein, that has led to the law’s puzzling treatment of groundwater. See *generally id.* This treatment is addressed in more detail in Part II.

47. Owen, *supra* note 38, at 262.

48. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 492.

49. *Id.*

50. *Id.*

51. Owen, *supra* note 38, at 262.

52. *Id.* at 262–63.

53. *Id.* at 264–65.

54. See *infra* Part II.

immediate impacts downstream, groundwater does not necessarily operate in such a linear fashion.⁵⁵ It can be difficult to ascertain who is responsible for any particular amount of groundwater use, either as a matter of hydrology or forensics: “Unless one watches the sprinklers very closely, or unless users are subject to mandatory reporting requirements, it is hard to tell how much water your neighbor is using.”⁵⁶

What is clear, however, is that groundwater extraction is a zero-sum game. Most often achieved through well pumps, groundwater extraction “does not just bring water to the surface; it also lowers water pressure at the site of the well.”⁵⁷ This lower pressure, in turn, draws groundwater from nearby areas, creating a “cone of depression” at the wellhead that lowers the water table.⁵⁸ If enough groundwater is extracted—or if there are enough wells—the cone of depression can be significant enough to reduce instream flows from aquifers and even lower surface water levels.⁵⁹ So a neighbor’s groundwater extraction is an activity with significant potential externalities. As Professor Dave Owen notes, this makes groundwater “a classic example of a common-pool resource, with limited monitoring capacity exacerbating all the widely identified challenges associated with managing such commons.”⁶⁰

B. The Accessibility Revolution

For much of human history groundwater remained hidden, or, at least, not easily accessible.⁶¹ But new technologies in the first half of the twentieth century suddenly made groundwater extraction feasible.⁶² High-powered centrifugal pumps revealed a world of water beneath our feet—water that was usable and seemingly endless.⁶³ Parts of the United States that were previously too arid for farming suddenly became ripe for intensive agriculture.⁶⁴

55. Owen, *supra* note 38, at 264 (“Subsurface groundwater flow also can be hard to measure, and determining the extent of interference among competing users can be difficult.”).

56. *Id.*

57. *Mississippi v. Tennessee*, 142 S. Ct. 31, 36 (2021).

58. *Id.*; Paul Stanton Kibel & Julie Gantenbein, *Fisheries Reliant on Aquifers: When Groundwater Extraction Depletes Surface Water Flows*, 54 U.S.F. L. REV. 473, 515 (2020).

59. Kibel & Gantenbein, *supra* note 58, at 515.

60. Owen, *supra* note 38, at 264.

61. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 492.

62. *Id.*

63. *Id.*

64. See Debbie Elliott, *Plains Farmers Learn from Past as Aquifer Depletes*, NPR (Aug. 11, 2007, 2:01 PM), <https://www.npr.org/2007/08/11/12595774/plains-farmers-learn-from-past-as-aquifer-depletes> [<https://perma.cc/FK9Z-G9YH>]; see also

The Ogallala Aquifer is a case in point. Also known as the High Plains Aquifer, this Aquifer is the largest in the United States, extending more than 170,000 square miles beneath eight states.⁶⁵ Ninety percent of water usage from the Aquifer is for irrigation.⁶⁶ It supports one-fifth of the agriculture in the entire country.⁶⁷

But it was not always this way. Even though the Aquifer's existence was known prior to the Dust Bowl of the 1930s, the water remained underground while the Great Plains turned into the "Great American Desert."⁶⁸ It was not until the post-Second World War era that technology developed to access the Aquifer.⁶⁹ And once the Aquifer was accessible, farmers took full advantage. Groundwater withdrawals *quintupled* between 1949 and 1974, with thousands of wells pumping thousands of gallons of groundwater each minute.⁷⁰ In West Texas, the number of wells "exploded from 1,166 in 1937 to more than 66,000 in 1971."⁷¹

This glut of groundwater extraction has had predictable results. The natural recharge rate of the Aquifer is much slower than the rate of extraction; by some estimates it would take six thousand years to refill it.⁷² Some intensive irrigation uses were withdrawing six feet of groundwater per year, with the recharge at half an inch.⁷³ Nothing about the use of the Ogallala Aquifer has been sustainable.

Bill Ganzel, *Groundwater Irrigation*, WESSELS LIVING HIST. FARM, <https://livinghistoryfarm.org/farming-in-the-1930s/water/groundwater-irrigation/> (last visited Oct. 30, 2024) ("[D]espite the drought and Depression, farmers began looking for ways to hire well drillers, put in new higher powered pumps, level their ground so the water would flow down the rows evenly and dig the ditches to deliver the water.").

65. Warigia M. Bowman, *Dustbowl Waters: Doctrinal and Legislative Solutions To Save the Ogallala Aquifer Before Both Time and Water Run Out*, 91 U. COLO. L. REV. 1081, 1086 (2020); *see also* Elliott, *supra* note 64.

66. Burke W. Griggs, Matthew R. Sanderson & Jacob A. Miller-Klugesherz, *Farmers Are Depleting the Ogallala Aquifer Because the Government Pays Them To Do It*, 54 A.B.A. SECTION ENV'T, ENERGY, & RES.: TRENDS (Feb. 27, 2022), https://www.americanbar.org/groups/environment_energy_resources/resources/trends/2022/farmers-depleting-ogallala-aquifer-because-government-pays-them-do-it/.

67. Robert R.M. Verchick, *Dust Bowl Blues: Saving and Sharing the Ogallala Aquifer*, 14 J. ENV'T L. & LITIG. 13, 13 (1999).

68. Bowman, *supra* note 65, at 1086 (quoting Ben Livneh & Martin P. Hoerling, *The Physics of Drought in the U.S. Central Great Plains*, 29 J. CLIMATE 6783, 6783 (2016)).

69. *Id.* at 1099.

70. *Id.* at 1099–100.

71. Jane Braxton Little, *The Ogallala Aquifer: Saving a Vital U.S. Water Source*, SCI. AM. (Mar. 1, 2009), <https://www.scientificamerican.com/article/the-ogallala-aquifer/>.

72. *See, e.g., id.*

73. *Id.*

As a result, many scientists, policy makers, and academics have been sounding the alarm for years now that the Ogallala Aquifer will dry up if usage rates do not change.⁷⁴ If current trends continue, the Aquifer is expected to be fully depleted by 2070.⁷⁵ But the impacts of overuse are already felt. In Kansas, about thirty percent of groundwater wells have run dry.⁷⁶ In some places in Texas, the water level is 256 feet lower than it used to be.⁷⁷

The story of the Ogallala Aquifer—discovery, rapid extraction, and depletion—is the story of groundwater usage in the United States. In just under a hundred years, the country went from modest groundwater usage to heavy reliance on groundwater.⁷⁸ As commentators have noted, this is nothing less than a “groundwater revolution.”⁷⁹

C. Current Groundwater Usage

What has the groundwater revolution wrought? Interestingly, the general trend in the United States is *less* water use over time.⁸⁰ In fact, total water withdrawals are estimated to be at their lowest point since 1970.⁸¹ But, curiously, groundwater is the exception; groundwater withdrawals were *up* eight percent in 2015 from five years previous.⁸² The general trend line over the past several decades is a steady sustained increase in groundwater use, a notable contrast with the decrease in surface water use.⁸³

What is this groundwater used for? Largely irrigation, livestock, and mining.⁸⁴ As you might expect, states in which those industries are prominent are the greatest users, with just twelve states accounting for more than half of all water usage: California, Texas, Idaho, Florida, Arkansas, New York, Illinois, Colorado, North Carolina, Michigan,

74. See Bowman, *supra* note 65, at 1087–88; Little, *supra* note 71.

75. See, e.g., Brad Plumer, *How Long Before the Great Plains Runs Out of Water?*, WASH. POST (Sep. 12, 2013, 10:20 AM), <https://www.washingtonpost.com/news/wonk/wp/2013/09/12/how-long-before-the-midwest-runs-out-of-water/>; see also Vincent Vaughn-Uding, OVEREXPLOITATION OF THE OGALLALA AQUIFER (Feb. 20, 2021), <https://storymaps.arcgis.com/stories/d818872aa6df4cfa9683373e1e6b5ae6>.

76. Griggs, Sanderson & Miller-Klugesherz, *supra* note 66, at 22.

77. Bowman, *supra* note 65, at 1087.

78. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 492.

79. *Id.*; Burke W. Griggs, *Interstate Water Litigation in the West: A Fifty-Year Retrospective*, 20 U. DENV. WATER L. REV. 153, 158 (2017).

80. See CHERYL A. DIETER ET AL., U.S. GEOLOGICAL SURV., CIRCULAR 1441, ESTIMATED USE OF WATER IN THE UNITED STATES IN 2015, at 1 (2018).

81. *Id.*

82. *Id.*

83. See *id.* at 50 tbl.14.

84. See *id.* at 1–2.

Montana, and Nebraska.⁸⁵ Groundwater use in those states has likely been driven by intense drought; California, for example, used groundwater as its primary source of irrigation in the face of historic drought in 2015, increasing its groundwater usage *sixty percent* from 2010.⁸⁶

Yet groundwater has uses beyond industry too. Thirty-five percent of the drinking water in the United States is groundwater.⁸⁷ That translates to roughly 115 million people who rely on groundwater for drinking water.⁸⁸ Much of that is well water: Of those who self-supply their own water usage, over ninety-eight percent of that water is from groundwater sources.⁸⁹

In short, the country is heavily dependent on groundwater. That reliance is new, relatively speaking. But it is already deeply ingrained in the functioning of our modern life. Changing how we use groundwater thus cannot simply target one industry or one geographic area.

D. Groundwater Quantity

To be short: The United States is running out of groundwater.⁹⁰ In August 2023, *The New York Times* released a comprehensive investigation into groundwater, one that relied on millions of readings from monitoring sites across the country.⁹¹ The results were unequivocal: The United States is facing a groundwater crisis.⁹² As the *Times* summed it up: “Some 45 percent of the wells the Times examined showed a statistically significant decline in water levels since 1980. Four in 10 sites reached record-low water levels during the past decade, and last year was the worst yet.”⁹³

85. *Id.* at 2 (in order of usage).

86. *Id.* at 54.

87. JAMES R. DEGNAN, LEON J. KAUFFMAN, MELINDA L. ERICKSON, KENNETH BELITZ & PAUL E. STACKELBERG, U.S. GEOLOGICAL SURV., SCI. INVESTIGATIONS REP. 2021-5069, DEPTH OF GROUNDWATER USED FOR DRINKING-WATER SUPPLIES IN THE UNITED STATES 1 (2021).

88. *The Quality of the Nation's Groundwater*, U.S. GEOLOGICAL SURV. (Jan. 21, 2015), <https://www.usgs.gov/news/featured-story/quality-nations-groundwater> [<https://perma.cc/L9ZK-5X8S>].

89. DIETER ET AL., *supra* note 80, at 1.

90. See Mira Rojanasakul, Christopher Flavelle, Blacki Migliozi & Eli Murray, *America Is Using Up Its Groundwater Like There's No Tomorrow*, N.Y. TIMES (Aug. 28, 2023), <https://www.nytimes.com/interactive/2023/08/28/climate/groundwater-drying-climate-change.html>.

91. *Id.*

92. *Id.*

93. Christopher Flavelle & Mira Rojanasakul, *Five Takeaways from Our Investigation into America's Groundwater Crisis*, N.Y. TIMES (Aug. 29, 2023),

This groundwater depletion is not just a phenomenon of the Western United States, nor an agricultural one—aquifers across the country are affected.⁹⁴ And that means the impacts will reach drinking water too.⁹⁵ As Professor Warigia Bowman says, “From an objective standpoint, this is a crisis. . . . There will be parts of the U.S. that run out of drinking water.”⁹⁶

E. Groundwater Quality

In general, water quality in the United States has improved dramatically since the passage of the Clean Water Act in 1972.⁹⁷ Yet, again, groundwater remains the exception.⁹⁸ Groundwater is particularly susceptible to nitrate pollution, a common runoff contaminate from agriculture.⁹⁹ Further, our appetite has altered groundwater flow, pushing shallow groundwater deeper and increasing its vulnerability to man-made chemicals.¹⁰⁰ And high levels of extraction and artificial

<https://www.nytimes.com/2023/08/29/climate/groundwater-aquifer-overuse-investigation-takeaways.html>.

94. *See id.*

95. *See id.*

96. *Id.*

97. Kara Manke, *Clean Water Act Dramatically Cut Pollution in U.S. Waterways*, BERKELEY NEWS (Oct. 8, 2018), <https://news.berkeley.edu/2018/10/08/clean-water-act-dramatically-cut-pollution-in-u-s-waterways/> (“The team analyzed data from 50 million water quality measurements collected at 240,000 monitoring sites throughout the U.S. between 1962 and 2001. Most of 25 water pollution measures showed improvement . . .”).

98. Groundwater quality depends greatly on location, time, and the sample itself. A review of the past three decades of groundwater quality shows marked increases in many areas for the following contaminants: chloride, nitrate, sodium, strontium, sulfate, and total dissolved solids. *See Decadal Change in Groundwater Quality*, U.S. GEOLOGICAL SURV. (2018), <https://nawqatrends.wim.usgs.gov/Decadal/> [<https://perma.cc/RVR4-QSWB>]; *see also* Douglas A. Yanggen & Leslie L. Amrhein, *Groundwater Quality Regulation: Existing Governmental Authority and Recommended Roles*, 14 COLUM. J. ENV'T L. 1, 3–4 (1989) (“While efforts have been made nationwide to improve the quality of surface waters, these efforts have sometimes been at the expense of groundwater quality; some of the wastes that were previously disposed into surface waters or burned have now been diverted onto land or to subsurface disposal, ultimately degrading groundwater quality in many instances.”).

99. *See Nitrate in Groundwater Data & Assessment*, WASH. ST. DEP'T ECOLOGY, <https://ecology.wa.gov/Water-Shorelines/Water-quality/Groundwater/Nitrate-data-assessment> [<https://perma.cc/P8N7-99RE>]; Monica Samayoa, *Oregonians with Polluted Wells Demand State of Emergency*, OR. PUB. BROAD. (Apr. 18, 2023, 8:00 AM), <https://www.opb.org/article/2023/04/18/oregon-morrow-umatilla-groundwater-contamination-nitrates-rural-action-nitrate-water/> [<https://perma.cc/L9QP-345Q>].

100. *The Quality of the Nation's Groundwater*, *supra* note 88 (“High-volume pumping and irrigation in many areas have profoundly changed groundwater flow and quality. By moving shallow groundwater deeper, into parts of aquifers used for drinking

recharge “can cause different types of waters to mix, with the unexpected consequence of causing the aquifer rocks and sediment to release naturally occurring contaminants, such as arsenic, selenium, or radium, into the groundwater.”¹⁰¹ Suffice to say, groundwater quality faces significant contemporary threats.

Groundwater also poses unique remediation challenges.¹⁰² Groundwater contamination is harder to test for, observe, and treat.¹⁰³ Some sites are so geologically complex that technology does not yet exist to remediate the contamination.¹⁰⁴ Further compounding the difficulties, remediation of groundwater contamination can be extremely expensive.¹⁰⁵

water, irrigation and pumping have increased the vulnerability of drinking-water supplies to contamination from nitrate, pesticides, and other manmade chemicals from the land surface.”).

101. *Id.*

102. See Stephen E. Fauer, *Why Is Site Remediation So Darn Expensive?*, ESA (Aug. 1, 2012), http://askesa.com/enewsletters/enewsletter_0812.pdf [<https://perma.cc/49TM-2DNE>] (“In general, it is often easier and less expensive to address impacted soil versus impacted groundwater.”).

103. See Osamah Al-Hashimi, Khalid Hashim, Edward Loffill, Tina Marolt Čebašek, Ismini Nakouti, Ayad A. H. Faisal & Nadhir Al-Ansari, *A Comprehensive Review for Groundwater Contamination and Remediation: Occurrence, Migration, and Adsorption Modelling*, MOLECULES, Oct. 2021, at 1, 3 (“[G]roundwater contamination . . . differs from surface water contamination in that it is unseen, and recovery of the resource is difficult and expensive at the current technological level.”); see also Water Res. Mission Area, *Groundwater Quality—Current Conditions and Changes Through Time*, U.S. GEOLOGICAL SURV. (Feb. 27, 2019), <https://www.usgs.gov/mission-areas/water-resources/science/groundwater-quality-current-conditions-and-changes-through> [<https://perma.cc/72W9-FPRK>] (explaining that “scientists are investigating why, in some areas and at some depths, groundwater quality changes at short timescales—years to months to days to hours, rather than decades”); EPA, WELLHEAD PROTECTION: A GUIDE FOR SMALL COMMUNITIES 17 (1993) (“Because ground water generally moves slowly, contamination often remains undetected for long periods of time.”).

104. Jeff Johnson, *Groundwater Mess Is Expensive To Clean Up*, CHEM. & ENG’G NEWS (Nov. 12, 2012), <https://cen.acs.org/articles/90/i46/Groundwater-Mess-Expensive-Clean.html> (“[F]or complex sites, no technology exists to complete a cleanup.”).

