GROUNDWATER LAWS AND REGULATIONS:
A Preliminary Survey of Thirteen U.S. States
Vol I (2nd Ed)

PROJECT DIRECTORS AND EDITORS

Professor Gabriel Eckstein
Texas A&M University School of Law

Professor Amy Hardberger
St. Mary's University School of Law

AUTHORS

Alexander Bennett
Contessa Gay
Ashley Graves
Thomas Long
Erin Milliken
Margaret Reed
Laura Smith
Lauren Thomas

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For all inquiries, please contact:
Texas A&M University School of Law
Program in Natural Resources Systems
1515 Commerce Street
Fort Worth, TX 76021

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I. Introduction

This report presents results of a study investigating the groundwater laws and regulations of thirteen U.S. states. The report is actually the second edition of the study following amendments made to the first edition in response to extensive feedback and reviews solicited from practitioners, academics, and other professionals working in the field of water law from across the country. The purpose of the project is to compile and present the groundwater laws and regulations of every state in the United States that could then be used in a series of comparisons of groundwater governance principles, strategies, issues, and challenges. Professor Gabriel Eckstein at Texas A&M University School of Law and Professor Amy Hardberger at Saint Mary's University Law School developed a matrix to ascertain chief components and characteristics of the groundwater legal regime of each state. Student researchers then used the matrix to respond to a standardized set of questions about the groundwater laws and regulations of a selection of states. In the near future, additional volumes with surveys of other U.S. states will be issued.

II. Research Approach

This study presents results of a survey of groundwater laws and regulations of thirteen U.S. states. The purpose of the project is twofold:

1) To compile and present this data in a comprehensive format that would allow water managers, researchers, governmental representatives, and other interested parties to explore the various governance mechanisms that states have employed to manage their groundwater resources;
2) To develop cross-state comparisons exploring the different mechanisms and approaches used to address groundwater-related issues and challenges, such as groundwater ownership and allocation, aquifer depletion, climate variability, shifting water needs and demands, fouling of recharge zones, and other topics.

A. Methodology

Professors Eckstein and Hardberger began the project by developing a detailed questionnaire to ascertain chief components and characteristics of the groundwater legal regime of each state. The questions and criteria were initially developed based on Professors Eckstein and Hardberger's professional experience working on water law-related issues, as well as their education in geology (both hold J.D. degrees, and

Professor Eckstein holds an LL.M. in International Environmental Law; both hold a B.A. in Geology, and Professor Hardberger holds an M.S. in Geology). They then refined the questionnaire based on feedback from practitioners, academics, and other professionals working in the field of water law from across the country, trial and error testing the questionnaire's relevance and applicability to various U.S. state groundwater legal regimes, and with the invaluable assistance of law students. The final version of the questionnaire is attached to this report in Appendix A.

In addition, Professors Eckstein and Hardberger developed a research protocol detailing the types of resources to use in researching each state's groundwater legal regime, and providing a structure for the work-product for each state. The protocol also provides tips and recommendations for locating various types of information since the nature and quality of information available, as well as the location of such information needed, varies from state to state. The final version of the research protocol is attached to this report in Appendix B.

Over the past six years, law students working under the professors' supervision applied the survey to a select group of U.S. states. Each student worked on a particular state answering the survey questions for that state. Afterwards, another law student conducted a first line reviep[w of the work product and offered comments, recommendations, and questions to further enhance the survey. The first student was then asked to revise the survey in response to the feedback received. The second law student also checked the survey responses for clarity and accuracy, and researched any portions of the survey for which the first researcher was unable to find answers. As some student researchers graduated, new student researchers familiarized themselves with completed surveys before beginning research on additional states. This resulted in each survey being read, edited, and refined by at least three students before finalization.

Once a state survey was completed, Professors Eckstein and Hardberger reviewed the survey and offered additional comments and suggestions, whereupon the original student revised the survey in response to the professors' feedback. Thereafter, upon completion of the final revisions, Professors Eckstein and Hardberger reviewed it once more and approve final drafts. Professors Eckstein and Hardberger were also available for questions throughout the process, and often reviewed preliminary drafts, offered recommendations for source material, and provided feedback on process and substance of each survey.

Once an individual survey was approved by Professors Eckstein and Hardberger, the survey was sent to at least one water law expert in the respective state for external review. State-specific water law experts were selected for their particular knowledge of the state's groundwater legal regime, and their willingness to volunteer their time to conduct the review. Upon receiving the feedback from the state-specific experts, a student was asked to assess and incorporate the comments and suggestions provided by the expert into the survey.

Finally, once all internal and external comments were incorporated into the survey, law students took the raw information contained in the surveys and converted them into readable, essay format. They also replaced individual survey questions contained in the questionnaire with brief but descriptive headings. The essay format is intended to make the results of the project more readable, useful, and accessible by other researchers, stakeholders, and the general public, as well as for later qualitative use. The thirteen surveys contained in this study are the results of this extensive process.

B. Research Design

This project's legal research is doctrinal or theoretical, inquiring what the law is in particular areas by exploring primary sources of case law and relevant legislation, as well as secondary descriptive resources.[1] Arguably, all doctrinal research is qualitative simply because it is non-numerical.[2] If law could be assessed using a systematic approach and the same law could be identified no matter who carried out the research, only then could doctrinal research be deemed to be quantitative.[3] However, any assumption that there is an objective approach to finding the law is at odds with the reasoning frequently used to make the law by judges and legislators.[4] For example, attorneys discover applicable legal principles through the processes of elimination and inductive reasoning where a principle is gleaned from precedent analysis.[5] Typically,

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[1] Ian Dobinson and Francis Johns, *Qualitative Legal Research*, in Research Methods for Law, 19 (Mike McConville and Wing Hong Chui Ed., Edinburgh University Press, 2007).

[2] *Id.*

[3] *Id*. at 21.

[4] *Id.*

[5] *Id.*

doctrinal research is not merely finding correct legislation and cases and making objectively verifiable statements of law, but rather is a process of selecting, weighing, and ranking materials by authority and source.[6] It is likely that such inductive reasoning must be qualitative in its methodology.[7] However, qualitative research can, and should, still be systematic, explicit, and reproducible, providing a framework for identifying, evaluating, and synthesizing primary sources.[8] Accordingly, to establish a systematic process for research for this project, research questions, primary and secondary sources, and synthesis of results were discussed before research began. Moreover, the research process and its results were reviewed and revised in order to better achieve a systematized and consistent process.

1. Source Selection

Because doctrinal law is based on authority and hierarchy, researchers must carefully select sources from primary authorities (s.a., case law and relevant legislation).[9] Secondary sources like law review articles may be useful in interpreting primary sources, but cannot be the main focus of doctrinal legal research.[10] Selection of sources in advance helps the methodology be thorough, systematic, justifiable, and reproducible.[11] Relevant legal documents may be self-selecting in doctrinal legal research in the United States because law is precedential and hierarchical; however, legal researchers and students involved in project such as this one must ensure they do not select sources based on whether the sources support a particular position or outcome.[12]

Here, law students were asked to rely primarily on case law, statutes, and regulations to answer the questions posed in the survey. A limited number of secondary sources, such as journal articles and water law treatises, were used, in part because of limited availability of primary sources from specific states. A focus on codified and case law

[6] *Id*. at 21-22.

[7] *Id*. at 21.

[8] *Id.* at 22.

[9] *Id.* at 23.

[10] *Id.*

[11] *Id.*

[12] *Id.* at 31.

from each state increased the accuracy and reliability of research findings. This strategy focused on established, primary resources to ensure all possible relevant documents were discovered. Focus on a limited number of sources allows the research to be documented, duplicated, and applied in a manner with limited bias.

2. Topic Selection

The states included in this effort were selected by Professors Eckstein and Hardberger with the initial objective of generating a diverse compilation of states and rules. Garnering the widest possible selection of state groundwater laws and regulations allowed the researchers to project the extent and limits likely encountered in the final, fifty state survey. Criteria included geography, climatic conditions, the states' individual characterization of their groundwater legal system (e.g., prior appropriation, reasonable use, etc.), and the variety of uses to which states employed their groundwater resources (e.g., agriculture, municipal, industrial, etc.). The target of this compilation was 25% of the states in the United States.

3. Survey Questions

In doctrinal research, research questions arise from a search for law applicable to a given set of circumstances, and do not inquire as to value judgments or policy.[13] There may be an assumption that law exists to be found, but the research questions must recognize that law derives from the *reasoning applied* to the sources found.[14] Here, a matrix containing survey questions were designed to help researchers describe the groundwater laws and regulations of each state for comparative purposes. The matrix approach helped quantify results of what is otherwise qualitative research. Because United States groundwater laws and regulations vary widely among the states, and are often under-developed and lack clarity, attempting to garner standardized results will allow later users of this data to conduct cross-state comparisons.

It is noteworthy that the survey questions were revised and refined at least five times based on feedback from practitioners, academics, and other professionals working in the field of water law from across the country, as well as trial and error testing the

[13] *Id.* at 23.

[14] *Id.*

questionnaire's relevance and applicability to various U.S. state groundwater legal regimes. Changes to questions were made where the prior language failed fully to capture the data and information pursued in the research, and where unique state case law and regulations required modification of the questions to provide a more comprehensive and equitable collection. Likewise, and usually for the same reasons, new questions were added to the questionnaire. The final version of the questionnaire is attached here in Appendix A.

One of the objectives of the survey is to develop an understanding of each state's groundwater governance system. Accordingly, the survey began by asking the researcher to provide definitions for key terminology, like groundwater, underground water, aquifer, and other concepts, under the state's legal regime. It then required the researcher to characterize the groundwater legal system in relation to established legal doctrines, such as prior appropriation or reasonable use. The survey specified that results may include a combination of doctrines, accommodating states that incorporate principles from multiple regimes. The survey then required a description of the basis for groundwater rights under the legal rights system used by each state. The basis for groundwater rights may be based on overlying land ownership, timing of appropriation, permit, or other criteria. Standards for obtaining a groundwater right under various legal regimes may also differ, and in response, the survey required the researcher to describe what types of use (beneficial, reasonable, or other) may give rise to obtaining a groundwater right.

The survey next asked the researcher to compile the major sources of state law describing the groundwater legal system. Many states have one or more seminal cases where state courts describe groundwater rights and use standards for the jurisdiction. States also frequently have statutory and regulatory schemes governing the right to, and use of, groundwater. As many states only recently adopted such statutory and regulatory schemes, they often attempt to codify the existing common law in the state. By compiling the major sources of law in this area, the survey lays the groundwork for subsequent detailed analyses and comparisons.

The third question in the survey examined the scope of the groundwater right, once acquired by a user. To that end, it questioned whether individuals, the public, or the state in trust "owns" the groundwater; and whether the state distinguishes between ownership of groundwater and the right to use it. It further asked what types of uses are permitted,

and whether any uses are preferred. If uses are preferred, the survey asked whether there is a hierarchy between groundwater uses, for example between domestic or agricultural use. It also asked whether use standards such as beneficial or reasonable use are implicated in this hierarchy. Additionally, the survey required the researcher to determine whether location of use is a factor in the scope of a valid groundwater right. Certain jurisdictions require use of water on the land from which it is drawn, and to that end the survey asked whether transport of water away from the overlying land, or outside of its basin of origin, is addressed in state law.

The survey next inquired about the loss of groundwater rights. In some states, statutory or common law procedures for losing groundwater rights have not been developed. In others, rigorous legal criteria govern loss of groundwater rights through forfeiture, abandonment, or other process. The survey asked whether loss procedures have been outlined in state law, and asks the researcher to expound on circumstances and legal procedures accompanying loss of rights.

The fifth area pursued by the survey focused on whether the state regulated well drilling. In doing so, it sought to assess regulations for well drilling-related aspects like licensing of contractors, permits for drilling, criteria for drilling, well-construction standards, etc. Where a state employed such regulations, the survey asked the researcher also to list the state authorities responsible for well-drilling oversight.

Whether state law recognizes the hydrologic connections between groundwater and surface water was the next area questioned in the survey. If the state does address connections between ground and surface water in law, the survey asked the researcher to determine whether any priority between ground and surface water users exists. Additionally, since states that do recognize hydrologic connections between ground and surface water often do so within a context of liability for overuse, the survey asked what penalties the state imposes for interference.

The seventh topic explored by the survey questioned whether the state regulates, encourages, or facilitates aquifer recharge or underground storage programs. While not a widely used technique, groundwater recharge and storage programs have been identified as alternative mechanisms for diversifying and enhancing the freshwater supplies of communities across the country, especially those in arid regions. Thus, the question sought to collect information (where available) on regulations governing

groundwater levels and quality, storage capacities, injection and extraction criteria, etc. The researcher was also asked to identify the governmental entity(ies) responsible for oversight of such programs and activities.

The survey next asked the researcher to investigate whether the state required, developed, and/or employed a statewide or local water management plan. Such plans have become more common as states have taken more holistic and approaches and implemented longer-term time horizons managing their freshwater resources. In particular, the survey asked how often such plans (if they existed and were utilized) were updated.

The next question in the survey asked the researcher to list all relevant permitting and regulatory authorities for groundwater in the state, including state and local agencies. The survey also required researchers to determine the scope of authority for the agencies involved. The survey closed with an inquiry into any potential special districts, such as conservation or special districts, or critical management areas, which may be managed by the state or local agencies.

The tenth topic addressed in the survey focused on transboundary arrangements and conflicts related to groundwater resources that the state may have entered into with neighboring states. The reality is that with the exception of Hawaii and Alaska, every state in the union is hydraulically linked to its neighboring states through its groundwater.[15] As a result, there is potential both for cooperation and conflict over these shared resources. Accordingly, researchers were asked to identify agreements and conflicts that somehow pertained to the state's groundwater resources, including identifying the parties involved, the scope and substance of the agreement or conflict, and in the case of agreements, the duration of the arrangement.

The next topic considered in the questionnaire related to Native American rights. The survey question required the researcher to identify and Native American groups that had any claims or rights pertaining to groundwater resources in the state based on historic treaties, pacts, case law, etc. It also asked whether the state granted exemptions, benefits, or other concessions to such tribes that involved or pertained to groundwater resources.

[15] *See e.g.*, USGS, Aquifers: Map of the Principal Aquifers of the United States, https://water.usgs.gov/ogw/aquifer/map.html (last visited Mar. 27, 2020).

In addition, where tribal groundwater rights are wholly or mostly separate from the state's regime, the questionnaire asked the researcher to prepare a separate summary of the tribe's groundwater legal regime following (to the extent possible) the same format as provided in this questionnaire.

Finally, the survey ended with a catchall question asking the researcher to provide any additional useful information, including particularly useful Internet link.

As noted above, as the research progressed and data was collected from more states, these questions were modified several times to better reflect the goals of the study and to accommodate the broad and varied scope of U.S. groundwater law. Each time research uncovered an important aspect of one state's law that was not addressed by the survey, the survey questions were updated to reflect the new finding, and previously collected survey data was edited to address the changed or additional survey questions. Applying a flexible standard to the initial states surveyed allowed the project to reflexively incorporate the researchers' preliminary findings.

C. Analysis

While detailed analysis of the collected data will occur at a later phase of the project, a variety of quantitative methods may be considered. Univariate descriptive data analysis gives a data snapshot by providing a basic summary of each studied variable in terms of frequency, or by statistics showing mean, mode, or median.[16] Bivariate analysis attempts to analyze the variables together, exploring similarities and differences by comparing averages between subjects.[17] Statistical tests may then measure correlations between variables.[18] Finally, explanatory analysis attempts to answer "why" rather than "what" questions, and looks for causes as well as patterns in data.[19] Methods like logistic regression and structural equation modelling explore the effect of two or more dependent variables on an independent variable.[20]

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[16] Wing Hong Chui, *Quantitative Legal Research*, in Research Methods for Law, 61 (Mike McConville and Wing Hong Chui Ed., Edinburgh University Press, 2007).

[17] *Id.* at 62.

[18] *Id.*

[19] *Id.*

[20] *Id.*

To accomplish more quantifiable analysis of this qualitative data, an excel spreadsheet or other database showing abbreviated responses to each question, by state, may be developed in the future. At that point, graphic and tabular display of the results also may be considered.

As an example, one area of interest for potential graphic display would show areas of combined or changing legal rights systems. Many states' laws are self-described as a particular groundwater legal regime, but in practice use another system – for example, Tennessee courts have described groundwater in the state as governed by the rule of reasonable use, but in practice groundwater allocation more closely resembles the correlative rights system. Groundwater rights systems have also changed as statutes developed codified schemes – for example, Mississippi common law originally followed the absolute ownership rule for groundwater, but later statutory enactments describe a regulated riparian system. Showing these changes or combinations in a table could allow more quantifiable analysis of otherwise qualitative data.

D. Objectives

Once surveys are completed for all fifty states, the various survey volumes (including this one) will be compiled and presented as a desk reference book. Such a reference should be of great interest to state legislatures, policymakers, and agencies across the country who wish to examine their groundwater legal regimes, as well as those of their sister states. It should also be of interest to them in their efforts to explore how various states respond to the numerous groundwater-related challenges and concerns facing states across the country, including shifting water demands, aquifer depletion, climate change impacts on freshwater resources, groundwater-surface water interaction, and other issues. Similarly, this reference book should be of interest to legal and policy scholars focusing on the usefulness and effectiveness of state water laws and regulations and exploring the same types of issues as legislatures, policymakers, and agencies. Finally, it could be particularly useful for engineering companies and law firms who need to know the basic legal framework for groundwater management and regulation in the multiple jurisdictions in which they operate.

As the study progresses, and if appropriate resources become available, the data and information generated from this study will be coded and converted into a searchable database, potentially on the Internet. The purpose of such a database is to facilitate

cross-state comparisons exploring the different mechanisms and approaches states use to address groundwater rights, allocation, depletion, and other factors, including the groundwater-related challenges and concerns noted above.

E. Limitations

The present study was limited by the selection of states, discussed above, and by its focus on groundwater use rights. This focus excluded a large body of state groundwater law addressing groundwater quality and contamination. Groundwater quality law is generally based on federal U.S. law and could easily constitute the entire subject matter of another comprehensive survey. Focus on allocation and use rights related to groundwater resources addresses an area of law that is still largely under-developed, that is not addressed by federal law, and that demonstrates wide variations between states. These variations are of scholarly interest because they highlight different principles of use, ownership, and management.

It is possible that the survey, by providing potential answers within its questions, limited the researchers' ability to craft qualitative descriptions. Nevertheless, focus on obtaining both qualitative and quantifiable results necessitated survey questions that pointedly limited the researcher's scope.

