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High-Capacity Wells: A Survey of Groundwater Withdrawal Rights and Regulations

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Linda Reid¹

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INTRODUCTION

Although out of sight, groundwater represents a critical portion of the world's freshwater supply. Approximately 30% of the world's freshwater is groundwater,⁶ and 2.5 billion people depend solely on groundwater to satisfy their daily water consumption needs.⁷ In the United States, approximately 20% of total freshwater withdrawals come from groundwater sources.⁸ Historically, these extractions occurred through crude devices that limited efficiency⁹ This changed in 1937 with the invention of the high-speed centrifugal pump, which drastically increased the rate at which groundwater could be extracted.¹⁰ Current practices in many regions of the United States permit groundwater withdrawals that exceed the rate at which the aquifers naturally replenish, leading to sustained and long-term depletion.¹¹

Agricultural irrigation accounts for the single largest use of groundwater in the United States.¹² Satisfying this demand often requires utilizing high-capacity wells, which are wells that, together with all other wells on a property, have the ability to withdraw water over an established daily threshold.¹³

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⁶ Deepak Khare, Manesh Kumar Jat & P.K. Minshra, *Groundwater Hydrology: An Overview*, in SUSTAINABLE HOLISTIC WATER RESOURCES MANAGEMENT IN A CHANGING CLIMATE 4-1 (2017).

⁷ Jenny Grönwall & Kerstin Danert, *Regarding Groundwater and Drinking Water Access through a Human Rights Lense: Self-Supply as a Norm*, 12 Water 419, 419 (2020).

⁸ Jacob D. Peterson-Perlman et al., *Critical Issues Affecting Groundwater Quality Governance and Management in the United States*, 10 Water 735, 735 (2018).

⁹ BARTON H. THOMPSON, JR. ET AL., LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 447 (6th ed. 2018).

¹⁰ *Id.*

¹¹ Leonard F. Konkikow, *Long-Term Groundwater Depletion in the United States*, 53 Groundwater 2, 2-4 (2015).

¹² Agriculture accounts for approximately 80% of the nation's consumption of surface and ground water. U.S. DEP'T OF AGRIC. ECON. RESCH. SERV., *Irrigation & Water Use*, <https://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use/> (last updated Sept. 23, 2019).

¹³ See *High-Capacity Wells*, WIS. DEP'T OF NAT. RES., <https://dnr.wisconsin.gov/topic/Wells/HighCap> (last visited Mar. 3, 2021).

High-capacity wells have the ability to reach withdrawal rates that exceed natural groundwater recharge and disrupt the hydrological cycle as a result.¹⁴ Unlimited and unregulated groundwater withdrawals through the use of high-capacity wells are not sustainable.

Absent an overarching federal framework to avoid depleting underground aquifers, the regulation of high-capacity wells is left largely to the separate states. Groundwater and surface water supplies are part of a single hydrological system, but the law of groundwater rights does not recognize this relationship.¹⁵ While surface water is covered by two common law doctrines (riparianism and prior appropriation), five groundwater doctrines have some acceptance (absolute ownership, American reasonable use, correlative rights, the Restatement (Second) of Torts, and prior appropriation).¹⁶ However, few states apply any one of these doctrines in a uniform way.¹⁷ Furthermore, state regulatory frameworks reflect varying degrees of scientific understanding of hydrology.¹⁸ As a result, groundwater management in the United States has been highly fragmented.¹⁹

An inefficient and piecemeal regulatory framework at the state level can have consequences, including: overallocation of groundwater, reduction in levels of surface waters that are supplied by the groundwater, agricultural supply problems, impaired water quality, and land subsidence.²⁰ Furthermore, mismanagement can have economic consequences because of the expenses associated with drilling deeper wells in response to dropping water table levels and costs that must be expended to remediate declining water quality.²¹ There may be additional consequences of over-appropriating aquifers with high-capacity wells that are “not yet apparent because the processes of groundwater movement occur slowly and the effects of capture are not always immediately visible.”²² Groundwater is a shared resource, and the consequences of improper or inefficient regulation of wells withdrawing large quantities of water are both localized and far-reaching.

¹⁴ ROBERT GLENNON, *WATER FOLLIES: GROUNDWATER PUMPING AND THE FATE OF AMERICA’S FRESH WATERS* 2 (2002).

¹⁵ *Id.*

¹⁶ *Id.* at 449.

¹⁷ *Id.*

¹⁸ Melissa K. Scanlan, *Droughts, Floods, and Scarcity on a Climate-Disrupted Plane: Understanding the Legal Challenges and Opportunities for Groundwater Sustainability*, 37 Va. Envtl. L.J. 52, 88 (2019).

¹⁹ *Id.* (“While individuals are focused on specific ‘rights’ to withdraw water, there is a need for an overarching holistic management of the entire common pool resource as an integrated system where ground and surface waters, and the quality and quantity of these waters, are viewed together.”)

²⁰ *Groundwater Decline and Depletion*, U.S. GEOLOGICAL SURV., https://www.usgs.gov/special-topic/water-science-school/science/groundwater-decline-and-depletion?qt-science_center_objects=0#qt-science_center_objects (last visited Mar. 5, 2021).

²¹ GLENNON, *supra* note 13, at 32.

²² *Id.* at 77.

This report proceeds as follows. Part I discusses the limited role of the federal government plays in managing groundwater resources. Part II provides an overview of the legal rights and obligations pertaining to the use of groundwater and examines the regulatory frameworks in place for groundwater withdrawal via high-capacity wells. Part III offers a brief conclusion.

I. FEDERAL LAW

The federal government is generally authorized to act in the public’s interest to protect the *quality* of the nation’s waters. In 1972, Congress passed the Federal Water Pollution Control Act, which is commonly referred to as the Clean Water Act (CWA).²³ Designed “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters,”²⁴ regulates discharges of pollutants from point sources.²⁵ The CWA defines the phrase “discharge of a pollutant” to mean “any addition of any pollutant to navigable waters from any point source.”²⁶ A “point source,” is “any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.”²⁷ Historically, the CWA has not been applied to protect groundwater.²⁸ However, the Supreme Court recently held that indirect discharges of pollutants to groundwater are subject to the CWA if they are the “functional equivalent” of a direct discharge.²⁹ Uncertainty surrounding the definition of key terms in the CWA has resulted in a patchwork regulatory framework.³⁰

The federal government’s role in managing and allocating groundwater resources (*quantity*) is much more limited. While the federal government generally does not have direct authority to monitor

²³ *History of the Clean Water Act*, U.S. ENV’T PROT. AGENCY, epa.gov/laws-regulations/summary-clean-water-act (last updated Jun. 15, 2020).

²⁴ 33 U.S.C. § 1251 *et seq.*

²⁵ For an overview of events leading up to the CWA, see William L. Andreen, *The Evolution of Water Pollution Control in the United States—State, Local, and Federal Efforts*, 1789-1972: Part I, 22 *Stanford Envtl. L. J.* 145 (2003), and *Part II*, 22 *Stanford Envtl. L. J.* 215 (2003). For a retrospective of the CWA and a discussion of its limitations see William L. Andreen, *Success and Backlash: The Remarkable (Continuing) Story of the Clean Water Act*, 4 *Geo. Wash. J. of Energy & Envtl. L.* 25 (Winter 2013).

²⁶ 33 U.S.C. § 1362(12).

²⁷ *Id.* § 1362(14).

²⁸ DAVID H. GETCHES ET. AL., *WATER LAW IN A NUTSHELL* 272 (5th ed. 2015). Some courts have held that the NPDES permit program covers discharges of pollutants to groundwater that is hydrologically connected to surface waters. *See, e.g.*, *Idaho Rural Council v. Bosma*, 143 F. Supp. 2d 1169 (D. Idaho 2001); *Sierra Club v. Colorado Refining Co.*, 838 F. Supp. 1428 (D. Colo. 1993). However, most courts have held that the statute does not reach that far. *See, e.g.*, *Village of Oconomowoc Lake v. Dayton Hudson Corp.*, 24 F. 3d 962 (7th Cir.1994); *Exxon Corp v. Train*, 554 F.2d 1310 (5th Cir. 1977).

²⁹ *County of Maui, Hawaii v. Hawaii Wildlife Fund*, 140 S. Ct. 1462, 1468 (2020). For a discussion of the implications of the Court’s decision, see Rachel L. Wagner, *County of Maui, Hawaii v. Hawaii Wildlife Fund*, 0 *Pub. Land & Res. L. Rev.* 9 (2020).

³⁰ Brigit Rollins, *Waters of the United States: Timeline of Definitions*, NAT’L AGRIC. L. CTR. 1 (Apr. 21, 2020), <https://nationalaglawcenter.org/wp-content/uploads/assets/articles/WOTUS-Timeline.pdf>.

and manage groundwater, several federal agencies help to inform state decision-making by providing assessments and information on groundwater trends.³¹ Beyond this limited role, the responsibility for managing groundwater belongs to the states. The exception to this pertains to groundwater on land reserved to the federal government.³² The Supreme Court stated that this exception is rooted in “Congress’s explicit deference to state water law in other areas.”³³ Thus, the default is that the authority to manage issues related to groundwater quantity, such as the use of high-capacity wells, is deferred to the states.

II. STATE LAW

The rules and regulations for the allocation, withdrawal, and use of groundwater are made by the governments of the several states, as opposed to by the federal government.³⁴ States regulate groundwater rights through application of common law, state statutes and regulations, or judicial precedent.³⁵ The rules that states adopt tend to incorporate more than one theory of groundwater rights.³⁶ As a result of these state-by-state differences, the regulatory framework for the nation’s groundwater is complicated and often contradictory.

A. GROUNDWATER AS A PROPERTY RIGHT

A water right authorization is the right to use groundwater in a prescribed manner. States differ in who they consider to be the legal owner of the water right authorization. The right to withdraw and use groundwater is owned either by: (1) the overlying landowner, or (2) the public, held by the state. According to the Water Systems Council, there is a clear trend of increasing conflict between private property rights in groundwater and public rights in groundwater.³⁷

While the Supreme Court has recognized a limited form of property rights in groundwater use, a state may still regulate this right. However, governmental regulation that goes “too far” by denying a landowner of the “economically viable use” of their property may be considered a

³¹ U.S. Geological Survey (USGS), NASA, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Agriculture (USDA); PETER FOLGER, ET AL., CONG. RSCH. SERV., R425259 THE FEDERAL ROLE IN GROUNDWATER SUPPLY: OVERVIEW AND LEGISLATION IN THE 115TH CONGRESS 16 (2018).

³² *Winters v. United States*, 207 U.S. 564, 575-77 (1908).

³³ *United States v. New Mexico*, 438 U.S. 696 (1978).

³⁴ John D. Leshy, *Interstate Groundwater Resources: The Federal Role*, 14 *Hastings W-Nw. J. Envtl. L. & Pol’y* 1475, 1480 (2008).

³⁵ ALEXANDER BENNET ET AL., *GROUNDWATER LAWS AND REGULATIONS: A PRELIMINARY SURVEY OF THIRTEEN U.S. STATES* 7 (2d. ed 2020).

³⁶ GETCHES ET AL., *supra* note 27, at 226.

³⁷ *Who Owns the Water?*, WATER SYSTEMS COUNCIL 3, <http://nationalaglawcenter.org/wp-content/uploads/2017/03/Who-Owns-the-Water-2016-Update-FINAL.pdf> (last updated Aug. 2016).