105. EPA, *supra* note 103, at 17 (“If a cleanup is undertaken, it can cost thousands to millions of dollars.”); see also COMM. ON FUTURE OPTIONS FOR MGMT. IN THE NATION’S SUBSURFACE REMEDIATION EFFORT, NAT’L RSCH. COUNCIL OF THE NAT’L ACADS., ALTERNATIVES FOR MANAGING THE NATION’S COMPLEX CONTAMINATED GROUNDWATER SITES (2013) 3–4, 17 (estimating that “[a]t least 126,000 sites across the country have been documented that have residual contamination at levels preventing them from reaching closure,” for which “the estimated ‘cost to complete’ of \$110-127 billion is likely to be an underestimate of future liabilities,” and noting that for the sites considered “complex”—about ten percent of sites—restoration is unlikely to be achieved “in the next 50-100 years” due to technological limitations).

Recent years have also seen an increase in two particular kinds of groundwater pollutants: methyl tertiary butyl ether (MTBE) and per- and polyfluoroalkyl substances (PFAS). MTBE was added to gasoline as an oxygenate in the 1980s and 1990s in an attempt to replace the lead that was regulated out of the fuel.¹⁰⁶ By the end of the 1990s, however, MTBE's pernicious nature became clear; malodorous, distinctively chemical-tasting, and water soluble, MTBE leaked from underground storage tanks into the groundwater.¹⁰⁷ Soon, MTBE was detected in groundwater drinking supplies.¹⁰⁸ States began to ban MTBE,¹⁰⁹ and by the 2000s, the EPA identified MTBE as a "possible human carcinogen."¹¹⁰ Gasoline refiners phased out MTBE in 2006.¹¹¹

But the effects of MTBE in groundwater lasted much longer. Private individuals, water suppliers, and even states have brought MTBE lawsuits, each alleging harm to groundwater.¹¹² New Hampshire's lawsuit resulted in a verdict of over \$235 million.¹¹³ Some lawsuits—including Rhode Island's—are still pending.¹¹⁴

PFAS has had a similar trajectory from hailed chemical to groundwater contaminant to subject of lawsuits.¹¹⁵ First formulated in the

106. Thomas O. McGarity, *MTBE: A Precautionary Tale*, 28 HARV. ENV'T L. REV. 281, 281–83 (2004); see also Graham C. Zorn, Casey T. Clausen & Eric L. Klein, *Going Backward? Environmental Regulation Through Tort Litigation*, 33 NAT. RES. & ENV'T, Spring 2019, at 22, 22 ("Ironically, MTBE came into use primarily as a result of statutory and regulatory environmental laws. EPA regulations, promulgated under 1970 amendments to the Clean Air Act, required the phase-out of lead from gasoline.").

107. Douglas A. Henderson & Mary K. McLemore, *MTBE: A Tale of Air, Water, and Civil Procedure*, NAT. RES. & ENV'T, Spring 2005, at 20, 20.

108. See McGarity, *supra* note 106, at 281–82.

109. See EPA, EPA420-B-04-009, STATE ACTIONS BANNING MTBE (STATEWIDE) (2004).

110. See Zorn, Clausen & Klein, *supra* note 106, at 22.

111. *Id.*

112. *Id.* at 23–24.

113. David Brooks, *N.H. To Get \$235 Million-Plus To Fight Gasoline Additive MTBE, Other Pollutants*, CONCORD MONITOR (May 16, 2016), <https://web.archive.org/web/20160517103013/https://www.concordmonitor.com/MTBE-supreme-court-ruling-2172836>.

114. See Press Release, Peter F. Neronha, R.I. Att'y Gen., Attorney General Neronha Announces Additional Million-Dollar Settlement with Major Oil and Gas Companies over MTBE Contamination (Dec. 7, 2022), <https://riag.ri.gov/press-releases/attorney-general-neronha-announces-additional-million-dollar-settlement-major-oil> [<https://perma.cc/UWE8-9D9H>] ("Litigation against the single remaining major gas refinery in Rhode Island's lawsuit, Exxon Mobil, remains ongoing.").

115. See Leticia M. Diaz & Margaret R. Stewart, "Forever Chemicals": Forever Altering the Legal Landscape, 7 BELMONT L. REV. 308, 311–13 (2020); Michelle G. Scanlon, Will "Forever Chemicals" Be Around Forever? An Analysis and a Proposal Concerning PFAS Contamination and Public Health, 34 HEALTH LAW., June 2022, at 52, 56–59.

1940s, PFAS is a family of chemicals that are heat-resistant and water-repellent.¹¹⁶ They became ubiquitous in consumer products—everything from cooking pans to clothing.¹¹⁷ Termed “forever chemicals,” PFAS chemicals are highly mobile compounds that are extremely resistant to breaking down over time.¹¹⁸ Although studies are nascent, early results suggest that PFAS exposure—particularly through drinking water—can cause adverse health outcomes.¹¹⁹

As a result, even more so than MTBE, there has been a glut of PFAS-related litigation.¹²⁰ States, localities, local water suppliers—the list of PFAS plaintiffs seems to grow by the day.¹²¹ Many of these lawsuits relate to PFAS accumulation in the groundwater.¹²²

MTBE and PFAS illustrate how common chemicals can infiltrate groundwater, causing litigation and remediation for years afterward. And they highlight just how susceptible groundwater is to contamination.

II. THE LAW OF GROUNDWATER

Both as a consequence of groundwater’s complex nature and its recent and rapid emergence as a mainstay of U.S. water use, the law of groundwater is perplexingly opaque. The venerable Joseph Sax—a pioneer of the public trust doctrine, among other environmental topics—has described the common law of groundwater as designed “[s]eemingly

116. See Thomas A. Bloomfield, Samantha R. Caravello, Nicholas M. Clabbers, Sarah C. Judkins & Sara V. Mogharabi, *PFAS Litigation: Emerging Trends for the Latest Emerging Contaminant*, NAT. RES. & ENV’T, Summer 2021, at 9, 9.

117. *Id.*

118. See Diaz & Stewart, *supra* note 115, at 311.

119. See *id.* at 313–16.

120. See Bloomfield, Caravello, Clabbers, Judkins & Mogharabi, *supra* note 116, at 10–11.

121. See, e.g., Norman Miller, *Wayland Is Latest Municipality To File Federal Lawsuit over PFAS in Groundwater*, METROWEST DAILY NEWS (Feb. 3, 2023, 5:10 AM), <https://www.metrowestdailynews.com/story/news/courts/2023/02/03/wayland-latest-ma-community-to-file-federal-suit-over-pfas-in-water/69863249007/> [https://perma.cc/UG2M-FYJE] (“The town has joined dozens of other municipalities and local water districts throughout the country in filing a federal lawsuit against several companies that the water districts say are responsible for dangerous substances leaking into groundwater.”); see also Shannon E. McClure, Jennifer A. Smokelin & Casey J. Snyder, *Litigation over ‘Forever Chemicals’ Is Growing: Is Your Company the Next Defendant?*, REUTERS (Dec. 7, 2022, 11:06 AM), <https://www.reuters.com/legal/legalindustry/litigation-over-forever-chemicals-is-growing-is-your-company-next-defendant-2022-12-07/>.

122. See Bloomfield, Caravello, Clabbers, Judkins & Mogharabi, *supra* note 116, at 10 (“Plaintiffs (including individuals, water districts, and municipalities) have asserted personal injury and products liability claims, and a number of states (including New York, Michigan, and Minnesota) have alleged environmental damage to state natural resources, including groundwater.”).

to confuse law students.”¹²³ The statutory law of groundwater fares little better, described by Professor Joseph Dellapenna as regulation that exists “in a highly fragmentary, piecemeal manner.”¹²⁴ One commentator characterized California’s groundwater law as “anarchy.”¹²⁵

To be sure, part of the problem is that groundwater law is no monolith; every state has their own version of groundwater law.¹²⁶ But even within state lines, groundwater law is a tangled mess.¹²⁷ Local governments—counties, municipalities, and even water districts—have their own regulations that impact groundwater.¹²⁸ Further, the common law of groundwater has sometimes been replaced by statutes.¹²⁹ Yet that replacement has been piecemeal and limited, leaving in place some of the no less than five common law doctrines that govern groundwater.¹³⁰ And sometimes the common law or statutory requirements treat groundwater differently based on geography or physical characteristics.¹³¹ Groundwater in one part of the state may be treated differently from another, and some groundwater is further separated into underground watercourses and underground “percolating water.”¹³² All of which is to say, groundwater law appears an impenetrable thicket.

123. JOSEPH L. SAX, BARTON H. THOMPSON, JR., JOHN D. LESHY & ROBERT H. ABRAMS, *LEGAL CONTROL OF WATER RESOURCES* 411 (4th ed. 2006). Even a more charitable characterization underscores the confusion. See Owen, *supra* note 38, at 266 (describing groundwater law as “evolving and uncertain”).

124. Joseph W. Dellapenna, *Legal Classifications*, in 2 *WATERS & WATER RIGHTS* § 19.05 (Amy L. Kelley ed., 3d ed. LexisNexis/Matthew Bender & Co. 2014).

125. Susie Cagle, *Everything You Need To Know About California’s Historic Water Law*, *GUARDIAN* (Feb. 27, 2020, 6:00 AM), <https://www.theguardian.com/environment/2020/feb/27/california-groundwater-sigma-law-what-does-it-mean> [<https://perma.cc/8DD4-4W7N>].

126. See, e.g., Bruce E. Toppin III, Comment, *The Path of Least Resistance: The Effects of Groundwater Law’s Failure To Evolve with Changing Times*, 38 *ST. MARY’S L.J.* 503, 506 (2007) (observing that the Texas “legislature chose to control groundwater production and use through a statewide framework of localized regulation”); see also Yanggen & Amrhein, *supra* note 98, at 7 (noting an “increasing emphasis on state and local government regulation of groundwater”).

127. See Tuholske, *supra* note 3, at 204–05.

128. See, e.g., Ruth Langridge, *Drought and Groundwater: Legal Hurdles to Establishing Groundwater Drought Reserves in California*, 36 *ENVIRONS* 91, 95–97 (2012) (describing local and county regulatory authority over groundwater in California).

129. Tuholske, *supra* note 3, at 205.

130. *Id.* at 204–05.

131. *Id.* at 205.

132. *Id.*; see also *Maddocks v. Giles*, 728 A.2d 150, 151–52 (Me. 1999) (“[Plaintiffs’] expert hydrogeologist conceded that the water underneath [defendant’s] land flowing into the spring is presumed to be percolating, but added that percolating water can constitute a watercourse because there is a general flow and predictable course. [Defendant’s] expert hydrogeologist testified that the water feeding the spring was

Of course, diversity in legal approaches to an issue like groundwater can be anticipated when separate states and local governments have had centuries to regulate it differently. But, unlike other areas of environmental law, groundwater law was never simplified by federal statute.¹³³ Certainly, some federal statutes directly or indirectly impact groundwater.¹³⁴ But Congress has never set forth “a complete or consistent federal approach to groundwater protection.”¹³⁵ The upshot is that groundwater law is overwhelmingly a state and local affair.¹³⁶ For a resource that does not abide by political boundaries, groundwater is uniquely subject to them.¹³⁷

This Article does not endeavor to summarize the voluminous common and statutory law on groundwater; other scholars have ably done so.¹³⁸ But it does provide context through a brief recitation of how the common law and statutory law have governed groundwater. This Part concludes with some common threads that can be woven from the disparate legal strands.

A. Common Law Doctrines

In the United States, groundwater was first regulated by common law.¹³⁹ Well before groundwater’s hydrology was understood, nineteenth

percolating water and that it could not constitute a watercourse because it has no sides or bed, as a surface watercourse does.”).

133. Cf. *Sackett v. EPA*, 143 S. Ct. 1322, 1330 (2023) (describing how the Federal Clean Water Act replaced state efforts at preventing water pollution); Owen, *supra* note 38, at 269 (referring to the federal environmental laws passed in the 1970s and remarking that “[w]hile none of those laws directly targeted groundwater use, some could compel restraint where groundwater pumping was causing environmental degradation”).

134. See generally John D. Leshy, *The Federal Role in Managing the Nation’s Groundwater*, 14 HASTINGS W. N.W. J. ENV’T L. & POL’Y 1323 (2008) (identifying numerous areas where the federal government can influence groundwater management).

135. Yanggen & Amrhein, *supra* note 98, at 7 (quoting A. Dan Tarlock, *Prevention of Groundwater Contamination*, 8 ZONING & PLAN. L. REP. 121, 122 (1985)).

136. See *id.* (“The EPA stated that ‘states, with local governments, have the principal role in groundwater protection and management . . . states are best suited to undertake direct implementation and enforcement of groundwater protection programs.’” (alteration in original) (quoting OFF. OF GROUNDWATER PROT., EPA, A GROUNDWATER PROTECTION STRATEGY FOR THE ENVIRONMENTAL PROTECTION AGENCY (1984))).

137. See Tuholske, *supra* note 3, at 204 (noting that “groundwater aquifers know no political bounds”).

138. See, e.g., Dellapenna, *supra* note 38; Tuholske, *supra* note 3; Kevin L. Patrick & Kelly E. Archer, *A Comparison of State Groundwater Laws*, 30 TULSA L.J., Fall 1994, at 123.

139. See Dellapenna, *supra* note 38, at 267 (“[T]he creation by courts in the United States and England of the common law of groundwater in the nineteenth century was steeped in ignorance.”).

century courts faced questions of groundwater use and allocation.¹⁴⁰ They accordingly found themselves uncertain of their role.¹⁴¹ Famously, the Ohio Supreme Court in 1861 disclaimed any responsibility for constructing legal doctrines for groundwater, proclaiming the resource “so secret, occult, and concealed, that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty, and would be, therefore, practically impossible.”¹⁴²

Indeed, a survey of the common law doctrines governing groundwater leave no doubt about jurisprudential confusion. No fewer than *five* common law doctrines apply to groundwater: (1) absolute dominion; (2) correlative rights; (3) reasonable use; (4) appropriative rights; and (5) regulated riparianism.¹⁴³ It is hard to think of another area of law where the common law is so fractured.

But even this typology is overly simplistic. There are shades of differences in the formulations of these groundwater common law doctrines—differences that can have substantive outcomes. In New Hampshire, for example, reasonable use doctrine is defined as that which is “reasonable in view of [a landowner’s] own interest and *that of all other persons thereby affected.*”¹⁴⁴ Arizona’s reasonable use doctrine, however, is not as solicitous of neighbors: “This rule does not prevent the extraction of ground water subjacent to the soil so long as it is taken in connection with a beneficial enjoyment of the land from which it is taken.”¹⁴⁵ So the categories of different common law doctrines—helpful as a shorthand—are less-than-precise encapsulations of how groundwater is treated state to state.

140. See, e.g., *Greenleaf v. Francis*, 35 Mass. (18 Pick.) 117, 123 (1836) (“Now the case finds, that the defendant dug his well in that part of his own ground, where it would be most convenient for him. It was a lawful act, and although it may have been prejudicial to the plaintiff, it is *damnum absque injuriâ* [damage without injury].”).

141. See, e.g., *Chatfield v. Wilson*, 28 Vt. 49, 54 (1855) (“The laws of the existence of water under ground, and of its progress while there, are not uniform, and cannot be known with any degree of certainty, nor can its progress be regulated. It sometimes rises to a great height, and sometimes moves in collateral directions, by some secret influences beyond our comprehension.”).

142. *Frazier v. Brown*, 12 Ohio St. 294, 311 (1861), *overruled by Cline v. Am. Aggregates Corp.*, 474 N.E.2d 324, 327 (1984).

143. Dellapenna, *supra* note 38, at 269; see also Tuholske, *supra* note 3, at 205–11 (noting further that some states have also looked to the Restatement (Second) of Torts to regulate groundwater).

144. *Micucci v. White Mountain Trust Co.*, 321 A.2d 573, 575 (N.H. 1974) (emphasis added); see also *City of Franklin v. Durgee*, 51 A. 911, 913 (N.H. 1901) (describing its formulation of the reasonable use doctrine as “peculiar to the jurisprudence of this state”).

145. *Bristor v. Cheatham*, 255 P.2d 173, 180 (Ariz. 1953) (“If it is diverted for the purpose of making reasonable use of the land from which it is taken, there is no liability incurred to an adjoining owner for a resulting damage.”).

To make matters more complicated, the different common law doctrines are not nuanced versions of the same principles; some are directly contrary to each other. For example, absolute dominion allows virtually unfettered groundwater extraction.¹⁴⁶ Yet reasonable use restricts groundwater withdrawals to those that are “reasonable” when there are multiple competing uses.¹⁴⁷ Maine remains under absolute dominion while next-door neighbor New Hampshire is a reasonable use state.¹⁴⁸ There are thus potentially aquifers that straddle the state line and so are governed by both contradictory common law rules simultaneously.¹⁴⁹

Further confounding comprehension is the fact that states have changed their groundwater common law over time. In the nineteenth century, most states used the absolute dominion rule.¹⁵⁰ But by the start of the twenty-first century, the reasonable use rule dominated.¹⁵¹ Within those time periods are fifty different stories of jurisprudential change.