Fig. 1. Principal Aquifers of the United States[21]

[21] United States Geological Survey, Principal Aquifers of the United States, https://water.usgs.gov/ogw/aquifer/map.html (last visited Mar. 27, 2020).

III. State Surveys

A. Alabama

Alabama generally follows the Reasonable Use doctrine in allocating groundwater rights, which are based on overlying land ownership and beneficial use. The state governs groundwater rights through the Alabama Water Resources Act, which designates regulatory authorities for groundwater withdrawal.

1. Definitions, Basis of Rights, Standards, and Interactions

Alabama has ground water as the water in a saturated zone or stratum beneath the surface of land or water, whether or not flowing through known and definite channels.[1] Waters of the State are defined as a quantity of any spring, brook, creek, stream, river, pond, swamp, lake, reservoir, impoundment, sound, tidal estuary, bay, waterway, aquifer, or any other body or accumulation of water, surface water, or ground water, public or private, natural or artificial that (a) is contained within the borders of this state; (b) flows through or to this state or any portion thereof; or (c) borders upon this state or any portion thereof, including those portions of the Gulf of Mexico over which this state has jurisdiction.[2]

Although specific groundwater users are subject to a statutory permitting system, requiring "certificates of use" for large withdrawals, common law generally governs groundwater rights in Alabama. The Alabama Supreme Court in *Adams v. Lang*, articulated that the common law doctrine of Reasonable Use (the American Rule) is the basis for groundwater rights in Alabama, such that no right exists to groundwater if the use of that water is unreasonable.[3]

[1] Ala. Code 1957 § 9-10B-3(12).

[2] *Id.* at § 9-10B-3(19).

[3] *Adams v. Long*, 553 So. 2d 89, 91 (Ala. 1989).

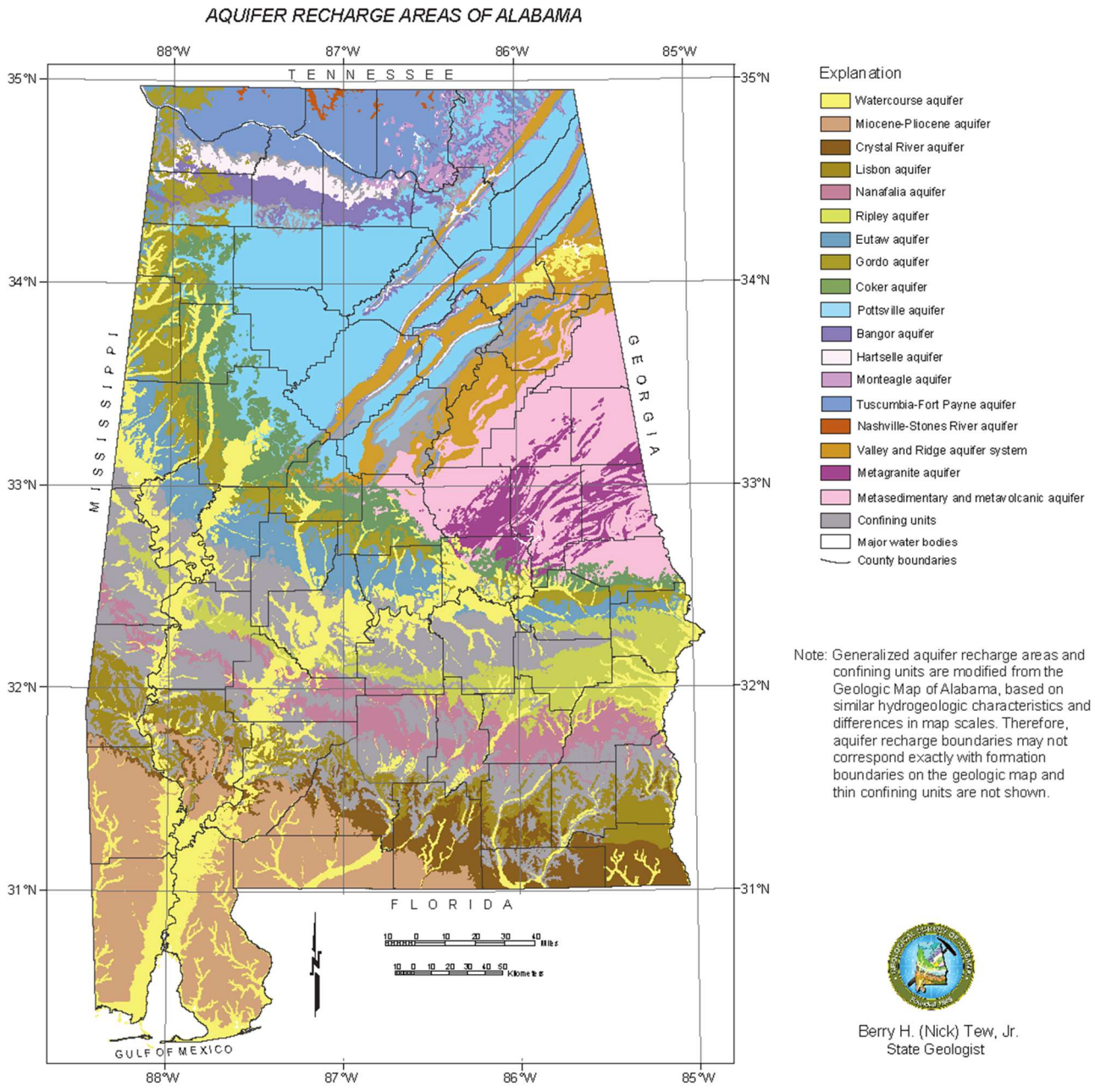

Fig. A.1. Aquifer Recharge Areas of Alabama[4]

[4] Geological Survey of Alabama, *Alabama Aquifers*, http://www2.ogb.state.al.us/gsa/water/water_information.html (last visited Mar. 27, 2020).

The Alabama Water Resources Act maintains that the conservation and management of groundwater use should enable the people of Alabama to realize the full beneficial use of groundwater, while preserving future resource use.[5] Alabama defines beneficial use as "the diversion, withdrawal, or consumption of the waters of the state in such quantity as is necessary for economic and efficient utilization consistent with the interests of this state."[6]

Alabama applied its version of the Reasonable Use doctrine to resolve conflicts between water users. In *Martin v. City of Linden* (1995), the Alabama Supreme Court incorporated the Reasonable Use-American Rule to resolve a groundwater dispute.[7] Specifically, the Court considered the city's proposed withdrawal unreasonable per se, because the daily export of 500,000 gallons would not be used on the land overlying the aquifer.[8]

As Andreen explains, the traditional American rule of reasonable use applies to conflicts between competing beneficial uses.[9] But though the Court suggested it was applying the reasonable use rule, other scholars argue that perhaps the Court instead applied the absolute ownership rule.[10] These scholars suggest that because the *Adams* court did not balance competing uses to determine their comparative reasonableness, the court failed to consider the principle that is "at the heart of [the] reasonable use doctrine."[11] Additionally, Alabama courts have applied nuisance theory to balance competing uses, particularly in a case where an aquifer was dewatered, but the water was not withdrawn for beneficial use on overlying land.[12]

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[5] Ala. Code §9-10B-2(3).

[6] Ala. Code §9-10B-3(2).

[7] William L. Andreen, 4 Waters & Water Rights II, Alabama: Underground Water (LexisNexis treatise).

[8] Joseph W. Dellapenna, The Law of Water Allocation in the Southeastern United States at the Opening of the Twenty-First Century, 25 UALR L. Rev. 9, 48 (2002).

[9] Andreen, *supra* note 7.

[10] Dellapenna, *supra* note 8 at 46.

[11] Dellapenna, *supra* note 8 at 48.

[12] Dellapenna, *supra* note 8 at 48. *See City of Mobile v. Lester*, 804 So. 2d 220, 231 (Ala. Civ. App. 2001) (applying nuisance theory to damage to homes caused by the city's dewatering of an aquifer through repairs to a street).

For most uses, overlying land ownership serves as the basis for the legal right to groundwater.[13] In Alabama, a person who owns land that does not overlie a water source has no right to groundwater, though they do not appear to be restricted from obtaining this right. In *Adams v. Lang*, the defendant groundwater user was not liable for injuries to neighboring landowners because the defendant's withdrawal was for a beneficial use on overlying land.[14]

Large groundwater withdrawals are required by the State to have a permit and these specified users must apply for "certificates of use."[15] Additionally, users withdrawing from wells in the coastal zone must apply for a permit if withdrawing 50 gallons per minute or more.[16] Each certificate of use issued by the Office of Water Resources (OWR) is conditioned upon the user submitting annual reports that detail the amount of water withdrawn on a monthly basis.[17]

The OWR issues these certificates upon receipt of a declaration of beneficial use, in accordance with the Alabama Water Resources Act.[18] Public water systems,[19] water users withdrawing or consuming 100,000 gallons or more per day[20] and large irrigators having the capacity to use 100,000 or more per day, are required to apply for a "certificate of use."[21] The OWR only limits the issuance of Certificates of Use if the office determines that the proposed use interferes with "any presently known existing use."[22] The Certificate of Use incorporates a condition that the user will submit the amounts it respectively diverts, withdraws, or consumes on a monthly basis.[23] Each declaration of beneficial use (application for certificate of use) shall include the following information: water source, primary uses of the water indicating that the actual

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[13] *Adams*, 553 So. 2d at 89. *See generally*, Dellapenna, *supra* note 8 at 47-49.

[14] *Adams*, 553 So. 2d at 91-92.

[15] Ala. Code §9-10B-3(4).

[16] Ala. Admin. Code 335-8-2-.09.

[17] Ala. Code §9-10B-20(f).

[18] Ala. Code §9-10B-3(4).

[19] Ala. Code §9-10B-20(a)-(b). Time period to file for public water systems is dependent on whether the system supplies 10,000 or more households.

[20] *Id.* at § 9-10B-20(a).

[21] *Id.* at § 9-10B-20(d).

[22] *Id.* at § 9-10B-20(e).

[23] Ala. Code § 9-10B-3(4), -19, -20(e)-(f), -22.

or proposed use is "beneficial," geographic location of the place of withdrawal/diversion and return, estimated or actual quantity withdrawn, and "basis of legal right to use the water to be diverted."[24]

Water users withdrawing less than 100,000 gallons per day are not required to apply for "certificates of use" and do not need to declare their beneficial use, unless the commission determines that it is necessary to accomplish the purposes of the Alabama Water Resources Act.[25]

2. Sources of Law

The Court's application of the reasonable use doctrine generally governs disputes and conflicts between groundwater users. The Alabama Water Resources Act was enacted in 1993 to assist established case law and the common law scheme addressing water rights in the state.[26] More precisely, the Act augments the common law scheme by adding an administrative regime to establish a water resources management program, implemented by the Alabama Water Resources Commission (WRC), which promulgates regulations of the OWR. According to Professor Dellapenna, the Act indicates that, "Alabama appeared to join the move to regulated riparianism."[27] The Act provides that the conservation and management of groundwater use should enable the people of Alabama to realize the full beneficial use of groundwater while preserving future resource uses.[28] Alabama defines beneficial use as, "the diversion, withdrawal, or consumption of the waters of the state in such quantity as is necessary for economic and efficient utilization consistent with the interests of this state."[29]

[24] Ala. Admin. Code 305-7-10-.02; Ala. Code § 9-10B-3(8). *See* Dellapenna, *supra* note 8 at 50.

[25] Ala. Code § 9-10B-20(c).

[26] Ala. Code § 9-10B-1.

[27] Dellapenna, *supra* note 8 at 49.

[28] Ala. Code §9-10B-2(3).

[29] Ala. Code § 9-10B-3(2).

3. Scope of Right

a. Groundwater Ownership

The Alabama Water Resources Act states: "All waters of the state, whether found on the surface of the ground or underneath the surface of the ground, are among the basic resources of the State."[30] This suggests that groundwater belongs to the state, with the public having the right to use it.

b. Scope of Use

i. Permitted and Preferred Uses

The Alabama Supreme Court, when resolving groundwater disputes, has characterized several activities as allowable beneficial uses. These uses include using artesian wells for a variety of practices, such as to water cattle, to water pecan trees, and to fill catfish ponds.[31] Pursuant to the Alabama Water Resources Act, uses that must file a Declaration of Beneficial Use to be allowable include public water systems, withdrawals more than 100,000 gallons per day, and those who have an irrigation system with a capacity to withdraw more than 100,000 gallons per day.[32] Presumably then, as long as users in Alabama file when appropriate, most uses are allowable, specifically if the use is on overlying land.

The use of waters of the state for human consumption is recognized as a priority use of the state, and limitations on human consumption cannot be imposed except in emergency situations.[33] In *Martin v. City of Linden*, the Court described the City's attempt to find a permanent source of freshwater, but noted that they *did not believe* that, "in supplying their subscribers with water, municipalities enjoy greater rights than do private individuals or corporations, and in such instances municipalities stand upon the same footing as do private corporations."[34]

[30] Ala. Code § 9-10B-2(1).

[31] *Adams*, 553 So.2d at 89.

[32] Ala. Code § 9-10B-3(15), -20(a)-(d).

[33] Ala. Code § 9-10B-2(1).

[34] *City of Linden*, 667 So.2d at 739.

The use of groundwater should be conserved and managed to enable the people of Alabama to realize the full beneficial use thereof and to maintain such water resources for use in the future.[35]

Alabama defines beneficial use as "the diversion, withdrawal, or consumption of the waters of the state in such quantity as is necessary for economic and efficient utilization consistent with the interests of this state."[36] In *Adams*, the court applied its understanding of the American rule of reasonable use:

> Where a landowner who is conducting any sort of operations to which its land is adapted in an ordinary and careful manner, and as a consequence percolating water is drained, affecting the surface owner's water supply, either of that or adjoining land, no liability for his damage exists. But if the waters are drained without a reasonable need to do so, or are willfully or negligently wasted in such operation in a way and manner as that is should have been anticipated to occur, and as a proximate result the damage accrued to the surface owners so affected, including adjoin landowners, there is an actionable claim…[37]

Several years later, the *City of Linden* Court based its understanding of the reasonable use doctrine on a 1940 case in the Pennsylvania Supreme Court because of similar fact situations.[38]

ii. Location of use

Water uses that require groundwater to be conveyed away from its source on the overlying land to land that does not overlie the water source is considered unreasonable per se under the common law doctrine of "reasonable use."[39] The application of the

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[35] Ala. Code § 9-10B-2(3).

[36] *Id.* §9-10B-3(2).

[37] *Adams*, 553 So.2d at 91 (Ala. 1989), citing *Sloss-Sheffield Steel & Iron Co. v. Wilkes*, 165 So. 764 (Ala. 1936) (Sloss I), *Sloss-Sheffield Steel & Iron Co. v. Wilkes*, 181 So. 276 (Ala. 1938).

[38] *City of Linden*, 667 So. 2d at 738-39 (citing *Rothrauff v. Sinking Spring Water Co*., 14 A.2d 87 (1940)).

[39] W. Barron A. Avery. Article. *Disenfraching the Non-Riparian: Alabama's Water Resource Management Program.* 39 Cumb. L. Rev. 437, 442 (2008-09).

"reasonable use" doctrine to non-overlying land groundwater uses was confirmed in 1995 by the Alabama Supreme Court in *Martin v. City of Linden*.[40] In Alabama, a person who owns land that does not overlie a water source has no right to the groundwater. Thus, any diversion of groundwater from overlying to non-overlying land is unreasonable per se.[41] The overlying vs. non-overlying land distinction is important to the Alabama Court, primarily because diverting to non-overlying was the crucial difference in *City of Linden*, as opposed to *Adams v. Lang*.[42]

The facts in *Martin v. City of Linden* do not specify whether the City's proposal involved the transport of water outside the basin. Under the reasonable use rule, the court did not permit the City's proposal to pump 500,000 gallons per day from the well to the City, which was fifteen-miles away.[43] However, it is unclear whether transporting the water away from the well to a location fifteen-miles away also suggests that the transport of water outside a basin is additionally not permitted under the reasonable use rule.[44]

c. Loss of Water Rights

Water rights may be limited or reduced in quantity by the Alabama Department of Environmental Management (ADEM) if the WRC adopts or promulgates any rules/regulations that limit or reduce the water available to a person holding a certificate of use.[45] Groundwater users who do not submit a Declaration of Beneficial Use to the OWR or who make a false statement, may be subject to administrative or civil enforcement actions.[46]

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[40] *See City of Linden*, 667 So. 2d at 732.

[41] *See City of Linden*, 667 So. 2d at 732; Dellapenna, *supra* note 8 at 47-49.

[42] Andreen, *supra* note 7. According to Andreen:

> In *Adams*, the use of underlying groundwater to fill commercial catfish ponds had been approved as "reasonable" even though that action periodically caused the neighbor's wells to run dry. The crucial difference, according to the court, was the fact that in *Adams* the water was used on the property from which it was pumped, whereas in the current case the City of Linden intended to divert groundwater for use off-site.

[43] *City of Linden*, 667 So. 2d at 734.

[44] *Id.* at 733.

[45] Ala. Code §9-10B-23(a).

[46] Ala. Code § 9-10B-5(18), (19).

No person's beneficial use of the quantitative waters of the state shall be restricted by the OWR or the WRC unless the beneficial use is within a designated capacity stress area.[47] Further, the use may not be restricted unless the person has received due process of the law, including a public hearing.[48] The ADEM directs any actions that restrict, limit, or condition a person's beneficial use of Alabama water resources.[49]

In the event that a water user brings a cause of action against a neighbor, they generally must litigate under the common law. The WRC may also restrict or limit water use in capacity stress areas, though they have not established any areas to this point.

4. Well Drilling

The Geological Survey of Alabama requires that a driller of a water well must be licensed, keep the appropriate license certificate furnished, file an application of intent to drill a water well, submit a report of any well drilled, and furnish a log and set of samples to the State Geological Survey from wells designated by the board or State Geologist.[50]

5. Hydraulic Connection and Regulation

Apparently, there is not law to regulate the interaction between groundwater and surface water, and the Alabama Water Resources Act does not protect minimum surface flows or minimum levels of groundwater.[51]

6. Aquifer Recharge and Underground Storage

It does not appear that the state regulates, encourages, or facilitates aquifer recharge or underground storage programs.

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[47] Ala. Code § 9-10B-2(6)(a).

[48] *Id.* at § 9-10B-2(6)(b).

[49] *Id.*

[50] Ala. Code § 22-24-8(3) & (5).

[51] Dellapenna, *supra* note 8 at 49.