“regulatory taking.”³⁸ The Constitution provides that the government may not take private property for public use without just compensation.³⁹ While the regulatory authority of a state over groundwater is not unlimited, the overall trend appears to be toward increased state regulation of groundwater resources.⁴⁰ This generally requires a prospective user to comply with applicable state procedures to obtain a groundwater right authorization. This process does not result in the user obtaining ownership of the actual groundwater, but the right to use the groundwater in a way that is consistent with limitations imposed by the state.

1. Overlying Common Law Doctrines Governing the Right to Withdraw and Use Groundwater

Common law principles serve as the foundation for how a water use right is obtained in each state. Common law is “[t]he body of law derived from judicial decisions, rather than statutes or constitutions.”⁴¹ While not a groundwater management law, common law serves as the theoretical basis used for managing groundwater withdrawals and uses in each state.

States generally follow one of five groundwater law doctrines:

- (a) **Absolute ownership.** The oldest and simplest doctrine, it gives landowners an unlimited right to withdraw any water beneath their land for any purpose.⁴² Also referred to as “capture” or the English Rule.⁴³
- (b) **Reasonable use.** The predominant groundwater doctrine in the United States, it is a modified version of absolute ownership wherein groundwater must be put to a reasonable use and must be used on the overlying land.⁴⁴ Also referred to as the “American Rule.”⁴⁵
- (c) **Correlative rights.** Described as “riparianism on its side,”⁴⁶ it requires that groundwater be shared among overlying landowners.⁴⁷ In times of shortage, overlying owners must limit withdrawals to a “fair and just proportion” of the supply.⁴⁸

³⁸ *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992).

³⁹ U.S. CONST. amend. V.

⁴⁰ GLENNON, *supra* note 13, at 219.

⁴¹ *Common law*, BLACK’S LAW DICTIONARY (11th ed. 2019).

⁴² THOMPSON ET AL., *supra* note 8, at 472.

⁴³ *Id.*

⁴⁴ Linda A. Malone, *The Necessary Interrelationship Between Land Use and Preservation of Groundwater Resources*, 9 UCLA J. J. Envtl. L. & Pol’y 1, 6 (1990).

⁴⁵ *Adams v. Lang*, 553 So.2d 89, 91 (Ala. 1989).

⁴⁶ THOMPSON ET AL., *supra* note 8, at 472.

⁴⁷ *Id.*

⁴⁸ *Katz v. Walkinshaw*, 74 P. 766, 772 (Cal. 1903).

- (d) **Restatement of Torts Reasonable Use.** A combination of the English and American rules,⁴⁹ it imposes liability for withdrawals that cause unreasonable harm to others.⁵⁰ The Restatement “attempts to balance equities and hardships among competing users.”⁵¹
- (e) **Prior Appropriation.** A “first in time, first in right” system of ownership.⁵² The first landowner to put a water source to beneficial use is granted a priority right.⁵³

A common thread running through these doctrines is an emphasis on individualism.⁵⁴ “That is, like the common law of torts, the doctrines contemplate ‘freedom of action where the effects of individual action cannot be demonstrated with specific proof.’”⁵⁵ Additionally, each doctrine is a variation on reasonableness as it relates to the withdrawal and use of groundwater. However, reasonableness is defined in various ways as it relates to each doctrine. Moreover, a state may modify a doctrine from its traditional form or combine aspects from multiple systems.⁵⁶ Thus, a prospective groundwater user should consult with the relevant agency or department in their state to ensure that they properly secure a groundwater use right.

Table 1 summarizes the distribution of the different approaches to groundwater rights across the United States.

⁴⁹ *Who Owns the Water?*, *supra* note 36, at 5.

⁵⁰ RESTATEMENT (SECOND) OF TORTS § 858 (1979)

⁵¹ GETCHES ET AL., *supra* note 27, at 236.

⁵² THOMPSON ET AL., *supra* note 8, at 472.

⁵³ Malone, *supra* note 43, at 8.

⁵⁴ THOMPSON ET AL., *supra* note 8, at 473.

⁵⁵ *Id.*

⁵⁶ THOMPSON ET AL., *supra* note 8, at 449.

Table 1: Summary of Groundwater Rights in the United States

Groundwater Allocation	States	Total
Absolute Ownership	CT, GA, IN, LA, ME, MA, MS, RI, TX	9
Reasonable Use	AL, AZ, AR, FL, IL, KY, MD, MO, NH, *NJ, NY, NC, PA, VA, WV	*15
Correlative Rights	DE, HI, IA, MN, *NJ, VT	*6
Restatement (Second) of Torts Reasonable Use	MI, OH, WI	3
Prior Appropriation	AK, CO, ID, KS, MT, NV, NM, ND, OR, SD, UT, WA, WY	14
Reasonable Use/Correlative Rights	CA, OK, NE, TN	4
No Common Law	SC	1

*New Jersey common law as it pertains to groundwater is unclear. We included it in both the Reasonable Use and Correlative Rights totals.

It is also important to note that while withdrawing large amounts of groundwater from underground aquifers may impact surface waters, many states use a different common law water rights system to regulate groundwater allocations and uses than the one used for surface water.⁵⁷ The application of different common law rules likely originated from a misunderstanding of the connection between surface and ground waters. However, some states have begun to consider the connectivity of surface water and groundwater by applying the same common law concept to each and managing them in an integrated manner. States that are most effective in regulating groundwater withdrawals and uses tend to consider the interconnection with surface waters.

a. Absolute Ownership

Under the absolute ownership rule, an overlying landowner can withdraw an unlimited amount of groundwater from the aquifer below their land and put it to any use. Under this rule, a groundwater use right is a property right. Thus, the landowner may “intercept the groundwater which would otherwise have been available to a neighboring water user and may even monopolize the yield of an aquifer without incurring liability.”⁵⁸

⁵⁷ *Id.*

⁵⁸ Teresa N. Lukas, *When the Well Runs Dry: A Proposal for Change in the Common Law of Ground Water Rights in Massachusetts*, 10 B.C. Envtl. Aff. L. Rev. 455, 469 (1982).

The doctrine originates from the English rule set forth in *Acton v. Blundell*.⁵⁹ In *Acton*, the Court of Exchequer held that a landowner has a property interest in groundwater, and what is “his is his alone from the heavens to the depths of the earth.”⁶⁰ This property interest gave the landowner the legal right to take and use as much groundwater as they wanted without incurring liability. As a result, there was very little government regulation over the diversion and use of groundwater.

The absolute ownership rule was initially used in a majority of states prior to the early 1900s.⁶¹ However, the absolute ownership rule posed challenges by threatening the groundwater supply and leaving landowners without legal remedies for harms suffered by unlimited pumping by a neighboring landowner.⁶² As a result, many states have moved away from the absolute ownership rule in its traditional form, instead opting for the reasonable use rule or correlative rights approach.⁶³ States that do continue to adhere to the absolute ownership rule have generally modified it to create an exception where an overlying landowner is liable for pumping groundwater in a willfully malicious or injurious manner.⁶⁴ Additionally, many of these states have enacted some type of registration or permitting system to prevent unregulated withdrawals. Texas is the only state that continues to follow the rule of capture in its traditional form (applies outside of special management areas).

States following: CT, GA, IN, LA, ME, MA, MS, RI, TX

b. Reasonable Use (American Rule)

More than a dozen states modified the rule of capture by adding “reasonable use” criteria to resolve conflicts between competing well owners.⁶⁵ A series of conflicts between cities that sunk high-capacity wells in rural areas to extract groundwater for use in the city led to the creation of the reasonable use rule.⁶⁶ Courts imposed a reasonableness restriction on all pumpers to protect farmers from unfair competition.⁶⁷

Under the reasonable use doctrine, an overlying landowner may withdraw an unlimited amount of groundwater from beneath their land, even if to the detriment of a neighboring landowner,

⁵⁹ 152 Eng. Rep. 1223 (Ex. Chamb. 1843).

⁶⁰ *Acton v. Blundell*, 12 M. & W. 324 (1843).

⁶¹ *Who Owns the Water?*, *supra* note 36, at 4.

⁶² GETCHES ET AL., *supra* note 27, at 228 (noting that the absolute ownership doctrine “leads to premature depletion of the resource and leaves groundwater users at the mercy of nearby high-capacity pumpers.”).

⁶³ *Who Owns the Water?*, *supra* note 36, at 1.

⁶⁴ *Id.* at 4.

⁶⁵ Ronald Kaiser & Frank F. Skiller, *Deep Trouble: Options for Managing the Hidden Threat of Aquifer Depletion in Texas*, 32 Tex. Tech. L. Rev. 249, 266 (2001).

⁶⁶ DAN TARLOCK, LAW OF WATER RIGHTS AND RESOURCES § 4:8 (2020)

⁶⁷ *Id.* (citing *Volkman v. City of Crosby*, 120 N.W.2d 18 (N.D. 1963) and *Martin v. City of Linden*, 667 So.2d 732 (Ala. 1995)).

qualified by the requirement that the use of the groundwater be “reasonable.”⁶⁸ Traditionally, groundwater use is *per se* reasonable if it is made on the overlying land.⁶⁹ “The rule is essentially the rule of absolute ownership with exceptions for wasteful and off-site use.”⁷⁰

This provides a right holder with a legal remedy for harm suffered from the pumping of a neighboring landowner if the withdrawal and use is found to be unreasonable. “Reasonableness” is broadly construed and generally means that pumping can be done for any “beneficial use,” meaning any use that is not wasteful and that has a reasonable relationship to the overlying land.⁷¹ However, because land ownership is the source of the use right under this rule, off-site uses are categorically deemed unreasonable, regardless of how beneficial the use is.⁷²

With a few exceptions, this doctrine is predominantly applied in the eastern United States⁷³ Many of the states that adhere to this doctrine have enacted some registration or permitting system to monitor withdrawals and ensure that the subsequent use is reasonable.

States following: AL, AZ, AR, **CA, FL, IL, KY, MD, MO, NE, NH, *NJ, NY, NC, **OK, PA, **TN, VA, WV

*Common law unclear

**Also follows Correlative Rights

c. Correlative Rights

The correlative rights doctrine allocates the use of groundwater based on land ownership of land above a basin or aquifer.⁷⁴ However, owners of land over a single aquifer or basin are each limited to a reasonable share of the total supply.⁷⁵ This rule was first recognized in *Katz v. Walkinshaw*, where the California Supreme Court held that in times of shortage, the amount of groundwater that an overlying landowner can withdraw is limited to a “fair and just proportion of the underlying supply.”⁷⁶ The “fair and just proportion” of an overlying owner has traditionally been determined by the ratio of land owned overlying the aquifer⁷⁷

⁶⁸ THOMPSON ET AL., *supra* note 8, at 472.

⁶⁹ See, e.g., *Martin v. City of Linden*, 667 So.2d 732 (Ala. 1995); *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. Ct. App. 1971); *Finley v. Teeter Stone, Inc.*, 248 A.2d 106 (Md. 1968); *Willis v. City of Perry*, 60 N.W. 727, 730 (Iowa 1894).

⁷⁰ Lukas, *supra* note 57, at 484.

⁷¹ THOMPSON ET AL., *supra* note 8, at 472.

⁷² Corwin W. Johnson, *What Should Texas Do About the Rule of Capture?*, in 100 YEARS OF THE RULE OF CAPTURE: FROM EAST TO GROUNDWATER MANAGEMENT 12 (2004).

⁷³ GLENNON, *supra* note 13, at 30.

⁷⁴ GETCHES ET. AL, *supra* note 27, at 229.