Suffice to say, the common law of groundwater has earned its reputation for being a muddled mess.¹⁵² While there are certainly similarities between states, a close look reveals more complexity than clarity.

B. Statutory Overlays

The common law, however, is not the only set of legal principles that governs groundwater. A thicket of state statutes also apply to groundwater.¹⁵³ At the risk of oversimplification, but with the benefits of categorization, there are three main kinds of state groundwater statutes.

146. Dellapenna, *supra* note 38, at 271; *see also* Tuholske, *supra* note 3, at 205 (“The absolute dominion rule permits the overlying landowner to take as much groundwater as the landowner desires, without limitation or liability to adjoining landowners.”).

147. Dellapenna, *supra* note 38, at 285; *see also* Tuholske, *supra* note 3, at 207–08.

148. *See* Tuholske, *supra* note 3, at 206–07.

149. PHILIP T. HARTE, GILPIN R. ROBINSON, JR., JOSEPH D. AYOTTE & SARAH M. FLANAGAN, U.S. GEOLOGICAL SURV., OPEN-FILE REP. 2008-1282, FRAMEWORK FOR EVALUATING WATER QUALITY OF THE NEW ENGLAND CRYSTALLINE ROCK AQUIFERS 1–3 (2008), <https://pubs.usgs.gov/of/2008/1282/pdf/ofr2008-1282.pdf> [<https://perma.cc/CBG6-N6UE>]; *see also* Charlie Eichacker, *There’s a Push To Protect Maine’s Abundant Groundwater as More Places Deal with Scarcity*, N.H. PUB. RADIO (Mar. 3, 2023, 8:02 AM), <https://www.nhpr.org/2023-03-03/theres-a-push-to-protect-maines-abundant-groundwater-as-more-places-deal-with-scarcity> [<https://perma.cc/M65K-QDA2>].

150. *See* Dellapenna, *supra* note 38, at 288.

151. *See* Tuholske, *supra* note 3, at 207.

152. *See supra* notes 123–125 and accompanying text.

153. *See* Tuholske, *supra* note 3, at 211 (“Today every state has some type of regulatory overlay applicable to groundwater.”).

First, some state statutes are essentially choice statutes whereby the state legislature chooses a particular common law doctrine to govern groundwater. Nebraska, for example, has a so-called “preference statute” for groundwater that declares a preference for domestic uses of groundwater.¹⁵⁴ As noted by Professor Dellapenna, the Nebraska Supreme Court has since interpreted this statute to mean that groundwater is subject to a modified version of the common law doctrine of correlative rights.¹⁵⁵ A statute in Oklahoma does the same.¹⁵⁶ Statutes in Ohio and Vermont pick the reasonable use rule for groundwater.¹⁵⁷ Other states have similarly chosen their version of the common law that applies to groundwater.¹⁵⁸

Second, some state statutes are protection statutes—legislation designed to control and restrict groundwater extractions in particular areas.¹⁵⁹ These laws allow the state to designate certain regions as areas of critical concern and restrict withdrawals.¹⁶⁰

Yet not all protection statutes come with teeth. As Professor Jack Tuholske observes, “[g]roundwater protection areas do not necessarily prevent groundwater mining.”¹⁶¹ Consider Indiana—a state law gives the Director of the Department of Natural Resources the power to declare groundwater emergencies and restrict extractions.¹⁶² But the law expressly exempts “nonsignificant ground water withdrawal facilit[ies]” from the statute’s ambit, defining those to be facilities that are capable of withdrawing less than 100,000 gallons of groundwater per day.¹⁶³

154. NEB. REV. STAT. § 46-613 (2021) (“Preference in the use of ground water shall be given to those using the water for domestic purposes. They shall have preference over those claiming it for any other purpose.”).

155. Dellapenna, *supra* note 38, at 282–83.

156. OKLA. STAT. tit. 60, § 60 (2024); *see also* Dellapenna *supra* note 38, at 283.

157. *See* Dellapenna, *supra* note 38, at 296 (first citing OHIO REV. CODE. ANN. § 1521.17 (1990); and then citing VT. STAT. ANN. tit. 10, § 1410 (2023)).

158. *See id.* at 291 (“In nine formerly reasonable use states, the legislature enacted a regulated riparian statute in large measure that draws upon the reasonable use rule.”).

159. *See* Tuholske, *supra* note 3, at 211–12.

160. *See, e.g.*, OR. REV. STAT. § 537.730(1) (2023) (allowing designation of “critical ground water area” if groundwater levels “are declining or have declined excessively”).

161. Tuholske, *supra* note 3, at 211.

162. IND. CODE §§ 14-25-4-9, -4-12 (2024) (“[T]he director may restrict the quantity of ground water that may be extracted from a significant ground water withdrawal facility when the director declares a ground water emergency . . .”).

163. § 14-25-4-3 (“As used in this chapter, ‘nonsignificant ground water withdrawal facility’ means the ground water withdrawal facility of a person that, in the aggregate, has a withdrawal capability of less than one hundred thousand (100,000) gallons of ground water in one (1) day.”).

Although estimates vary, the average private well for a single family uses nowhere close to that amount.¹⁶⁴ In fact, the Wisconsin Department of Natural Resources uses the 100,000 gallon cutoff as a signifier of a “high capacity well.”¹⁶⁵ In short, Indiana’s statute does not—by its terms—cover the vast majority of private groundwater wells, blunting its effectiveness. And even if the state law was intended to cover more withdrawals, there is evidence that these protection statutes have been underused in some states.¹⁶⁶

Third, still other statutes control groundwater well drilling.¹⁶⁷ Montana, for instance, requires permits for any appropriation of water, including wells.¹⁶⁸ So do fourteen other states.¹⁶⁹ And many other states require well contractors to be licensed with the State.¹⁷⁰ In general, these statutes (and their implementing regulations) specify well locations, materials, and minimum build requirements.¹⁷¹ Even here, however, exemptions for smaller wells limit the statutes’ reach.¹⁷²

164. CONN. DEP’T OF PUB. HEALTH, PUB. NO. 28, PRIVATE DRINKING WATER IN CONNECTICUT 2 (2009), https://portal.ct.gov/-/media/departments-and-agencies/dph/dph/environmental_health/private_wells/28privatewellguidancefordeterminingwellsafetyieldpdf.pdf [<https://perma.cc/GT7F-HPS9>] (“A typical 2-bedroom house with 4 persons averages 300 gallons per day for domestic water demand.”); N.H. DEP’T OF ENV’T SERVS., DWGB-1-8, RECOMMENDED MINIMUM WATER SUPPLY CAPACITY FOR PRIVATE WELLS (2021), <https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/dwgb-1-8.pdf> [<https://perma.cc/3NNC-JWE5>] (estimating private groundwater well usage at 600 or 900 gallons per day).

165. *High Capacity Wells*, WIS. DEP’T NAT. RES., <https://dnr.wisconsin.gov/topic/Wells/HighCap> [<https://perma.cc/N73U-DAQV>].

166. *See generally* Toppin, *supra* note 126 (criticizing Texas for having statutory protections for groundwater conservation but nonetheless maintaining the common law doctrine of absolute ownership).

167. Tuholske, *supra* note 3, at 212.

168. MONT. CODE ANN. § 85-2-302 (2023) (“Except as provided in 85-2-306 and 85-2-369, a person may not appropriate water or commence construction of diversion, impoundment, withdrawal, or related distribution works unless the person applies for and receives a permit or an authorization for a change in appropriation right from the department.”).

169. Jeremiah Zac, *Is It Legal To Drill Your Own Well? A State by State Guide*, WORLD WATER RSRV., <https://worldwaterreserve.com/is-it-legal-to-drill-your-own-well/> [<https://perma.cc/KTV8-TEJ8>] (Aug. 7, 2024) (listing California, Colorado, Delaware, Georgia, Hawaii, Maryland, Michigan, Mississippi, North Carolina, Ohio, South Carolina, Virginia, and West Virginia).

170. *See id.*

171. *See, e.g., Bulletin 74-81 Introduction*, CAL. DEP’T OF WATER RES., <https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Standards/Combined-Well-Standards/Bulletin-74-81-Intro> [<https://perma.cc/SM84-JC82>].

172. *See, e.g.,* MONT. CODE ANN. § 85-2-306(3)(a)(iii) (2023) (exempting well permits when “the appropriation is outside a stream depletion zone, is 35 gallons a minute or less, and does not exceed 10 acre-feet a year”).

In broad brushstrokes, these are the three kinds of statutes that apply to groundwater. Of course, some groundwater statutes are hybrids, containing elements of some or all of these categories.¹⁷³ And, to be sure, a few states have passed groundwater legislation designed to be “comprehensive.”¹⁷⁴ Yet those states are the exception, not the rule.¹⁷⁵ And even some statutes termed “comprehensive” groundwater laws do not, in fact, apply comprehensively.¹⁷⁶ There are also political and resource constraints that prevent existing groundwater laws from being enforced properly.¹⁷⁷

There is, however, one putative exception. As it often is on environmental issues, California is a progressive outlier on groundwater

173. See, e.g., ARIZ. REV. STAT. ANN. §§ 45-401 to 704 (The Arizona Groundwater Management Act). This Act implements a regulated riparian system for groundwater while maintaining appropriative rights for surface waters. See Dellapenna, *supra* note 38, at 308. It also designates “active management areas” where groundwater use is restricted. See Patrick & Archer, *supra* note 138, at 132–39.

174. See, e.g., WIS. GROUNDWATER COORDINATING COUNCIL, SUMMARY OF WISCONSIN’S GROUNDWATER LAW 1 (n.d.), <https://dnr.wisconsin.gov/sites/default/files/topic/Groundwater/GCC/WIgroundwaterLaw.pdf> [<https://perma.cc/K72C-HBUP>] (“Wisconsin has a long history of groundwater protection. The first law is the 1983 Wisconsin Act 410, Wisconsin’s Comprehensive Groundwater Protection Act, which created Chapter 160, Wisconsin Statutes.”).

175. Yanggen & Amrhein, *supra* note 98, at 93–94 (“Existing statutes should be modified to create a more comprehensive groundwater protection framework.”); see also Michael A. Wehrkamp, Comment, *Groundwater Allocation in Ohio: The Case for Regulated Riparianism and Its Likely Consequences Under McNamara*, 40 U. TOL. L. REV. 525, 525 (2009) (“Ohio, traditionally considered a ‘water-rich’ state, has recently experienced an increased demand for groundwater, prompting the need for a more comprehensive regulatory system.”).

176. See, e.g., Rob O’Dell & Ian James, *Arizona Has Tried To Safeguard Groundwater Beneath Its Big Cities. But Things Are About To Change*, ARIZ. CENT., <https://www.azcentral.com/in-depth/news/local/arizona-environment/2019/12/05/arizona-groundwater-rules-water-tables-declining-parts-phoenix-tucson/3949004002/> [<https://perma.cc/S287-MVG5>] (Dec. 11, 2019, 6:13 PM) (noting that “[i]n 1980, Arizona became the first state in the nation to pass a comprehensive groundwater management law” but that “the latest data show that the managed areas are either not on track to achieve this target or struggling to get there” and that “there are no [groundwater] regulations” in rural Arizona).

177. See, e.g., Tony Wilkin Gibart, Commentary, *It’s Time To Reclaim Wisconsin’s Legacy of Water Protection*, WIS. EXAM’R (Aug. 12, 2021, 11:03 AM), <https://wisconsinexaminer.com/2021/08/12/its-time-to-reclaim-wisconsins-legacy-of-water-protection/> [<https://perma.cc/C4NL-LD2A>] (“The barrier to ensuring that all Wisconsin residents have access to safe drinking water is not that Wisconsin does not have the laws and resources needed to address lead, nitrates and PFAS. Rather, the problem we currently face is that powerful special interests and their allies in Wisconsin’s Legislature are preventing the state from using those laws to respond to communities that are burdened by contaminated water.”).

legislation.¹⁷⁸ Though, to be fair, California’s action on groundwater was more reactive than proactive; years of significant drought and over-extraction of groundwater created a water scarcity crisis in the 2010s which the state is still reeling from.¹⁷⁹ In 2014, the state passed a trio of bills that are collectively called the Sustainable Groundwater Management Act (“SGMA”).¹⁸⁰ The intended scope of SGMA is admirably ambitious; it seeks to “achieve sustainable groundwater basins through management plans ‘without causing undesirable results.’”¹⁸¹

Interestingly, despite its differences from other groundwater statutes, SGMA functions in a similar way to many other groundwater statutory regimes: It decentralizes groundwater management and control to local governments.¹⁸² Indeed, as one scholar has observed, “SGMA reflects a strong political and ideological commitment to localism.”¹⁸³

178. See, e.g., *History of the California Environmental Protection Agency*, CAL. ENV’T PROT. AGENCY, <https://calepa.ca.gov/about/history01/> [<https://perma.cc/JSG2-QFHA>] (“The California Environmental Protection Agency has led California in creating and implementing some of the most progressive environmental policies in America . . .”).

179. Jeremy Miller, *California’s Sweeping New Groundwater Regulations*, HIGH COUNTRY NEWS (Nov. 10, 2014), <https://www.hcn.org/issues/46-19/californias-sweeping-new-groundwater-regulations/> [<https://perma.cc/2P93-798A>] (“In vast swaths of the Central Valley, the water table has fallen by as much as 60 feet in the last year alone. A new study from UC Davis estimates that water shortages have led to the fallowing of over 400,000 acres in the Central Valley this year, resulting in the loss of more than 17,000 seasonal farming jobs. Several small towns in Tulare County, near Fresno, have run out of water entirely.”); see also Lauren Sommer, *3 Reasons Why California’s Drought Isn’t Really Over, Despite All the Rain*, NPR (Mar. 23, 2023, 5:03 AM), <https://www.npr.org/2023/03/23/1165378214/3-reasons-why-californias-drought-isnt-really-over-despite-all-the-rain> [<https://perma.cc/CWZ6-FYKF>].

180. See *Sustainable Groundwater Management Act (SGMA)*, *supra* note 31.

181. Jessica B. Jandura & L. Victoria Wang, *Introduction* to Kevin O’Brien, Richard Frank, Andy Sawyer, Alleta Belin & Paul Stanton Kibel, *Proceedings of the 2019 California Water Law Symposium Panel Organized by GGU School of Law: SGMA and Interconnected Groundwater-Surface Water*, 12 GOLDEN GATE U. ENV’T L.J. 81, 81 (2020) (quoting Assemb. 1739, 2013–14 Leg., Reg. Sess. (Cal. 2014)).

182. *Compare Sustainable Groundwater Management Act (SGMA)*, *supra* note 31 (“In signing SGMA, then-Governor Jerry Brown emphasized that ‘groundwater management in California is best accomplished locally.’”), with WIS. GROUNDWATER COORDINATING COUNCIL, *supra* note 174, at 2 (“The Comprehensive Groundwater Protection Act clarified the powers and responsibilities of local governments to protect groundwater in partnership and consistent with state law.”), and JOHN HELLAN, MINN. H.R. RSCH. DEP’T, A SURVEY OF THE GROUNDWATER ACT OF 1989, at 5 (2001), <https://www.house.mn.gov/hrd/pubs/gdwtract.pdf> [<https://perma.cc/RN6X-79S4>] (noting that Minnesota’s groundwater law “resulted in state-approved and locally adopted local water management plans in all 80 greater Minnesota counties and groundwater plans in five of the seven metropolitan counties”).

183. Louise Nelson Dyble, *Aquifers and Democracy: Enforcing Voter Equal Protection To Save California’s Imperiled Groundwater and Redeem Local Government*, 105 CALIF. L. REV. 1471, 1473 (2017).

Rather than state regulation driving groundwater restrictions, local agencies are empowered to regulate the resource, backed by long-term goals that threaten state intervention if not achieved.¹⁸⁴

But, like other state groundwater statutes, SGMA still does not go far enough to protect groundwater.¹⁸⁵ As one journalist notes, SGMA quite intentionally does not cover large amounts of the state's groundwater:

The law actually leaves out quite a lot of water. It applies to 'alluvial' basins—water stored in deposits of sediment, in other words. But it does not apply to brackish groundwater, which often sits below alluvial basins and can be treated and used. It also doesn't govern water stored in fractured hard-rock and volcanic aquifers, since they are not alluvial basins. This a problem, because these forms of storage hold the majority of the state's groundwater, and this leaves 40% of its wells unregulated and vulnerable to over-pumping.¹⁸⁶

C. Local Groundwater Law

Nestled under these state groundwater statutes are local ordinances relating to groundwater.¹⁸⁷ Although the diversity of approaches here

184. *Id.* at 1473–74.

185. According to one report, SGMA creates three regulatory gaps, since it:

(1) defines only alluvial basins and does not map fractured hard rock and volcanic aquifers (which it labels 'non-basin areas') and (2) does not define the basin bottom, which effectively allows local agencies to exclude lower lying brackish groundwater by defining the basin bottom as above that brackish groundwater. SGMA creates a third gap by requiring regulation only in alluvial basins that [the State] ranks as medium or high priority—even though pumping in the low and very-low priority basins can lead to undesirable results, such as depletion of streamflow. . . . The result is a fragmented regulatory system that leaves significant gaps in the sustainable management of California's groundwater.