7. Water Management Plan(s)

In 1990, the Water Resources Act gave the OWR the responsibility to develop a comprehensive management plan,[52] however, no management plan has ever been issued. In 2012, former Governor Robert Bentley created a task force to create a state water plan, and in 2018, it was submitted to governor, Kay Ivey.[53] It does not appear that a plan has been issued yet.

8. Regulatory Authorities

The Alabama Water Resources Act vested authority in the OW and the WRC to implement the Act by developing plans and strategies for the management of Alabama's ground and surface water.[54] The OWR, through the WRC, can promulgate rules and regulations and "implement quantitative water resource programs and projects for the coordination, conservation, development, management, use, and understanding of the waters of the state."[55] The Act further grants the Alabama Department of Environmental Management with authority to issue permits when necessary to limit or restrict withdrawals, as well as authority to enforce Act.[56]

The OWR is tasked with developing long-term plans, promulgating rules & regulations for the purposes of the "Alabama Water Resources Act." The OWR monitors by implementing quantitative water resource programs and serving as a repository for data regarding waters of the state.[57] Office Water Resources also has authority to enforce all provisions of the Act.[58] The WRC has the power to establish and adopt rules or regulations and to hear and determine administrative appeals of the Office.

The ADEM—Coastal Division issues groundwater withdrawal permits for wells whose surface location is in the coastal area and whose surface location is not in the coastal

[52] Ala. Code § 9-10B-2(5).

[53] Gigi Douban, Why Alabama Still Has No Water Management Plan, WBHM, https://wbhm.org/feature/2017/why-alabama-still-has-no-water-management-plan/ (last visited Mar. 27, 2020).

[54] Ala. Code § 9-10B-2(5) & § 9-10B-4 to 9-10B-18.

[55] Ala. Code § 9-10B-5(3).

[56] Ala. Code § 9-10B-2(6)(b).

[57] Ala. Code § 9-10B-5.

[58] *Id.* at § 9-10B-5(17).

area but whose 50-year capture zone extends into the coastal area.[59] Users that plan to extract groundwater at a rate of 50 gallons per minute or greater require a permit from ADEM-Coastal Division.[60] This regulation also contains several provisions regarding saltwater intrusion.[61]

9. Special Districts

No person's beneficial use of the quantitative waters of Alabama shall be restricted by the OWR or WRC except where such beneficial use is within an area designated as a capacity stress area.[62]

Any restriction or condition placed on any person's beneficial use of water resources can be implemented only after: i.) the WRC determines that the action is necessary because the aggregated uses of the waters in such area exceed or will exceed the availability[63], and ii.) such person has been afforded due process, including a public hearing, within enforcement of such action under the direction of the Alabama Department of Environmental Management.[64]

Furthermore, Alabama has additional area designations when the demand of water exceeds availability. OWR has the authority to declare an area of the state as a Capacity Stress Area when the aggregate uses of the waters in such area currently exceeds or will exceed the availability of such waters.[65] Capacity Stress Areas are defined as an area of the state designated when the commission determines that the use of the waters of the state, whether groundwater, surface water, or both, requires coordination, management, and regulation for the protection of the interests and rights of the people of the state.[66]

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[59] Ala. Admin. Code 335-8-2-.09.

[60] *Id.*

[61] *Id.* at 335-8-2-.09(2)-(4).

[62] Ala. Code § 9-10B-2(6).

[63] *Id.* at § 9-10B-2(6)(a).

[64] *Id.* at § 9-10B-2(1)(b).

[65] *Id.* at § 9-10B-2(6)(a).

[66] Ala. Code § 9-10B-3(3).

If WRC decides to implement restrictions, limitations, or conditions on water use in capacity stress areas, the Commission must consider all relevant matters.[67] These include: the uses of water under each 'certificate of use' in the area, the quantity of water returned by each holder of a certificate of use to the capacity stress area, the reasonably foreseeable impacts on the economic or other interests of Alabama, and the effect of these limitations and restrictions on the status of such area as a capacity stress area. The Commission is also required to review any imposed limitations or restrictions every twelve months.[68]

Priority is given to certain uses when limiting withdrawals in capacity stress areas, thus this section is also pertinent to the 'Hierarchy of Purposes' described above. The Act states that the "use of waters of the state for human consumption is recognized as a priority use…no limitation upon the use of water for human consumption shall be imposed except in emergency situations after the Office has considered all feasible alternatives to such limitations."[69] The Act also lists several specific impoundment uses that are not subject to the capacity use provisions, which may be interpreted as providing some guidance to the priority scheme within capacity stress areas.[70]

The WRC has not yet established any capacity stress areas.[71] Alabama appears to be reluctant to establish these capacity stress areas. Despite a severe drought in the Flint River Basin along the southwest Georgia/ southeast Alabama border in the early 2000s, only Georgia curtailed water withdrawal permitting.[72]

[67] Ala. Code § 9-10B-22(c).

[68] *Id.*

[69] Ala. Code § 9-10B-2(2).

[70] Ala. Code § 9-10B-7(a)-(c).

[71] Dellapenna, *supra* note 8, at 52.

[72] *See* Adam M. Kron, David H. Pope, Gilbert B. Rogers. *Water Issues in the Deep South*, 11 No. 1 ABA Water Resources Committee Newsl. 15 (Dec. 2008).

10. Transboundary Arrangements

It does not appear that Alabama is party to any transboundary arrangements or conflicts.

11. Native American Rights

It does not appear that the state grants exemptions, benefits, or concessions to Native American Tribes.

B. Arkansas

Arkansas is generally considered to operate under a "Reasonable Use" groundwater governance system although a statutory permitting system regulates withdrawals in "critical groundwater areas."

1. Definitions, Basis of Rights, Standards, and Interactions

Arkansas has defined groundwater as the water beneath the surface of the ground.[1] An aquifer is defined as a permeable, water-bearing stratum of rock, sand, or gravel.[2]

In *Jones v. Oz-Ark-Val Poultry Co.* (1957), the Supreme Court of Arkansas applied to the state's groundwater resources its reasonable use rule for surface water from *Harris v. Brooks* (1955).[3] The Court explained, "We see no good reason why the same rule should not apply to a true subterranean stream or to subterranean percolating waters."[4] However, the Court in *Jones v. Oz-Ark-Val* did not solely refer to the rule as reasonable use, but described it as "the rule of 'reasonable use', the rule of correlative rights, or the American rule."[5] Josepha W. Dellapenna considers the holding in *Jones* to suggest a reasonable use approach, stating that "this appears to be the true form of the doctrine in which competing uses are balanced against each other to determine the specific allocation of each user."[6]

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[1] Ark. Code Ann. § 15-22-903(9) (West, West through the end of the 2019 Regular Session of the 92nd Arkansas General Assembly).

[2] *Id.* at § 15-22-903(2).

[3] *Jones v. Oz-Ark-Val Poultry Company*, 306 S.W.2d 111 (Ark. 1957); *Harris v. Brooks*, 283 S.W.2d 129 (Ark. 1955).

[4] *Jones*, 306 S.W.2d at 113.

[5] *Id.*

[6] J.W. Dellapenna, *The Law of Water Allocation in the Southeastern States at the Opening of the Twenty First Century*, 25 U. Ark. Little Rock L. Rev. 9, 52 (2002); *See generally*, Phillip E. Norvell, *Arkansas, in* 6 Waters and Water Rights, 227-30, 234-36 (Robert E. Beck ed., Lexis Relp. 2001).

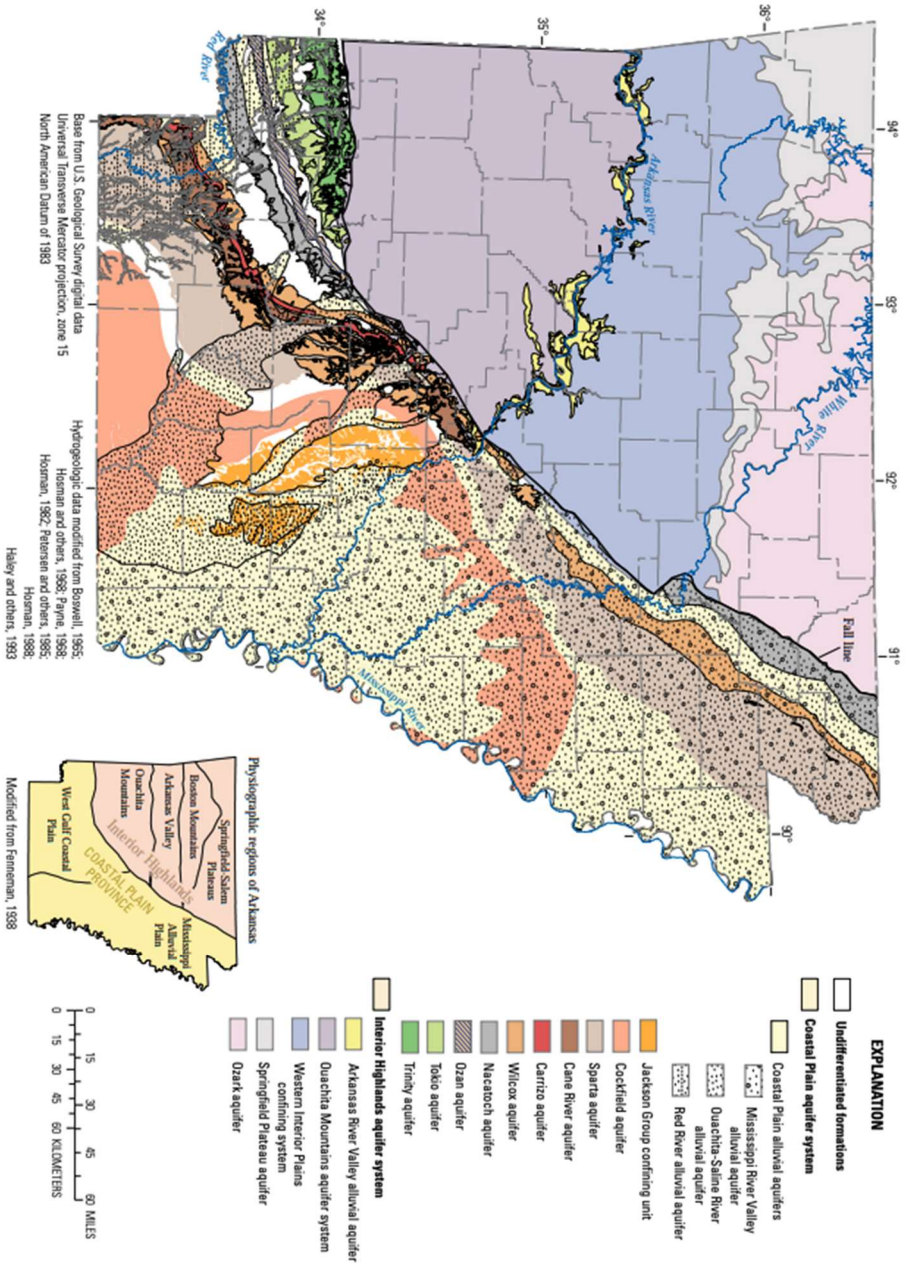

Fig. B.1. Groundwater Map of Arkansas[7]

[7] USGS, *Aquifers of Arkansas Abstract* (Oct. 29, 2014), https://pubs.usgs.gov/sir/2014/5149/pdf/sir2014-5149_Abstract.pdf (last visited Mar. 27, 2020).

Academics note that Arkansas has described itself as following the "correlative rights doctrine."[8] To further confuse the designation, the Arkansas Natural Resources Commission (ANRC) said this might be called a version of the "correlative rights doctrine for ground water," which is similar to the approach of the surface water "reasonable use rule."[9] Academics summarize the Arkansas groundwater doctrine as "[e]ach surface owner above a common source of groundwater has an equal right to make reasonable use of the groundwater subject to the equal rights of other surface owners to make a reasonable use."[10]

Much of the confusion with the "reasonable use vs. correlative rights" designation stems from the decision in *Jones* to follow the American Rule described in *Hudson v. Dailey*:

> "Where two or more persons own different tracts of land, underlaid by porous material…, which is saturated with water moving with more or less freedom therein, *each has a common and correlative right to the use* of this water upon his land, to the full extent of his needs if the common supply is sufficient, and to the *extent of a reasonable share* thereof, if the supply is so scant that the use by one will affect the supply of the others."[11]

Water rights are an incident of the surface ownership of property and may not be transferred separately from the property itself.[12] Under the Arkansas Groundwater Protection and Management Act (the Act), groundwater rights are issued for beneficial uses.[13] The Act includes a definition of beneficial use: "the use of water in such quantity as is economical and efficient and which use is for a purpose and in a manner which is reasonable, not wasteful, and is compatible with the public interest."[14]

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[8] *See generally*, Earl Finbar Murphy*, The Status of the Correlative Rights Doctrine in Groundwater Today, in* 3 Waters and Water Rights, § 22.05(a) (Robert E. Beck ed., Lexis Relp. 2001).

[9] *Water Law in Arkansas*, Arkansas Natural Resources Commission (2011), pg. 6, https://static.ark.org/eeuploads/anrc/arkansas_water_law_2011_draft-new.pdf (last visited Mar. 27, 2020)

[10] G. Alan Perkins, *Arkansas Water Rights: Review and Considerations for Reform*, 25 U. Ark. Little Rock L. Rev. 123, 129 (2002).

[11] *Jones,* 306 S.W.2d at 115; *Hudson v. Dailey*, 156 Cal. 617 (1909).

[12] Ark. Code Ann. § 15-22-911(h) (West, West through the end of the 2019 Regular Session of the 92nd Arkansas General Assemb.).

[13] *Id.* at § 15-22-911(a).

[14] Ark. Code Ann. § 15-22-903 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

2. Sources of Law

The principle case addressing groundwater rights in Arkansas is *Jones v. Oz-Ark-Val Poultry Company*, 306 S.W.2d 111 (Ark. 1957). Additionally, in 1991, the Arkansas General Assembly enacted the Arkansas Ground Water Protection and Management Act.[15]

3. Scope of Right

a. Groundwater Ownership

In *Felton Oil Co. v. Gee* (Ark. 2004), the State argued that groundwater is a state resource, which can be limited by legislative enactments, and that the Gee's merely had riparian rights to reasonable use of their groundwater.[16] The court reasoned that the State failed to cite any statutory authority or case law to establish the State's ownership of groundwater.[17]

b. Scope of Use

i. Permitted and Preferred Uses

Pursuant to the Act, water rights are issued for beneficial uses.[18] The statutes do not offer any specific restrictions on allowable types of usage, so long as they are beneficial uses. Although usage is not generally restricted based on the type of use, these usages may have different annual reporting requirements: for example, commercial agricultural usage has different annual reporting requirements than small-scale domestic withdrawals.[19]

The Arkansas Natural Resources Commission is authorized, by Ark. Code Ann. § 15-22-901, to issue groundwater rights for beneficial uses, giving preference first to

[15] 1991 Ark. Acts 154 and 342 (codified at Ark. Code Ann § 15-22-901 et seq.).

[16] *Felton Oil Co. v. Gee*, 182 S.W.3d 72 (Ark. 2004).

[17] *Id.*

[18] Ark. Code Ann. § 15-22-911(a) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[19] Ark. Code Ann. § 15-22-302 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

sustaining life, then to maintaining health, and finally to increasing wealth.[20] The sustaining life and maintaining health provisions suggest that domestic use is the utmost priority. Arkansas defines domestic use as "the use of water for ordinary household purposes, including human consumption, washing, the watering of domestic livestock, poultry, and animals, and the watering of home gardens for consumption by the household."[21] The ANRC rules and case law do not indicate a specified preference between commercial agriculture or industrial usages.

The ANRC issues groundwater rights for beneficial uses[22], and on all renewal applications, consideration is given to reasonable beneficial use.[23] The ANRC defines beneficial use as "the use of water in such quantity as is economical and efficient and which use is for a purpose and in a manner which is reasonable, not wasteful, and is compatible with the public interest."[24] The seminal Arkansas groundwater cases offered some insight into the meaning of reasonable use: "It is unreasonable to permit appellees to use thousands of gallons of water per day for the purpose of processing chickens, not leaving enough water for the domestic needs of the Joneses and Mrs. Ward."[25]

ii. Location of Use

Overlying land is the basis for the right to groundwater, and water rights "run with the land." Thus, upon the sale of a property, water rights automatically transfers to the new landowner.[26] In *Lingo v. City of Jacksonville*, the court indicated that groundwater is not restricted to use on overlying land.[27] For example, public water supply systems and marketers of bottled water originating from springs and groundwater are not subject to restrictions on the location of water use.[28]

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[20] Ark. Admin. Code § 138.00.6-404.1 (West, West through Nov. 15, 2019).

[21] Ark. Code Ann. § 15-22-903, codifying 1991 Ark. Acts 154 and 342.

[22] Ark. Code Ann. § 15-22-911(a) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[23] *Id.* at § 15-22-911(d)(2).

[24] Ark. Admin. Code § 138.00.6-401.3 (West, West through Nov. 15, 2019).

[25] *Jones*, 306 S.W.2d at 115.

[26] Ark. Code Ann. § 15-22-911(h) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.); Ark. Admin. Code § 138.00.6-404.7 (West, West through Nov. 15, 2019).

[27] *Lingo v. City of Jacksonville*, 522 S.W.2d 403, 404 (Ark. 1975).

[28] Ark. Code Ann. § 15-22-905(6) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

Water rights are an incident of surface ownership of property, and the right may not be transferred separately from the property itself.[29] Conversely, Arkansas rejects the appurtenance rule restricting use to the overlying land[30] and allows the export of water for use off and away from the overlying land so long as there is no injury to other owners of land overlying the aquifer and their respective water uses.[31]

In *Lingo*, the court reasoned that it would be "permissible for a riparian owner to remove subterranean and percolating waters and *use it away from the lands* from which it was pumped if this use does not injure the common supply of the riparian owners."[32] However, Arkansas case law is silent on the transport of water outside a basin. In *Lingo*, the proposed transport was within the same subterranean watershed, as the city wanted to transport water five miles away from its wells for municipal consumption.[33]

c. Loss of Water Rights

A water right *may be canceled* under several conditions:

i. if water is used for a purpose other than that for which the water right was issued;[34]

ii. for nonuse or failure to put the water to a reasonable beneficial use within a reasonable period of time following the issuance of the water right if the nonuse is for a reason other than implementation of conservation measures, crop rotation, conversion to surface water sources, or climatic conditions;[35]

iii. for failure to report water use for two consecutive years under Ark. Code Ann. §15-22-302 or failure to pay the fee as set out in Ark. Code Ann. § 15-22-913 for two consecutive years.[36]

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[29] Ark. Code Ann. § 15-22-911(h) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[30] Joseph W. Dellapenna, *Correlative Rights Today, in* 21 Waters and Water Rights § 21.04 (Amy L. Kelley, ed., 3rd ed. LexisNexis/Matthew Bender 2014).