⁷⁵ *Id.*

⁷⁶ 74 P. 766, 772. (Cal. 1903).

⁷⁷ *Tehachapi-Cummings Water Dist v. Armstrong*, 122 Cal. Rptr. 918, 924-25 (Ct. App. 1975).

In California surplus groundwater may be used on lands that do not overlie the aquifer.⁷⁸ The doctrine of prior appropriation governs conflicts between non-overlying users.⁷⁹ However, a non-overlying user is subordinate to an overlying owner regardless of priority relative to the non-overlying user.⁸⁰ However, this aspect of California's allocation scheme has been rejected by other jurisdictions adopting correlative rights.⁸¹

In contrast with reasonable use and absolute ownership, the correlative rights doctrine does not vest ownership rights in the water or recognize an unlimited right to pump.⁸² Rather, the correlative rights doctrine maintains that the power to allocate water resources is held by the courts.⁸³ Therefore, overlying owners and non-overlying users have co-equal or correlative rights in the reasonable, beneficial use of groundwater.⁸⁴ "The most important distinguishing feature of the correlative rights doctrine, however, is its recognition that adjoining lands may be underlain by a common, shared aquifer."⁸⁵

States following: **CA, DE, HI, IA, **NE, MN *NJ, **OK, **TN, VT

**Common law unclear*

***Also follows Reasonable Use Rule*

d. Restatement (Second) Of Torts Reasonable Use

The Restatement (Second) of Torts approach to groundwater management combines the traditional English rule of absolute ownership with the American reasonable use rule.⁸⁶ However, the Restatement considers the nature of the competing uses and the relative burdens imposed upon each user and it attaches no special significance to the use of the water on overlying land.⁸⁷ It attempts to provide specific criteria for comparing the reasonableness of competing uses of groundwater.⁸⁸ Under the doctrine, a well owner is not liable for withdrawal of groundwater unless the withdrawal:

- (a) unreasonably causes harm to a neighbor by lowering the water table or reducing artesian pressure;

⁷⁸ See *Santa Maria v. Adam*, 149 Cal. Rptr. 3d 491, 502 (Cal. Ct. App. 2012).

⁷⁹ TARLOCK, *supra* note 65, at § 4:14.

⁸⁰ *Katz*, 74 P. at 772.

⁸¹ GETCHES ET AL., *supra* note 27, at 229.

⁸² Steven J. Levine, *Ground Water: Louisiana's QuasiFictional and Truly Fugacious Mineral*, 44 La. L. Rev. 1123, 1135 (1984).

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ Water Systems Council, *supra* note 36, at 5.

⁸⁷ GETCHES ET AL., *supra* note 27, at 236.

⁸⁸ Kaiser & Skiller, *supra* note 61 at 264.

- (b) exceeds the owner’s reasonable share of the annual supply or total score of groundwater; or
- (c) has a direct and substantial effect upon a watercourse or lake and unreasonably causes harm to a person entitled to the use of its water.⁸⁹

“Reasonableness” is determined using a balancing test weighing a number of factors.⁹⁰ For example, “[i]t seems to require that a[n] [owner’s] well be reasonably efficient in light of the type of use.”⁹¹ The second restriction employs a correlative rights concept as another foundation of liability.⁹² The final restriction considers administration of groundwater use along with surface appropriation frameworks.⁹³

States following: MI, OH, WI

e. Prior Appropriation

Under the doctrine of prior appropriation, a groundwater user acquires the legal right to use groundwater by being the first to divert it and put it to a (broadly defined) “beneficial use” in a manner consistent with state rules.⁹⁴ The hallmark of this doctrine is “first in time, first in right.”⁹⁵ Once the user has made a diversion and puts the water to beneficial use, the user has a perfected water use right. Prior appropriation protects investments in wells and other businesses that are based on an expectation of a water supply.⁹⁶

A pumper’s place in the priority system is determined by the date of withdrawal. Many states use a registration or permitting system to formally establish a user’s position. The right holder is generally permitted to pump as much groundwater as can be put to beneficial use, subject to their place in the priority system. However, the right does not extend to amounts of groundwater that exceed what can be beneficially used.⁹⁷ In times of shortage when there is not enough groundwater to

⁸⁹ RESTATEMENT (SECOND) OF TORTS § 858 (1979).

⁹⁰ Section 850A of the Restatement (Second) of Torts provides:

[f]actors that affect the determination [of reasonableness] include the following: (a) The purpose of the use, (b) the suitability of the use to the watershed or lake, (c) the economic value of the use, (d) the social value of the use, (e) the extent and amount of harm it causes, (f) the practicality of avoiding the harm by adjusting the use or method of use of one proprietor or the other, (g) the practicality of adjusting the quantity of water used by each proprietor, (h) the protection of existing values of water uses, land, investments, and enterprises, and (i) the justice of requiring the user causing harm to bear the loss.

⁹¹ GETCHES ET AL., *supra* note 27, at 237.

⁹² *Id.*

⁹³ *Id.*

⁹⁴ GLENNON, *supra* note 13, at 16.

⁹⁵ Chennat Gopalkrishnan, *The Doctrine of Prior Appropriation and Its Impact on Water Development: A Critical Survey*, Am. J. Econ. & Soc. 61, 67 (1973).

⁹⁶ GETCHES ET AL., *supra* note 27, at 231 (citing *Farmers Inv. Co. v. Betty*, 558 P.2d 14, 21 (Ariz. 1976))

⁹⁷ Kaiser & Skiller, *supra* note 61 at 263-64.

satisfy the needs of all users, the appropriator who later acquired the water right (junior appropriator) must yield to the right holder who made the diversion first (senior appropriator).⁹⁸

Under this approach to groundwater management, the groundwater belongs to the state. The trend has been to recognize groundwater as a public resource, as opposed to private property.⁹⁹ The state then places rules, requirements, limits, and conditions on groundwater withdrawals and uses to protect groundwater supplies and the other users' rights. States are increasingly replacing common law procedures for determining groundwater use rights with legislative processes, such as registration schemes and permitting systems.¹⁰⁰

The doctrine of prior appropriation tends to be adhered to in western states, where the climate is more arid and fewer tracts of land are adjacent to bodies of surface water. The comparative scarcity of groundwater in the west makes this system attractive because it provides users with "secure property rights."¹⁰¹ In reality, however, these states' systems are "prior appropriation in name only."¹⁰² A strict application of prior appropriation is unworkable and inconsistent with the nature of the resource.¹⁰³ Under a pure prior appropriation system "a senior groundwater appropriator theoretically could demand that no pumping be allowed because virtually any new pumping causes some effect on existing wells."¹⁰⁴

States following: AK, CO, ID, KS, MT, NV, NM, ND, OR, SD, UT, WA, WY

⁹⁸ GLENNON, *supra* note 13, at 16.

⁹⁹ Johnson, *supra* note 68, at 14.

¹⁰⁰ WILLIAM GOLDFARB, WATER LAW 45 (2d ed. 1988).

¹⁰¹ GLENNON, *supra* note 13, at 19.

¹⁰² Dan Tarlock, *An Overview of the Law of Groundwater Management*, 21 Water Res. Rsch 1751, 1752 (1985).

¹⁰³ *Id.*; GETCHES ET AL., *supra* note 27, at 231.

¹⁰⁴ GETCHES ET AL., *supra* note 27, at 231.

Table 2 summarizes key aspects of the groundwater allocation doctrines.

Table 2: Key Aspects of Groundwater Allocation Doctrines

Groundwater Allocation	Basis of Right	Withdrawal Amount	Liability	Off-tract Use
Absolute Ownership	Land ownership	Unlimited	No, unless malicious or wasteful	Yes
Reasonable Use	Land ownership	“Reasonable” for beneficial use	Yes, if unreasonable amount or off-tract use	No
Correlative Rights	Land ownership	Proportional share based on ratio of land owned overlying aquifer	Yes, if exceeding share and injurious	No, unless surplus
Restatement of Torts Reasonable Use	Land ownership	“Reasonable” for beneficial use	Yes, if unreasonable amount and injurious	Yes, if reasonable and no harm
Prior Appropriation	“First in time, first in right”	Specific amount based on priority for beneficial use	No, unless interfering with reasonable pumping level of other users	Yes

B. MANAGING GROUNDWATER WITHDRAWALS

While there has been a trend towards legislative reform in groundwater management policies, commentators have noted that the process has been disorganized.¹⁰⁵ Groundwater statutes evolved independently from surface water statutes due to the complexity of groundwater as a resource¹⁰⁶. Furthermore, groundwater statutes differ from state to states.¹⁰⁷

1. Legal Source of Authority

The legal source of authority for securing a water use right varies by state. Some states allow for a property right to use groundwater to arise largely from common law principles (ex: CA and TX). However, in most states, a pumper must comply with the state’s comprehensive statutory and regulatory schemes in order to obtain a use right. A minority of states take a hybrid approach, where

¹⁰⁵ THOMPSON ET AL., *supra* note 8, at 495 (citing Joseph W. Dellapenna, *Legal Classifications, in 2 WATERS AND WATER RIGHTS* § 19.05 (Amy K Kelley Ed., 3rd ed. 2017).

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

a pumper obtains a use right under common law principles but must follow statutory procedures to exercise that right (ex: CO and AZ).

2. Managing Agency/Regulatory Department

While each state is ultimately authorized to manage the groundwater within its boundaries, each state differs in how they allocate that authority. In some states, groundwater is managed entirely at the state level. In other states, the authority to regulate groundwater withdrawals and uses is allocated to local governments and agencies.

3. Special Management Areas

Many states have designated certain areas as “special management areas” (label differs by state). Groundwater withdrawals and uses in these areas are generally subject to different procedures or more stringent standards. These are generally areas that the state legislature has set aside to allow for more localized control in order to protect the aquifers from being over-appropriated.

Special management areas are prevalent in the western U.S., where groundwater is less available. In all southwestern states, groundwater that is withdrawn from a special permitting area must be put to beneficial use. However, what constitutes “beneficial use” varies by state. Some states provide a broad definition, while others expressly articulate uses that are considered “beneficial.” Additionally, some state laws in special management areas require that the use of the groundwater be “reasonable.” Most states will consider an existing user’s rights when determining whether to permit a proposed withdrawal in these areas. A minority of southwestern states with special management areas require a determination of the impact that a proposed withdrawal would have on an ecosystem before issuing a use right.¹⁰⁸

There are 12 states without any type of special management designation or with designations only applicable to protecting the groundwater quality and preventing pollution (GA, IL, KY, MA, ME, MI, MO, ND, NH, RI, TN, VT).

4. Management of Wells

Each state has different rules and procedures that allow a groundwater user to obtain the right to divert and use groundwater. This is most often accomplished through one or a combination of the following: registration, permitting, and adjudication.

¹⁰⁸ For example, in Utah, the State Engineer is directed to consider the impact that a proposed withdrawal will have on “the natural streams and environment” (§ 73-3-8(1)(b)).

a. Registration

In total, there are 30 states that have some type of registration requirement: AL, AR, CT, HI, IL, IN, KY, LA, MA, MI, MO, MT, NE, NV, NH, NJ, NY, NC, OH, OR, PA, RI, SC, SD, TN, TX, VA, WV, WI, WY. Of these states, only 5 have some type of registration requirement, but no permitting requirements (AL, LA, MO, TN, WV).