BARTON H. THOMPSON, JR., MELLISA M. RHODE, JEANETTE K. HOWARD & SANDI MATSUMOTO, *MIND THE GAPS: THE CASE FOR TRULY COMPREHENSIVE SUSTAINABLE GROUNDWATER MANAGEMENT* 2 (2021), <https://stacks.stanford.edu/file/druid:hs475mt1364/Mind%20the%20Gaps%2C%20The%20Case%20for%20Truly%20Comprehensive%20Sustainable%20Groundwater%20Management.pdf> [<https://perma.cc/Z52Q-KQGT>].

186. Nick Bowlin, *How 'Sustainable' Is California's Groundwater Sustainability Act?*, *HIGH COUNTRY NEWS* (May 10, 2021), <https://www.hcn.org/issues/53-6/south-water-how-sustainable-is-californias-groundwater-sustainability-act/> [<https://perma.cc/4ZHE-MZVK>].

187. See Mary Reilly, *Local Government Has an Important Role for Water Quality Protection: Part 1*, *MICH. ST. UNIV. EXTENSION* (Apr. 13, 2023), https://www.canr.msu.edu/news/local_government_has_an_important_role_for_water_

precludes blanket statements—there are, after all, over 38,000 local governmental entities in the United States¹⁸⁸—some common themes emerge.

First, local authority over groundwater is largely placed within pre-existing spheres of local authority: zoning and planning.¹⁸⁹ Some state groundwater statutes expressly contemplate local involvement in groundwater management or protection through zoning and planning.¹⁹⁰ In other words, local groundwater law is situated within the traditional home of local authority.¹⁹¹

The second theme is that the full spectrum of local governmental entities are involved in regulating groundwater. More than just towns and cities, county governments, water authorities, and special districts are particularly relevant here.¹⁹² For example, SGMA implementation in

quality_protection [https://perma.cc/9SXQ-X55Q] (“Local governments have a very important role to play in the protection of surface water, ground water, drinking water and wetlands, often filling in the gaps in state and federal regulations.”).

188. Rick Su, *Democracy in Rural America*, 98 N.C. L. REV. 837, 840 (2020) (“There are nearly 39,000 local governments in the United States.”); see also Dave Owen, *Cooperative Subfederalism*, 9 UC IRVINE L. REV. 177, 197 (2018) (“[L]ocal governance in the United States is diverse, and none of the generalizations made here will apply equally across the entire local government realm.”).

189. See Yanggen & Amrhein, *supra* note 98, at 11 (“Land use controls such as zoning and subdivision regulations can clearly play an important role in regulating land use to protect groundwater quality.”); see also John R. Nolon, *Calming Troubled Waters: Local Solutions*, 44 VT. L. REV. 1, 30–37 (2019) (describing various land use planning, zoning, and site plan regulations that can protect and conserve water, including groundwater).

190. See, e.g., *supra* notes 180–184 and accompanying text (discussing California’s SGMA, a locally driven groundwater regulation); HELLAND, *supra* note 182, at 5 (explaining that Minnesota’s groundwater law created a local water management task force that evaluated “the status and effectiveness of local water planning and management activities”); *Whatcom County v. Hirst*, 381 P.3d 1, 15 (Wash. 2016) (“[Washington’s groundwater law] clearly places sole responsibility for land use decisions affecting groundwater resources on local governments. Counties are authorized by statute to grant or deny building permits, and the legislature has imposed on the counties the responsibility of protecting the availability of water . . . protecting groundwater resources.”).

191. See Nolon, *supra* note 17, at 372–73; see also *Groundwater Sustainability Agencies*, CAL. DEP’T WATER RES., <https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Groundwater-Sustainable-Agencies> [https://perma.cc/68AB-N6XN] (“A legislative intent of SGMA is to recognize and preserve the authority of cities and counties to manage groundwater according to their existing powers.”).

192. See, e.g., *Groundwater Sustainability Agencies*, *supra* note 191 (“A legislative intent of SGMA is to recognize and preserve the authority of cities *and* counties to manage groundwater according to their existing powers.” (emphasis added)); Thomas V. Corrigan, Note, *Water Run Aground: Mississippi v. Tennessee*, *Interstate Groundwater Conflict, and the West*, 65 ARIZ. L. REV. 479, 501–02 (2023) (noting that “the Southern Nevada Water Authority pursued legal claims that would allow it to build

California requires local entities to designate themselves as groundwater sustainability agencies.¹⁹³ Thus far, such agencies “include general-purpose local governments (*i.e.*, cities and counties), special districts with governing boards that represent people, special districts that represent landowners only, and a variety of appointed authorities and other hybrid entities.”¹⁹⁴ This means that groundwater law expands the lines of federalism beyond the traditional federal, state, and local order.

Finally, local groundwater law is often not specifically about groundwater at all. Instead, many local ordinances that pertain to non-groundwater issues—building codes, density requirements, parking lot minimums—are the ones that have the greatest effect on groundwater.¹⁹⁵ For instance, paved surfaces have been linked to increased groundwater contamination¹⁹⁶ and reduced groundwater recharge rates.¹⁹⁷ But many parking lot sizes and materials are still mandated by local governments.¹⁹⁸ Even unknowingly, then, local governments impact groundwater quantity and quality.

There is thus a rich body of local authority that pertains to groundwater. But, like the common law and state statutory overlays, local groundwater law is both more complex and less effective than it might appear at first blush.

a pipeline to pump groundwater to Las Vegas from the aquifer until plans stalled in early 2020”).

193. See Dyble, *supra* note 183, at 1474.

194. *Id.* (footnotes omitted); see also *id.* at 1505–07 (describing groundwater sustainability agencies that include the Fox Canyon Groundwater Management Agency, Mid-Kaweah Groundwater Subbasin Joint Powers Authority, San Joaquin River Exchange Contractors Water Authority, and the Pajaro Valley Water Management Agency).

195. See Nolon, *supra* note 189, at 30–37 (describing various land use planning, zoning, and site plan regulations that can protect and conserve water, including groundwater); Cordell Johnston, *Groundwater Protection: What Can Municipalities Do?* 2 (N.H. Dep’t Env’t Servs. Watershed Conference, 2004), <https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/groundwater-protection-municipalities.pdf> [<https://perma.cc/2KRT-CHV7>] (“Perhaps the most commonly used basis for municipal regulation of groundwater is the planning and zoning authority granted by RSA chapter 674.”).

196. See Janina Piekutin, *Assessment of Ground Water Pollution in Parking Areas*, 16 J. ECOLOGICAL ENG’G, no. 1, 2015, at 153, 153, 157 (2015).

197. See Lance Frazer, *Paving Paradise: The Peril of Impervious Surfaces*, 113 ENV’T HEALTH PERSPS. A456, A458 (2005).

198. Brandon Hanson, *Parking Maximums*, SUSTAINABLE CITY CODE, <https://sustainablecitycode.org/brief/parking-maximums-9/> [<https://perma.cc/BME8-RTR8>] (“Local governments across the U.S. have routinely set parking *minimums* in their land development regulations for various types of uses.”).

D. The State of Groundwater Law

Three conclusions are apparent from the morass. First, groundwater's scientific complexity and relatively recent emergence as an accessible source of water renders much of the extant groundwater law out of sync with scientific realities. Indeed, much of groundwater law was formulated prior to the mid-twentieth century.¹⁹⁹ That is, it was formulated prior to scientific understanding of how groundwater works, prior to its easy accessibility, and prior to society's increased reliance on it as a water source.²⁰⁰

As a result, much of groundwater law is an anachronism. And that is to be expected when law—a conservative, slow-changing force—confronts a reality that has changed so quickly.²⁰¹ Worse still, groundwater law's historical pedigree bases the law's treatment of the resource on a profound misunderstanding—that groundwater was somehow distinct from surface water and thus should be treated differently.²⁰² Professor Christine Klein has termed this mismatch “groundwater exceptionalism.”²⁰³ As she argues, this has resulted in groundwater's overprotection and under-regulation.²⁰⁴

Second, groundwater is uniquely responsive to and dependent upon local governments.²⁰⁵ California's express resort to local authorities to implement its SGMA is in part a policy preference, in part a concession to reality.²⁰⁶ Local governments are responsible for so many decisions

199. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 494 (“Water law began to develop at least by the mid-nineteenth century, about fifty years before science understood the hydrologic cycle and almost a century before the ‘groundwater revolution’ vastly increased our ability to efficiently pump groundwater.”).

200. *See supra* Sections I.A, I.C.

201. *See* Kris Franklin, “*Theory Saved My Life*,” 8 N.Y.C. L. REV. 599, 630 (2005) (“[T]he law we teach is, for good reason, inherently conservative. It moves slowly and seeks to retain that which already exists.”).

202. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 497 (“[N]umerous legal doctrines recognize exceptions for groundwater and treat it differently than surface water.”); *see also* Catherine Janasie, *Mississippi v. Tennessee: A Groundwater Case that Mistakenly Relies on Surface Water Doctrines*, 7 BELMONT L. REV. 245, 249 (2020) (“However, many states continue to regulate surface water and groundwater separately, despite the growing amount of evidence of connecting some aquifers to surface water.”); Tuholske, *supra* note 3, at 212–13 (“The failure of states to regulate ground and surface water as a unified resource magnifies shortcomings in both surface and groundwater law.”).

203. Klein, *Groundwater Exceptionalism*, *supra* note 38, at 490.

204. *Id.* at 491.

205. *See, e.g., Whatcom County v. Hirst*, 381 P.3d 1, 15 (Wash. 2016) (“[Washington's groundwater law] clearly places sole responsibility for land use decisions affecting groundwater resources on local governments.”)

206. *See supra* notes 182–184 and accompanying text.

about land use and design that directly affect groundwater, both its quantity and quality.²⁰⁷ The corollary, then, is that any effort to address groundwater problems must include local governments. In this way, groundwater bucks the traditional environmental law trend of seeking federal or international mechanisms to solve problems that are too big for local governments alone.²⁰⁸ To the contrary, groundwater solutions must be—at least in part—local solutions.

Third, and counterintuitively, there is *not enough* groundwater law. Or, to be more precise, there is not enough *effective* groundwater law to protect and preserve the resource. For all the common and statutory law we have—and we are abundant in that regard—we have not yet found a means of curbing overextraction or preventing groundwater contamination.²⁰⁹ So much of our law regarding quantity is hobbled by exemptions.²¹⁰

The upshot is that groundwater law is ripe for reimagining and revitalization. As the next Part details, the public trust doctrine is one such avenue of recourse.

III. THE PUBLIC TRUST DOCTRINE AND GROUNDWATER

A. *The Historical View*

Consistent with society's general lack of understanding of groundwater, historically the public trust doctrine did not apply to groundwater.²¹¹ Regardless of where you trace the doctrine back to—ancient Rome or English common law—there are no historical precedents

207. See *supra* notes 195–198 and accompanying text.

208. See Richard J. Lazarus, *Restoring What's Environmental About Environmental Law in the Supreme Court*, 47 UCLA L. REV. 703, 761 (2000) (“[I]t is the national character of the affected markets and industries, rather than the physical nature of the ecological injuries, that has prompted the Supreme Court repeatedly to invalidate as undue burdens on interstate commerce state and local governmental efforts to craft localized solutions to environmental problems.”).

209. See *supra* Sections I.C–E.

210. See *supra* Section II.B.

211. *In re Water Use Permit Applications*, 9 P.3d 409, 445 (Haw. 2000) (“Courts in the United States have commonly understood the trust as extending to all navigable waters and the lands beneath them irrespective of tidality.”); see also *White Bear Lake Restoration Ass'n ex rel. State v. Minn. Dep't. of Nat. Res.*, 946 N.W.2d 373, 386 (Minn. 2020) (“We have found no precedent—and, at oral argument, counsel for Homeowners could cite none—extending the public trust doctrine in this way [to groundwater].”).

for including groundwater as within the ambit of the doctrine.²¹² To the contrary, traditional formulations of the public trust have specified its application to surface waters, either tidal or navigable.²¹³ This history was grafted onto the nascent American legal system after the country's founding.²¹⁴ Accordingly, state and federal courts routinely clarified the doctrine's scope in ways that excluded groundwater from its reach.²¹⁵

This view was not confined to the eighteenth and nineteenth centuries. Cases from the twentieth century routinely affirmed that groundwater was not part of the public trust.²¹⁶ In a 1929 Hawai'i Supreme Court case, for example, the court made plain that the sovereign's transfer of land to individuals did not include "subterranean waters."²¹⁷

This approach to groundwater makes sense given the law's past understanding of the resource. Prior to the public trust doctrine's resurgence in the 1970s as a vital environmental tool,²¹⁸ the doctrine was, at best, an outer limit on state action.²¹⁹ There were certainly examples

212. The oft-cited Institutes of Justinian listed the public trust as encompassing "the air, running water, the sea, and consequently the shores of the sea." J. INST. 2.1.1 (Thomas Collett Sandars trans., London, Longmans, Green & Co. 1874).

213. See *id.*; see also *PPL Mont., LLC v. Montana*, 565 U.S. 576, 604 (2012) ("[T]he State takes title to the navigable waters and their beds in trust for the public . . ."); *Shively v. Bowlby*, 152 U.S. 1, 11 (1894) ("By the common law, both the title and the dominion of the sea, and of rivers and arms of the sea, where the tide ebbs and flows, and of all the lands below high-water mark, within the jurisdiction of the crown of England, are in the king.").

214. See *Shively*, 152 U.S. at 14 ("The common law of England upon this subject, at the time of the emigration of our ancestors, is the law of this country, except so far as it has been modified by the charters, constitutions, statutes, or usages of the several colonies and states, or by the constitution and laws of the United States.").

215. See cases cited *supra* note 213.

216. See, e.g., *Rettkowski v. Dep't of Ecology*, 858 P.2d 232, 239 (Wash. 1993) ("[W]e have never previously interpreted the doctrine to extend to non-navigable waters or groundwater.").

217. *City Mill Co. v. Honolulu Sewer & Water Comm'n*, 30 Haw. 912, 934 (1929). This case would later be the foundation for a future litigant's position "that the sovereign reservation does not extend to ground waters." *In re Water Use Permit Applications*, 9 P.3d 409, 445–46 (Haw. 2000) (noting that the party's "position rests almost entirely on" the *City Mill* decision, but ultimately disagreeing with *City Mill*'s conclusion).

218. See Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471, 474 (1970); see also Gerald Torres, *Joe Sax and the Public Trust*, 45 ENV'T L. 379, 380 (2015) ("Most legal observers would agree that credit for the resurrection of the modern public trust doctrine ought to be placed at the feet of one scholar: Professor Joseph Sax.").

219. See William D. Araiza, *Democracy, Distrust, and the Public Trust: Process-Based Constitutional Theory, the Public Trust Doctrine, and the Search for a Substantive Environmental Value*, 45 UCLA L. REV. 385, 386–87, 396–97 (1997) ("The last twenty-five years have witnessed a remarkable renaissance of the public trust

of courts using the public trust doctrine to restrain states from alienating public trust resources.²²⁰ But these cases were, prior to the 1970s, relatively rare.²²¹ What's more, these cases often dealt with the most extreme examples of states abrogating their public trust responsibilities: total alienation of public trust resources.²²² The trickier question of whether the trust could impose an affirmative obligation on states to manage public trust resources was largely unanswered.²²³ In short, the doctrine's role in the first several centuries of the American legal system was a much different, more diminished one than it plays today.²²⁴

B. The Modern Debate

The groundwater accessibility revolution eventually changed the public trust doctrine's relationship to the resource.²²⁵ By the turn of the twentieth century, some states were reconsidering their relationship to the waters beneath our feet, and public trust law began to follow suit. Interestingly, these changes were often done by legislative enactment, not judicial precedent. Montana's Constitution, for example, contains a provision that appears to create a public trust that includes groundwater, declaring that "[a]ll surface, underground, flood, and atmospheric waters within the boundaries of the state are the property of the state for the use of its people."²²⁶ But Montana courts have never held as such.²²⁷ Nevada

doctrine. . . . The rebirth of the public trust doctrine is directly attributable to the publication of Joseph Sax's seminal 1970 article calling attention to the doctrine").

220. *E.g.*, *Ill. Cent. R.R. Co. v. Illinois*, 146 U.S. 387, 453 (1892) (preventing state sale of lands within Chicago Harbor to private railroad, noting that "[s]uch abdication is not consistent with the exercise of that trust which requires the government of the State to preserve such waters for the use of the public").

221. See Michael C. Blumm & Zachary A. Schwartz, *The Public Trust Doctrine Fifty Years After Sax and Some Thoughts on Its Future*, 44 PUB. LAND & RES. L. REV. 1, 16 (2021) ("The article was groundbreaking, not only for its revival of an historic, largely forgotten doctrine, but also, according to Professor Carol Rose, for 'unhook[ing] it from its traditional moorings on [or] around water bodies.'" (quoting Carol M. Rose, *Joseph Sax and the Idea of the Public Trust*, 25 ECOLOGY L.Q. 351, 352 (1998))).