[31] *Lingo,* 522 S.W.2d at 405.

[32] *Id.* at 404.

[33] *Id.* at 405.

[34] Ark. Code Ann. § 15-22-911(e)(1)(A) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[35] *Id*. at § 15-22-911(e)(2).

[36] *Id*. at § 15-22-911(e)(3).

The Arkansas Natural Resources Commission has all powers necessary to enforce the Arkansas Ground Water Protection and Management Act.[37] This authority includes the power to issue subpoenas for any witnesses to testify or produce relevant records in any proceeding before the commission,[38] as well as the power to enter upon property (at reasonable times) to conduct investigations to enforce the Act.[39] Any person aggrieved by decisions and actions under the Act by the Arkansas Natural Resources Commission may appeal under the Arkansas Administrative Procedure Act, § 25-15-201 et seq. [40]

4. Well Drilling

The Commission on Water Well Construction regulates the construction of water wells for the general health, safety, and welfare of the state. A licensed well contractor must supervise construction, and the well contractor must deliver a report once construction is completed.[41]

Any person who withdraws groundwater, unless exempted, must submit annual usage reports to the Arkansas Natural Resources Commission no later than March 1 for the prior water year.[42] Exemptions include household wells exclusively for domestic use and wells within maximum potential flow rates of less than 50,000 gallons.[43] If required to report, the withdrawal report must include the following: (1) for water used for agriculture; the number and size of wells; the name and address of the water user; the crops, livestock, poultry, or fish type grown, the acreage that is irrigated or aquacultured; the quantity of water used; and the location of the wells and the water use;[44] and (2) for water used for a purpose other than agriculture, the number, size, and

[37] Ark. Code Ann. § 15-22-904 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[38] *Id*. at § 15-22-904(2).

[39] *Id*. at § 15-22-904(4).

[40] Ark. Code Ann. § 15-22-912 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[41] Ark. Code Ann. § 17-50-104 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[42] Ark. Admin. Code § 138.00.6-402.1 (West, West through Nov. 15, 2019).

[43] Ark. Code Ann. § 15-22-302 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.); Ark. Admin. Code § 138.00.6-402.2 (West, West through Nov. 15, 2019).

[44] *Id.*

location of wells; the name and address of the water user; the use made of the water; and the quantity of water used.[45]

5. Hydraulic Connection and Regulation

Arkansas does not regulate ground/surface water interactions from a hydrologic perspective. However, within critical groundwater designation areas, tax credits are available for conversion from groundwater to surface water, with the highest amount of credit going to surface water conversions by individuals owning land in critical groundwater areas.[46] Arkansas appears to provide monetary benefit for using surface water, as opposed to groundwater, in specific locations.

6. Aquifer Recharge and Underground Storage

Arkansas does not facilitate aquifer recharge or underground storage programs because, although "artificial recharge and [aquifer storage and recovery] can both be made to work in Arkansas, the hydrogeologic setting is not conducive, and therefore, not economically feasible."[47]

7. Water Management Plan(s)

The Arkansas Natural Resource Commission is charged with preparing, developing, formulating, and engaging in a comprehensive program for the development and management of the state's water and related land resources, to be referred to as the "Arkansas Water Plan."[48] The statute states the plan "from time to time, shall be altered, amended, or repealed to the extent necessary for the proper administration of the state's water resources."[49] The most recent Arkansas Water Plan was adopted in 2014.[50]

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[45] Ark. Admin. Code § 138.00.6-402.3 (West, West through Nov. 15, 2019).

[46] Ark. Nat'l Res. Comm'n, *Arkansas Water Plan* (2014), http://arkansaswaterplan.org/plan/ArkansasWaterPlan/2014AWPWaterPlan/AWPFinalExecutiveSumm.pdf (last visited Mar. 27, 2020).

[47] Ark. Nat. Res. Comm'n, *Arkansas Groundwater Protection and Management Report for 2013*, https://static.ark.org/eeuploads/anrc/2013-2014AnnualReport.pdf (last visited Mar. 27, 2020).

[48] Ark. Code Ann. § 15-22-503 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[49] *Id.*

[50] *Id.*

8. Regulatory Authorities

The Arkansas Natural Resources Commission[51] has the powers necessary to enforce the Arkansas Ground Water Protection and Management Act (AGWPMA).[52] Its website and contact information are:

http://www.anrc.arkansas.gov/
101 East Capitol Avenue, Suite 350
Little Rock, AR 72120
Phone: (501) 682-1611

The ANRC has the powers necessary to accomplish the purpose of the AGWPMA, by establishing a comprehensive groundwater protection program to conserve groundwater and protect water quality.[53] The AGWPMA provides an administrative process for identifying critical groundwater areas and provides a process for initiation of regulation limiting groundwater withdrawals, as well as establishing ground water criteria.[54] ANRC has reporting (or monitoring) requirements for certain groundwater users in Arkansas, although there are exemptions.[55]

9. Special Districts

The ANRC can designate "critical ground water areas." The Arkansas Natural Resources Commission has established three "critical ground water areas," each in the different counties overlying the Sparta aquifer. These critical areas include the South Arkansas Critical Ground Water Area, the Grand Prairie Critical Ground Water Area, the Cache Critical Ground Water Area, the Phillips County Critical Groundwater Area, and the Monroe County Critical Groundwater Area.[56]

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[51] Ark. Code Ann. § 15-20-201 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[52] Ark. Code Ann. § 15-20-901 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.) et. seq.; Ark. Admin. Code § 138.00.6-401.4 (West, West through Nov. 15, 2019).

[53] Ark. Admin. Code § 138.00.6-401.4 (West, West through Nov. 15, 2019).

[54] Ark. Code Ann. § 15-22-906 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[55] Ark. Admin. Code § 138.00.6-402.1 (West, West through Nov. 15, 2019).

[56] *Id.*

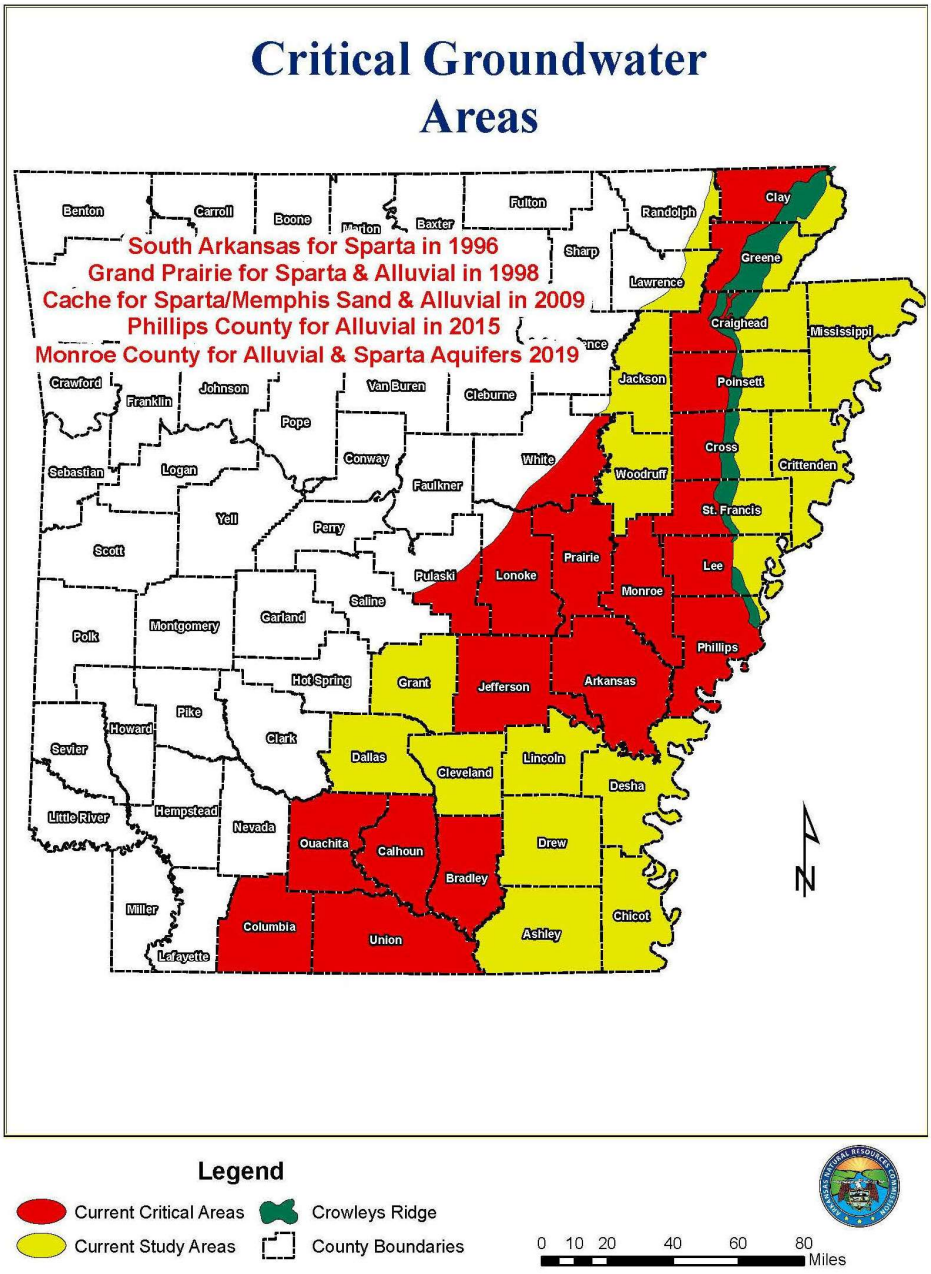

Fig. B.2. Critical Groundwater Areas in Arkansas[57]

The ANRC regulates groundwater withdrawals in critical areas. After designating critical groundwater areas, the ANRC must follow the outlined procedures to initiate its

[57] Ark. Nat. Res. Comm'n, *The Facts About Critical Groundwater Designation*, https://static.ark.org/eeuploads/anrc/2019_CGWA_Fact_Sheet_cp.pdf (last visited Mar. 27, 2020).

regulatory authority. These procedures include having public hearings and following the Arkansas Administrative Procedure Act.[58] Existing wells must apply for the issuance of a "water right" within one year of the initiation of regulation.[59] If a well owner fails to apply for the water right then they are presumed to have abandoned their claim and lose the ability to establish a right.[60] Although the ANRC has the authority to initiate regulation in critical groundwater areas by following a process similar to that required for the designation of an area, the ANRC has never taken steps to regulate these areas.[61]

There are some exceptions to the ANRC's power in critical groundwater areas. No groundwater withdrawals can be reduced from wells for which a water right has been issued under Section 404.3, and the right holder can demonstrate a 20% reduction of his groundwater use by either conserving water or converting to surface water supplies.[62] There will be no reduction of the withdrawal of groundwater from existing wells in an alluvial or sustaining aquifer for which the user has a "grandfathered" water right.[63]

10. Transboundary Arrangements

It does not appear that Arkansas is a party to any transboundary arrangements or conflicts regarding groundwater.

11. Native American Rights

It does not appear that the state grants exemptions, benefits, or concessions to Native American tribes.

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[58] Ark. Code Ann. § 15-22-909 (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[59] Ark. Admin. Code § 138.00.6-404.3 (West, West through Nov. 15, 2019).

[60] Ark. Nat. Res. Comm'n, Water Law in Arkansas, Revised by the ANRC in 2011, pg. 20. https://static.ark.org/eeuploads/anrc/arkansas_water_law_2011_draft-new.pdf (last visited Mar. 27, 2020).

[61] ANRC, *Critical Groundwater Areas*, http://anrc.ark.org/divisions/water-resources-management/groundwater-protection-and-management-program/critical-groundwater-areas/ (last visited Mar. 27, 2020).

[62] Ark. Code Ann. § 15-22-905(2) (West, West through the end of the 2019 Reg. Sess. of the 92nd Ark. Gen. Assemb.).

[63] *Id*. at § 15-22-905(1).

C. Colorado

Colorado uses a modified system of prior appropriation to allocate groundwater rights: "While the doctrine of prior appropriation is recognized, such doctrine should be modified to permit full economic development of designated ground water resources."[1] The Colorado Doctrine is comprised of four laws for all water use: "(1) all surface and groundwater in Colorado is a public resource for beneficial use by public agencies, private persons and entities; (2) a water right is a right to use a portion of the public's water resources; (3) water rights owners may use streams and aquifers for the transportation and storage of water; and (4) water rights owners can build facilities on the private lands of others to divert, extract or move water from a stream or aquifer to its place of use, with consent of the landowners or upon payment of just compensation."[2]

1. Definitions, Basis of Rights, Standards, and Interactions

There are four categories of groundwater in Colorado: tributary groundwater, designated groundwater, nontributary groundwater, and Denver basin groundwater, and appropriation rules differ depending on the type of groundwater at issue.[3]

In general, Colorado is described as following Modified Prior Appropriation in its administration of its groundwater, defined as beneficial use in reasonable amounts through appropriation.[4] However, appropriation rules differ based on the type of groundwater at issue. Tributary groundwater is groundwater hydraulically connected to surface streams, and because it can deplete surface water, it is treated as surface water in the state's surface prior appropriation system.[5]

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[1] 37 Colo. Rev. Stat. Art. 90-102(1); *Upper Black Squirrel Creek v. Goss*, 993 P.2d 1177, 1183–84 (Colo. 2000), *noting* "[The General Assembly] intended this modified appropriation to: (1) permit full economic development of designated ground water resources, (2) protect prior appropriations of designated ground water, and (3) protect and maintain reasonable ground water pumping levels, but not to require the maintenance of historical water levels]"

[2] Justice Gregory J. Hobbs, Jr., Citizen's Guide to Colorado Water Law (5) (Caitlin Coleman et al. eds., 4th ed. 2015).

[3] *Colorado Ground Water Comm'n v. N. Kiowa-Bijou Groundwater Mgmt. Dist.,* 77 P.3d 62, 69 (Colo. 2003).

[4] Colo. Rev. Stat. Ann. § 37-90-102 (West, West through 2019 Reg. Sess.).

[5] *Colorado Ground Water Comm'n*, 77 P.3d at 69, see also Colo. Rev. Stat. §§ 37-92-201 through 37-92-305 (West, West through 2019 Reg. Sess.).

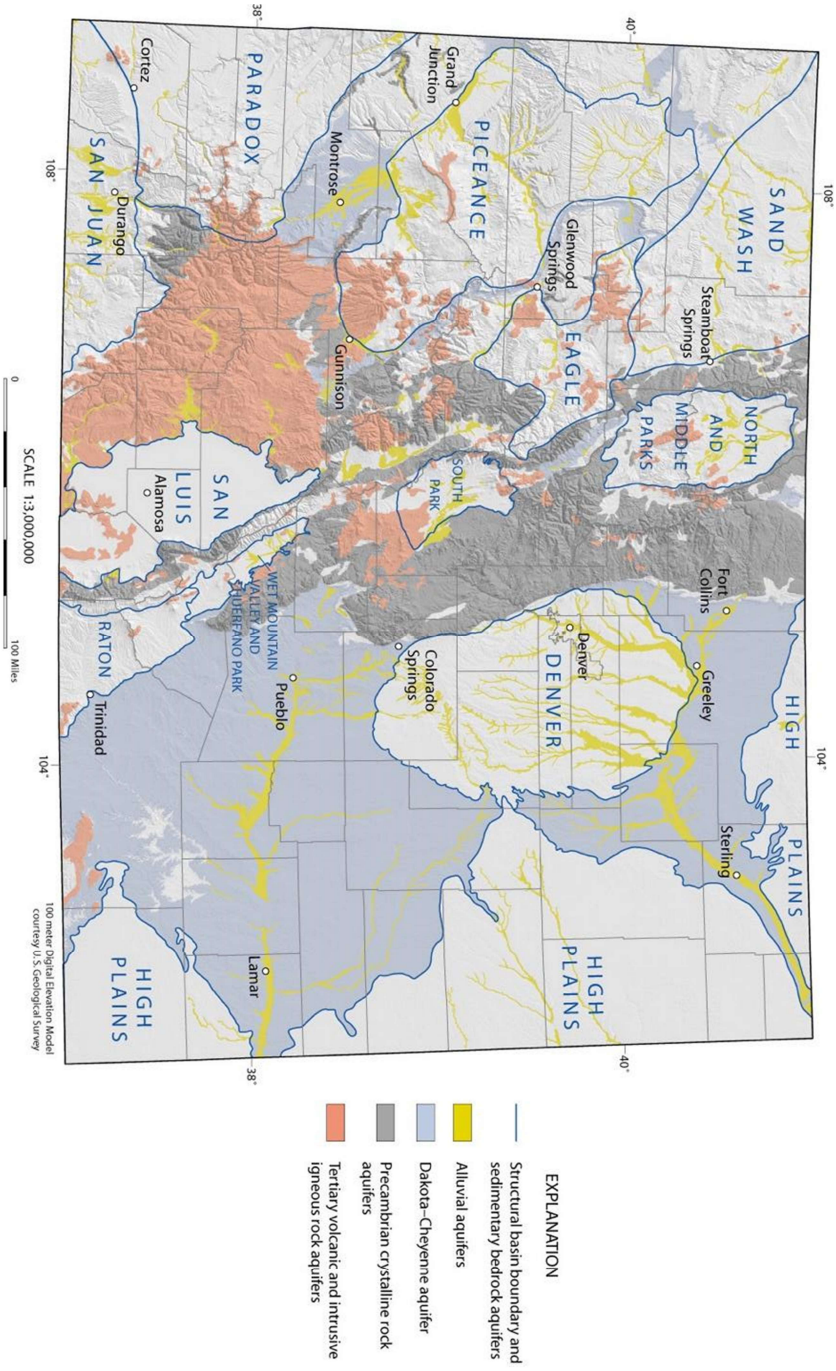

Fig. C.1. Groundwater Atlas of Colorado[6]

[6] Colorado Geological Society, https://i.pinimg.com/originals/f2/17/00/f2170074ede13c4594d8257d0ada6896.jpg (last visited Mar. 27, 2020).