Breakdown by common law doctrine:

- Absolute dominion: 6 states
- Reasonable use: 13 states
- Correlative rights: 2 states
- Restatement of Torts (Second) § 858: 3
- Prior appropriation: 5
- Reasonable use/correlative rights: 1
- States without common law: 1

Some of these states require a groundwater facility or withdrawal to be registered with the regulating agency if it has the *capacity* to withdraw a certain amount over a threshold amount. The applicable threshold varies by state. Several states with registration systems in place, all of which are east of the Mississippi River, set the threshold at a capacity to divert groundwater at a rate of 100,000 gallons/day, regardless of whether an actual diversion of that amount is made (AL, IL, IN, MO, NJ, NH, WI). Other states have lower thresholds (in descending order, based on threshold):

- Louisiana, Arkansas: wells with a capacity to pump 50,000 gallons/day (Arkansas exempts any well below this from its registration process)
- Montana: wells exempt from the permitting process with a maximum pump rate of 35 gallons/minute and maximum volume of 25 acre-feet/year
- Kentucky: exempts withdrawals made at a constant rate with an average withdrawal rate of 10,000 gallons/day

Other states require registration for wells that make *actual* diversions above a certain threshold.

North Carolina and Tennessee require registration based on an amount withdrawn in a day (at least 100,000 gallons/day, and at least 10,000 gallons/day, respectively). Other states require a well to be registered if it withdraws either a certain amount of groundwater in a given month or averages a certain rate. These states are (in ascending order, based on threshold):

- Michigan: withdrawals of more than 100,000 gallons/day averaged over any 30-day period
- West Virginia: withdrawals of more than 300,000 gallons/day averaged over any 30-day period
- South Carolina: withdrawals of more than 3 million gallons/month

New Hampshire merges the two by requiring a well to be registered if it withdraws over 20,000 gallons/day, or 600,000 gallons over 30 days.

Several states require registration for certain existing diversions, potentially exempting these wells from other permitting and reporting requirements (CT, HI, MA, OR).

Some states either specifically require registration in special management areas or have the potential to require registration if the need arises (TX, NV, OH, VA, WI).

States with different registration rules include: New York, where agricultural withdrawals can either be registered or reported; Rhode Island, where registration is required for the installation of the well, but not for the withdrawal; and South Dakota, where wells that are exempt from the permitting process have the option to register in order to document the location of their well and its output.

i. Exemptions/Exceptions

Most states exempt wells withdrawing groundwater for certain uses from registration requirements. Some of the more common exempted uses include:

- Agricultural uses (KY, NJ, NC,¹⁰⁹ TN, WV)
- Domestic uses: This typically requires that the well be on a property that serves a single family, or a small number of families, and that the water be used for non-commercial purposes (AR, KY, MI, SC)
- Existing uses (AR, NE, NJ, NY)
- Emergency uses (NH, NY, SC, TN)
- Temporary withdrawals (AL, MI, NH, TN)

Wyoming is the only state that does not exempt any wells or groundwater uses from its registration procedures.

b. Permitting

The majority of states (44) have some type of permitting scheme in place (all except AL, LA, MO, RI, TN, WV).

A groundwater withdrawal permitting regime requires a would-be user to obtain a permit before constructing the well or diverting groundwater. The state legislature may specify whether compliance with the permitting regime is mandatory or discriminatory. The majority of western states use a permit system where a prospective user must submit an application for the right to divert and use groundwater. Permit requirements differ by state. Some states require a user to have a permit

¹⁰⁹ Withdrawal must be less than 1 million gallons/day. N.C. GEN. STAT. § 143-215.22H(b1).

before making a withdrawal anywhere in the state, while others require a user to have a permit only in a special management area.

Many states require a groundwater user to have a permit if they are extracting groundwater from a well in an amount or at a rate above a certain threshold, regardless of what the water will be used for. This can be done either by only regulating withdrawals over a threshold amount or by exempting users withdrawing groundwater in amounts below the threshold. States differ in the duration of time that the amount of water withdrawn is measured over.

- Gallons/day
 - 5,000 gallons/day: AK, MD, WA
 - 10,000 gallons/day: KY,¹¹⁰ MN¹¹¹
 - 25,000 gallons/day: IA
 - 50,000 gallons/day: AR, CT, DE, ME¹¹²
 - 57,600 gallons/day (equals 40 gallons/minute): NH, VT
 - 100,000 gallons/day: GA, MA, NJ, NY, WI
 - 144,000 gallons/day: ME¹¹³
 - 2 million gallons/day: MI
- Gallons/minute
 - 15 gallons/minute: CO
 - 18 gallons/minute: SD
 - 35 gallons/minute: AZ, MT
- Gallons/month
 - 2 million gallons/month: WI

Some states require a groundwater user to have a permit in a legislatively designated special management area, regardless of the amount withdrawn (AZ, AR, HI, IL, NM, SC). Other states require a prospective user to obtain a permit in special management areas when the user withdraws an amount or at a rate above a certain threshold.

- Gallons/day
 - 10,000 gallons/day: PA
 - 20,000 gallons/day: MS
 - 100,000 gallons/day: IN, NC
- Gallons/minute
 - 20 gallons/minute: MT
 - 50 gallons/minute: CO, NE

¹¹⁰ Note: withdrawal must be made at “a relatively constant rate.” 401 KY. ADMIN. REGS. 4:010(2).

¹¹¹ Appropriation cannot total over 1 million gallons/year. Minn. Stat. § 103G.271(4)(a).

¹¹² If withdrawal is within 500 feet of a body of water or at least 75,000 gallons during any week. ME. STAT. TIT. 38, § 480-B(9-A)(A)(1).

¹¹³ If withdrawal is over 500 feet from a body of water, or at least 216,000 gallons during any week ME. § 480-B(9-A)(A)(2).

- Gallons/month
 - 300,000 gallons/month: VA

Some states give local agencies in special management areas the authority to impose permit requirements or more stringent permit requirements (CA, MN, TX). Additionally, groundwater pumpers in states that are part of the Great Lakes Compact may be subject to additional permitting requirements. Finally, a state may subject a user to its permitting regime based on how the groundwater will be used. For example, both Nebraska and New York require that a pumper have a permit when the water will be used for irrigation, regardless of how much will be withdrawn.

i. Exemptions/Exceptions

A state may choose for wells withdrawing certain amounts of groundwater or putting the withdrawn water to certain uses to be exempt from standard permitting requirements. Exempt groundwater uses vary by state. Utah and Wyoming are the only two states that require a permit for all withdrawals, without exception. Common exemptions include:

- Withdrawals for domestic purposes¹¹⁴
- Withdrawals for agricultural purposes¹¹⁵
- Emergency withdrawals¹¹⁶
- Temporary or nonrecurring withdrawals¹¹⁷
- Certain existing water rights may be grandfathered in so as to not require a permit¹¹⁸

¹¹⁴ Examples include: AK (ALASKA ADMIN. CODE TIT. 11, § 93.040(D)), AR (ARIZ. REV. STAT. § 15-22-302(A)), CO (2 COLO. CODE REGS. § 4.2.18 SAYS THAT A PERMIT IS NEEDED UNLESS IT'S FOR A SMALL CAPACITY WELL; COLO. REV. STAT. § 37-90-105(1)(A) DEFINES A DOMESTIC WELL AS A SMALL CAPACITY WELL), FL (FLA. STAT. § 373.219(1)), HI (HAW. REV. STAT. § 174C-48(A)), ID (IDAHO CODE § 42-227), KS (KAN. STAT. ANN. § 82A-705), KY (KY. REV. STAT. ANN. § 151.140), ME (ME. STAT. TIT. 38, § 470-C(2)), MD (MD. CODE ANN., ENVIR. § 5-502(B)(1)), MI (MICH. COMP. LAWS § 324.32727(1)(H)), MN (MINN. STAT. § 103G.271 SUBD. 1 (B)(1)), MS (MISS. CODE ANN. § 51-3-7(1)), NV (NEV. REV. STAT. § 534.315(1)), ND (N.D. CENT. CODE § 61-04-02), OK (OKLA. STAT. TIT. 82, § 1020.3), OR (OR. REV. STAT. § 537.545(1)(D)), SC (S.C. CODE ANN. § 49-5-70(A)(4)), SD (S.D. CODIFIED LAWS § 46-5-8), TX (TEX. WATER CODE ANN. § 36.117(B)(1)), VT (VT. STAT. ANN. TIT. 10, § 1418(B)(2)), WA (WASH. REV. CODE § 90.44.050).

¹¹⁵ Examples include: CO (2 COLO. CODE REGS. § 4.2.18 SAYS THAT A PERMIT IS NEEDED UNLESS IT'S FOR A SMALL CAPACITY WELL; COLO. REV. STAT. § 37-90-105(1)(B) DEFINES A DOMESTIC WELL AS A SMALL CAPACITY WELL), KY (KY. REV. STAT. ANN. § 151.140), ME (ME. STAT. TIT. 38, § 470-C(10)), MD (MD. CODE ANN., ENVIR. § 5-502(b)(2)), NJ (N.J. STAT. ANN. § 7:19-1.4(a)(1) STATES THAT THIS CHAPTER DOES NOT APPLY TO AGRICULTURE AND HORTICULTURE USES), NY (N.Y. ENVTL. CONSERV. LAW § 1501(7)(E)), NC (N.C. GEN. STAT. § 143-215.22H(B1)), VT (VT. STAT. ANN. TIT. 10, § 1418(B)(3)).

¹¹⁶ Examples include: CO (in designated basins: 2 Colo. Code Regs. § 4.2.18 SAYS THAT A PERMIT IS NEEDED UNLESS IT'S FOR A SMALL CAPACITY WELL; COLO. REV. STAT. § 37-90-105(1)(B) DEFINES A WELL USED EXCLUSIVELY FOR FIREFIGHTING PURPOSES AS A SMALL CAPACITY WELL), NH (N.H. REV. STAT. ANN. § 488:11 STATES THAT THIS CHAPTER DOESN'T APPLY TO A DISCRETE WITHDRAWAL ARISING FROM AN EMERGENCY EVENT), NY (N.Y. ENVTL. CONSERV. LAW § 15-1501(7)(a)), SC (S.C. CODE ANN. § 49-5-70(A)(1)), VT (VT. STAT. ANN. TIT. 10, § 1418(b)(1)).

¹¹⁷ Examples include: KY (401 Ky. Admin. Regs. 4:010 sec. 1 (3): permit may be required if withdrawal is made at irregular basis at irregular rate and the water withdrawn represents a significant portion of the available water supply), MI (MICH. COMP. LAWS § 324.32723(13)(b)), NH (N.H. REV. STAT. ANN. § 485-C:2(IX-a) EXEMPTS SHORT-TERM WITHDRAWALS FROM BEING CLASSIFIED AS A "LARGE GROUNDWATER WITHDRAWAL").

¹¹⁸ Examples include: AZ (ARIZ. REV. STAT. § 45-462), AR (ARK. CODE ANN. § 15-22-905(1)(A)), CT (CONN. GEN. STAT. § 22a-368(b)), MT (MONT. CODE ANN. § 85-2-306(4)-(5)).

Interestingly, in determining the amount of groundwater that a user withdraws and whether it is sufficient to warrant a permit, at least one eastern state (Massachusetts) exempts nonconsumptive uses from these calculations.¹¹⁹

c. Adjudication

Vested rights typically require adjudication, where the court decrees the existence of the right. This process results in the definition and confirmation of an existing water right. Adjudication was typically how an appropriator obtained a water use right prior to the establishment of specific agencies that were tasked with defining water rights. One issue with this approach is that the decision of a court applies only to the individual litigants and not to the entire water system.