222. See, e.g., *Ill. Cent. R.R. Co.*, 146 U.S. at 453.

223. See *id.*

224. See Blumm & Schwartz, *supra* note 221, at 3–4 ("Beginning shortly after 1970, the doctrine gave the public the right to protect the ecological and recreational value of tidelands in California; recognized public rights to recreate on ocean beaches in New Jersey; required evaluation of ecological considerations in the administration of water rights in California; gave trust protection to groundwater in Hawaii; was construed to be implicit in the federal due process clause in an atmospheric trust case; and gave implementation force to an international treaty on climate.") (footnotes omitted).

225. See *supra* Section I.B.

226. MONT. CONST., art. 9, § 3(3).

227. See *Galt v. State Dep't of Fish, Wildlife, & Parks*, 731 P.2d 912, 916 (Mont. 1987) (Turnage, C.J., concurring) ("The Public Trust Doctrine is not expressly

passed a law in 1913 declaring that “[t]he water of all sources of water supply within the boundaries of the State, whether above or beneath the surface of the ground, belongs to the public.”²²⁸ And in New Mexico, the State Legislature declared some groundwater to be public waters in 1931.²²⁹ Though the law only applied to groundwater that had “reasonably ascertainable boundaries,” it nonetheless marked groundwater as within the public trust.²³⁰ By 1953, the State Legislature went further and recognized *all* groundwater as public waters.²³¹ New Hampshire passed a similar law in the 1980s, asserting that “the water of New Hampshire whether located above or below ground constitutes a limited and, therefore, precious and invaluable public resource which should be protected, conserved and managed in the interest of present and future generations.”²³² Mississippi followed suit the same decade,²³³ though the Mississippi Supreme Court did not so recognize in a case discussing the doctrine just one year later.²³⁴

State declarations of groundwater as part of the public trust, however, did not necessarily expand the doctrine, at least not yet. For one thing, in many states the doctrine was yet to be revitalized; as noted

set forth in the Montana Constitution. It is a legal theory created by courts.”). *But see* Tuholske, *supra* note 3, at 224–25 (noting that Montana courts have applied the public trust to water irrespective of navigability but have not specified the doctrine’s application to groundwater).

228. NEV. REV. STAT. § 533.025 (2023).

229. *See State ex rel. Reynolds v. Mendenhall*, 362 P.2d 998, 1000 (N.M. 1961) (“The water of underground streams, channels, artesian basins, reservoirs, or lakes, having reasonably ascertainable boundaries, are hereby declared to be public waters and to belong to the public and to be subject to appropriation for beneficial use” (quoting N.M. STAT. ANN. § 75–11–1 (1953))).

230. *Id.*

231. *See id.*; *see also* N.M. STAT. ANN. § 72-12-18 (2024) (“[A]ll underground waters of the State of New Mexico are hereby declared to be public waters and to belong to the public of the State of New Mexico and to be subject to appropriation for beneficial use”).

232. N.H. REV. STAT. § 481:1 (2023).

233. MISS. CODE ANN. § 51-3-1 (1985) (“All water, whether occurring on the surface of the ground or underneath the surface of the ground, is hereby declared to be among the basic resources of this state to therefore belong to the people of this state”); *see also* Exceptions to the Report of the Special Master by Plaintiff State of Mississippi and Brief in Support of Exceptions at 31, *Mississippi v. Tennessee*, 142 S. Ct. 31 (2021) (No. 143) (“Mississippi’s claim is that *all* groundwater in Mississippi is held by Mississippi in public trust for the use and benefit of its citizens, and it is Mississippi’s duty under the Constitution to protect, preserve, and control its taking for the benefit of its citizens.” (emphasis bolded in original)).

234. *Cinque Bambini P’ship v. State*, 491 So. 2d 508, 510–11 (Miss. 1986) (describing the public trust without mentioning groundwater, holding that “fee simple title to all lands naturally subject to tidal influence, inland to today’s mean high water mark, is held by the State of Mississippi in trust”).

earlier, the doctrine did not flourish until after 1970.²³⁵ For another, considerable confusion remained about the precise scope of the doctrine with respect to groundwater.²³⁶ And, finally, the public trust doctrine as a judicially centered doctrine is only as developed as the cases brought that involve it.²³⁷

That changed in the new millennium. The past several decades have seen a glut of groundwater litigation, much of it involving the public trust doctrine. These cases have provided opportunities for state supreme court after state supreme court to opine on the public trust doctrine and groundwater.

The recent state-level developments fall into three camps: (1) states that recognize groundwater as a public trust asset; (2) states that do not; and (3) states that recognize groundwater as a public trust asset only to the extent that it impacts other public trust assets.

1. States Where Groundwater Is a Public Trust Asset

Some state courts and legislatures have declared groundwater to be part of the public trust, though the substantive effects of those declarations vary. Perhaps most comprehensive in its treatment of groundwater and the public trust is Hawai'i. In 2000, the Hawai'i Supreme Court addressed a water dispute over an irrigation system.²³⁸ Hawai'i's Commission on Water Resource Management considered petitions to change the amount of water being withdrawn and used by a ditch system.²³⁹ In its determination, the Commission concluded that the groundwater was subject to the public trust and thus subject to a duty to preserve the resource.²⁴⁰ On appeal, the Hawai'i Supreme Court conducted an extensive review of the state's public trust.²⁴¹ Although the court acknowledged that the doctrine traditionally covered tidal waters or navigable waters, the court nonetheless expanded the public trust to

235. See *supra* notes 218–219 and accompanying text.

236. See, e.g., *Mineral County v. Lyon County*, 473 P.3d 418, 425 (Nev. 2020) (“Given the confusion over the *res* of the public trust doctrine, we clarify that the public trust doctrine applies to all waters of the state, whether navigable or nonnavigable, and to the lands underneath navigable waters.” (footnote omitted)).

237. See, e.g., Sax, *supra* note 218, at 474 (noting that the public trust doctrine satisfied his search for “some broad legal approach which would make the opportunity to obtain effective judicial intervention more likely”).

238. *In re Water Use Permit Applications*, 9 P.3d 409, 423 (Haw. 2000) (“The Waiāhole Ditch System collects fresh surface water and dike-impounded ground water from the Ko‘olau mountain range on the windward side of the island of O‘ahu and delivers it to the island’s central plain.” (footnote omitted)).

239. *Id.* at 422.

240. *Id.* at 425–26.

241. See *id.* at 439–45.

include groundwater.²⁴² This conclusion was supported by the state’s constitutional codification of the public trust doctrine in 1978, a provision whose legislative history evinced an intention to include “ground water, surface water, and all other water.”²⁴³ The court’s inclusion of groundwater in the public trust reflected a view of an adaptable, moldable doctrine that “conform[s] to changing needs and circumstances.”²⁴⁴ And, most significantly, the court’s conclusion was predicated on science; the court rejected “the common law distinctions between ground and surface water” that have been “discredited” by “[m]odern science.”²⁴⁵

The Hawai‘i Supreme Court’s holding was more than declaratory. The court clarified that the public trust doctrine placed an affirmative obligation on the state to “recognize enduring public rights in trust resources separate from, and superior to, the prevailing private interests in the resources at any given time.”²⁴⁶ This means that when there are competing water uses—including groundwater—then “any balancing between public and private purposes begin[s] with a presumption in favor of public use, access, and enjoyment.”²⁴⁷ In this particular case, that meant that the Commission had to more closely scrutinize the petitions for increased water usage, with the court remanding the dispute for additional factual findings on the actual need for state withdrawals, the practicality of alternatives, and mitigation measures.²⁴⁸

In subsequent cases, the Hawai‘i Supreme Court has held the State to this obligation. In a 2004 case, the court found that the Commission violated its public trust duty when it failed to find the requisite facts from an applicant seeking water pumping from an aquifer.²⁴⁹ And in 2020, the court interrogated and upheld a Land Use Commission finding that a golf

242. *Id.* at 445–46.

243. *Id.* at 441–42, 445 (quoting 2 PROCEEDINGS OF THE CONSTITUTIONAL CONVENTION OF HAWAII OF 1978, at 861 (1978) (statement of Del. Fukunaga)).

244. *Id.* at 447.

245. *Id.*

246. *Id.* at 450.

247. *Id.* at 454.

248. *See id.* at 501–02.

249. *In re Wai‘ola O Moloka‘i, Inc.*, 83 P.3d 664, 694–95 (Haw. 2004) (“Inasmuch as the Commission failed to render the requisite FOFs [findings of fact] and COLs [conclusions of law] with respect to whether MR–Wai‘ola had satisfied its burden as mandated by the Code, it violated its public trust duty to protect [the Department of Hawai‘ian Home Lands’] reservation rights under the [Hawai‘i Homes Commission Act], the Code, the Hawai‘i Constitution, and the public trust doctrine in balancing the various competing interests in the state water resources trust. Accordingly, we vacate and remand for the entry of further FOFs and COLs on the matter.”).

course development was precluded from using any water from a high-level groundwater aquifer.²⁵⁰

Nevada has similarly expressly included groundwater in its public trust doctrine. In 2020, the Nevada Supreme Court resolved certified questions from the Ninth Circuit regarding the century-long litigation over water rights in the Walker River Basin and, in particular, Walker Lake.²⁵¹ Somewhat unusually, the Nevada Supreme Court only explicitly adopted the public trust doctrine in a 2011 case.²⁵² Questions soon emerged as to the legitimacy of already-adjudicated water rights.²⁵³ In litigation that put these questions forward, the court took the opportunity to explain the extent of the doctrine: “Given the confusion over the *res* of the public trust doctrine, we clarify that the public trust doctrine applies to all waters of the state, whether navigable or nonnavigable, and to the lands underneath navigable waters.”²⁵⁴ This expansive statement was based, as its counterpart in Hawai‘i was, on the scientific reality that groundwater and surface water are one and the same.²⁵⁵ Indeed, to exclude groundwater from the doctrine could allow the state to “freely allocate nonnavigable waters to the detriment of navigable waters,” something that “would permit the state to evade its fiduciary duties regarding public trust property.”²⁵⁶

Yet despite this language and conclusion, the Nevada Supreme Court failed to use the expansive public trust doctrine it had just articulated.²⁵⁷ Accepting the “tragic decline of Walker Lake,” the court nonetheless neglected to “use the public trust doctrine as a tool to uproot an entire water system.”²⁵⁸ All previously adjudicated water rights were final and could not be reallocated.²⁵⁹ In one fell swoop, the court both expanded the public trust and hobbled its use.

250. *Lāna‘ians for Sensible Growth v. Land Use Comm’n*, 463 P.3d 1153, 1163 (Haw. 2020) (holding that the Land Use Commission’s interpretation of a condition on water use “fulfills the LUC’s public trust duty to ensure that the public’s use of the limited natural resource is *always* prioritized over the irrigation of a private commercial golf course, regardless of whether Lāna‘i’s water supply is actively threatened” (emphasis underlined in original)).

251. *See Mineral County v. Lyon County*, 473 P.3d 418, 421 (Nev. 2020).

252. *Lawrence v. Clark County*, 254 P.3d 606, 611–17 (Nev. 2011) (“We expressly adopt the public trust doctrine in Nevada.”).

253. *See Mineral County*, 473 P.3d at 421.

254. *See id.* at 425 (footnote omitted).

255. *See id.* at 426 (“To limit the public trust doctrine to only navigable waterways and the lands below would ignore the fact that flowing water that feeds into the navigable waters is allocated along the way.”).

256. *Id.*

257. *See id.* at 430.

258. *Id.* (footnote omitted).

259. *See id.*

But that was not the end of the story. The Ninth Circuit, on remand, determined that the Nevada Supreme Court did not foreclose public trust claims that do *not* require a reallocation of adjudicated water rights.²⁶⁰ The moving party that precipitated this phase of the litigation—Mineral County—did exactly that: It sought “various types of relief,” all of which were “under the public trust doctrine.”²⁶¹ Those claims remain pending as of October 2024.²⁶²

South Dakota has also expressly recognized groundwater as part of its public trust. Unlike so many of the disputes that gave rise to litigation discussed here, the conflict that led to the 2004 South Dakota Supreme Court case on groundwater stemmed from an abundance of water, not a lack.²⁶³ As wet years increased water levels in previously low bodies of water, public recreation and sporting opportunities increased.²⁶⁴ Local landowners sued the state, seeking an injunction against the public from using the lakes.²⁶⁵ Taking these sympathetic facts as an opportunity, the South Dakota Supreme Court declined the private property owners’ claims, declaring that “all water in South Dakota belongs to the people in accord with the public trust.”²⁶⁶ In so doing, the court clarified that this was “all waters within South Dakota, not just those waters considered navigable under the federal test.”²⁶⁷ Language within the opinion makes plain that this includes groundwater.²⁶⁸ The court deferred to the

260. *United States v. Walker River Irrigation Dist.*, 986 F.3d 1197, 1205 (9th Cir. 2021) (“[W]e agree with the County that the Nevada Supreme Court’s decision in *Mineral County* does not foreclose the County from seeking remedies under the public trust doctrine that do not require a reallocation of adjudicated water rights. To be sure, the Nevada Supreme Court assumed that affording effective relief to the County would require a reallocation of such rights The court, however, did not consider whether other remedies were viable.”).

261. *Mono County v. Walker River Irrigation Dist.*, No. 3:73-cv-00128-MMD-CSD, 2022 WL 3143993, at *3 (D. Nev. Aug. 5, 2022).

262. *See id.* at *11 (denying defendants’ motion to dismiss).

263. *Parks v. Cooper*, 676 N.W.2d 823, 824–25 (S.D. 2004) (“The dispute in this appeal centers on three bodies of water located in Day and Clark counties in South Dakota, known as Long Lake, Parks Slough, and Schiley Slough. Because of unseasonably wet years, the water has accumulated into large lakes.”).

264. *Id.* at 825.

265. *Id.*

266. *Id.*; *see also id.* at 838 (“[W]e conclude that the State of South Dakota retains the right to use, control, and develop the water in these lakes as a separate asset in trust for the public. Accordingly, we align ourselves with the Idaho, Iowa, Minnesota, New Mexico, Montana, North Dakota, Oregon, Utah, and Wyoming decisions that have recognized the public trust doctrine’s applicability to water, independent of bed ownership.”); *Duerre v. Hepler*, 2017 SD 8, ¶ 33, 892 N.W.2d 209, 221 (“Today, we adhere to our position in *Parks*.”).

267. *Parks*, 676 N.W.2d at 839.

268. *See id.* at 838 (noting that the South Dakota legislature had already expressed that “the state shall determine in what way the water of the state, both surface

legislature, however, as to how to best develop and use the state's waters.²⁶⁹

But the South Dakota Supreme Court's 2004 opinion does not seem to have had much of an effect on groundwater in the state. In 2017, when the court again faced questions of the impact of the public trust, it expressed disappointment that the Legislature had not filled in any of the gaps:

Since *Parks*, the Legislature has not decided the question. The Legislature has not declared that the public's right to use the waters of the State includes the right to use the waters for recreational purposes. Nor has the Legislature declared that the public must obtain permission from private landowners such that private landowners have a right in the water superior to the general public.²⁷⁰

Without legislative guidance, the court resolved to continue to press the State Legislature to act.²⁷¹ The Legislature responded the same year with legislation that addressed surface waters, but not groundwater.²⁷² Thus, in South Dakota, groundwater is a public trust asset but one without guidance on usage.

Connecticut passed a general environmental protection act in the early 1970s that appeared to cover groundwater.²⁷³ The act declared "a public trust in the air, water and other natural resources of the state," which did not differentiate between surface and underground waters.²⁷⁴ However, that declaration had little impact for decades. One case from 2016 recognizes that groundwater contamination is properly a violation of the public trust, but that case was from an unreported decision of the

and underground, should be developed for the greatest public benefit" (quoting S.D. CODIFIED LAWS § 46-1-2)).

269. See *id.* at 841.

270. *Duerre*, 2017 SD 8, ¶ 33, 892 N.W.2d at 221.

271. *Id.* ("But we remand for the circuit court to modify the language of relief to provide: (a) Pursuant to *Parks v. Cooper*, 2004 S.D. 27, 676 N.W.2d 823 and SDCL 46-1-2, the Legislature must determine whether members of the general public may enter or use any of the water or ice located on the Plaintiffs' private property for any recreational use such as hunting or fishing. Currently, there is no such legislative authorization.").

272. See 2017 S.D. Sess. Laws § 1001; see also Joshua Haiar, *Concerns Persist over Law Limiting Public Access to Lakes*, S.D. PUB. BROAD. (Aug. 16, 2022, 3:39 PM), <https://listen.sdpb.org/politics/2022-08-16/concerns-persist-over-law-allowing-private-access-to-public-lakes> [<https://perma.cc/W9MA-MAW7>].

273. See Connecticut Environmental Protection Act of 1971, CONN. GEN. STAT. § 22a-14 (1971).

274. § 22a-15.

state superior (trial) court.²⁷⁵ No subsequent cases further develop or clarify groundwater's role in the public trust.