All groundwater in Colorado that is not Denver Basin groundwater is presumed to be tributary unless proven by clear and convincing evidence.[7] Therefore, tributary groundwater is integrated into the administration of surface water priority systems.[8] Designated groundwater is defined as groundwater located within designated groundwater basins, but not within the Denver Basin aquifers.[9] Nontributary groundwater is located outside a designated groundwater basin and, if pumped, will not deplete surface streams at rates of more than 1/10th of 1% of the rate of pumping within 100 years.[10] Denver Basin groundwater is comprised of four stratified, geologically isolated aquifers, and is governed by distinct statutory guidelines.[11]

Designated groundwater rights are adjudicated by the Colorado Ground Water Commission (CGWC), which uses a modified prior appropriation system to permit the full economic development of designated groundwater resources.[12] Tributary groundwater is governed by prior appropriation surface water principles.[13] To designate a groundwater supply "nontributary" it must first be proven by clear and convincing evidence, either in the well permitting process or in water court.[14] Rights to nontributary water are determined by the total amount of recoverable water beneath the overlying land, and are allowed on the basis of an aquifer life expectancy of 100 years, and the average pumped amount may not exceed 1% of the recoverable water underlying the owner's land.[15]Denver Basin aquifer rights are governed by statutory rules, and unlike designated groundwater withdrawal rights (which are determined by a modified appropriation system), Denver Basin rights are appurtenant to ownership of the overlying land.[16] Permitting procedures, replacement rates, and municipal withdrawal procedures differ slightly for waters within the Denver Basin, which are still categorized

[7] *Colorado Ground Water Comm'n*, 77 P.3d at 69.

[8] Colo. Rev. Stat. Ann. § 37-92-102 (West, West through 2019 Reg. Sess.).

[9] Colo. Rev. Stat. Ann. § 37-90-103(6)(a) (West, West through 2019 Reg. Sess.).

[10] *Id.* at § 37-90-103(10.5).

[11] *Id.* at § 37-90-103(10.5, 10.7).

[12] Colo. Rev. Stat. Ann. §§ 37-90-106; 37-90-102 (West, West through 2019 Reg. Sess.).

[13] Colo. Rev. Stat. Ann. §§ 37-92-201 through 37-92-305 (West, West through 2019 Reg. Sess.).

[14] *Colorado Ground Water Comm'n.*, 77 P.3d at 69.

[15] Colo. Rev. Stat. Ann. § 37-90-137(4) (West, West through 2019 Reg. Sess.); 2 Colo. Code Reg. 402-7 § 8(A).

[16] Colo. Rev. Stat. Ann. §§ 37-90-107(7)(a) -- 111(5) (West, West through 2019 Reg. Sess.).

as tributary groundwater, designated groundwater, or nontributary groundwater, depending on whether the waters are located in another designated groundwater basin.[17]

Prior appropriation rights require beneficial use in reasonable amounts, and apply to tributary and designated groundwater of the state.[18] However, the legislature has noted that the prior appropriation principles may be modified to permit full economic development of the economic resource.[19] Nontributary groundwater statutory rights are governed by the "best available evidence" used by the General Assembly in recognizing the finite nature of nontributary groundwater outside of groundwater basins; those rights are based on beneficial use in amounts that will conserve the resource and protect vested water rights.[20]

2. Sources of Law

The Colorado Groundwater Management Act sets out groundwater definitions, establishes the Groundwater Commission, lays out rules for determining designated basins and well permits, and establishes groundwater management districts and water conservation boards.[21]

The CGWC issues rules and regulations as well as case law from Colorado Water Courts.[22] Colorado is divided into seven water divisions with a water judge in each division.[23] The Ground Water Commission determines areas to designate as groundwater basins, in which groundwater management districts may be formed.[24]

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[17] Colo. Rev. Stat. Ann. § 37-90-103(10.5) (West, West through 2019 Reg. Sess.).

[18] Colo. Rev. Stat. Ann. § 37-90-102 (West, West through 2019 Reg. Sess.).

[19] *Id.*

[20] *Id.* at § 37-90-102(2).

[21] Colo. Rev. Stat. Ann. § 37-90-101 -- 90-143 (West, West through 2019 Reg. Sess.).

[22] Co. Dep't of Natural Resources, *Colorado Division of Water Resources*, http://water.state.co.us/Home/Pages/default.aspx (last visited Mar. 27, 2020).

[23] Colo. Rev. Stat. Ann. § 37-92-203 (West, West through 2019 Reg. Sess.).

[24] Colo. Rev. Stat. Ann. § 37-90-118 (West, West through 2019 Reg. Sess.).

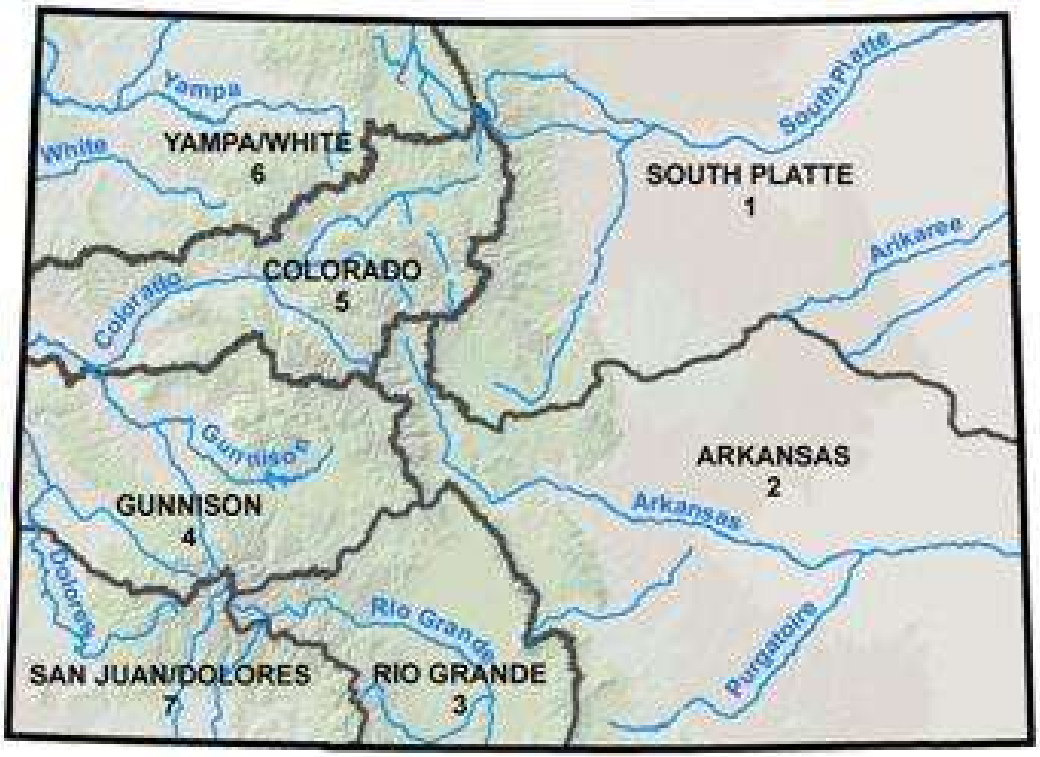

Fig. C.2. Division of Offices by Major River Basins[25]

3. Scope of Right

a. Groundwater Ownership

Colorado statute states that it is:

> the policy of the state of Colorado that all water in or tributary to natural surface streams, not including nontributary groundwater as that term is defined in section 37-90-103, originating in or flowing into this state have always been and are hereby declared to be the property of the public, dedicated to the use of the people of the state, subject to appropriation and use in accordance with sections 5 and 6 of article XVI of the state constitution and this article. As incident thereto, it is the policy of this state to integrate the appropriation, use, and

[25] Colorado Division of WaterResources, *Division Offices by Major River Basins*, http://water.state.co.us/DivisionsOffices/Pages/default.aspx (last visited Mar. 27, 2020).

> administration of underground water tributary to a stream with the use of surface water in such a way as to maximize the beneficial use of all of the waters of this state.[26]

This section designates both surface and groundwater as publicly owned resources, except for nontributary groundwater, located outside groundwater basin districts and where withdrawal will not deplete the flow of natural streams within one hundred years of continuous withdrawal.[27]

b. Scope of Use

i. Permitted and Preferred Uses

The Colorado Groundwater Management Act proscribes a regulatory scheme to non-tributary groundwater and designated groundwater basins, including the Denver Basin. It provides for groundwater permitting based on beneficial use:

> Any person desiring to appropriate groundwater for a beneficial use in a designated groundwater basin shall make application to the commission in a form to be prescribed by the commission. The applicant shall specify the particular designated groundwater basin or subdivision thereof from which water is proposed to be appropriated, the beneficial use to which it is proposed to apply such water, the location of the proposed well, the name of the owner of the land on which such well will be located, the estimated average annual amount of water applied for in acre-feet, the estimated maximum pumping rate in gallons per minute, and, if the proposed use is irrigation, the description of the land to be irrigated and the name of the owner thereof, together with such other reasonable information as the commission may designate on the form prescribed. The amount of water applied for shall only be utilized on the land designated on the application. The place of use shall not be changed without first obtaining authorization from the ground water commission.[28]

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[26] Colo. Rev. Stat. Ann. § 37-92-102 (West, West through 2019 Reg. Sess.).

[27] Colo. Rev. Stat. Ann. § 37-92-103 (West, West through 2019 Reg. Sess.).

[28] *Id.* at § 37-90-107 (West, West through 2019 Reg. Sess.).

While the Colorado Groundwater Management Act does not define "beneficial" as used in the above section, it specifies that a commission may examine whether a use creates unreasonable waste or unreasonably affect the rights of other appropriators.[29] Assessment of waste or unreasonable adverse effect may include analysis of annual yield and recharge rates, priority of existing claims, proposed method of use, and impairment to others including by unreasonable lowering of the water level beyond reasonable economic limits.[30]

Colorado recognizes twenty-two primary uses of water under beneficial use. In addition to water storage, these include:

> augmentation, Colorado Water Conservation Board [(CWCB)] instream flows and natural lake levels, commercial, domestic, dust suppression, evaporation from a gravel pit, fire protection, fish and wildlife culture, flood control, industrial, irrigation, mined land reclamation, municipal, nature centers, oil and gas production, power generation, recreation on reservoirs, recreational in-channel diversions, release from storage for boating and fishing, snowmaking, stock watering.[31]

Tributary groundwater, by contrast, is groundwater hydraulically connected to surface streams, and because it can deplete surface water, it is treated as surface water in the state's surface prior appropriation system - therefore, it is governed by prior appropriation surface water principles.[32] Those principles rely on a common law concept of "beneficial use," which is defined as, "use of that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made."[33] Such uses include firefighting, recreation, fishery, wildlife, municipal or governmental uses, and state appropriations (including minimum flow appropriations) for the "benefit and enjoyment of present and future generations" for environmental preservation.[34]

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[29] *Id.* at § 37-90-107(5).

[30] *Id.*

[31] Justice Gregory J. Hobbs, Jr., Citizen's Guide to Colorado Water Law (7) (Caitlin Coleman et al. eds., 4th ed. 2015).

[32] Colo. Rev. Stat. Ann. §§ 37-92-201 -- 37-92-305 (West, West through 2019 Reg. Sess.).

[33] Colo. Rev. Stat. Ann. § 37-92-103(4) (West, West through 2019 Reg. Sess.).

[34] *Id.* at § 37-92-103(4)(a-c).

The Colorado Constitution provides that:

> (t)he right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied. Priority of appropriation shall give the better right as between those using water for the same purposes; but when the waters of any natural stream are not sufficient for the service of all those desiring to use of the same, those using the water for domestic purposes shall have the preference over those claiming for any other purpose, and those using the water for agricultural purposes shall have preference over those using the same for manufacturing.[35]

In one early case, the state Supreme Court stated that the rule of priority was essential to make irrigated agriculture possible in the arid climate, and that once appropriated, the appropriation may be used anywhere, and not necessarily appurtenant to the riparian land or within the watershed.[36] As such, priority of appropriation is the basis on which groundwater may be claimed for use.

ii. Location of Use

Tributary groundwater may be used on non-overlying land; all water is presumed to be tributary until proven otherwise. Since groundwater in Colorado is presumed to be owned by the public the right to use the groundwater may be sold apart from the land, thus, it can be pumped and transported. This right is limited by beneficial use and the owner of the groundwater must quantify the amount of water to be used in their well permits to ensure that their right does not interfere with other water rights.

Transbasin water transfers must comply with the EPA standards for clean water and the Clean Water Act. Under Section 31.23(A)(5)(d) of the Code of Colorado Regulation:

> The provision as adopted also will help accommodate the language of EPA's water quality regulations with the established Colorado water rights system, which authorizes transbasin water transfer. For water diversion projects, the "area" would include both the basin from which the diversion occurs and the area in which the water use will occur. A narrower definition of "area in which the waters are located" could essentially prohibit transbasin water transfers from affected streams, whenever significant degradation would result from such

[35] Colorado Const. Art. XVI Section 6.

[36] *Coffin v. Left Hand Ditch Co.*, 6 Colo. 443, 447 (1882).

activities. Moreover, these activities would be restricted even though other activities with identical water quality impacts (but with economic benefits centered in a different location) would be allowed to proceed. There does not appear to be any basis in the federal Clean Water Act for such a non-water-quality-based, land use policy distinction. In fact, such an interpretation would appear to run directly counter to the section 101(b) recognition of states' "primary responsibilities and rights ... to plan the development and use ... of land and water resources" while protecting water quality.[37]

c. Loss of Water Rights

Ground and surface water priority appropriations may be lost in whole or in part by abandonment, rebuttably raised by a period of non-use lasting ten years and proven through a water court proceeding. Forfeiture of conditional groundwater rights may also occur where a holder fails to pursue conditional water rights with reasonable diligence.[38]

Abandonment and forfeiture may cause a loss of priority groundwater rights, but eminent domain has not been used to cause a loss of existing priority groundwater rights in Colorado. While claimants are prohibited from adversely possessing water within surface streams or tributary aquifers, Colorado law allows private water users to adversely possess each other after the water has been diverted from the stream or aquifer pursuant to an adjudicated water right.[39] To succeed, claimants must demonstrate they exclusively, hostilely, and adversely made actual, beneficial, consumptive use of all or a portion of the existing adjudicated water right for an 18 year period.[40]

Adjudication of a loss of groundwater rights occurs through the Colorado Water Courts, which are divided into district courts. Water judges for each division consider matters in which protests have been filed or that have been referred by water referees.[41] When deciding on a change of a water right, the court's decision shall include the condition that approval of such change is subject to reconsideration by the water judge on the

[37] 5 CCR 1002-31:31.23(A)(5)(d) (West 2019).

[38] *Talco Ltd. v. Danielson*, 769 P.2d 468 (Colo. 1989).

[39] *Archuleta v. Gomez*, 200 P.3d 333, 337 (Colo. 2009).

[40] *Archuleta*, 200 P.3d at 337; *Farmer v. Farmer*, 720 P.2d 174, 177 (Colo. App. 1986).

[41] Colo. Rev. Stat. Ann. § 37-92-304 (West, West through 2019 Reg. Sess.).

question of injury to vested rights of others for a period after the decision is made, and include consideration of historical use to which the water rights were put and proposed future uses involved.[42] Appellate review of the water court's judgment is allowed, but not for parts of judgments to which no protests have been filed.[43]

4. Well Drilling

Colorado has promulgated rules and regulations regarding water well construction, pump installation, cistern installation, and the monitoring and observation of hole/well construction.[44] These rules apply to the following: (1) "the construction and repair of water wells, test holes, dewatering wells, monitoring and observation holes and wells; well plugging, sealing, and abandonment" and any person who undertakes any of these activities; (2) "cistern installation and repair"; (3) "licensed well construction and pump installation contractors, private drillers, private pump installers, [and] authorized individuals"; and (4) "any persons excluded from the licensing requirements" because they have been previously licensed.[45]

For a person or entity to construct, repair, replace, or modify a well, the well must be associated "with a valid well permit issued by the State Engineer."[46] If the well has been previously permitted, then "a new well permit must be obtained prior to . . . changing the producing and/or grout interval of an existing well, installing certain dewatering systems as specified by the State Engineer, [or] installing pumping equipment that will allow a sustained production rate in excess of the permitted production rate."[47] Additionally, "the Division of Water Resources must be provided with a Notice of Intent . . . no less than 72 hours . . . prior to the construction of . . . any dewatering well; any monitoring and observation hole; or any test hole that will penetrate through a confining layer between two distinct or administratively defined aquifers."[48] For a summary of licensing and construction authorization requirements, see Table 1 in the Colorado Code of Regulations 402-2:6.

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[42] *Id*. § 37-92-304(6).

[43] *Id*. § 37-92-304(9).

[44] Colo. Code Regs. § 402-2:1.

[45] *Id.* at § 402-2:3.

[46] *Id.* at. § 402-2:6.2.1.

[47] *Id. at* § 402-2:6.2.1 (emphasis omitted).

[48] *Id*. at § 402-2:6.3.

All well drilling rigs, monitoring and observation hole rigs, pump installation rigs, and formation fracturing rigs "owned, leased or operated by any well construction contractor, pump installation contractor, or person having a special license must be registered with the Board."[49] Any individual engaged "in the business of contracting for and performing either the construction and/or the repair of wells, the installation and/or repair of pumping equipment, or the installation and/or repair of cisterns connected to water well supply systems, must obtain a license for one or more methods of well construction or pump installation from the Board" before beginning such business.[50]

In general, "all wells constructed to withdraw or inject water must be constructed, maintained, or repaired in such a manner that will" achieve the following: (1) "maintain existing natural protection against contamination of aquifers"; (2) prevent the entry of contaminants through the borehole"; (3) "limit groundwater production to one aquifer unless otherwise permitted by the State Engineer"; and (4) "prevent the intermingling of groundwater from different sources through the borehole."[51] However, "[t]he contractor is responsible for constructing the well using standards that are more stringent than the minimum specified . . . if necessary to ensure the adequate integrity of the well and protection of the aquifer."[52]

Finally, work reports "must be submitted to the State Engineer . . . that describe where, when, and how all wells have been constructed, the pumping equipment . . . installed in water wells, and a description of how boreholes, well, dry holes, and incomplete wells are plugged, sealed, and abandoned."[53] These reports "must be submitted to the State Engineer within sixty (60) days after completion of the well construction, pump installation, or other work required to be reported or within seven (7) days after the expiration of the permit or other authorization, whichever is sooner."[54]

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[49] Colo. Code Regs. § 402-14:5.

[50] *Id*. at § 402-14:6.1.

[51] Colo. Code Regs. § 402-2:10.1.

[52] *Id*. at § 402-2:10.1.1.