5. Continued Compliance (Monitoring and Reporting)

Once a pumper obtains the right to appropriate groundwater, there are typically continuing obligations on the user. Some states require groundwater uses to be reported for all groundwater users (AR and HI).

a. For Registered Wells

The vast majority of states with registration procedures require that registrants submit reports. The contents of these reports and the frequency of reporting varies by state. States that require some type of reporting for all registrants include: AL, AR, CT, HI, IL, IN, MA, MO, NH, NC, OH, PA, SC, TN, WV, WI. A small number of states have no reporting requirements for registered wells (RI, SD, WY). Some states require reporting for registered wells in special management areas or give the local regulating department the authority to require users to submit reports (LA, NE, SC, TX). Virginia and West Virginia have thresholds for which a registrant withdrawing groundwater in amounts that exceed must submit information. Michigan has a threshold below which a registrant is subject to less stringent requirements. Finally, Montana requires the well driller to submit a report, not the groundwater user.

b. For Permitted Wells

Some states require all groundwater users who have obtained a permit and are not exempt from the permitting process to report certain information, regardless of the amount of groundwater withdrawn or the use to which it was put.¹²⁰ Additionally, a state may choose to vest local agencies

¹¹⁹ Mass. Gen. Laws ch. 21G, § 4 (“for purposes of determining whether a withdrawal is in excess of the threshold volume, any withdrawal of water for a nonconsumptive use. . . shall not be counted in the volume of water withdrawn.”)

¹²⁰ Examples include: DE (7 Del. Admin. Code § 5.5.3), GA (GA. CODE ANN. § 12-5-987: every person required to get a permit shall file a certified statement of quantities of water used and withdrawn; GA. COMP. R. & REGS. 391-3-2-.08(1)), KY (KY. REV. STAT. ANN. § 151.160(1)), ME (if within 500 feet of a lake or pond) (ME. STAT. TIT. 38 § 470-B),

with the authority to impose reporting requirements on permits.¹²¹ Other states may require certain uses to be reported, such as groundwater used for agricultural purposes.¹²² Finally, some states impose thresholds that differ from the threshold requiring a permit and mandate that groundwater users that exceed the threshold limits report their uses:

- 10,000 gallons/day: MD, VA
- 20,000 gallons/day: MS
- 30,000 gallons/day: AK
- 50,000 gallons/day: ME (if more than 500 feet from a lake or pond)
- 100,000 gallons/day: FL

A state may also choose to exempt certain uses from being subject to its reporting requirements, such as groundwater used for domestic uses, farm uses, or irrigation.

6. State Regulation of Large Groundwater Withdrawals

There are a variety of ways that states regulate wells that withdraw large quantities of groundwater. Below are summaries of the rules and regulations that each state has in place regarding large groundwater withdrawals. These summaries are not a comprehensive collection of a state's rules and are meant to serve as a starting point.

Alabama (Reasonable Use): Alabama employs a system of registration and reporting for withdrawals exceeding a certain threshold. Any well with a capacity to withdraw at least 100,000 gallons/day is required to register and report their withdrawals.¹²³ Additional limitations are imposed in capacity stress areas as to the maximum amount of groundwater that can be withdrawn.¹²⁴

Alaska (Prior Appropriation): Alaska has a permitting system for wells exceeding certain statutory thresholds. A groundwater use permit is required for any withdrawal of a “significant” amount of groundwater.¹²⁵ A significant withdrawal is statutorily defined as: (1) more than 5,000 gallons in one day from a single source, (2) the regular use of more than 500 gallons/day from a single source for more than 10 days/year, (3) more than 30,000 gallons/day for non-consumptive use from a single source, or (4) any other use that may affect the rights of other appropriators.¹²⁶ The DNR is required to issue notices when considering applications for appropriations of 5,000 gallons/day or more.¹²⁷

MA (Mass. Gen. Laws ch. 21G, § 11), MI (MICH. COMP. LAWS § 324.32707(1)), MN (MINN. STAT. § 103G.281 subd. 3), NJ (N.J. STAT. ANN. § 58:1A-8(d); N.J. ADMIN. CODE § 7:19-2.14(a)(3)), NY (N.Y. ENVTL. CONSERV. § 15-1501(6)), OH (OHIO REV. CODE ANN. § 1521.30), OK (OKLA. STAT. TIT. 82, § 1020.12; OKLA. ADMIN. CODE § 785:30-5-9), SC (S.C. CODE ANN. § 49-5-90(A)), WI (WIS. STAT. § 281.34(5)(E)).

¹²¹ California is an example (local agencies administer permits and impose conditions, such as reporting, into them).

¹²² Examples include: MD (MD. CODE REGS. 26.17.06.06(D)(1)), NY (N.Y. ENVTL. CONSERV. LAW § 15-1504(1)(B)).

¹²³ ALA. CODE § 9-10B-20.

¹²⁴ § 9-10B-21.

¹²⁵ 11 ALASKA ADMIN. CODE § 93.035(A).

¹²⁶ § 93.035(b).

¹²⁷ *Fact Sheet: Water Rights in Alaska*, ALA. DEP'T OF NAT. RES. (July 2018), http://dnr.alaska.gov/mlw/factsht/wtr_fs/Fact-Sheet-Water-Rights-in-Alaska.pdf.

Arizona (Reasonable Use): Arizona regulates groundwater withdrawals in special management areas by requiring that all wells obtain a permit, subject to certain exemptions.¹²⁸ Exemptions include withdrawals for non-irrigation use¹²⁹ from wells with a maximum pump capacity not exceeding 35 gallons/minute.¹³⁰ However, exempted withdrawals may not exceed 10 acre-feet/year, unless the groundwater is used for domestic purposes or stock watering.¹³¹ Arizona allows special management areas to set the maximum withdrawal amount (the goal of most is “safe yield”) through the use of local management plans.¹³² Reporting is required for all non-exempt wells in special management areas.

Arkansas (Reasonable Use): Arkansas regulates large quantity withdrawals as the rule, and exempts low-capacity wells. Registration is required for wells with a maximum potential flow rate of more than 50,000 gallons/day, excluding individual wells exclusively used for domestic purposes.¹³³ These wells must then report their usage.¹³⁴ A permitting scheme is used in the state’s special management areas for withdrawals in excess of 50,000 gallons/day.¹³⁵

California (Reasonable Use/Correlative Rights): California has delegated regulatory authority over groundwater withdrawals to local groundwater sustainability agencies.¹³⁶ These local agencies then adopt groundwater management plans, which provide for the regulation of groundwater withdrawals.

Colorado (Prior Appropriation): Colorado manages large-scale groundwater withdrawals geographically, based on where the groundwater is located. In designated basins, a permit is needed for large capacity wells.¹³⁷ A large capacity well is defined as “any well which is permitted to put designated groundwater to beneficial use provided the said permit is not for a small capacity well.”¹³⁸ A small capacity well is exempt, and includes: (1) wells with a withdrawal rate not exceeding 50 gallons/minute and used for no more than three single-family dwellings (exception: does not include irrigation on more than one acre of land), (2) livestock wells not exceeding 50 gallons/minute, (3) wells used in one commercial business not exceeding 50 gallons/minute, (4) certain wells used for observation purposes, (5) wells used exclusively for firefighting purposes, and (6) certain monitoring

¹²⁸ ARIZ. REV. STAT. § 45-152(A).

¹²⁹ Non-irrigation is defined to include growing crops on 2 acres of land or less. § 45-402(23)(a).

¹³⁰ § 45-454(A) and (B).

¹³¹ § 45-454(B)(2).

¹³² JANICK F. ARTIOLA AND KRISTINE UHLMAN, ARIZONA WELL OWNER’S GUIDE TO WATER SUPPLY 9 (2009), <https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/az1485.pdf>.

¹³³ *Water-use Registration*, ARK. DEPT OF AGRIC., <https://www.agriculture.arkansas.gov/natural-resources/divisions/water-management/groundwater-protection-and-management-program/water-use-registration/> (last visited Mar. 7, 2021).

¹³⁴ ARK. CODE § 15-22-302(a).

¹³⁵ § 15-22-905(3).

¹³⁶ *See* Cal. Water Code § 10720.

¹³⁷ COLO. DIV. OF WATER RES, SYNOPSIS OF COLORADO WATER LAW 3 (2016).

¹³⁸ 2 COLO. CODE REGS. § 4.2.18.

wells.¹³⁹ In non-designated basins, a prospective user must apply for a permit to appropriate groundwater from a non-exempt well.¹⁴⁰ An exempt well is one with flow rates of 15 gallons/minute or less for in-house use and outside use only for domestic animals.¹⁴¹ In both designated and non-designated basins, wells must report if they are not exempt from permitting requirements.

Connecticut (Absolute Dominion): Connecticut employs a permitting and reporting scheme for wells above a certain threshold. A permit is required for withdrawals of more than 50,000 gallons/day.¹⁴² Annual reporting is required for consumptive uses of water by permit holders.¹⁴³

Delaware (Correlative Rights): Delaware regulates groundwater withdrawals through the use of a permitting scheme, applicable to wells exceeding a statutorily prescribed threshold. All withdrawals over 50,000 gallons/day must obtain a permit.¹⁴⁴ Annual reporting is required by permit holders.¹⁴⁵ The state can control the amount of water that is withdrawn by setting a maximum allowable withdrawal rate in the permit.¹⁴⁶ The maximum amount of groundwater that a permit holder can withdraw is 20 acre-inches/year, but not more than 10 acre-inches/month.¹⁴⁷

Florida (Reasonable Use): The state has delegated its regulatory authority to local agencies. Florida is divided into five water management districts (WMDs), with each district having the authority to administer state water law. A WMD may require that an appropriator acquire a permit, subject to reasonable conditions.¹⁴⁸ However, a WMD is restricted from imposing its permitting requirements on wells that provide for the domestic consumption of water by individual users.¹⁴⁹ Each WMD has imposed a permitting regime in its district, so each appropriator must have a permit.¹⁵⁰ Each WMD is authorized to impose reasonable conditions as to the amount and rate of groundwater withdrawn. Annual reporting is required for permit holders who are authorized to withdraw more than 100,000 gallons/day.¹⁵¹

Georgia (Absolute Dominion): Georgia subjects wells above a certain threshold to its permitting and reporting requirements. A permit is required for any user who withdraws more than 100,000 gallons/day for any purpose.¹⁵² Annual reporting is required for permit holders.¹⁵³

¹³⁹ COLO. REV. STAT. § 37-90-105(1).

¹⁴⁰ § 37-90-137(1).

¹⁴¹ § 37-92-602.

¹⁴² See CONN. GEN. STAT. §§ 22a-368, 22a-377(a)(1).

¹⁴³ § 22a-368a(b).

¹⁴⁴ 7 DEL. ADMIN. CODE § 1.2.

¹⁴⁵ § 5.5.3

¹⁴⁶ § 5.5.2.

¹⁴⁷ Del. Code Ann. tit. 7, § 6010(h)(1).

¹⁴⁸ Fla. Stat. § 373.219(1).

¹⁴⁹ § 373.219(1).

¹⁵⁰ Northwest Florida WMD: Fla. Stat. § 40A-2.041(1), Suwannee River WMD: § 40B-2.041(1), St. Johns River WMD: § 40C-1.602, Southwest Florida WMD: § 40D-2.04, South Florida WMD: § 40E-2.041(1).

¹⁵¹ § 373.223(6).

¹⁵² Ga Code Ann. § 12-5-96.

¹⁵³ § 391-3-2-.04(11)(i).