Vermont, too, passed legislation relating to groundwater and the public trust. In 2008, the state passed a law that declared that “the groundwater resources of the State are held in trust for the public.”²⁷⁶ The law was enforced in a 2011 superior court case in which the state natural resources agency was ordered to “perform the additional level of public trust analysis” before permitting a solid waste facility.²⁷⁷ The law was also central to the State's MTBE lawsuit; because the case was dismissed for statute of limitations reasons, the Vermont Supreme Court declined to decide whether the law “created a new cause of action [a groundwater public trust claim] in favor of the State.”²⁷⁸ The law popped up again in 2024, when the state supreme court rejected a private property owner's argument that their groundwater was “taken” under the Fifth Amendment.²⁷⁹ Relying on the 2008 groundwater declaration, the court held that groundwater does not afford a private property interest necessary for a takings claim because groundwater is a public trust resource.²⁸⁰ Beyond these cases, there is not much additional jurisprudential evidence of the groundwater public trust in Vermont.

Alaska recently joined these other states in holding groundwater to be a public trust asset.²⁸¹ In 2014, the State sued an oil refinery that operated on leased state land for chemical spills that contaminated local groundwater.²⁸² In a 2023 opinion largely upholding the trial court's finding of damages and injunctive relief, the Alaska Supreme Court sustained the State's public trust claims, noting that the doctrine “enables the State to recover damages from third parties for harm to trust

275. *See Deep River Assocs., LLC v. McCann*, 2016 WL 1397582, at *8 (Conn. Super. Ct. 2016) (“In the present case, the plaintiff alleges that the defendants contaminated the groundwater with a hazardous chemical inimical to the public health. This plainly constitutes a ‘substantive violation’ of § 22a-427 and is thus sufficient to give rise to an inference that the defendants’ conduct caused ‘unreasonable pollution.’ The plaintiff has therefore sufficiently alleged a cause of action under § 22a-16.”).

276. VT. STAT. ANN. tit. 10, § 1390(5) (2023).

277. *In re Omya Solid Waste Facility Final Certification*, No. 96-6-10 Vtec, 2011 WL 2610151, at *3 (Vt. Super. Ct. May 16, 2011).

278. *State v. Atl. Richfield Co.*, 2016 VT 61, ¶ 29, 148 A.3d 559, 566–67 (“[W]e conclude that even if [the groundwater declaration law] did create a new cause of action that was retroactively enforceable, that would not empower the State to apply the statute to injuries discovered more than six years prior to its complaint.”).

279. *See In re DJK, LLC WW & WS Permit*, 2024 VT 34, ¶¶ 36–37, 37 n.3, No. 22-AP-296, 2024 WL 2984279, at *9 (Vt. 2024).

280. *See id.*

281. *See Williams Alaska Petrol., Inc. v. State*, 539 P.3d 1160, 1187 (Alaska 2023).

282. *Id.* at 1171, 1174.

resources.”²⁸³ In Alaska, “‘waters’ comprising the public trust are broadly defined,” and thus the term includes groundwater.²⁸⁴ The oil refinery’s interference “with the public’s use of groundwater resources,” then, meant that the “State could properly pursue damages” under the public trust doctrine.²⁸⁵ Given the recency of the court’s decision, the implications of its holding are, as of yet, uncertain. But the Alaska Supreme Court’s full-throated adoption of groundwater as a public trust asset—and the accompanying articulation of the doctrine’s use as a shield to “restrain governmental use of public resources” as well as a sword to “recover damages from third parties for harm to trust resources”—leaves no doubt as to the doctrine’s continued vitality.²⁸⁶

Other state courts have more obliquely acknowledged groundwater as part of the public trust. Often these acknowledgments have come as implicit inferences in MTBE cases.²⁸⁷ New Hampshire, for example, brought its MTBE lawsuit against refiners and chemical manufacturers pursuant to its role as trustee of the statewide water supply.²⁸⁸ Because the suit centered on groundwater contamination, this included groundwater as part of the public trust.²⁸⁹ In 2011, the New Hampshire Supreme Court accepted this position when it held that “the State can bring suit to protect the waters over which it is trustee from contamination.”²⁹⁰

So too in New Jersey. The state brought a similar MTBE lawsuit for groundwater contamination in 2007, likewise asserting that it was suing pursuant to its role as trustee of groundwater.²⁹¹ The lawsuit—which is

283. *Id.* at 1187, 1211.

284. *Id.* at 1187.

285. *Id.*

286. *Id.*

287. *See supra* Section I.E.

288. *See State v. Hess Corp.*, 20 A.3d 212, 216–17 (N.H. 2011).

289. *Id.* at 214 (“In 2003, New Hampshire and several other states filed suit in their respective state courts against several gasoline suppliers, refiners and chemical manufacturers (MTBE defendants) seeking damages for groundwater contamination allegedly caused by MTBE.”).

290. *Id.* at 217, 221 (“The State also argues that private well contamination affects its entire citizenry because while some wells only serve a single family or business, these wells ultimately draw their water from the groundwater over which the State is trustee.”). This holding was based, in part, on the State Legislature’s longstanding declaration that “the water of New Hampshire whether located above or below ground constitutes a limited and, therefore, precious and invaluable public resource which should be protected, conserved and managed in the interest of present and future generations.” N.H. REV. STAT. § 481:1 (2001).

291. *See* Press Release, Gerbil S. Grewal, N.J. Att’y Gen., Attorney General Grewal Announces Total of \$196 Million in MTBE Settlements with Sunoco, BP and Shell (Mar. 12, 2018), <https://nj.gov/oag/newsreleases18/pr20180312a.html> [<https://perma.cc/WF3M-PNAU>]; *see also In re Methyl Tertiary Butyl Ether Prods.*

still pending—has already resulted in over \$369 million in settlements.²⁹² An implicit assumption in the litigation is that groundwater is part of the public trust, a fact that has gone unchallenged.²⁹³ And, owing to the success of its MTBE case, New Jersey has made a similar claim to ownership of groundwater in its more recent PFAS-related litigation.²⁹⁴

Thus, in varying ways, some states have included—explicitly or implicitly—groundwater as a public trust asset.

2. States Where Groundwater Is Not Part of the Public Trust

Not all states, however, have concluded that groundwater is part of the public trust. In Rhode Island, for example, the MTBE lawsuit similarly targeted groundwater contamination and also was brought pursuant to the public trust doctrine.²⁹⁵ But unlike New Hampshire and New Jersey, which brought common law and statutory claims predicated on their standing as trustees, Rhode Island additionally brought a separate public trust cause of action.²⁹⁶ A federal district court judge dismissed this claim, noting that “the State’s portfolio of trust assets it administers for public benefit does not, as yet, include groundwater.”²⁹⁷ Drawing from Rhode Island’s admittedly limited public trust precedent,²⁹⁸ the court noted that the Rhode Island version of the doctrine “stops at granting the State legal title to tidal lands below the high-water mark.”²⁹⁹ While there may be “merits of extending the doctrine, Rhode Island—

Liab. Litig., MDL No. 1358, 2014 WL 840955, at *1 (S.D.N.Y. 2014) (“The basis of both the public nuisance and trespass claims is that defendants’ conduct contaminated the ‘waters of the State,’ which the State holds in trust for the public.”).

292. Blake Nelson, *More Companies Agree To Pay Millions To Clean Up N.J. Water Pollution*, NJ.COM, <https://www.nj.com/news/2020/08/more-companies-agree-to-pay-millions-to-clean-up-nj-water-pollution.html> [https://perma.cc/R6XR-RVZW] (Aug. 12, 2020, 4:43 PM).

293. *Cf. infra* note 296 and accompanying text.

294. *See, e.g., N.J. Dep’t of Env’t Prot. v. E.I. du Pont de Nemours & Co.*, Nos. 19-14758, -14765-14767, 2021 WL 6049522, at *5 (D.N.J. Dec. 21, 2021) (“Plaintiffs assert that the State is the owner of the State’s groundwater.”).

295. *See Rhode Island v. Atl. Richfield Co.*, 357 F. Supp. 3d 129, 144 (D.R.I. 2018) (“The State’s claim is that it can sue as trustee to protect the corpus of a public trust that includes groundwater.”).

296. *Id.*; *see supra* notes 288–294 and accompanying text.

297. *Atl. Richfield Co.*, 357 F. Supp. 3d at 144.

298. I have written previously on the jurisprudence of the Rhode Island public trust doctrine and its maddeningly narrow focus. In particular, the Rhode Island Supreme Court has not yet acknowledged a change in the constitutional provision that codifies the doctrine, even forty years after its enactment. *See* Sean Lyness, *A Doctrine Untethered: “Passage Along the Shore” Under the Rhode Island Public Trust Doctrine*, 26 ROGER WILLIAMS U. L. REV. 671, 671–72 (2021).

299. *Atl. Richfield Co.*, 357 F. Supp. 3d at 144.

either through legislation or decisional law—has yet to do so.”³⁰⁰ With that, the public trust claim was dismissed from the case.³⁰¹

This exclusion is not academic. Several years later, Rhode Island sued chemical manufacturers in its PFAS litigation for damage to “groundwater, surface water, sediments, soils, and biota throughout the State.”³⁰² The cause of action for “Impairment to Public Trust Resources,” however, was careful to omit groundwater, claiming damage only to “the fisheries, shores, and other coastal resources of the State, plant and animal life within the State, and the State’s watershed.”³⁰³

Minnesota has also excluded groundwater from its public trust doctrine, at least in practical effect. After a popular lake’s water levels reached historically low levels, two nonprofits sued Minnesota’s Department of Natural Resources for allowing groundwater withdrawal permits.³⁰⁴ White Bear Lake is hydrologically connected to an aquifer that supplies water for the Twin Cities metropolitan area.³⁰⁵ In a story consistent with groundwater usage nationwide, groundwater withdrawals from the aquifer have doubled since 1980.³⁰⁶ The lawsuit centered on the Department’s permitting process, with allegations that the Department mismanaged groundwater appropriations, leading to the low water levels in White Bear Lake.³⁰⁷ One claim alleged that the Department “violated its fiduciary duties by failing to protect the trust asset, White Bear Lake.”³⁰⁸ To be sure, White Bear Lake is a surface water.³⁰⁹ But the alleged impairment of the lake only happened through groundwater withdrawals, making groundwater and its role in the public trust a centerpiece of the case.³¹⁰

In an opaque series of paragraphs, the Minnesota Supreme Court declined to “extend the public trust doctrine to this situation.”³¹¹ The court cited its reluctance to expand the common law, particularly where

300. *Id.* at 144–45.

301. *Id.*

302. Complaint, ¶ 77, *Neronha ex rel. State v. 3M Co.*, No. PC-2023-02452 (R.I. Super. Ct. May 25, 2023).

303. *Id.* ¶ 352.

304. *See White Bear Lake Restoration Ass’n ex rel. State v. Minn. Dep’t of Nat. Res.*, 946 N.W.2d 373, 376 (Minn. 2020).

305. *Id.* at 377.

306. *Id.*

307. *See id.*

308. *Id.* at 385.

309. *Id.* at 385 n.8 (“The parties have stipulated that White Bear Lake is protected under the public trust doctrine, as it was navigable at the time of statehood.”).

310. *See id.* at 377.

311. *Id.* at 386.

“a subject is extensively regulated by statutes and rules.”³¹² And then the court seemingly disclaimed the public trust’s role in *any* public water disputes.³¹³ But, curiously, the court caveated that “[w]e do not understand [the plaintiffs] to be urging that groundwater is either held in public trust or that the doctrine should be extended to make it so.”³¹⁴ In theory, this seems to leave the door open to a future case where the court could determine that groundwater is a public trust asset. In practice, however, if the court was disinclined to hold that the public trust applied here—where surface water levels were tangibly impacted by state-issued groundwater withdrawal permits—it is hard to imagine the court would ever find groundwater a public trust asset. Or, at least, it is unlikely that the public trust will have much of a substantive role in regulating groundwater use.

The State of Washington has also declined to include groundwater within its public trust. Faced with an opportunity to include groundwater as a public trust asset in 1993, the Washington Supreme Court declined to do so, noting that it did “not need to address the scope of the doctrine today.”³¹⁵ And six years later, the court noted that it would “adhere to our analysis in [the 1993 case] of the public trust doctrine and its relationship to the state’s water codes.”³¹⁶

In 2000, facing the issue yet again, the Washington Supreme Court made clear that groundwater and the public trust doctrine did not mix. The state agency board responsible for groundwater withdrawal applications has held that the public trust doctrine applied to those applications.³¹⁷ The court disagreed, holding that the state agency did not “assume the public trust duties of the state” and, further, that “the doctrine does not serve as an independent source of authority for [the

312. *Id.* (citing legislative enactments that “cover policy, conservation, water resources, *groundwater*, wells, ditches, dams, and more” (emphasis added)).

313. *See id.* (“Because the Legislature has established structures within which public water use priorities are to be balanced, and no private encroachment or diversion to another state has been alleged, we see no need to extend the judiciary’s common-law role in this instance.”).

314. *Id.* at 387.

315. *See Rettkowski v. Dep’t of Ecology*, 858 P.2d 232, 239 n.5 (Wash. 1993); *see also id.* at 239 (“[W]e have never previously interpreted the doctrine to extend to non-navigable waters or groundwater.”). This case was later a touchstone for the Washington Supreme Court in deciding the children’s trust climate litigation case, *Aji P. ex rel. Piper v. State*, 480 P.3d 438 (Wash. 2021). In upholding the trial court’s granting of judgment on the pleadings for the State, the Washington Supreme Court observed that *Rettkowski* declined to extend the public trust to groundwater, and that the court would accordingly decline to extend the public trust to the atmosphere. *Aji P.*, 480 P.3d at 457–58.

316. *R.D. Merrill Co. v. State*, 969 P.2d 458, 462 (Wash. 1999).

317. *See Postema v. Pollution Control Hearings Bd.*, 11 P.3d 726, 744 (Wash. 2000).

agency] to use in its decision-making.”³¹⁸ This decision effectively ended any notion that groundwater could be a public trust asset. In short, several states have foreclosed including groundwater as a public trust asset.

3. States Where Groundwater Is a Public Trust Asset to the Extent that It Impacts Surface Waters

The final category is states that have conditionally termed groundwater a public trust asset. That is, groundwater is part of the public trust only to the extent that it impacts another public trust asset, like a surface water.

North Dakota first recognized the connection between surface public trust assets and groundwater in 1983, albeit obliquely.³¹⁹ There, the North Dakota Supreme Court held, as many other states have, that all navigable waters were part of the public trust.³²⁰ It is accordingly “the state’s affirmative duty” to “[p]rotect[] the integrity of the waters of the state.”³²¹ In a footnote, the court observed that this imbued the State with not only “the authority to control drainage of a lake, but also . . . to restore a lake to its natural water level.”³²² This suggests that groundwater is part of the public trust if it impacts a navigable water.³²³ But it does not appear that North Dakota courts have further developed this principle.

California, on the other hand, has unequivocally adopted groundwater as a conditional public trust asset. But that declaration came from less-than-certain beginnings. In 2003, a state appeals court held that the public trust “doctrine has no direct application to groundwater sources.”³²⁴ Then, in 2014, the State passed SGMA, which, as described in Section II.B, attempted to comprehensively regulate groundwater in the state.³²⁵ Such a statute could, in theory, preempt the common law

318. *Id.*

319. *See N.D. State Water Comm’n v. Bd. of Managers*, 332 N.W.2d 254, 258 (N.D. 1983).

320. *Id.*

321. *Id.*

322. *Id.* at 258 n.5.

323. *See White Bear Lake Restoration Ass’n ex rel. State v. Minn. Dep’t of Nat. Res.*, 928 N.W.2d 351, 375 (Minn. Ct. App. 2019) (Bratvold, J., dissenting) (citing *N.D. State Water Comm’n*, 332 N.W.2d 254, when declaring that “courts in other jurisdictions have held that the public-trust doctrine applies to the extraction of groundwater that adversely impacts a navigable waterway.”).

324. *Santa Teresa Citizen Action Grp. v. City of San Jose*, 7 Cal. Rptr. 3d 868, 884 (Ct. App. 2003).

325. *See supra* notes 182–184 and accompanying text.

public trust doctrine. It appeared that groundwater and the public trust doctrine were distinct and unrelated.

That changed in 2018. Nearly a decade after it began, a lawsuit over groundwater extraction permits in Siskiyou County and their impact on the Scott River reached an end.³²⁶ Although the California Court of Appeals described its opinion as “extraordinarily narrow,”³²⁷ the court nonetheless held that groundwater was conditionally covered by the public trust doctrine *and* that SGMA did not abrogate the State’s public trust duty.³²⁸ As argued by the nonprofit plaintiffs, extraction of groundwater *will* adversely impact the Scott River, an acknowledged navigable water and public trust resource.³²⁹ According to the court, that impact on a public trust resource is “determinative.”³³⁰ In fact, “[t]he analysis begins and ends with whether the challenged activity harms a navigable waterway and thereby violates the public trust.”³³¹ That the activity here related to groundwater was irrelevant, as the “source of the activity” bears little on the resulting harm.³³²

In some ways, this holding is significant in that it includes groundwater extraction within the public trust’s ambit. But in other ways it is limiting. For one thing, this approach requires some scientific finding that groundwater withdrawals have a measurable impact on surface waters—and an adverse one at that. This quantum of proof may be easy to present in some circumstances.³³³ But not all cases will lend themselves to ascertainable findings with requisite scientific certainty. Indeed, hydrology is complex. It is often not a linear equation, where withdrawal from one aquifer produces expected and quantifiable impacts on one surface water.³³⁴ This approach endeavors to oversimplify a complicated world, with inevitably underinclusive results.