[53] Colo. Code Regs. § 402-17.1.

[54] *Id*. at § 402-17:3.

For small capacity wells in Designated Ground Water Basins, evidence of a beneficial use is not required for obtaining a permit so long as the "small capacity well permit [was] issued prior to the effective date" of the rules.[55]

The Division of Water Resources/Office of the State Engineer is the primary state authority responsible for well-drilling oversight. Its responsibilities include administering water rights, issuing water well permits, representing Colorado in interstate water compact proceedings, monitoring streamflow and water usage, approving dam construction and repairs and performing dam safety inspections, issuing licenses for well drillers, and assuring the safe and proper construction of water wells.[56]

5. Hydraulic Connection and Regulation

Colorado water law addresses hydraulically connected surface and groundwater, which it defines as tributary groundwater. Because tributary groundwater can deplete surface water, it is treated as surface water in the state's surface prior appropriation system.[57] All groundwater in Colorado that is not Denver Basin groundwater is presumed tributary unless proven by clear and convincing evidence.[58]

Because tributary groundwater is governed by prior appropriation, as is surface water, the date of appropriation prioritizes use regardless of whether the water in question is tributary groundwater or surface water.[59] This is unlike nontributary ground water where rights accrue based on land ownership of the estate above.[60] However, where surface water becomes over-appropriated, state law presumes that groundwater depletions result in injury to senior appropriators absent a showing to the contrary.[61]

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[55] Colo. Code Regs. § 6 402-4:3-4.

[56] Colo. Dep't of Pub. Health & Env't, *Groundwater Program* (2018), https://www.colorado.gov/pacific/cdphe/groundwater-program (last visited Mar. 27, 2020).

[57] *Colorado Ground Water Comm'n,* 77 P.3d at 69*, see also* Colo. Rev. Stat. §§ 37-92-201 through 37-92-305 (West, West through 2019 Reg. Sess.).

[58] *City of Aurora ex rel. Util. Enter. v. Colorado State Eng'r*, 105 P.3d 595, 607 (Colo. 2005).

[59] *Colorado Ground Water Comm'n,* 77 P.3d at 70.

[60] *Bayou Land Co. v. Talley*, 924 P.2d 136, 149 (Colo. 1996).

[61] *City of Aurora ex rel. Util. Enter.*, 105 P.3d at 607.

Furthermore, where a hydraulically connected groundwater user cannot show its depletions would occur even when senior water rights do not have a "call" on the surface body, a water court may order 100% replacement of those withdrawals.[62]

6. Aquifer Recharge and Underground Storage

The Colorado Division of Water Resources is the primary state entity responsible for the oversight of aquifer recharge in Colorado.

The State Engineer must "promulgate reasonable rules that apply to the permitting and use of water artificially recharged into the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers.[63] The State Engineer was required to do this "[o]n or before July 1, 1995." Additionally, the State Engineer must "promulgate rules that apply to the permitting and use of water artificially recharged into a nontributary groundwater aquifer." The State Engineer was required to do this "[o]n or before July 1, 2018." These rules were codified in the Colorado Code of Regulations 402-11. In general, water that is artificially recharged into the Denver Basin aquifer or a nontributary groundwater aquifer must be "fully consumable and/or reusable."[64] Additionally, "[a]ll extraction operations shall be conducted in a manner that will protect the life and health of the citizens of the State of Colorado, and cause no injury to existing users of, and rights to water from the Denver Basin aquifers and Nontributary Groundwater Aquifers and comply with all applicable federal, state, and local rules."

The purpose of these rules is to protect the "water contained in the Denver basin aquifers and Nontributary Groundwater Aquifers" as it is a significant but finite resource and the "[a]rtificial recharge of these aquifers by Injection of surface and/or groundwater for the purpose of subsequent Extraction, or for maintaining water levels will extend the life of this resource."[65] Therefore, Colorado does regulate, encourage, and facilitate aquifer recharge in order to increase aquifer levels, maintain water level in the aquifers, and facilitate further extraction of water from these aquifers.

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[62] *Id.*

[63] Colo. Rev. State. Ann. § 37-90-137(9)(d) (West, West through 2019 Reg. Sess.).

[64] Colo. Code. Regs. § 402-11:5.1-2.

[65] Colo. Code. Regs. § 402-11:3.2.

7. Water Management Plan(s)

Colorado does have a state water plan. According to the executive summary of the most recent version of the plan, the following are the measurable objectives and actions of the state water plan: (1) reduce "the projected 2050 municipal and industrial gap from as much as 560,000 acre-feet to zero acre-feet by 2030"; (2) "achieve 400,000 acre-feet of municipal and industrial water conservation by 2050"; (3) ensure that, "by 2025, 75 percent of Coloradans will live in communities that have incorporated water-saving actions into land-use planning"; (4) ensure "that agricultural economic productivity will keep pace with growing state, national, and global needs, even if some acres go out of production"; (5) "attain 400,000 acre-feet of water storage in order to manage and share conserved water and the yield of IPPs by 2050"; and (6) by 2030, "cover 80 percent of the locally prioritized lists of rivers with stream management plans, and 80 percent of critical watersheds with watershed production plans."[66]

It appears that the state water plan is updated and issued every 2-3 years, and the "CWCB will initiate the next iteration of Colorado's Water Plan by 2020."[67]

8. Regulatory Authorities

Colorado's primary authorities governing groundwater are the Division of Water Resources, also called the Office of the State Engineer, and the Water Courts, which oversee disputes regarding both surface and groundwater. Colorado also has a Ground Water Commission, which oversees groundwater use within designated groundwater basins. Colorado's Board of Examiners for Pump Installation and Well Construction Contractors oversee pumping equipment and related groundwater quality issues.

Contact information for governing entities are available at the following websites:

> State Engineer/Division of Water Resources:
> http://water.state.co.us/Home/Pages/default.aspx
> The State Engineer for the State of Colorado receives authority for administering the waters of the state by statute. The powers given are very broad and by no means restricted to those listed herein. He, along with the Division Engineers

[66] Colorado Official State Web Portal, *Colorado's Water Plan*, https://www.colorado.gov/pacific/cowaterplan/plan (last visited Mar. 27, 2020).

[67] *Id.*

and staff, are responsible for the administration and distribution of the state's waters, the promulgation of rules and regulations to assist in such administration, the collection and study of data on water supplies (both surface and groundwater), the compliance with compact commitments and administration between states, and the enforcement of laws imposed by statutes and the courts.[68] The State Engineer appoints seven Engineers, one for each of the seven divisions.[69]

Water Courts: https://www.courts.state.co.us/Courts/Water/
Divided into seven divisions, the Water Courts are staffed by a division engineer appointed by the state engineer, a water judge appointed by the state Supreme Court, a water referee appointed by the water judge, and a water clerk assigned by the District Court.

Ground Water Commission: http://water.state.co.us/cgwc
The CGWC is a regulatory and adjudicatory body authorized by the General Assembly to manage and control groundwater resources within eight Designated Groundwater Basins in eastern Colorado. The General Assembly granted the CGWC authority under Title 37, Article 90 of the Colorado Revised Statutes (Groundwater Management Act) to adjudicate water rights and issue large capacity well permits.[70]

Ground Water Management Districts:
http://water.state.co.us/groundwater/CGWC/Pages/ManagementDistricts.aspx
The Groundwater Commission established eight designated basins and thirteen groundwater management districts. The districts may adopt additional rules and regulations to help administer groundwater within the district.

Board of Examiners for Pump Installation and Well & Pump Installation Contractors: http://water.state.co.us/groundwater/BOE/Pages/default.aspx
The Board has supervisory authority over construction and abandonment of

[68] Colorado Division of Water Resources, Synopsis of Colorado Water Law (2016), https://www.uawcd.com/uploads/2/5/5/3/25530864/synopsis_of_colorado_water_law.pdf (last visited Mar. 27, 2020).

[69] Colo. Rev. Stat. Ann. § 37-92-202 (West, West through 2019 Reg. Sess.).

[70] Colorado Ground Water Commission, *Designated Basins*, http://water.state.co.us/groundwater/CGWC/Pages/default.aspx (last visited Mar. 27, 2020).

wells and pumping equipment, and may adopt regulatory and administrative rules to approve, examine, revoke, suspend, or deny licenses of applicants to preserve state groundwater resources.

9. Special Districts

Colorado has seven water divisions,[71] 8 designated basins and 13 local groundwater management districts within designated basins.[72] There is also the Denver Basin. In the Denver Basin, statutory law allows the owner of land in the Denver Basin to apply for a determination of water rights for the Denver Basin groundwater. Such rights are determined by either a water court or the CGWC, depending on which Designated Basin the land is located in.[73]

Designated Basins

- Kiowa-Bijou
- Southern High Plains
- Upper Black Squirrel Creek
- Lost Creek
- Camp Creek
- Upper Big Sandy
- Upper Crow Creek
- Northern High Plains

Ground Water Management Districts

- North Kiowa-Bijou
- Southern High Plains
- Upper Black Squirrel Creek
- Lost Creek
- Upper Big Sandy
- Plains
- Sand Hills
- Arikaree
- Frenchman
- Central Yuma
- W-Y
- East Cheyenne
- Marks Butte

[71] Colo. Rev. Stat. Ann. § 37-92-201 (West, West through 2019 Reg. Sess.).

[72]Colorado Division of Water Resources, Designated Basins and Ground Water Management Districts, http://water.state.co.us/groundwater/CGWC/Pages/ManagementDistricts.aspx last visited Mar. 27, 2020).

[73] Colo. Rev. Stat. § 37-92-203(1)(a) (West, West through 2019 Reg. Sess.); Colorado Division of Water Resources, Denver Basin Ground Water Rights, http://water.state.co.us/groundwater/GWAdmin/DenverBasin/Pages/DenverBasin.aspx (last visited Mar. 27, 2020).

10. Transboundary Arrangements

It does not appear that Colorado is party to any transboundary arrangements or conflicts.

11. Native American Rights

There are two federally recognized Indian tribes in Colorado today: the Southern Ute Tribe and the Ute Mountain Ute Tribe. Under the Winters Doctrine, Congress reserves water sufficient to fulfill the purposes of the reservations of the Southern Ute Tribe and the Ute Mountain Ute Tribe.[74] Ultimately, under the Winters doctrine, "the priority and extent of Indian reserved water rights is affected by the purposes of the Indian reservation, the date when the Indian reservation was created, the quantification of water sufficient to accomplish those purposes, and the sources of water that may be used to fulfill the particular water rights."[75]

The Colorado Indian Water Rights Settlement Act of 1988 is the primary governing law on the reservations in Colorado. The statute holds that the "Tribe may voluntarily elect to sell, exchange, lease, use, or otherwise dispose of any portion of a water right confirmed in the Agreement and final consent decree off its reservation."[76] This Act "recognized tribal water rights for all surface streams and tributary groundwater on the Reservation."[77]

[74] Cynthia Brougher, *Indian Reserved Water Rights Under the* Winters *Doctrine: An Overview*, Congressional Research Service (2011), https://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32198.pdf (last visited Mar. 27, 2020).

[75] *Id.*

[76] 102 Stat. 2973.

[77] M. Catherine Condon, *Colorado Ute Indian Water Rights Settlement Act of 1988*, http://www.crwua.org/assets/downloads/2013-annual-conference/Condon_SUIT.pdf (last visited Mar. 27, 2020).

D. Florida

Florida follows the Reasonable Use governance system for groundwater, although the common law is statutorily modified to require a permit for most consumptive uses.[1] Although the Supreme Court of Florida has recognized the rule of Reasonable Use,[2] the Florida Water Resources Act of 1972 ("the Act") represents the statutory modification of the common law. Generally, permits are required for groundwater withdrawals in Florida, "[h]owever, no permit shall be required for domestic consumption of water by individual users."[3]

1. Definitions, Basis of Rights, Standards, and Interactions

Florida defines groundwater to be "water beneath the surface of the ground, whether or not flowing through known and definite channels."[4]

The Act maintains the Reasonable Use standard, as it is the policy of the Florida legislature "to promote the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems."[5]

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[1] *Vill. of Tequesta v. Jupiter Inlet Corp.*, 371 So. 2d 663, 666 (Fla. 1979); Fla. Stat. Ann. § 373.219 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[2] *See Vill. of Tequesta,* 371 So. 2d at 666-67; *see also Koch v. Wick*, 87 So. 2d 47, 48 (Fla. 1956); *Cason v. Florida Power Co.*, 76 So. 535, 536-57 (Fla. 1917).

[3] Fla. Stat. Ann. § 373.219 (West, West through 2019 1st Reg. Sess. 26th Leg.); *City of Cocoa v. Holland Props., Inc.*, 625 So. 2d 17, 20 (Fla. Dist. Ct. App. 1993).

[4] Fla. Stat. Ann. § 373.019 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[5] Fla. Stat. Ann. § 373.016 (3)(d) (West, West through 2019 1st Reg. Sess. 26th Leg.).

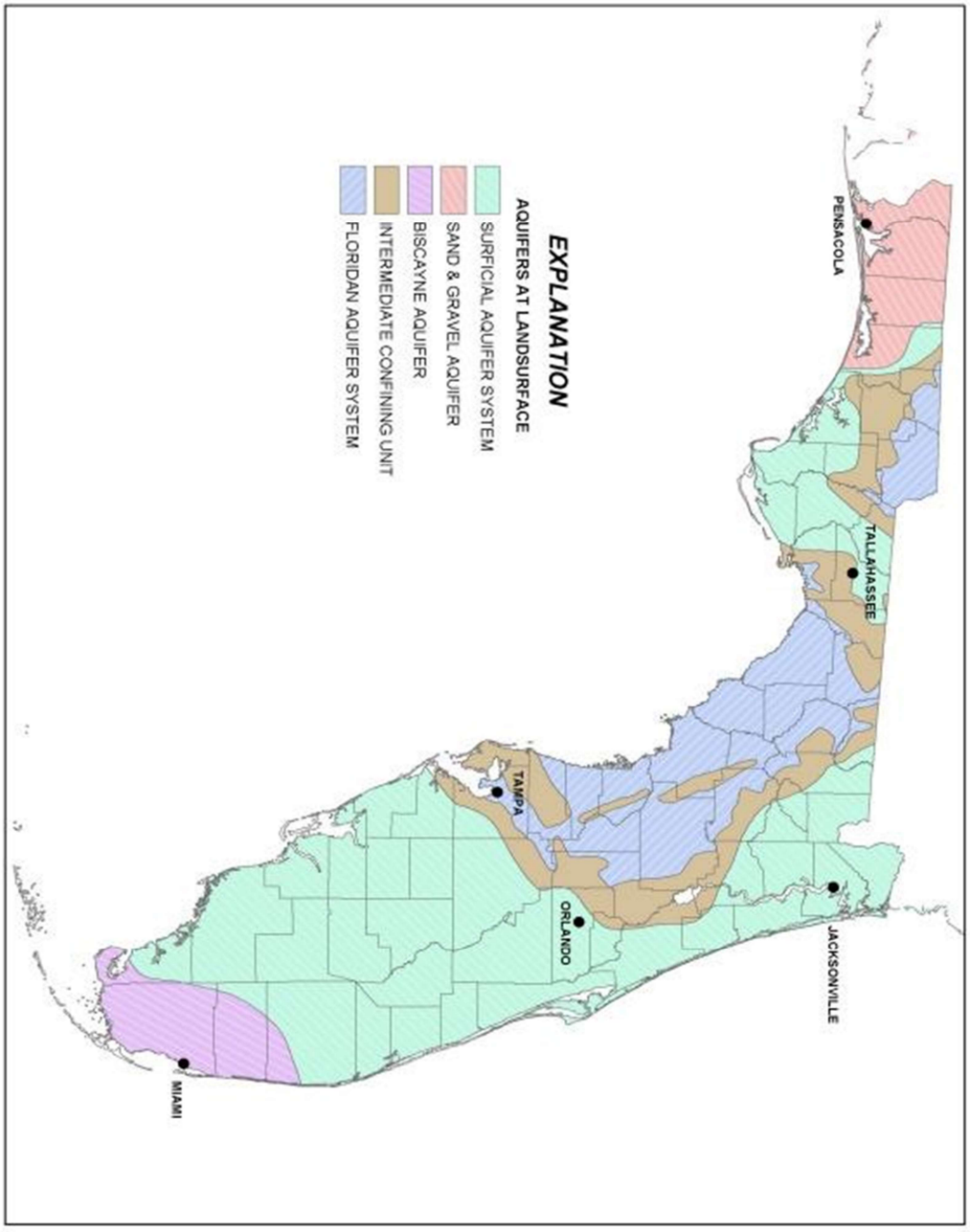

Fig. D.1. Florida Aquifers[6]

[6] Florida Department of Environmental Protection, *Aquifers*, https://fldep.dep.state.fl.us/swapp/Aquifer.asp (last visited Mar. 27, 2020).

Scholars cite Florida case law, specifically in *Labruzzo v. Atl. Dredging & Const. Co*. and *Vill. Of Tequesta v. Jupiter Inlet Corp.*, as examples of cases that did not apply correlative rights in the strict sense of a proportional sharing of groundwater among overlying landowners.[7] "These courts were not very clear about the difference between their interpretation of correlative rights and the reasonable use rule."[8] In fact, Joseph Dellapenna considers Florida's Water Resources Act (Fla. Stat. Ann. §§ 373.012 to 373.619) to be an example of a "regulated riparian system," as the state moved away from an unregulated common law system.[9]

Overlying land ownership is the basis for the right to withdraw groundwater in Florida, presuming the resource is withdrawn for domestic use.[10] In Florida, domestic use refers to the "use of water for the individual personal household purposes of drinking, bathing, cooking, or sanitation. All other uses shall not be considered domestic."[11] The right is vested in the landowner for use on his/her land, even if the use could cause injury to his neighbor as long as it is reasonable and put to a beneficial use. As the Florida Supreme Court has stated, a "landowner, who, in the course of using his own land, obstructs, diverts, or removes percolating water to the injury of his neighbor . . . must be (making) a reasonable exercise of his proprietary right, i.e., such an exercise as may be reasonably necessary for some useful or beneficial purpose, generally relating to the land in which the waters are found."[12]

However, if withdrawing for a non-domestic consumptive use, the Act requires a permit to obtain the right to withdraw groundwater.[13] Therefore, all other uses, aside from individual withdrawals for drinking, bathing, cooking, or sanitation must obtain a permit in order to use groundwater. To obtain a permit "the applicant must establish that the proposed use of water: (a) Is a reasonable-beneficial use []; (b) Will not interfere with any presently existing legal use of water; and (c) Is consistent with the public interest."[14]

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[7] *Labruzzo v. Atl. Dredging & Const. Co.*, 54 So. 2d 63, 675-77 (Fla. 1951); *Vill. of Tequesta*, 371 So. 2d at 666-70.