Hawaii (Correlative Rights): Hawaii regulates all groundwater withdrawals in special management areas, subject to certain exceptions. In general, a water use permit is required to extract groundwater in designated water management areas.¹⁵⁴ However, no water use permit is needed for individual domestic users.¹⁵⁵

Idaho (Prior Appropriation): Subject to certain exceptions, all groundwater users must obtain a permit prior to making a withdrawal.¹⁵⁶ Domestic users are exempted from the permitting process.¹⁵⁷ A “domestic purpose” is statutorily defined as withdrawal for individual use, irrigation of less than half an acre of land, and any other associated purpose so long as the withdrawal is not more than 13,000 gallons/day, and any other use so long as the total use is not more than .04 cubic-feet/second or 2,500 gallons/day.¹⁵⁸ Unlike other western states, exempt uses in Idaho are also exempt from reporting requirements.¹⁵⁹

Illinois (Reasonable Use): Illinois uses the term “high-capacity well” to encompass large-scale withdrawals of groundwater. A high-capacity well is statutorily defined as a well “located on property where the rate or capacity of groundwater withdrawal of all wells on the property is at least 100,000 gallons during any 24-hour period.”¹⁶⁰ When a user “proposes to develop a new point of withdrawal that is a high capacity well, the land occupier or person must notify the District before beginning construction on the well. The District then must notify other local units of government with water systems who may be impacted by the proposed withdrawal. The District then reviews . . . the proposed point of withdrawal’s effect upon other uses of the water.”¹⁶¹ Registration with the local District is required for high-capacity wells.¹⁶² These wells must participate in the Illinois Water Inventory Program and submit an annual report.¹⁶³ A maximum withdrawal amount may be placed upon high-capacity wells by the Department of Agriculture if the District has investigated and recommended a limit.¹⁶⁴

Indiana (Absolute Dominion): A significant water withdrawal facility (SWWF) is defined as any well, or combination of wells, capable of pumping at least 100,000 gallons/day, regardless of how much water is actually pumped.¹⁶⁵ A SWWF must be registered¹⁶⁶ and must report groundwater

¹⁵⁴ Haw. Rev. Stat. § 174C-48.

¹⁵⁵ § 174C-84.

¹⁵⁶ Idaho Code § 42-217.

¹⁵⁷ § 42-227.

¹⁵⁸ § 42-111.

¹⁵⁹ §§ 42-221(K)(1), 42-701(7).

¹⁶⁰ 525 Ill. Comp. Stat. § 45/4.

¹⁶¹ § 45/5.

¹⁶² § 45/5.1.

¹⁶³ § 45/5.3.

¹⁶⁴ § 45/5.1.

¹⁶⁵ Ind. Code § 14-25-7-15(a).

¹⁶⁶ § 14-25-7-15(c).

usage.¹⁶⁷ An additional permitting regime is imposed in special management areas. A permit is required in restricted use areas for all new users or those withdrawing more than 100,000 gallons/day.¹⁶⁸ Liability is imposed on the owner of an SWWF, as state statute requires that the owner provide “timely and reasonable compensation to persons who own nonsignificant groundwater withdrawal facilities if there’s failure or substantial impairment of those facilities” that can be tied to the SWWF.¹⁶⁹

Iowa (Correlative Rights): In Iowa, a permit is required for withdrawals that exceed 25,000 gallons/day.¹⁷⁰ Additional permitting requirements are imposed on high-capacity wells and wells used for irrigation purposes.¹⁷¹ Iowa uses the term “high-capacity well” to encompass any well expected to have a pump capacity at or above 500 gallons/minute.¹⁷² The state allows for a degree of local control, as each aquifer has a different limit on the amount of groundwater that can be withdrawn or the rate that it can be withdrawn at.

Kansas (Prior Appropriation): Kansas regulates large-scale groundwater withdrawals by exempting smaller uses. All wells, except for domestic uses on 2 acres of land or less, are required to obtain a permit.¹⁷³ Permit holders must report their usage.¹⁷⁴

Kentucky (Reasonable Use): Kentucky regulates large groundwater withdrawals by using a permitting and reporting regime for withdrawals above a certain threshold, subject to certain exemptions. A permit is required for facilities with a withdrawal rate of more than 10,000 gallons/day.¹⁷⁵ A permit may be required if the withdrawals are made on an “irregular basis and at an irregular rate” “if the water withdrawn represents a significant portion of the available water supply or collection of data is necessary for water resource planning purposes.”¹⁷⁶ The quantity of groundwater to be withdrawn is managed by setting a maximum quantity and rate in the permit.¹⁷⁷ Exempt uses include domestic and agricultural uses (including irrigation).¹⁷⁸ Permit holders must submit reports regarding their water usage.¹⁷⁹

¹⁶⁷ § 14-25-7-15(e).

¹⁶⁸ Governed by IND. CODE § 14-25-3-6.

¹⁶⁹ § 14-25-4-17.

¹⁷⁰ See IOWA ADMIN. CODE R. 567-50.2.

¹⁷¹ Iowa Source Link, *Private Water Well Construction Permit*, <https://www.iasourcelink.com/licensing/detail/private-water-well-construction-permit>.

¹⁷² Water Use/Allocation Permitting – High Capacity Well – 2015, Technical Bulletin 23.1.

¹⁷³ KAN. STAT. ANN. §§ 82a-705, 82a-728 (Domestic rights, defined as “those held for household purposes” do not require a permit).

¹⁷⁴ § 82a-732.

¹⁷⁵ KY. REV. STAT. ANN. § 151.140; 401 KY. ADMIN. REGS. 4:010.

¹⁷⁶ 401 KY. ADMIN. REGS. 4:010.

¹⁷⁷ KY. REV. STAT. ANN. § 151.170(1).

¹⁷⁸ § 151.140.

¹⁷⁹ § 151.160.

Louisiana (Absolute Dominion): Registration is required for all wells that withdraw more than 50,000 gallons/day.¹⁸⁰ Users must provide usage information.¹⁸¹ A large volume well is defined as a well “with an 8 inch or greater diameter screen size or a well that by itself or in conjunction . . . is capable” of withdrawing 1,500 gallons/minute.”¹⁸² It is not immediately clear if there are specific rules or regulations applicable to large volume wells.

Maine (Absolute Dominion): Maine legislation requires a “significant groundwater user” to obtain a permit.¹⁸³ A significant groundwater user is one withdrawing at least 75,000 gallons/week or 50,000 gallons/day if the withdrawal is located within 500 feet of a body of water, or a withdrawal of at least 216,000 gallons/week or 144,000 gallons/day if the withdrawal is over 500 feet away from a body of water.¹⁸⁴ Additionally, “if a proposed activity includes a significant groundwater well, the applicant must demonstrate that the activity will not have ‘an undue unreasonable effect on waters of the State.’”¹⁸⁵ Annual reporting is required for withdrawals exceeding the statutorily prescribed thresholds.¹⁸⁶

Maryland (Reasonable Use): Subject to certain exceptions, every groundwater user must obtain a permit in Maryland.¹⁸⁷ Certain domestic uses, agriculture uses of less than 10,000 gallons/day (with some exceptions), and withdrawals of less than 5,000 gallons/day (not including use for a public water system, or uses within a water management strategy area) are exempted.¹⁸⁸ Semi-annual reporting is required for permit holders when a permit is issued for an average withdrawal of more than 10,000 gallons/day.¹⁸⁹

Massachusetts (Absolute Dominion): In Massachusetts, a permit is required for withdrawals over 100,000 gallons/day.¹⁹⁰ These users may then be required to report their groundwater withdrawals.¹⁹¹

Michigan (Restatement Second of Torts § 858): Michigan requires that large quantity water withdrawals be registered.¹⁹² A large quantity withdrawal is defined as a withdrawal with an average totaling over 100,000 gallons/day in any consecutive 30-day period.¹⁹³ Registration is not required for owners of a noncommercial well on certain residential properties (either a single-family residential property, or a multi-family residential property not exceeding four residential units on three acres or

¹⁸⁰ LA. STAT. ANN. § 3094(A)(1)-(2) (*see* § 3092(5) for definition of ground water user).

¹⁸¹ §§ 38:3091-3097.

¹⁸² LA. ADMIN. CODE. TIT. 43, § 103.

¹⁸³ ME. STAT. TIT. 38, § 480-C(4).

¹⁸⁴ § 480-B, 9-A(1)-(2).

¹⁸⁵ § 480-D(1).

¹⁸⁶ § 470-D.

¹⁸⁷ MD. CODE ANN. ENVIR. § 5-502.

¹⁸⁸ MD. CODE ANN. ENVIR. § 5-502.

¹⁸⁹ MD. CODE REGS. 26.17.06.07.

¹⁹⁰ MASS. GEN. LAWS CH. 21G, §§ 4, 7.

¹⁹¹ MASS. GEN. LAWS ch. 21G, § 11.

¹⁹² MICH. COMP. LAWS § 324.32705(1).

¹⁹³ § 324.32701(aa).

less) and seasonal withdrawals of 2 million gallons/day in any consecutive 90-day period to supply a common distribution system.¹⁹⁴ Compliance with a permitting system is required for users proposing to withdraw over 2,000,000 gallons/day, and certain other large withdrawals that will be used to supply a common distribution system.¹⁹⁵ Reporting is required for registered users and permit holders.¹⁹⁶ However, the reporting requirements are less stringent for registered users withdrawing less than 1,500,000 gallons/year.¹⁹⁷ If a groundwater dispute has been declared, liability is imposed on the owner of a high-capacity well, in which case, the owner must provide compensation “if there is a failure or substantial impairment of a small-quantity well” and either “the failure or substantial impairment was caused by the groundwater withdrawals of the high-capacity well” or if the small-quantity well was constructed before or after a certain date.¹⁹⁸ A high-capacity well is defined as “1 or more water wells associated with an industrial or processing facility, an irrigation facility, or a farm that, in the aggregate from all sources and by all methods, have the capability of withdrawing 100,000 or more gallons of groundwater in 1 day.”¹⁹⁹ A small-quantity well is defined as “1 or more water wells of a person at the same location that, in the aggregate from all sources and by all methods, do not have the capability of withdrawing 100,000 or more gallons of groundwater in 1 day.”²⁰⁰

Minnesota (Correlative Rights): Minnesota uses a permitting and reporting system to manage groundwater withdrawals, subject to certain exemptions. Under the minimum use exemption, a permit is not needed for withdrawals of less than 10,000 gallons/day, so long as the amount withdrawn does not exceed 1 million gallons/year.²⁰¹ Additionally, a well is exempt if the water is used to supply the domestic needs of less than 25 people.²⁰² However, an exempt well may still be required to obtain a permit if it is located in a groundwater management area.²⁰³ A permit holder must annually report the total amount of water that was appropriated.²⁰⁴ Additional requirements are placed on proposed withdrawals that will exceed 2 million gallons/day for consumptive use. Legislative approval is needed, along with a determination from DNR that there are adequate resources.

Mississippi (Absolute Dominion): A permit is required for all withdrawals,²⁰⁵ except those made for domestic uses.²⁰⁶ However, the Board may require permits for exempt wells in a water caution area for withdrawals of water in excess of 20,000 gallons/day.²⁰⁷ Annual reporting is required for owners and operators of wells that withdraw over 20,000 gallons/day.²⁰⁸

¹⁹⁴ See § 324.32705(2).

¹⁹⁵ § 324.32723(1)(a).

¹⁹⁶ § 324.32702(1).

¹⁹⁷ § 324.32707(8).