326. See *Env’t Law Found. v. State Water Res. Control Bd.*, 237 Cal. Rptr. 3d 393, 396–97 (Ct. App. 2018).

327. *Id.* at 396.

328. See *id.* With narrow decisions like this, who needs broad rulings?

329. See *id.* at 402.

330. *Id.*

331. *Id.* at 403.

332. *Id.*

333. See, e.g., *id.* at 397 (“Yet pumping of interconnected groundwater in the Scott River system that has an effect on surface flows is occurring outside of the geographical area covered by the decree.”).

334. See U.S. DEP’T OF AGRIC., TECH. BULL. NO. 3468: LINEAR THEORY OF HYDROLOGIC SYSTEMS 18 (1973), <https://ageconsearch.umn.edu/record/160041/files/tb1468.pdf> (“In hydrology, the assumptions of linearity and time-invariance are not valid, but nevertheless have been used for a long time in applied hydrology because of the simplification they introduce.”).

For another, conditional inclusion of groundwater contravenes the precautionary principle.³³⁵ A major tenet of environmental law, the precautionary principle holds that actions that could impact the environment should be foreclosed before they happen, not just after the impacts are known.³³⁶ In the realm of environmental contamination, where cleanups can take decades,³³⁷ costs can be overwhelming,³³⁸ and the full impact of environmental harm can be difficult to quantify,³³⁹ the idea of preventing harm from happening in the first place rather than cleaning it up after makes sense. Yet conditional inclusion of groundwater does the exact opposite; it waits until groundwater use has a tangible adverse impact on a surface water.³⁴⁰ By then, the harms may be entrenched, myriad, and diffuse.³⁴¹

In short, California's halfway position on groundwater and the public trust presents real challenges. Although the 2018 case has been cited a handful of times by other courts³⁴² (and more than a handful by

335. See John S. Applegate, *The Taming of the Precautionary Principle*, 27 WM. & MARY ENV'T L. & POL'Y REV. 13, 13 (2002) ("At its core, the precautionary principle embodies two fundamental regulatory policies: anthropogenic harm to human health and the environment should be avoided or minimized through anticipatory, preventive regulatory controls; and, to accomplish this, activities and technologies whose environmental consequences are uncertain but potentially serious should be restricted until the uncertainty is largely resolved.").

336. *Id.*

337. See, e.g., Betsy Marshall, *A Landowner Walks into a Bar: Using State Common Law To Encourage Efficient CERCLA Cleanups*, 48 ECOLOGY L.Q. 477, 478 (2021) (observing that the Opportunity, Montana, hazardous waste cleanup is past its thirty-seventh year).

338. See Daniel Benjamin, *Superfund Follies, Part II*, PERC (Mar. 3, 2009), <https://perc.org/2009/03/03/superfund-follies-part-ii/> [<https://perma.cc/9RDX-GLWU>] (noting that the average superfund cleanup costs \$43 million).

339. See Lazarus, *supra* note 208, at 747 ("There is much uncertainty associated with environmental injury, which poses even further challenges for lawmaking. The primary source of this uncertainty is the sheer complexity of the natural environment and, accordingly, how much is still unknown about it. This uncertainty expresses itself in our inability to know beforehand the environmental impact of certain actions. It equally undermines our ability to apprehend, after the fact, what precisely caused certain environmental impacts." (footnote omitted)).

340. See *Env't Law Found. v. State Water Res. Control Bd.*, 237 Cal. Rptr. 3d 393, 403 (Ct. App. 2018) ("The analysis begins and ends with whether the challenged activity harms a navigable waterway and thereby violates the public trust.").

341. EPA, *supra* note 103, at 17 (noting that "cleanup of a contaminated water supply [is] difficult, if not impossible" and "can cost thousands to millions of dollars").

342. A Westlaw search indicates that nine other courts have cited this case, including the Alaska and Iowa Supreme Courts. See *Williams Alaska Petroleum, Inc. v. State*, 529 P.3d 1160, 1187 n.86 (Alaska 2023); *Iowa Citizens for Cmty. Improvement v. State*, 962 N.W.2d 780, 798–99 (Iowa 2021).

academics),³⁴³ further development of the doctrine and its relationship to groundwater in California remains to be seen.³⁴⁴

* * *

Two final notes on the current intersection of groundwater and the public trust doctrine: First, despite the abundance of recent groundwater public trust cases, most states have not yet addressed the issue. To be sure, there has been a growing crescendo of state courts addressing the issue; of the cases discussed in this Part, all of them happened in the past two decades, and most in the past five years. But they still represent just thirteen states.³⁴⁵ There remains ample room for the remaining states to stake out a position, and hopefully a well-informed one. This Article hopes to be a part of that process.

Second, for states who have yet to decide whether groundwater is part of the public trust, there is some guidance, albeit limited, from the U.S. Supreme Court. The Court waded into this discussion, likely unintentionally, in *Mississippi v. Tennessee*³⁴⁶ in 2021. There, the Supreme Court appeared to acknowledge that as a matter of state law, groundwater *can* be a public trust asset.³⁴⁷

The case involved the Middle Claiborne Aquifer, a groundwater source beneath eight states.³⁴⁸ Concerned that Tennessee's zealous groundwater pumping was taking Mississippi's groundwater, Mississippi sued.³⁴⁹ It did so on the claim that groundwater was a public trust asset, and thus that status obligated the State to sue over its impairment.³⁵⁰

343. A Westlaw search reveals that the case has been cited in no less than thirty law review articles.

344. In late summer 2024, a California Superior Court judge ruled that Sonoma County must do more to limit groundwater pumping as part of its obligations under the public trust doctrine. Kurtis Alexander, *California Judge Issues First-of-Its-Kind Ruling To Rein in Groundwater Pumping*, S.F. CHRON. (Aug. 23, 2024) <https://www.sfchronicle.com/climate/article/sonoma-groundwater-public-trust-19719597.php>. This decision could herald a more aggressive application of the public trust doctrine to groundwater. But it is unclear whether this ruling will stand if appealed or whether other judges will rule similarly in other situations.

345. *See supra* Section III.B.

346. 142 S. Ct. 31 (2021).

347. *See id.* at 38.

348. *Id.* at 36.

349. *Id.*

350. Exceptions to the Report of the Special Master by Plaintiff State of Mississippi and Brief in Support of Exceptions at 31, *Mississippi v. Tennessee*, 142 S. Ct. 31 (2021) (No. 143) (“Mississippi’s claim is that *all* groundwater in Mississippi is held by Mississippi in public trust for the use and benefit of its citizens, and it is Mississippi’s duty under the Constitution to protect, preserve, and control its taking for the benefit of its citizens.; [sic] and that [Tennessee’s] intentional cross-border pumping

The Supreme Court never addressed the public trust doctrine in its terse unanimous opinion, instead deciding the case under the equal apportionment doctrine (and in Tennessee’s favor).³⁵¹ But there are tea leaves from the Court. As I have written previously,³⁵² the Court did nothing to counter Mississippi’s recognition of groundwater as a public trust asset.³⁵³ In fact, the Court appeared to credit the premise of the lawsuit—that public trust obligations can require a trustee to prevent their impairment.³⁵⁴ The Court noted that Tennessee had not physically intruded on Mississippi or its resources, implying that if Tennessee had done so it would have been appropriate for Mississippi to act.³⁵⁵ This seems to condone affirmative state actions for protecting public trust assets—including groundwater—at least within a state’s borders. There is thus some tacit acknowledgment from the Court that groundwater *can* be a proper public trust asset.

IV. ENTRUSTING GROUNDWATER

As the previous Parts have illustrated, groundwater remains a contested, precious, and ill-understood resource. This Part makes two arguments: (1) that groundwater *should* be a public trust asset; and (2) that entrusting groundwater requires more than a declaration of its status. Section A makes the normative case for including groundwater as part of the public trust, and Section B articulates *how* groundwater should be incorporated into the doctrine.

of Mississippi groundwater without Mississippi’s permission is a violation of Mississippi’s sovereignty under the Constitution” (emphasis bolded in original); *see also* Sur-Reply of the State of Mississippi in Support of Its Exceptions to Report of the Special Master at 6–7, *Mississippi v. Tennessee*, 142 S. Ct. 31 (2021) (No. 143) (“Mississippi seeks in this proceeding to discharge its duties as a trustee under the public trust doctrine . . .”).

351. *See generally* *Mississippi v. Tennessee*, 142 S. Ct. 31 (2021).

352. *See* Sean Lyness, *The Public Trust Doctrine and Mississippi v. Tennessee*, UNIV. CIN. L. REV.: BLOG (Apr. 19, 2022), <https://uclawreview.org/2022/04/19/the-public-trust-doctrine-and-mississippi-v-tennessee/> [https://perma.cc/MDU7-XHDV].

353. *See generally* *Mississippi v. Tennessee*, 142 S. Ct. 31 (2021).

354. *See id.* at 41.

355. *See id.*

A. Groundwater Should Be a Public Trust Asset

The public trust is as often defined by the murkiness of its contours as it is by the assets it protects.³⁵⁶ States should dispel all doubt: Groundwater should be a public trust asset.³⁵⁷

1. Groundwater Is Similar to Existing Public Trust Assets

First, groundwater as a resource bears important similarities to other acknowledged public trust assets. Traditional public trust assets—ones that are present in almost every iteration of the doctrine—are tidal areas and navigable waters.³⁵⁸ This was the case back to the doctrine’s English and Roman roots and was certainly so for the American versions of the doctrine.³⁵⁹ As an aqueous resource, groundwater fits the pattern.

But there are more than superficial compositional similarities. The rationale behind tidal areas and navigable waters being held in trust for the public was twofold: (1) both resources are crucial to the economy, making the doctrine operate as an antimonopoly mechanism;³⁶⁰ and (2) both resources are susceptible to the tragedy of the commons, with public ownership ensuring their preservation.³⁶¹

Groundwater fits neatly within these rationales. As described in Section I.C, groundwater has become, in many places, the predominant water source. From drinking supplies to agriculture to industrial processes, groundwater is a crucial and economically necessary resource.³⁶² Allowing one person or entity to take more than their fair share can have devastating consequences. And because groundwater withdrawals are discrete, there is a tendency for both overuse and

356. See, e.g., James L. Huffman, *Speaking of Inconvenient Truths – A History of the Public Trust Doctrine*, 18 DUKE ENV’T L. & POL’Y F. 1, 4–6 (2007) (discussing the various “[a]mbitions for an expanded public trust doctrine” and how courts and commentators have contested what the doctrine applies to).

357. I am indebted to others who have come to this same conclusion. See, e.g., Tuholske, *supra* note 3, at 226–31.

358. See *supra* note 213 and accompanying text.

359. See *supra* notes 212–213 and accompanying text.

360. Michael C. Blumm & Aurora Paulsen Moses, *The Public Trust as an Anti-Monopoly Doctrine*, 44 B.C. ENV’T AFFS. L. REV. 1, 2 (2017) (“[A]ntimonopoly is the essence of the [public trust doctrine], preventing privatization of certain resources used by the public, such as tidal waters and wildlife. Without this limit on alienation many valuable natural resources would, by now, be privately owned and thus inaccessible to the public.”).

361. See generally Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (1968) (articulating the concept of the “tragedy of the commons” whereby public use of natural resources incentivizes overuse and depletion).

362. See *supra* Section I.C.

underenforcement.³⁶³ The public trust doctrine's anti-monopoly function is thus particularly well-suited to groundwater.

As is the doctrine's preservation aim. While, certainly, there are concerns in some areas about groundwater overabundance,³⁶⁴ most of groundwater's challenges are based in scarcity.³⁶⁵ The public trust doctrine is largely concerned with nonalienation and nonimpairment,³⁶⁶ two goals that are designed to confront the problem of scarcity, whether that be scarcity of access or scarcity of the resource itself.

2. Scientific Reality

Second, including groundwater as a public trust asset is consistent with the scientific reality that groundwater *is* surface water.³⁶⁷ As discussed in Section II.D, the law's insistence on separating groundwater from surface water fundamentally misunderstands the science. Surface waters are not just impacted by groundwater, they *are* groundwater, and vice versa.³⁶⁸ To single out groundwater for exclusion from the doctrine is to draw dividing lines that nature has not.

And, in any event, that dividing line is hard, if not impossible, to draw. To be sure, at any given point in time, some waters are very clearly above ground while others are below. But that point in time passes, and so may those waters. Water's constant motion evades categorization. The legal system craves precision and certainty, yet water's temporality provides neither.

Treating groundwater as part of the public trust doctrine sidesteps those labels. Whether the water exists below ground or above, it is owned by the public and cannot be alienated or impaired.³⁶⁹ Thus, somewhat paradoxically, including groundwater within the public trust obviates any need for distinguishing categories.

3. Gap Filling

Third, making groundwater part of the public trust helps fill the current gaps in groundwater's legal protections. As noted in Part II, there is both too much groundwater law and too little; too much of a legal

363. See *supra* notes 54–56 and accompanying text.

364. See *supra* note 30 and accompanying text.

365. See *supra* Section I.D.

366. Blumm & Moses, *supra* note 360, at 2 (“At its core, the [public trust doctrine] prohibits sovereigns from alienating these natural resources and requires sovereign protection of trust resources for future public use and enjoyment.”).

367. See *supra* notes 42–46 and accompanying text.

368. See *supra* notes 42–46 and accompanying text.

369. This is not to say that it cannot be allocated or used.

thicket and too few protections. The public trust doctrine can function as a backstop in areas where the existing legal regime fails. For example, numerous state groundwater laws are littered with exemptions and loopholes.³⁷⁰ In those states, the public trust doctrine can provide protection at the seams, a nonimpairment floor.

Consider, for example, a groundwater well in California. If the well happens to hit an alluvial basin, the well is governed by the state's SGMA.³⁷¹ But if the well reaches brackish water it is not.³⁷² The public trust doctrine would apply to both—providing a bare minimum amount of groundwater protection, covering the cracks in the statutory regime. And, with some forty percent of California wells *not* covered by SGMA, that gap-filling would be significant.³⁷³

4. The Public Trust as an Organizing Principle

The public trust doctrine also has the benefit of experience; as a longstanding and broadly applicable legal doctrine, the public trust doctrine is an established means of protecting important natural resources.³⁷⁴ For over fifty years now, litigants have used the public trust doctrine in state after state to ensure a judicial check on the use and impairment of important natural resources.³⁷⁵ Of course, the doctrine's track record has not been without fault, as its success has depended on both the circumstance and jurisdiction.³⁷⁶ But even in cases where the doctrine fails to effectively protect natural resources, it nonetheless brings an existing framework for mediating access and use disputes over limited natural resources. That framework can be neatly transferred to the groundwater context.

In this way, the public trust doctrine can operate as an antidote to the extant legal quagmire. Rather than rely on a handful of common law

370. See *supra* Section II.B.

371. See *supra* notes 180–186 and accompanying text.

372. See *supra* notes 185–186 and accompanying text.

373. See *supra* notes 185–186 and accompanying text.

374. See Alexandra B. Klass, *The Public Trust Doctrine in the Shadow of State Environmental Rights Laws: A Case Study*, 45 ENV'T L. 431, 439 (2015) (“Excellent journal articles and books in recent years have detailed the use and expansion of the public trust doctrine for environmental protection purposes in all fifty states. This writing illustrates how litigants have now used the public trust doctrine for over four decades in efforts to protect traditional water-based resources as well as, in some states, public lands, parks, shoreland and beaches, the atmosphere, animals, and plant species.” (footnote omitted)).

375. *Id.*

376. See *id.* (“[I]t is important to keep in mind that in the majority of states, the public trust doctrine remains limited to navigable waters and submerged lands and has not been extended beyond access to and use of those resources.”).

doctrines, a panoply of state statutes, or a multitude of local ordinances, efforts to protect groundwater can be centered on a common organizing principle: the public trust doctrine. In other words, the conversation on groundwater use could be centered on the public trust doctrine as a common language.

This focus on a single legal doctrine brings coherency to an area of law that desperately needs it. Indeed, from agriculture to mining to drinking water, groundwater use is diverse and varied.³⁷⁷ Adopting a comprehensive approach is necessary. Doing so could streamline advocacy, future legislative efforts, and legal disputes surrounding groundwater.