[8] Joseph W. Dellapenna, A Primer on Groundwater Law, 49 Idaho L. Rev. 265, 279-80 (2013).

[9] *Id.* at 302-303.

[10] *Vill. of Tequesta v. Jupiter Inlet Corp.*, 371 So. 2d at 666.

[11] Fla. Stat. Ann. § 373.019(6) (West, West through 2019 1st Reg. Sess. 26th Leg).

[12] *Vill. of Tequesta*, 371 So. 2d at 666.

[13] See supra note 2 and accompanying text.

[14] Fla. Stat. Ann. § 373.223 (West, West through 2019 1st Reg. Sess. 26th Leg.).

As discussed in *Village of Tequesta v. Jupiter Inlet Corp.*, the Florida Supreme Court established the standard for the right as "reasonable-beneficial use," such that the use of groundwater is "reasonably necessary for some useful or beneficial purpose."[15] However, Florida's common law groundwater governance regime has been statutorily modified by the Act. Thus, in combining the two systems—the basis for the right is a statutory modification of reasonable use. Florida's Water Resource Act defines "Reasonable-beneficial use" as the "use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest."[16] In creating the state water plan, the DEP must consider: (1) "the attainment of the maximum reasonable-beneficial use of water"; (2) "the maximum economic development of water consistent with other uses"; (3) "the quantity of water available for application to a reasonable-beneficial use"; (4) "the prevention of wasteful and uneconomical…uses of water; and (5) "the preservation and enhancement of the water quality of the state."[17]

In contrast, the Florida Supreme Court described the reasonable use rule that was adopted by Florida: "[A] landowner, who, in the course of using his own land, obstructs, diverts, or removes percolating water to the injury of his neighbor…must be [making] a reasonable exercise of his proprietary right, i.e., such an exercise as may be reasonably necessary for some useful or beneficial purpose, generally relating to the land in which the waters are found."[18] Additionally, the Court in *Village of Tequesta* described the impact of the reasonable use standard on a given groundwater user noting that, "[a] person developing his own land could make a substantial investment with no way of determining whether reasonable use by others would limit or destroy his development right even though it was the first in time."[19]

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[15] *Vill. of Tequesta*, 371 So. 2d at 666.

[16] Fla. Stat. Ann. § 373.019 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[17] Fla. Stat. Ann. § 373.036(2)(a), (b), (d), (e), (g) (emphasis added) (West, West through 2019 1st Reg. Sess. 26th Leg.).

[18] *Vill. of Tequesta v. Jupiter Inlet Corp* So. 2d at 666.

[19] *Id.* at 670.

2. Sources of Law

The principal source of authority for groundwater allocation is Florida's Water Resource Act of 1972.[20] The Florida Supreme Court provided both the foundation of groundwater law in *Florida in Cason v. Florida Power Co*. (1917) and *Koch v. Wick* (1956),[21] as well as an interpretation of the Act in 1979 in the case of *Village of Tequesta v. Jupiter Inlet Corp*.[22] In fact, *Village of Tequesta* indirectly upheld the constitutionality of the Act.[23] In *Osceola County v. St. Johns River Water Management Dist.*, the Florida Supreme Court recognized that the Act established a statewide and comprehensive framework for regulating, protecting, and permitting the consumptive uses of water.[24]

In *Southwest Florida Water Management Dist. v. Charlotte County*, the court approved an administrative law judge's decision that, "[i]n adopting the Florida Water Resources Act, the legislature clearly intended to supplant the common law allocation system."[25]

In recognition of Florida's challenges with saltwater intrusion, groundwater depletion, and surface water pollution, the Act makes all waters in the state subject to regulation, unless otherwise specifically exempt.[26]

3. Scope of Right

a. Groundwater Ownership

Pursuant to *Village of Tequesta*, the overlying landowner has a usufructuary right to the water underlying his land: "The right of the owner to groundwater underlying his land is to the usufruct of the water and not to the water itself."[27] Therefore, the landowner does not actually own a property right in the water; "[t]he ownership of the land does

[20] Fla. Stat. Ann. § 373.023(1) (West, West through 2019 1st Reg. Sess. 26th Leg).

[21] *Koch*, 87 So. 2d at 48; *Cason*, 76 So. at 536-57.

[22] *Vill. of Tequesta*, 371 So. 2d at 666-67.

[23] Mary Jane Angelo and Christine A. Klein, 4-FL Waters and Water Rights I, (LexisNexis).

[24] *Osceola County v. St. Johns River Water Management Dist.*, 504 So. 2d 385, 386 (Fla. 1987).

[25] *Southwest Florida Water Management Dist. v. Charlotte County*, 774 So. 2d 903, 912 (Fla. Dist. Ct. App. 2001).

[26] Fla. Stat. Ann. § 373.023(1) (West, West through 2019 1st Reg. Sess. 26th Leg.).

[27] *Vill. of Tequesta*, 371 So. 2d at 667.

not carry with it any ownership of vested rights to underlying ground water not actually diverted and applied to beneficial use."[28]

The overlying landowner has a limited right to the groundwater.[29] They have the "unqualified right to capture and control it in a reasonable way with an immunity from liability to his neighbors for doing so."[30] When the landowner reduces the water to his possession, the water ceases to be percolating water and becomes the personal property of the landowner.[31] If the water percolates or flows from his boundaries of their land and passes into the land a neighbor, then the neighbor takes limited possession.[32]

d. Scope of Use

i. Permitted and Preferred Uses

Consumptive use permitting is governed by Part II of the Act, specifically Fla. Stat. Ann. §§ 373.203-373.250. To obtain a consumptive use permit, an applicant must establish that the proposed use of water: (a) is a reasonable-beneficial use as defined in s. 373.019; (b) will not interfere with any presently existing legal use of water; and (c) is consistent with the public interest.[33] The reasonable-beneficial use condition is implemented by Water Management District (WMD) regulations—each WMD sets forth their own criteria that must be met for the use to be recognized as a reasonable-beneficial use.

According to scholars, WMDs "rarely deny consumptive use permit applications, although they frequently impose numerous permit conditions."[34] Among the five WMDs in Florida, only one requires a permit for uses or withdrawals less than 100,000 gallons per day.[35]

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[28] *Id.*

[29] *Id.*

[30] *Id.*

[31] *Id.*

[32] *Id.*

[33] Fla. Stat. Ann. § 373.019(1)(a)-(c) (West, West through 2019 1st Reg. Sess. 26th Leg.).

[34] Angelo and Klein *supra* note 23.

[35] Fla. Admin. Code. r. 40E-2.041(1), 40E-2.051 (rules of the South Florida WMD).

For example, an owner of "a 120-unit condominium does not qualify as an individual user and thus must secure a permit in order to draw water from beneath its property."[36] Artesian wells: Wells must have installed valves "capable of controlling the discharge from the well and . . . so adjusted that only a supply of water is available which is necessary for ordinary use…"[37]

The Act also contains a rarely used and controversial provision that allows WMDs or Department to "reserve from use" certain quantities of water for environmental, public health, and safety reasons.[38]

With regard to competing applications for consumptive use permits, the Water Management Districts (WMD) "shall give preference to a renewal over an initial application," and likely will approve competing initial applications based on the one that "best serves the public interest."[39]

In the context of domestic uses, the statute does not require a permit for overlying individual domestic uses.[40] Hence, any individual use automatically receives a priority in use. Also, during water shortages, domestic uses without permits would likely be excluded from curtailment consideration as the individual wells, within specifications,[41] would be largely unregulated as relating to water quantity.

As noted above, the WMDs set forth criteria in their regulations as to what constitutes a reasonable-beneficial use in order to receive a consumptive use permit. The "reasonableness" determination depends on a case-by-case analysis of multiple variables. According to the Florida Supreme Court, these variables include: "[T]he reasonable demands of other users; the quantity of water available for use; the consideration of public policy."[42]

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[36] *Vill. of Tequesta*, 371 So. 2d at 671.

[37] Fla. Stat. Ann. § 373.206 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[38] Fla. Stat. Ann. § 373.223(4) (West, West through 2019 1st Reg. Sess. 26th Leg.); *see generally* Angelo and Klein *supra* note 23.

[39] Fla. Stat. Ann. § 373.233 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[40] *See supra* Part 1.

[41] *See* Fla. Stat. Ann. § 373.326 (West, West through 2019 1st Reg. Sess. 26th Leg.) (excluding, *inter alia*, a well that is 2 inches or under in diameter, on the person's own or leased property, intended for use only in a single-family house which is his or her residence.)

[42] *Vill. of Tequesta*, 371 So. 2d at 670.

ii. Location of Use

Even though under the statutory permit system non-overlying land can obtain rights,[43] overlying land is required for the purpose of a well. Before the permit system, this was more of an issue. For example, it might have been unreasonable for a small parcel of land to withdraw excessive amounts of water for use on non-overlying to the detriment of the larger neighboring parcel, even though the off-site use was for the public good.[44] Today, under the permit system the question of reasonableness and beneficial use is determined upon permitting.[45] Although, the statutory scheme seems to favor overlying land as individual use for domestic purposes does not require a permit for such use.[46]

In the Act's declaration of policy, the legislature makes a general reference to both the use on overlying vs. non-overlying land, as well as the transport of groundwater. Accordingly, as a public resource that benefits the entire state and to protect groundwater resources, the Act directs the DEP and water management districts to encourage the use of water from sources nearest the area of use or application whenever possible."[47] However, the Act further clarifies this statement, noting that the preference to use water from sources nearest the area of use/application does not apply to the transport and direct/indirect use of water within the region of the Central and Southern Florida Flood Control Project. It also does not apply anywhere in the state to the transport and use of water supplied exclusively for bottled water as defined by statute (s. 500.03(1)(d), nor shall it apply to the transport and use of reclaimed water for electrical power production by an electric utility (s. 366.02(2)).[48]

e. Loss of Water Rights

In Florida, water rights may be lost. Rights may be lost temporarily during water shortages. In the event of a water shortage, the District "may impose such restrictions on one or more users of the water resource as may be necessary to protect the water

[43] *See infra* Part 3.b.

[44] *Koch*, 87 So. 2d at 47.

[45] *See infra* Part 3.b.

[46] *See supra* Part 1.

[47] Fla. Stat. Ann. § 373.016 (4)(a) (West, West through 2019 1st Reg. Sess. 26th Leg.).

[48] *Id.*

resources of the area from serious harm."[49]Additionally, rights may be lost statutorily, including by forfeiture and a form of abandonment.

> "The governing board or the department may revoke a permit as follows:
> (1) For any material false statement in an application to continue, initiate, or modify a use, or for any material false statement in any report or statement of fact required of the user pursuant to the provisions of this chapter, the governing board or the department may revoke the user's permit, in whole or in part, permanently.
> (2) For willful violation of the conditions of the permit, the governing board or the department may permanently or temporarily revoke the permit, in whole or in part.
> (3) For violation of any provision of this chapter, the governing board or the department may revoke the permit, in whole or in part, for a period not to exceed 1 year.
> (4) For nonuse of the water supply allowed by the permit for a period of 2 years or more, the governing board or the department may revoke the permit permanently and in whole unless the user can prove that his or her nonuse was due to extreme hardship caused by factors beyond the user's control. For a permit issued pursuant to s. 373.236(7), the governing board or the department may revoke the permit only if the nonuse of the water supply allowed by the permit is for a period of 4 years or more.
> (5) The governing board or the department may revoke a permit, permanently and in whole, with the written consent of the permittee."[50]

Water rights also can be lost due to failure to renew a permit or when a permit has run its duration. Generally, permits are only granted for a maximum of 20 years. However, there is a 50-year duration for municipalities and public works with ties to bonds.[51]Lastly, water rights can be lost through eminent domain. Although the right is only a usufructuary one, which "is not considered 'private property' requiring condemnation proceedings unless the property has been rendered useless for certain purposes," the right is tied to the land, in which case an eminent domain proceeding would effectively include the water right. However, "[n]o private property shall be taken

[49] Fla. Stat. Ann. § 373.175 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[50] Fla. Stat. Ann. § 373.243 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[51] Fla. Stat. Ann. § 373.236 (West, West through 2019 1st Reg. Sess. 26th Leg.).

except for a public purpose and with full compensation therefor paid to each owner or secured by deposit in the registry of the court and available to the owner."[52]

4. Well Drilling

Florida regulates well water drilling. The Florida Department of Environmental Protection ("DEP") is responsible for well-drilling oversight, including the granting of permits. Well registration and regulation is governed by the Florida Administrative Code §§ 40-D-3. Water districts are tasked with well registration and regulation. In general, a permit is required to construct, repair, or abandon a well that will draw potable water. Additionally, in designated areas, a permit is required to construct, repair, or abandon a well that will draw non-potable water. For an application to be considered, it must meet the requirements of Chapter 373 of the Florida Statutes.

5. Hydraulic Connection and Regulation

Even though Florida makes distinctions between surface waters and underground water, it regulates consumptive use permits in the same manner.[53] The same District regulates both ground and surface water, e.g. there is no separate ground water district. Florida's Supreme Court has recognized the "interrelated parts of the hydrologic cycle"[54] and there is recognition of interaction, or an intertwined relationship.

The minimum water level of groundwater in an aquifer, as well as surface water levels, must be at a level that further withdrawals would significantly harm the water resources of the area.[55] Additionally, "the governing board may establish works of the district for the purpose of introducing water into, or drawing water from, the underlying aquifer for storage or supply."[56] However, no water other than that of a compatible quality can be introduced directly into the aquifer.[57]

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[52] Fla. Const. art. X, § 6.

[53] *See* Fla. Stat. Ann. §§ 373.203-301 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[54] *Vill. of Tequesta*, 371 So. 2d at 666.

[55] Fla. Stat. Ann. § 373.042 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[56] Fla. Stat. Ann. § 373.087 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[57] *Id.*

Furthermore, to aid in the development of surface and groundwater resources, the water management districts shall develop an information program designed to provide information on the existing hydrologic conditions of major surface and groundwater resources.[58] They shall make suggestions on good conversation practices.[59] The water management district are to utilize the most efficient means to regularly disseminate information to member of the legislature, media, and the public.[60]

Moreover, with regard to artesian wells, "nothing in ss. 373.203, 373.206, 373.209, or this section shall be construed to apply to an artesian well feeding a lake already in existence prior to June 15, 1953, which lake is used or intended to be used for public bathing and/or the propagation of fish, where the continuous flow of water is necessary to maintain its purity for bathing and the water level of said lake for fish."[61]

Additionally, there is generally no priority among users of hydraulically linked surface and groundwaters. However, each water management district is to maintain a list that prioritizes water bodies of regional or statewide significance within the water management district.[62] A landowner is allowed to appropriate the water found under their land, regardless of the impact it would have on the land to which it would have passed to had it not been diverted.[63] However, if the subterranean water has assumed the proportion of the stream following in a well-defined channel, the landowner may not divert it, pollute it, or improperly use it, any more than it the stream ran upon the surface in a well-defined course.[64]

When a party violates the conditions of the permit, they are liable to the abutting consumptive use permit holders for the damages they caused.[65] No cause of action shall accrue until the complainant has applied and been denied relief by the appropriate water management district.[66] Additionally, where the actions of the owner of the land above

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[58] Fla. Stat. Ann. § 373.145 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[59] *Id.*

[60] *Id.*

[61] Fla. Stat. Ann. § 373.213 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[62] Fla. Stat. Ann. § 373.453 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[63] *See Tampa Waterworks Co. v. Cline*, 37 Fla. 586, 20 So. 780 (1896).

[64] *Id.*

[65] Fla. Stat. Ann. § 373.245 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[66] *Id.*

the groundwater interferes with the use of the water at the spring, the owner of the land containing the spring may seek an injunction to stop the use of the groundwater.[67]

6. Aquifer Recharge and Underground Storage

The DEP is responsible for the oversight of aquifer recharge and underground storage.

In Florida, aquifers are recharged from rainfall, surface water, reclaimed water, or a combination of each. Reclaimed water--which is municipal wastewater treated to levels that allow safe use for designated purposes--is often used for groundwater recharge in areas where potable water is present.[68] However, some injection wells are used to inject waste into permeable rock below the Floridan aquifer system or inject waste into the deeper parts of the Floridan aquifer where saltwater is present.[69]

Additionally, according to Florida Statutes Annotated § 373.106, "[n]o construction may be begun on a project involving artificial recharge or the intentional introduction of water into any underground formation except" by permit or permission of the water management district.

7. Water Management Plan(s)

Florida Statute § 373.036 and the Florida Administrative Code require the DEP to develop a Florida Water Plan addressing water supply, water quality, flood management, and natural systems protection.[70] For water supply, the DEP is required to provide "sufficient water for both people and the environment."[71] The water management districts are the entities charged with implementing water supply responsibilities and they do so through "water supply planning, water use permitting,

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[67] *See Tampa Waterworks Co.*, 37 Fla. at599-600, 20 So. at 783-84.

[68] Christopher J. Martinez & Mark W. Clark, *Reclaimed Water and Florida's Water Reuse Program*, University of Florida IFAS Extension, (2009), https://www.researchgate.net/profile/Mark_Clark6/publication/237228318_Reclaimed_Water_and_Florida's_Water_Reuse_Program1/links/54aa860d0cf2bce6aa1d3e5c/Reclaimed-Water-and-Floridas-Water-Reuse-Program1.pdf (last visited Mar. 27, 2020).

[69] U.S. Geological Survey, Ground Water Atlas of the United States: Alabama, Florida, Georgia, South Carolina HA 730-G, https://pubs.usgs.gov/ha/ha730/ch_g/G-text6.html (last visited Mar. 27, 2020).

[70]Fla. Dep't of Envtl. Prot., Florida Water Plan (2019), https://drought.unl.edu/archive/plans/Water/state/FL_2019.pdf (last visited Mar. 27, 2020).