¹⁹⁸ § 324.31706.

¹⁹⁹ § 324.31701(k).

²⁰⁰ § 324.31701(q).

²⁰¹ MINN. STAT. § 102G.271.

²⁰² § 102G.271.

²⁰³ § 103G.281.

²⁰⁴ *Id.*

²⁰⁵ MISS. CODE ANN. § 51-3-5.

²⁰⁶ § 51-3-7.

²⁰⁷ § 51-3-7.

²⁰⁸ 11-1 MISS. CODE R. § 1.4(E)(2).

Missouri (Reasonable Use): Missouri regulates “major water users.” State statute defines a major water user as one with a capacity to withdraw at least 70 gallons/minute or 100,000 gallons/day.²⁰⁹ These users must register their wells prior to making a withdrawal.²¹⁰ Reporting is required for registered wells. The failure of a major water user to register their withdrawals is a nuisance under state law.²¹¹

Montana (Prior Appropriation): Montana regulates withdrawals of large quantities of groundwater by exempting smaller withdrawals. Every new use is required to obtain a permit prior to construction.²¹² Exempt wells are defined as those outside of a stream depletion zone with a maximum pumping rate of 35 gallons/minute and a maximum volume of 10 acre-feet/year,²¹³ so long as the water is used for domestic, irrigation, stock, or industrial purposes.²¹⁴ However, exempt wells may still need a permit to appropriate groundwater in a controlled groundwater area.²¹⁵ The combined appropriation by multiple wells exceeding 10 acre-feet/year requires permit, regardless of flow rate.²¹⁶ Additional requirements are imposed on appropriations of 4,000 or more acre-feet/year and 5.5 or more cubic-feet/second. These appropriators must prove the regular permit criteria,²¹⁷ and that the use of water is reasonable.²¹⁸ Appropriations greater than 3,000 acre-feet/year require legislative approval, unless the water will be used for irrigating croplands owned and operated by the applicant.²¹⁹

Nebraska (Reasonable Use/Correlative Rights): Nebraska only regulates large quantity groundwater withdrawals in special management areas. All wells in these areas must have a permit, except for single water wells designated and built to pump 50 gallons/minute or less.²²⁰

Nevada (Prior Appropriation): Nevada regulates large quantity groundwater withdrawals through a permitting process by exempting certain smaller wells. Unless exempt, a permit is required for all groundwater withdrawals.²²¹ An exempt well is a domestic well diverting less than 2 acre-feet/year, with a flow rate below 1,800 gallons/day, and serving not more than three single-family dwellings.²²²

²⁰⁹ MO. REV. STAT. § 256.400(4).

²¹⁰ § 256.410.

²¹¹ § 256.415.

²¹² MONT. CODE ANN. § 85-2-301(1).

²¹³ § 85-2-306(3)(a)(iii).

²¹⁴ Water Policy Interim Committee, Jason Mohr, Final Report to the 66th Montana Legislature (Draft), *The Exemption at 45: A Study of Groundwater Wells Exempt From Permitting 2* (July 2018).

²¹⁵ § 85-2-306(2).

²¹⁶ § 85-2-306(3)(a)(iii).

²¹⁷ § 85-2-311(3)(a).

²¹⁸ Factors to consider when evaluating reasonableness can be found at § 85-2-311(3)(b).

²¹⁹ § 85-2-317.

²²⁰ NEB. REV. STAT. § 46-735(1).

²²¹ NEV. REV. STAT. § 533.325.

²²² § 534.315(8).

New Hampshire (Reasonable Use): New Hampshire uses a registration and reporting system to regulate smaller groundwater withdrawals,²²³ but imposes an additional permitting scheme on large groundwater withdrawals. A large groundwater withdrawal is statutorily defined as any withdrawal of 57,600 gallons/day, except for short-term uses.²²⁴ Approval from the Board is needed for large groundwater withdrawals.²²⁵ Notice of these withdrawals must be provided to “the governing bodies of each municipality and each supplier of water within the potential impact area of the proposed withdrawal.”²²⁶ The Board is required to ensure that the proposed withdrawal will not have an “unmitigated impact.”²²⁷ Many of the factors that the Board is required to analyze involve consideration of the interconnection between groundwater and surface flows.

New Jersey (Reasonable Use or Correlative Rights): New Jersey regulates groundwater withdrawals that exceed a certain threshold. Registration is required for any well with the capacity to divert over 100,000 gallons/day, but that diverts less.²²⁸ A permit is required for users withdrawing over 100,000 gallons/day for a period of more than 30 days in a 365 consecutive day period.²²⁹ The maximum diversion quantity will be specified in the permit.²³⁰ Both registered users and permit holders must report.²³¹

New Mexico (Prior Appropriation): New Mexico regulates groundwater withdrawals by designating areas as declared groundwater basins, and then by imposing a permitting scheme in these areas.²³² The entire state has been designated as a declared groundwater basin. While permit applications are presumptively granted for minimal domestic uses, these uses are not exempted from complying with the state’s permitting requirements.²³³ A domestic use is defined as the irrigation of one acre or less of non-commercial land and other domestic uses.²³⁴

New York (Reasonable Use): New York regulates withdrawals over a certain threshold with a permitting system. A permit is required for all wells with a capacity to withdraw at least 100,000 gallons/day.²³⁵ Annual reporting is required for permit holders and for any user withdrawing groundwater for agriculture purposes at an average rate of over 100,000 gallons/day in any consecutive 30-day period.²³⁶

²²³ Registration and reporting are required for users withdrawing over 20,000 gallons/day (averaged over a 7-day period) or over 600,000 gallons over any 30-day period. N.H. REV. STAT. ANN. § 488:3 (registration). § 488:6 (reporting).

²²⁴ § 485-C:2(IX-a). Short-term use is defined as “the temporary, non-routine withdrawal of groundwater at a specific geographical location over a period of one year or less.” § 485-C:2(IXIII-b).

²²⁵ § 485-C:21(II).

²²⁶ § 485-C:14-a.

²²⁷ Factors found at § 485-C:32(V-c).

²²⁸ N.J. ADMIN. CODE § 7:19-2.18.

²²⁹ N.J. STAT. ANN. §§ 58:1A-5(a), 58:1A-6, 58:1A-7(a).

²³⁰ § 58:1A-8(b).

²³¹ See §§ 58:1A-8(d) 7:19-2.14(a) for permits and § 7:19-2.18(b) for registered wells.

²³² N.M. STAT. ANN. § 72-12-3(A).

²³³ N.M. CODE R. § 19.27.5.9(D).

²³⁴ N.M. STAT. ANN. § 72-12-1.1.

²³⁵ N.Y. ENVTL. CONSERV. § 15-1501.

²³⁶ § 15-1504.

North Carolina (Reasonable Use): All withdrawals of at least 100,000 gallons/day must be registered.²³⁷ A permit is required in order to make withdrawals in excess of 100,000 gallons/day in a capacity use area.²³⁸ The groundwater user is then subject to more frequent reporting requirements. If an area is designated as a capacity use area, the Commission is required to adopt “provisions establishing a range of prescribed pumping levels or maximum pumping rates.”²³⁹

North Dakota (Prior Appropriation): A permit is required for all withdrawals, unless exempted.²⁴⁰ Exempt uses include: domestic uses of less than 12.5 acre-feet/year;²⁴¹ livestock uses of less than 12.5 acre-feet/year; and fish wildlife, or other recreational uses of less than 12.5 acre-feet/year.²⁴² Annual reporting is mandatory.²⁴³

Ohio (Restatement Second of Torts § 858): Registration is required for all facilities with a capacity to withdraw at least 100,000 gallons/day.²⁴⁴ A permit is required for withdrawals resulting in the consumptive use of an average of more than 2 million gallons/day over a 30-day period.²⁴⁵ Annual reporting is required for both registered users²⁴⁶ and permit holders.²⁴⁷

Oklahoma (Reasonable Use/Correlative Rights): Oklahoma regulates large withdrawals by requiring a permit for all withdrawals, and by then exempting smaller amounts for certain uses.²⁴⁸ Domestic uses are exempted,²⁴⁹ defined as uses for household purposes, for farm and domestic animals up to normal grazing capacity of the land and for irrigation of three acres or less.²⁵⁰ The maximum amount of groundwater that can be withdrawn is the user’s proportionate share of the maximum annual yield (MAY)²⁵¹ allocated to the landowner on a per-acre basis.²⁵² An annual report of the amount used is required for all permit holders.²⁵³

²³⁷ N.C. GEN. STAT. § 143-215.22H.

²³⁸ § 143-215.15.

²³⁹ § 143-215.14.

²⁴⁰ N.D. CENT. CODE § 61-01-03.

²⁴¹ A domestic use is defined as a use of water by a single individual, family, or household (includes irrigation of land not exceeding 5 acres) for non-commercial purposes. § 61-04-01.1(4).

²⁴² § 61-04-02.

²⁴³ John Patch, *North Dakota Water Rights Administration*, N.D. STATE WATER COMM’N, <https://westernstateengineers.files.wordpress.com/2015/10/patch2014fall.pdf> (last visited Mar. 7, 2021).

²⁴⁴ OHIO REV. CODE ANN. § 1521.23(A).

²⁴⁵ § 1521.23.

²⁴⁶ § 1521.23(C).

²⁴⁷ § 1521.30.

²⁴⁸ OKLA. STAT. TIT. 82, § 1020.7; OKLA. ADMIN. CODE § 785:30-1 and -2.

²⁴⁹ § 1020.3; *see* OKLA. ADMIN. CODE § 785:30-1 and -2 for what uses are included.

²⁵⁰ § 1020.1(2).

²⁵¹ *See* § 1020.5.

²⁵² *Id.*

²⁵³ § 1020.12; OKLA. ADMIN. CODE § 785:30-5-9.

Oregon (Prior Appropriation): Oregon regulates large withdrawals by requiring a permit for all withdrawals,²⁵⁴ and then by exempting smaller amounts and certain uses. Exemptions from the permitting process include: domestic uses up to 15,000 gallons/day, stock watering, lawn watering up to half an acre, and small industrial or commercial uses up to 5,000 gallons/day.²⁵⁵ The Department may require any groundwater user, either permitted or exempt, to submit information about the well use.²⁵⁶

Pennsylvania (Prior Appropriation): Pennsylvania uses a registration and reporting system to track large quantity withdrawals. Registration is required for all facilities that withdraw or use more than 10,000 gallons/day over a 30-day period.²⁵⁷ Additionally, registration is required for users of any amount of groundwater in critical water planning areas.²⁵⁸ Registered users must annually report their withdrawals and use.²⁵⁹ A permit is required for all new or increased withdrawals of 10,000 gallons/day in the Delaware or Susquehanna River basins.

Rhode Island (Absolute Dominion): Registration is required for the construction of the well, but not for the withdrawal. Wells constructed for domestic consumption or personal farming use are exempt.

South Carolina (no common law): South Carolina generally requires all wells to register and report.²⁶⁰ Additionally, South Carolina imposes a permitting scheme in capacity use areas for withdrawals over 3,000,000 gallons/month.²⁶¹

South Dakota (Prior Appropriation): A permit is required for any well, with certain exemptions.²⁶² Domestic uses are exempted,²⁶³ defined as a withdrawal that does not exceed 18 gallons/minute or a peak diversion rate of 25 gallons/minute for individual farm/household use, or irrigation of a non-commercial area of one acre or less.²⁶⁴ An application for a “large scale appropriation” (withdrawal of groundwater in excess of 10,000 acre-feet/year) must be presented to the legislature by the Board for approval.²⁶⁵ No volume of groundwater withdrawn may be greater than three acre-feet/year (does not apply to permits to appropriate water for irrigation from the Missouri River). Limits have been set for certain uses. If water is to be used for irrigation, the rate cannot exceed one cubic-foot/second for

²⁵⁴ OR. REV. STAT. § 537.140 says what must be included in permit application. *See* § 537.615 for permit application requirements.