5. Substantive Effects of Including Groundwater

There are tangible substantive effects of including groundwater in the doctrine. Hawai‘i is perhaps the best example.³⁷⁸ The inclusion of groundwater in the state’s public trust has resulted in numerous cases where the Hawai‘i Supreme Court has held the state to its obligations to preserve and protect groundwater.³⁷⁹

And, in the inverse, there are significant restraints on public trust doctrines that do not include groundwater. Rhode Island’s MTBE lawsuit, for example, was cut down by a cause of action when a federal district court judge found groundwater outside of the doctrine.³⁸⁰ The import is substantial: the “Impairment of Public Trust Resources” claim applied statewide, was untethered to statutory penalties, and not limited by statutory remedies.³⁸¹ If proven, the claim could have reaped enormous monetary relief.³⁸² Although it is not a direct apples-to-apples comparison, New Hampshire’s similar MTBE lawsuit included a public trust claim; the State received \$350 million from the lawsuit.³⁸³ Rhode Island has obtained just \$26 million from its MTBE lawsuit.³⁸⁴ When

377. See *supra* Section I.C.

378. See *supra* notes 238–250 and accompanying text.

379. See *supra* notes 246–250 and accompanying text.

380. See *supra* notes 295–301 and accompanying text.

381. See *supra* note 296 and accompanying text.

382. See *supra* notes 295–301 and accompanying text.

383. Ashley Campbell, *New Hampshire Puts \$350 Million To Work from a Successful Lawsuit over MTBE Contamination*, WATER ONLINE, (Jan. 25, 2022), <https://www.wateronline.com/doc/new-hampshire-puts-million-to-work-from-a-successful-lawsuit-over-mtbe-contamination-0001> [<https://perma.cc/MB88-W7RR>]; see also *State v. Exxon Mobil Corp.*, 126 A.3d 266, 312 (N.H. 2015).

384. See Press Release, Peter F. Neronha, R.I. Att’y Gen., Attorney General Neronha Announces 6-Million-Dollar Settlement with Exxon Mobil over MTBE Contamination (Dec. 11, 2023), <https://riag.ri.gov/press-releases/attorney-general->

Rhode Island subsequently filed its PFAS lawsuit, it did so without a public trust claim for groundwater, an apparent concession in light of the MTBE case.³⁸⁵

* * *

In sum, groundwater should be recognized as a public trust asset. Common sense, hydrological science, efficiency, and efficacy all counsel in favor.

B. Tenets of Entrusting Groundwater

Suppose a state is convinced that there are benefits to entrusting groundwater and wishes to do so. How should it do it? And what should the framework for entrusting groundwater look like? This section covers these questions.

At the outset, I concede that what follows is a list of best practices. Not every tenet may be politically or practically feasible, depending on the state. Thus, this section presents the *ideal* means of entrusting groundwater. It is not, however, the only means. As illustrated in Section III.B, several states have entrusted groundwater in ways that look very different from the comprehensive proposal below. This list, then, is intended to offer a menu of options for states, not an “all or nothing” proposition.

1. Judicial or Legislative Adoption

As a preliminary matter, *how* should a state entrust groundwater? As the state examples discussed earlier indicate, either judicial pronouncement or legislative adoption is a possible means of declaring groundwater a public trust asset. And either method attains the same goal.

But there are benefits to legislative adoption. For one, legislative adoption is proactive and need not wait for the perfect set of facts to arise. For another, legislative adoption is more comprehensive than judicial. A piece of legislation can do more than just expressly include groundwater in the doctrine; it can also inform state agencies how to incorporate groundwater impacts in their regulations and articulate standards for impairment. And, of course, legislative adoption adds

neronha-announces-6-million-dollar-settlement-exxon-mobil-over-mtbe [https://perma.cc/4G33-H6RP].

385. See *supra* notes 302–303 and accompanying text.

democratic legitimacy and political accountability to the mix.³⁸⁶ Given the choice, legislative adoption is preferable.

However, legislative adoption may not always be politically feasible.³⁸⁷ Judicial adoption has the benefit of being quick and the potential to be unmired by legislative compromise. A judicial pronouncement that groundwater is a public trust asset also fits in with how many other public trust assets have been recognized.³⁸⁸

2. Statewide Standards

Any adoption of groundwater as a public trust asset should set forth statewide standards for its use and nonimpairment. Simply articulating that groundwater is part of the doctrine is insufficient without also detailing the standards by which the state and localities will be held accountable. While the particulars could vary from state to state, there are two general categories of possible statewide standards: quantity standards and quality standards.

Quantity standards are those that relate to the amount of groundwater left in the state. There are two components to this: (1) ascertaining and monitoring the current amount of groundwater; and (2) limiting and monitoring the current withdrawal rates. Somewhat shockingly, many states have little idea how much groundwater they have or are using.³⁸⁹ Any statewide standards will need to be informed by a

386. See Eric Berger, *Deference Determinations and Stealth Constitutional Decision Making*, 98 IOWA L. REV. 465, 504 (2013) (In comparison to the legislative branch, “[s]ome critics . . . contend that courts’ lack of democratic legitimacy and political accountability alone is reason enough to defer to Congress. Such an approach implicitly contends that genuine expertise does not matter; instead, democratic legitimacy should trump other considerations, and elected legislators are far more politically accountable than unelected judges.”).

387. See Richard Lazarus, *Congressional Descent: The Demise of Deliberative Democracy in Environmental Law*, 94 GEO. L.J. 619, 621–22 (2006) (“Congress’s ability to serve a constructive role in the ongoing process of environmental lawmaking has virtually disappeared. . . . Now, Congress passes almost no coherent, comprehensive environmental legislation and displays no ability to deliberate openly and systematically in response to changing circumstances and new information.”).

388. *Foster v. Wash. Dep’t of Ecology (Foster II)*, No. 14-2-25295-1 SEA, 2015 WL 7721362 (Wash. Super. Ct. Nov. 19, 2015), has been described as a victory because it “clearly announced the atmosphere as a public trust asset.” Mary Christina Wood & Charles W. Woodward, IV, *Atmospheric Trust Litigation and the Constitutional Right to a Healthy Climate System: Judicial Recognition at Last*, 6 WASH. J. ENV’T L. & POL’Y 634, 674–75 (2016). However, the trial court’s expansion of the public trust to include the atmosphere was reversed on appeal. See *Foster v. Wash. Dep’t of Ecology*, 200 Wash. App. 1035, 2017 WL 3868481 (2017).

389. See Rojanasakul, Flavelle, Migliozi & Murray, *supra* note 90 (“Oklahoma is working to determine how much water remains in its aquifers”); Dionne Searcey & Delger Erdenesanaa, *A Tangle of Rules To Protect America’s Water Is Falling Short*,

baseline of the current amount of groundwater, with regularly scheduled monitoring to assess levels in the future.

Once that information is available, states can use it to set and calibrate standards for withdrawals. There are different approaches here: States could require groundwater withdrawal permits for any withdrawals, permits for withdrawals by region, or they can simply set maximum withdrawal amounts over a set period of time. In any case, states should be mindful of past legislation that exempted so-called “de minimis” withdrawals that, in the aggregate, turned out to be a significant amount of groundwater.³⁹⁰ The key is that the state sets forth standards for how much groundwater can be withdrawn at any given time.

Those standards can build on existing law. A number of states already require permits for new wells.³⁹¹ Conditions on use—such as withdrawal limits and periodic mandatory reporting—can be built into those existing programs.

Quality standards relate to the impairment of the groundwater. These standards can be modeled on other state water quality standards—including those formulated under the Clean Water Act³⁹²—or they can contain their own specific thresholds. Quality standards should take into account the fact that groundwater quality can face unique threats—saltwater intrusion, agricultural runoff, and MTBE to name a few.³⁹³ As with quantity standards, quality standards should include oversight: regularly scheduled monitoring of groundwater quality.

There are myriad ways for a state to articulate its preferred groundwater standards. But the important point is that it has groundwater standards at all. Statewide standards provide a nonimpairment floor, a benchmark by which public and private uses of groundwater can be measured.

3. Local Governance

How will statewide standards be implemented? Local governments are well-positioned to carry out this function. As a preliminary matter, local governments are co-trustees of the public trust doctrine.³⁹⁴ Like the

N.Y. TIMES (Nov. 2, 2023), <https://www.nytimes.com/interactive/2023/11/02/climate/us-groundwater-depletion-rules.html> (“The majority of states don’t know how many wells they have . . .”).

390. See Bowlin, *supra* note 186, at 9.

391. See *supra* notes 167–172 and accompanying text.

392. See *What Are Water Quality Standards?*, EPA, <https://www.epa.gov/wqs-tech/what-are-water-quality-standards> [<https://perma.cc/EX2Z-TZXE>] (May 15, 2024).

393. See *supra* Section I.E.

394. See, e.g., *State v. Village of Lake Delton*, 286 N.W.2d 622, 629 (Wis. Ct. App. 1979) (“[M]any cases recognize that [the power to administer the public trust] may

state itself, local governments already have obligations to protect public trust assets.³⁹⁵ So delegating implementation of groundwater protection measures to local governments is consistent with how the public trust doctrine already operates.

Moreover, local governments are currently in positions of monitoring and distributing groundwater. As the framers of California's SGMA noted, local governance of groundwater restrictions is a concession to current realities.³⁹⁶ Rather than adding another layer to the thicket of groundwater law, using local governments to implement groundwater standards works within the existing system.

There are intrinsic benefits, too, to local governance. As local government scholars have long argued,³⁹⁷ decentralized governance has a number of distinct advantages, among them local knowledge.³⁹⁸ Local officials are "on the ground" and thus hold "the nuanced knowledge and local sensibilities necessary" to make decisions that affect local resources.³⁹⁹ Indeed, "project-specific land use decisions are essentially and fundamentally land use mediations, the resolutions of which ultimately depend on knowledge of local conditions and interests, not technical expertise."⁴⁰⁰ These are precisely the skills needed to implement statewide groundwater standards and attune them to local conditions.

4. Broad Judicial Enforcement

In the public trust doctrine context, resort to judicial oversight is a common and well-established means of checking both governmental and

be delegated to other units of government, including municipalities, for purposes in furtherance of the trust."); *Fafard v. Conservation Comm'n*, 733 N.E.2d 66, 71 (Mass. 2000) ("[O]nly the Commonwealth, or an entity to which the Legislature properly has delegated authority, may administer public trust rights."); *Kelly v. 1250 Oceanside Partners*, 140 P.3d 985, 1004 (Haw. 2006) ("[T]he County has a duty, as a political subdivision of the State, to protect the waters located adjacent to the Property.").

395. See cases cited *supra* note 394.

396. See *supra* notes 182–184 and accompanying text.

397. See, e.g., Richard Briffault, *Our Localism: Part I—The Structure of Local Government Law*, 90 COLUM. L. REV. 1 (1990); Richard Briffault, *Our Localism: Part II—Localism and Legal Theory*, 90 COLUM. L. REV. 346, 395–97 (1990); Gerald E. Frug, *The City as a Legal Concept*, 93 HARV. L. REV. 1057, 1068 (1980).

398. See Ashira Pelman Ostrow, *Land Law Federalism*, 61 EMORY L.J. 1397, 1442 (2012).

399. *Id.*

400. Alejandro Esteban Camacho, *Mustering the Missing Voices: A Collaborative Model for Fostering Equality, Community Involvement and Adaptive Planning in Land Use Decisions, Installment Two*, 24 STAN. ENV'T L.J. 269, 326 (2005).

private actors.⁴⁰¹ Indeed, Joseph Sax’s seminal 1970 law review article that reinvigorated the doctrine is subtitled: “Effective Judicial Intervention.”⁴⁰² Much of the public trust doctrine’s development has come through litigation.⁴⁰³

Judicial enforcement of the public trust doctrine—including groundwater—is essential. It counters private and public impulses to squander important natural resources.⁴⁰⁴ It provides a forum for publicly redressing impairments of those natural resources.⁴⁰⁵ And it allows judges themselves to be stewards of natural resources.⁴⁰⁶

However, rather than limiting plaintiffs to state or local governments, members of the public should be able to sue as well. Citizen suits—a common feature of environmental law⁴⁰⁷—are a crucial tool to enforce groundwater protections. Their benefits are myriad, among them that they: (1) allow enforcement when political or resource limitations bind government actors; and (2) allow those most impacted by natural resource impairments to have a voice in the process.⁴⁰⁸

Concededly, citizen suit provisions are most often added to statutory environmental laws, not a common law-based doctrine like the public

401. See, e.g., Ryan Shannon, *Developments in the Public Trust*, 45 ENV’T L. 257, 257 (2015) (describing a symposium on the public trust doctrine wherein many participants focused on caselaw developments).

402. See Sax, *supra* note 5.

403. See Shannon, *supra* note 401.

404. See Blumm & Moses, *supra* note 360, at 2; Jordan M. Ellis, Comment, *The Sky’s the Limit: Applying the Public Trust Doctrine to the Atmosphere*, 86 TEMP. L. REV. 807, 819–20 (2014) (“Judicial enforcement of the public trust doctrine helps to maintain the checks and balances of a democracy. It also provides a level of protection against the destruction of irreplaceable public resources.”); Haochen Sun, *Towards a New Social-Political Theory of the Public Trust Doctrine*, 35 VT. L. REV. 563, 576 (2011) (“[T]he public trust doctrine is, by nature, a judicially-created and enforced tool that empowers the judiciary to threaten, disrupt, and even overturn legislative and administrative decisions to regulate public resources and protect private property.”).

405. Sun, *supra* note 404, at 593 (“By providing the venue for human interactions, the public trust doctrine fosters a culture of political participation, thus enriching human socialization and promoting democratic governance.”).

406. *Id.* at 608 (“Central to the judicial scrutiny of the government’s decisions is an inquiry as to whether the government has fulfilled its role as a steward of public trust resources. Acting as a separate steward of public trust resources, courts investigate whether the government has fulfilled its responsibilities for serving the public interest.”).

407. See James R. May, *The Availability of State Environmental Citizen Suits*, NAT. RES. & ENV’T, Spring 2004, at 53, 53 (“Sixteen of the nation’s principal federal environmental laws invite citizens to sue as ‘private attorneys general’ to force compliance, or to force agencies to perform mandatory duties.”).

408. See James R. May, *Now More than Ever: Trends in Environmental Citizen Suits at 30*, 10 WIDENER L. REV. 1, 5 (2003) (arguing that citizen suits “foster the rule of law, agency accountability, representational democracy, and environmental stewardship.”).

trust.⁴⁰⁹ Certainly, there are instances of citizens enforcing the public trust doctrine without an express citizen suit provision.⁴¹⁰ But there are other examples of citizen-led public trust lawsuits that falter for lack of standing.⁴¹¹ In one extreme case, the Wisconsin Supreme Court disposed of a public trust case brought by the Wisconsin Attorney General, holding that the public trust doctrine did not provide standing.⁴¹² Providing an express citizen suit provision for members of the public to enforce the public trust doctrine—including groundwater—dispels any doubt as to standing.

* * *

The foregoing provides a series of tenets for entrusting groundwater in ways that are intended to give practical effect to groundwater's inclusion in the public trust doctrine. Certainly, there are many ways to do so, and the list above represents an ideal scenario. What is important, however, is that it is not enough to simply declare groundwater a public trust asset and be done with it. Instead, states and localities should be mindful, proactive, and intentional about entrusting groundwater. Undoubtedly, the details of withdrawal limits, permitted uses, and the day-to-day tasks taken to protect groundwater will need to be worked out by affected stakeholders—the state, localities, and users. But it is important to envision a framework for how those details can be resolved; that is what the tenets of entrusting groundwater can provide.

CONCLUSION

States have increasingly been faced with questions over their public trust doctrines and the groundwater beneath their feet. This dynamic area

409. See *May supra* note 407, at 53.

410. See, e.g., *Chelan Basin Conservancy v. GBI Holding Co.*, 413 P.3d 549, 560–61 (Wash. 2018) (holding that conservation group had standing to bring public trust claim as a particular type of common law public nuisance claim).

411. See, e.g., *Iowa Citizens for Cmty. Improvement v. State*, 962 N.W.2d 780, 793 (Iowa 2021) (dismissing environmental group's public trust lawsuit for lack of standing); *Mouton v. Dep't of Wildlife & Fisheries*, 657 So.2d 622, 627–28 (La. Ct. App. 1995) (“While each member of the general public has an interest, in equal measure with all other citizens of the state, in the public trusts of the state's various natural resources, including wildlife and fisheries, no one citizen or citizen group has a ‘special interest’ beyond that enjoyed by the general public.”).

412. See *State v. City of Oak Creek*, 2000 WI 9, ¶ 50, 605 N.W.2d 526, 541 (“While the state, or any person suing in the name of the state, may use the public trust doctrine to attempt to establish standing, the attorney general may not use the doctrine in this case because the attorney general is not the state . . . and because he lacks statutory authority to sue in this case.” (citations omitted)).

of law is ripe for clarity: Groundwater *should* be a public trust asset. And states should proactively think through ways to best entrust groundwater as part of their sovereign responsibilities under their public trust doctrines. The United States is at a crossroads in groundwater management. Decades of overuse—indeed abuse—of the resource forces our confrontation with hard choices. What is plain is that doing nothing is woefully insufficient.