²⁵⁵ § 537.545.

²⁵⁶ § 537.543(3).

²⁵⁷ 25 PA. CONS. STAT. § 110.201.

²⁵⁸ *Id.*

²⁵⁹ § 110.301.

²⁶⁰ S.C. CODE ANN. § 49-5-20.

²⁶¹ § 49-5-60.

²⁶² S.D. CODIFIED LAWS § 46-1-15.

²⁶³ § 46-5-8.

²⁶⁴ § 46-1-6(7).

²⁶⁵ § 46-5-20.1.

each 70 acres, and the volume can't exceed two acre-feet/acre on land for a specified time each year.²⁶⁶ For domestic uses, the rate cannot exceed 25 gallons/minute.²⁶⁷

Tennessee (Reasonable Use and/or Correlative Rights): Registration is required for withdrawals of 10,000 gallons or more on any day from any water source.²⁶⁸ Certain groundwater uses are exempted (agriculture, emergency uses, nonrecurring uses, or water bought from a utility/industry).²⁶⁹ Registered users must report their withdrawals.

Texas (Absolute Dominion): Texas has allocated the authority to manage large groundwater withdrawals to local groundwater conservation districts (GCDs). A permit is required for large withdrawals in these areas. However, GCDs cannot regulate wells extracting less than 25,000 gallons/day, wells supplying the domestic needs of 10 or less families on more than 10 acres, among other exceptions.²⁷⁰ Otherwise, there are no state-wide registration, permitting, or reporting requirements. Texas is the only state (outside of GCDs) that still adheres to the English rule of absolute ownership in its traditional form. Thus, an appropriator can take as much water as they'd like and put it to any use without incurring liability, regardless of any harmful effects that the pumping may have on a neighboring landowner.²⁷¹ This is problematic because it results in practically unregulated pumping, which could potentially undercut conservation efforts in other states. Furthermore, the inability of GCDs to regulate smaller withdrawals could result in detrimental effects on the groundwater if the impact of those wells are considered in the aggregate.

Utah (Prior Appropriation): Without exception, a permit is required for all groundwater withdrawals in Utah.²⁷² The State Engineer can set limits on maximum annual withdrawals in areas where water management plans have been issued.²⁷³

Vermont (Correlative Rights): Vermont regulates groundwater withdrawals over a certain threshold by using a permitting and reporting system. A permit is required for withdrawals over 57,600 gallons/day (40 gallons/minute for 24 hours). Annual reporting is required for permit holders and for commercial and industrial uses that have a monthly average of 20,000 gallons/day.

Virginia (Reasonable Use): Virginia has enacted a permitting system in groundwater management areas for withdrawals of at least 300,000 gallons in any 30-day period.²⁷⁴ Every user withdrawing an

²⁶⁶ § 46-5-6.

²⁶⁷ § 46-1-6(7).

²⁶⁸ TENN. CODE ANN. § 69-7-304.

²⁶⁹ *Id.*

²⁷⁰ TEX. WATER CODE ANN. § 36.117(B).

²⁷¹ *Sipriano v. Great Springs Water of America*, 1 S.W.3d 75 (Tex. 1999).

²⁷² UTAH CODE ANN. § 73-3-1.

²⁷³ § 73-5-15.

²⁷⁴ VA. CODE ANN. § 62.1-258.

average of 10,000 gallons/day (or who withdraws over one million gallons/month for irrigation) must submit an annual report.²⁷⁵

Washington (Prior Appropriation): Washington regulates groundwater withdrawals by requiring that every appropriator apply for and receive a permit,²⁷⁶ subject to certain exemptions. Permit holders must then report their usage. Exemptions from the permitting process include domestic and industrial uses of less than 5,000 gallons/day, groundwater used for irrigating non-commercial areas less than half an acre, and stock watering.²⁷⁷ However, the Department of Ecology may still require exempt users to submit information about their water usage.

West Virginia (Reasonable Use): West Virginia requires all large quantity users to register their withdrawals.²⁷⁸ A large quantity user is defined as “any person who withdraws over 300,000 gallons of water in any 30-day period,” excluding water withdrawn for farm use.²⁷⁹

Wisconsin (Restatement of Torts § 858): There is a general set of requirements for all wells, and additional requirements imposed on high-capacity wells in Wisconsin. A high capacity well either has the capacity to withdraw more than 100,000 gallons/day or, when taken with all of the other wells on the same property, has a capacity to withdraw more than 100,000 gallons/day.²⁸⁰ Residential wells and fire protection wells are excluded from this definition,²⁸¹ with residential wells being those with a pump capacity of 100,000 gallons/day or less and used primarily to supply water to a single-family or multifamily home.²⁸² Registration is required for new and existing high capacity wells.²⁸³ Additionally, high capacity wells “with a water loss of more than two million gallons per day must also comply with the standards in Wis. Stat. § 281.35.”²⁸⁴ A permit is required for a well that proposes to make consumptive withdrawals at an average of more than two million gallons/day in any 30-day period.²⁸⁵ Annual reports are required for high capacity wells.²⁸⁶ For high capacity wells that are located in a groundwater protection area, have a water loss of more than 95% of the amount of water withdrawn, or potentially have a significant environmental impact on a spring, the DNR must review the application for the well.²⁸⁷ In 2011 Wisconsin Supreme Court held that Wisconsin’s permitting framework “provides the DNR with the discretion to undertake the environmental review it deems necessary for all proposed high capacity wells, including the authority and a general duty to consider

²⁷⁵ 9 VA. ADMIN. CODE §§ 25-200-30, 25-200-40.

²⁷⁶ WASH. REV. CODE § 90.44.050.

²⁷⁷ § 90.44.050.

²⁷⁸ W. VA CODE § 22-26-3(C).

²⁷⁹ § 22-26-2.

²⁸⁰ WIS. STAT. § 281.34(1)(B).

²⁸¹ *Id.*

²⁸² WIS. STAT. § 281.34(1)(EM).

²⁸³ PAUL G. KENT, WISCONSIN WATER LAW IN THE 21ST CENTURY: UNDERSTANDING WATER RIGHTS AND REGULATIONS 177 (2013).

²⁸⁴ *Id.* at 181.

²⁸⁵ § 281.35.

²⁸⁶ WIS. ADMIN. CODE NR § 856.30(2).

²⁸⁷ WIS. STAT. § 281.34(4)(A).

the environmental impact of a proposed high capacity well on waters of the state” under Wisconsin’s public trust doctrine.”²⁸⁸ However, there is a conflict between the implied duties of environmental protection stated by the Wisconsin Supreme Court in *Lake Beulah* and Wisconsin Act 21, which was enacted just prior to the *Lake Beulah* decision.²⁸⁹ In 2016, Wisconsin Attorney General Brad Schimel issued an opinion stating that the Wisconsin Supreme Court in *Lake Beulah* did not interpret or apply Act 21 and “much of the Court’s reasoning in *Lake Beulah*. . . is no longer controlling.”²⁹⁰ In 2020, the current Wisconsin Attorney General, Josh Kaul, rescinded Schimel’s 2016 opinion,²⁹¹ after a circuit court held *Lake Beulah* still governed DNR review of high-capacity well permit applications.²⁹² The circuit court’s decision is currently pending before the Wisconsin Supreme Court for resolution.²⁹³

Wyoming (Prior Appropriation): Registration and permitting procedures must be followed, without exception. Wells for stock and domestic uses may not withdraw at a rate greater than 25 gallons/minute.²⁹⁴ The State Board of Control may designate areas and impose water restrictions where: (1) the use of groundwater is approaching a use equal to the current recharge rate; (2) groundwater levels are declining or have declined excessively; (3) conflicts between users are occurring or are foreseeable; (4) waste is occurring or may occur; or (5) other conditions exist or may arise that require regulation to protect the public interest.²⁹⁵

Great Lakes Compact: In addition to state laws, large quantity groundwater withdrawals in certain states may be subject to additional regulations based on the state’s status as a party to the Great Lakes-St. Lawrence River Basin Compact (Public Law 110-342). The Compact is a legally binding agreement among the eight states that border the Great Lakes (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin) and two Canadian provinces (Ontario and Quebec).²⁹⁶ Each of the state legislatures has ratified the compact, and it was signed into federal law in 2008.²⁹⁷

The Great Lakes Compact is an international agreement as to how new or increased surface water or groundwater withdrawals from the Great Lakes basins will be regulated. The Compact recognizes that “the landscape . . . constitute[s] a single system that must be managed as such” in order to preserve the Great Lakes.²⁹⁸ Under the Compact, each party has signaled their commitment to “manage water

²⁸⁸ *Lake Beulah Management District v. DNR*, 2011 WI 54, ¶ 39

²⁸⁹ 2011 Wisconsin Act 21 states that “No agency may implement or enforce any standard, requirement, or threshold, including as a term or condition of any license issued by the agency, unless that standard, requirement or threshold is explicitly required or explicitly permitted by statute or by a rule that has promulgated.”

²⁹⁰ State of Wis. Dep’t of Justice, OAG-01-16, Opinion Letter on the Application of Wis. Stat. § 227.10(2m) to the Issuance of High-Capacity Groundwater Well Withdrawal Permits ¶ 16 (May 10, 2016).

²⁹¹ State of Wis. Dep’t of Justice, Opinion Letter on the Continuing Validity of OAG-01-16 (May 1, 2020).

²⁹² *See Clean Wisconsin, Inc. v. DNR*, No.16-CV-2817 (Wis. Cir. Ct. Dane Cty.) (consolidated).

²⁹³ *See Clean Wisconsin, Inc. v. DNR*, Nos. 2016AP1688, 2016AP2502, unpublished certification (WI App Jan. 16, 2019).

²⁹⁴ WYO. STAT. § 41-3-907.

²⁹⁵ WYO. STAT. § 41-3-912(A).

²⁹⁶ *Who Owns the Water?*, *supra* note 36, at 9.

²⁹⁷ *Id.*

²⁹⁸ *Water Law Explanation*, MICH. DEP’T. OF ENV’T. QUALITY, https://www.michigan.gov/documents/deq/Water_Law_Explanation_626093_7.pdf (updated June 22, 2018).

within their jurisdictions similarly and annually report their water use and regulation to a central body.”²⁹⁹ The default threshold for regulating withdrawals is set at 100,000 gallons/day, averaged over a 90-day period.³⁰⁰ Council approval is required for any new or increased consumptive use of 5 million gallons/day or greater averaged over a 90-day period.³⁰¹

III. CONCLUSION

Withdrawing large amounts of groundwater is essential for agricultural irrigation. However, these large withdrawals have the potential to over appropriate the underlying aquifer. With regulatory authority over groundwater allocated to the several states, a piecemeal framework works to protect the aquifers. Several states have enacted comprehensive regulatory regimes over these high-capacity wells. With varying degrees of efficacy, these frameworks help the state to manage and track large quantity withdrawals. Protection of groundwater supplies from over appropriation by high-capacity wells is a collective concern and responsibility.

²⁹⁹ *Id.*

³⁰⁰ *Who Owns the Water?*, *supra* note 36, at 9.

³⁰¹ *Id.*