[71] *Id.*

and water conservation programs."[72] Additionally, the water districts "provide funding assistance for water supply projects."[73]

Florida's Water Plan is assessed annually. Additionally, the water management districts have "moved to a more operational planning approach" where they develop District Strategic Plans that "cover a shorter time period, typically three to five years, and are directly linked to a water management district's budget."[74]

8. Regulatory Authorities

The DEP the primary authority to construe and apply the policies set forth in the Act.[75] Further, the DEP is responsible for the administration of the Act, although it is state policy to enter into interagency agreements with other state agencies, including water management districts.[76] Florida has five Water Management Districts ("WMDs") with statutorily defined locations in very great detail.[77] "Water districts are the sole agencies empowered to grant consumptive use permits in Florida."[78] Further, DEP delegates its authority—to have the lead role in the conservation, protection, management, and control of all state waters—to the WMDs "to the greatest extent practicable."[79]
The five WMDs include:

1. Northwest Florida Water Management District
2. Suwannee River Water Management District
3. St. Johns River Water Management District
4. Southwest Florida Water Management District
5. South Florida Water Management District

[72] *Id.*

[73] *Id.*

[74] *Id.*

[75] Fla. Stat. Ann. § 373.016 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[76] Fla. Stat. Ann. § 373.026 (West, West through 2019 1st Reg. Sess. 26th Leg.).

[77] Fla. Stat. Ann. § 373.069 (Creation of water management districts) (West, West through 2019 1st Reg. Sess. 26th Leg.).

[78] *City of Cocoa v. Holland Props., Inc.*, 625 So. 2d 17, 20 (Fla. Dist. Ct. App. 1993).

[79] Fla. Stat. Ann. § 373.016(3) (West, West through 2019 1st Reg. Sess. 26th Leg.); *see also* Alexander Rhodes, *Capacity Sharing: The Next Step in Florida's Evolving Water Economy*, XXVI Stetson L. Rev. 805, 814 (1997).

The five WMDs may be contacted at: *Florida Dept. of Environmental Protection*:

2600 Blair Stone Road M.S. 3500
Tallahassee, Florida 32399
(850)-245-8336
http://www.dep.state.fl.us/mainpage/default.htm

Water Management Districts:

1. *Northwest Florida WMD*

   81 Water Management Drive
   Havana, FL 32333-4712
   (850) 539-5999
   http://www.nwfwmd.state.fl.us

2. *Suwannee River WMD*

   9225 CR 49
   Live Oak, FL 32060
   (386)-362-1001
   http://www.srwmd.state.fl.us

3. *St. Johns WMD*

   P.O. Box 1429
   Palatka, FL 32178-1429
   (386)-329-4500
   http://www.sjrwmd.com

4. *Southwest Florida WMD*

   2379 Broad Street
   Brooksville, FL 34604-6899
   (352)-796-7211
   http://www.swfwmd.state.fl.us

5. *South Florida WMD*

   3301 Gun Club Road
   West Palm Beach, FL 33406
   (561)-686-8800
   http://www.sfwmd.gov

The Water Management Districts are given broad power to implement Florida's Water Resource Act (Fla. Stat. Ann. § 373). The DEP can delegate its powers, *inter alia*, to "[a]dminister and enforce all provisions of this chapter, including the permit systems . . . consistent with the water resource implementation rule."[80] The districts have common mission goals of water supply, flood protection, water quality, and natural systems. These goals include permitting, quality and quantity monitoring, research, regulation, land acquisition and management, and reporting.[81] Additionally, the Water Management Districts may create Basins and Sub-districts and define their borders.[82]

9. Special Districts

The State of Florida does not have any special groundwater districts.

10. Transboundary Arrangements

Florida does not have trans-boundary arrangements pertaining to groundwater.

11. Native American Rights

The State of Florida, the South Florida Water Management District, and the Seminole Tribe of Florida entered into a Water Rights Compact which exempts the Tribe from the procedural provisions of the Florida Water Resources Act and administrative control by the District. Therefore, the Seminole Tribe has the authority to create a water code and set up a water management office, regulating water use through the Compact; a Manual which defines and explains the conditions, criteria, and objectives of the compact; and tribal water code. Additionally, the Compact states that the Tribe will enjoy preferences with regard to groundwater use.

[80] Fla. Stat. Ann. § 373.103(1) (West, West through 2019 1st Reg. Sess. 26th Leg.).

[81] *See supra* Part 5. (collective information from listed websites).

[82] Fla. Stat. Ann. § 373.0693 (West, West through 2019 1st Reg. Sess. 26th Leg.).

E. Illinois

Illinois defines groundwater as "[u]nderground water which occurs within the saturated zone and geologic materials where the fluid pressure in the pore space is equal to or greater than atmospheric pressure."[1] At common law, the state followed the Absolute Ownership rule for groundwater use; however, Illinois statutory scheme affirms the principle of Reasonable Use.

1. Definitions, Basis of Rights, Standards, and Interactions

For many years, Illinois followed the Absolute Ownership or English Rule for groundwater ownership.[2] However, the state's statutory scheme for groundwater governance changed when Illinois adopted the Water Use Act of 1983 ("Water Use Act").[3] *Bridgman v. Sanitary District of Decatur* affirmed the Water Use Act, explicitly recognizing the provision that established the rule of Reasonable Use and its applicability to "groundwater withdrawals in the State."[4] Subsequently, the state also adopted the Illinois Groundwater Protection Act of 1987 ("Groundwater Protection Act"), which mandated statewide monitoring of wells and data collection programs, among other regulations.[5]

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[1] 525 Ill. Compiled Statutes Ann. 45/4 (West, West through P.A. 101-622). (hereinafter "ILCS")

[2] An early Illinois case from 1899, *Edwards v. Haegar*, discussed groundwater rights issued and went on to state the rule of "absolute ownership" in its decision even though the ownership of property—not the issue of groundwater rights—was the central and deciding issue in this case. *See Edwards v. Haegar*, 180 Ill. 99, 106-107, 54 N.E. 176, 177-178 (1899). Even though the reference in *Edwards* to the absolute ownership doctrine was considered as mere dictum by numerous legal scholars, the doctrine of absolute ownership in *Edwards* has been cited favorably in numerous court decisions. Fred L. Mann, Harold H. Ellis, & N.G.P. Krasusz, *Water Use Law in Illinois*, U. Ill. Agricultural Experiment Station Bulletin 703 (1964).

[3] 525 ILCS 45/1 (West, West through P.A. 101-622).

[4] *Bridgeman v. Sanitary District of Decatur,* 164 Ill. App. 3d 287, 291-92, 517 N.E. 2d 309, 312-13 (Ill. App. Ct. 4th Dist. 1987); 525 ILCS 45/3(c) (West, West through P.A. 101-622), 525 ILCS 45/6 (West, West through P.A. 101-622) (amending Ill. Rev. Stat. 1985, ch. 5, par. 1606, § 6).

[5] 415 ILCS 55/1 et seq. (West, West through P.A. 101-622).

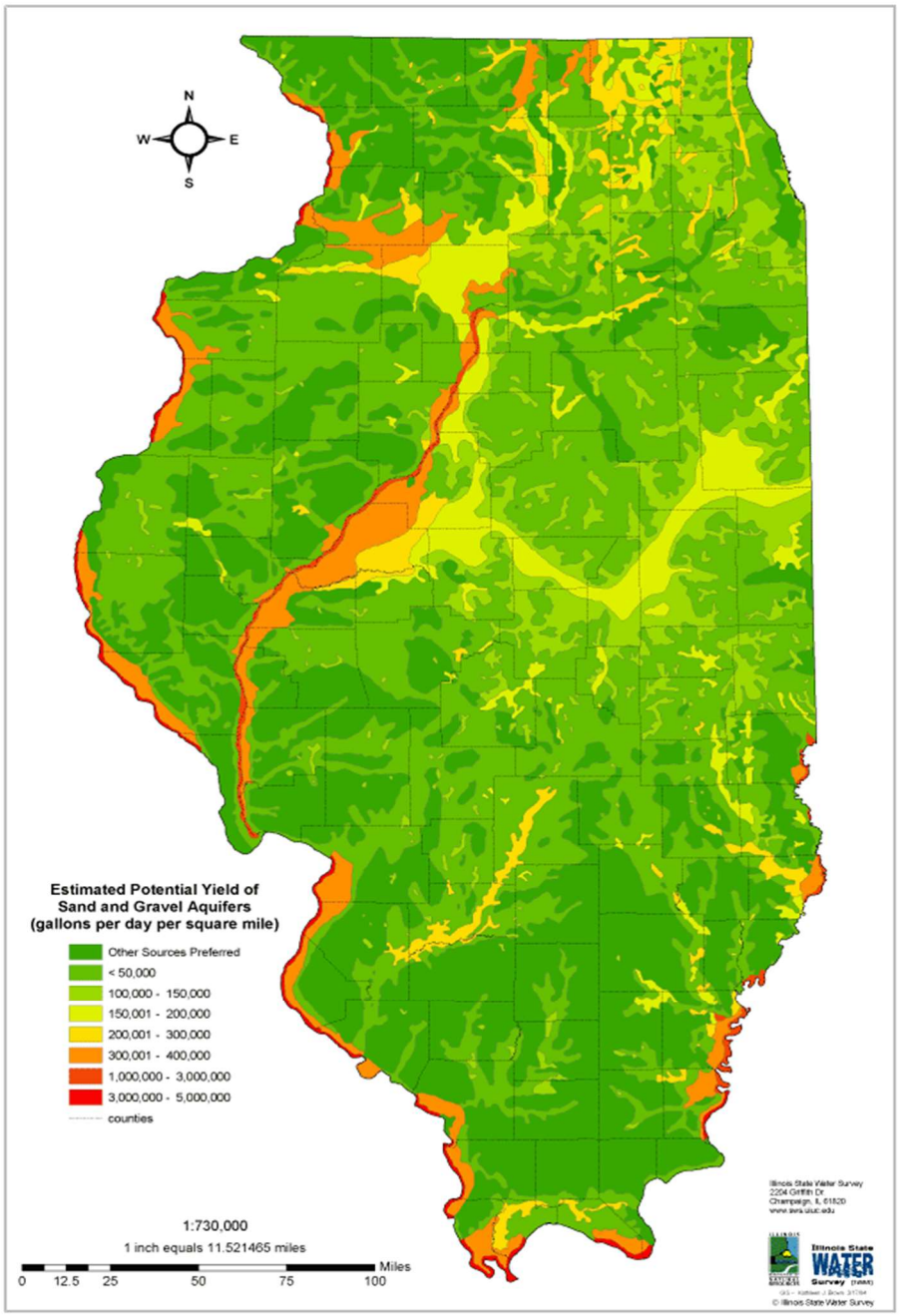

Fig. E.1. Estimated Potential Yield of Sand and Gravel Aquifers[6]

[6] Illinois State Water Survey, *Estimated Potential Yield of Sand and Gravel Aquifers* (2003), http://hdl.handle.net/2142/100396 (last visited Mar. 27, 2020).

Adoption of the Reasonable Use Rule in Illinois was an attempt to align groundwater law with established surface water law in the state. [7] The first and only case to interpret this new rule for groundwater usage, *Bridgman v. Sanitary Dist.,* concluded that in the Water Use Act of 1983 the legislature had intentionally mirrored the terms 'natural wants' and 'artificial wants' from surface water law. Accordingly, the application of substantial case law history in surface water disputes should apply to groundwater disputes as well.[8]

The *Bridgman* Court rejected the absolute ownership rule for groundwater withdrawals.[9] This decision suggests that absolute ownership of the land overlying the groundwater, without reasonable use of that withdrawal, is not the basis for the right. However, overlying land ownership is presumably a platform to obtain the right of groundwater withdrawals, where the use is a "reasonable one."[10] To establish parallels between groundwater and surface water withdrawals, the *Bridgman* Court also cited *Merriweather* in terms of the basis of the right, "[e]ach riparian proprietor is bound to make such a use of running water, as to do as little injury to those below him, as is consistent with a valuable benefit to himself. The use must be a reasonable one."[11]

Surface water law may provide insight into the importance of overlying land ownership as a basis for the right in a groundwater ownership context.[12] To acquire riparian rights for streams in Illinois, the property owner must own land that "includes or encompass[es] the shoreline."[13] For lakes, the landowner "must own property that touches the lake at its boundary line."[14] If the same principles of Reasonable Use apply to groundwater as the *Bridgman* Court suggested, then land ownership of property that overlies groundwater, and reasonable use forms a basis of the right.

Seniority in length (or time) of use does not increase the right of use, particularly for surface water withdrawals. In 1867, the Supreme Court of Illinois in *Bliss v. Kennedy*

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[7] William P. Hardy, 6-IL Waters and Water Rights I(B)(2).

[8] *Bridgeman*, 164 Ill. App. 3d at 292-93.

[9] *Id.* at 294.

[10] *Id.* at 293.

[11] *Id.* at 293 (citing *Merriweather*, 4 Ill. 492, 495 (1842)).

[12] *See* Bouris v. Largent, 94 Il. App. 2d 251, 256 (1968).

[13] *Id.*

[14] *Smith v. City of Greenville*, 115 Ill. App. 3d 39, 43 (1983).

denied the plaintiffs argument that their right to use the water in the stream was superior due to the fact they were the first to construct a mill on the stream.[15] The Court rejected this argument, reasoning that "prior occupancy giv[es] no exclusive right."[16]

The Water Use Act established the Reasonable Use rule for groundwater withdrawals, such that the use of groundwater is subject to a "reasonable use."[17] In particular, the Water Use Act defines "reasonable use" as "the use of water to meet natural wants and a fair share for artificial wants. It does not include water used wastefully or maliciously."[18] The *Bridgman* Court relied on the terms "artificial wants" and "natural wants" to draw the similarities between groundwater and surface water—because both the Water Use Act and the *Merriweather* Court each used this terminology.[19]

The concept of natural wants and artificial wants establishes whether riparian or overlying landowners subjects their respective withdrawals to reasonable use. The *Bridgman* Court cited *Merriweather* to explain these concepts in the context of groundwater withdrawals. With regard to "natural wants," these are generally domestic uses such as drinking, bathing, and cooking, which are "absolutely necessary" to one's existence.[20] The Illinois Supreme Court in *Merriweather* reasoned that "quench[ing] thrist," "household purposes," and "water for cattle" are necessary.[21] Without water for these "absolutely indispensable" uses—"both man and beast will perish."[22] In contrast, "artificial wants" are non-essential and not indispensable. The *Merriweather* Court, as cited in *Bridgman's* seminal groundwater decision, reasoned that water for "irrigation and manufactures" in this country are artificial wants because "they promote the prosperity and comfort of mankind, but cannot be considered absolutely necessary to his existence."[23]

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[15] *Bliss v. Kennedy*, 43 Ill. 67, 1867 WL 4984 (Ill. 1867).

[16] *Id.* at 74.

[17] 525 ILCS 45/3(c) (West, West through P.A. 101-622).

[18] 525 ILCS 45/4 (West, West through P.A. 101-622).

[19] *Bridgeman*, 164 Ill. App. 3d at 291-93.

[20] *Id.* at 292 (citing *Merriweather*, 4 Ill. at 495).

[21] *Id.*

[22] *Id.*

[23] *Id.* at 292-93 (citing *Merriweather*, 4 Ill. at 495-96).

2. Sources of Law

The Water Use Act of 1983 is the primary source of law governing the groundwater allocation system in Illinois.[24] The Act describes the Reasonable Use rule in the groundwater context. Case law remains significant because several Illinois courts have explained specific provisions within the statutory regime. For instance, the *Bridgman* Court affirmed the Act, explaining that the Illinois Supreme Court's explanation concerning the reasonable use of surface water is also applicable to understand the reasonable use of groundwater. The statutory framework under the Act also includes a complaint investigation and review process, an administrative hearing and appeals process, and a penalties provision.[25]

The Groundwater Protection Act of 1987 sets forth various technical programs to monitor and collect groundwater data.[26] The Water Authorities Act plays a peripheral role in the governance of groundwater withdrawals in Illinois.[27]

3. Scope of Right

a. Groundwater Ownership

The *Merriweather* Court explained that the "property in the water, therefore, by virtue of the riparian ownership, is in its nature usufructuary and consists, in general, not so much of the fluid itself, as of the advantage of its impetus."[28] The Illinois General Assembly declares it to be in the public interest to better manage and conserve water.[29] In further recognition that the *Bridgman* Court rejected the absolute ownership rule, it seems that the state "owns" the groundwater. Citizens of the state and overlying property owners have a usufructuary right to the publicly held water resources and are free to withdrawal groundwater as long as they use the water in accordance with the Reasonable Use Rule. However, if a landowner or person plans to develop a new point

[24] 525 ILCS 45/1 et seq. (West, West through P.A. 101-622).

[25] 525 ILCS 45/5.1, 7 (West, West through P.A. 101-622).

[26] 415 ILCS 55/1 et seq. (West, West through P.A. 101-622).

[27] 70 ILCS 3715/0.01 et seq. (West, West through P.A. 101-622).

[28] *Evans v. Merriweather*, 4 Ill. 492, 492 (1842).

[29] 525 ILCS 45/2 (West, West through P.A. 101-622).

of withdrawal from which withdraws are expected to exceed 100,000 gallons in any day, then the local Soil and Water Conservation District must be notified.[30]

b. Groundwater Ownership

i. Permitted and Preferred Uses

The use of groundwater for both artificial wants and natural wants are allowable types of use in Illinois, subject to the reasonable use limitation. As discussed in the following section, the hierarchy of these uses becomes pivotal during conflicts between artificial vs. natural wants or during times of Groundwater Emergencies.

Courts in Illinois have referred to the following uses as natural uses: quenching thirst, household purposes, water for cattle, and more generally, domestic uses.[31] Some scholars have argued that watering cattle may not be a natural want in the current era, considering that the *Evans* decision occurred in the mid-1800s, a time when "watering cattle was necessary for sustenance in the household."[32] This dispute may lead to confusion in determining whether large modern-day commercial livestock operations are considered artificial uses, rather than natural uses. In contrast, water for irrigating lands and water for propelling machinery (i.e., manufactures) are not considered natural uses, and thus are classified as artificial uses, because they are not absolutely necessary for existence.[33]

When in conflict, natural users of water prevail over artificial users of water.[34] The *Bridgman* Court's reasoning referenced the *Merriweather* decision to explain this principle.[35] Thus, in disputes between these opposing uses, such as for domestic vs. industrial purposes, the domestic purpose will prevail as a natural want.[36] "If [the landowner] desires to use [water] for irrigation or manufactures, and there be a lower proprietor to whom its use is essential to supply his natural wants, or for his stock, he

[30] 525 ILCS 45/5 (West, West through P.A. 101-622).

[31] *Bridgman*, 164 Ill. App. 3d at 292-93 (citing Merriweather, 4 Ill. at 495-96).

[32] William P. Hardy, 6-IL Waters and Water Rights 1(B) (Matthew Bender & Co., LexisNexis 2015).

[33] *Bridgeman*, 164 Ill. App. 3d at 292-93 (citing *Merriweather*, 4 Ill. at 495-96).

[34] *Id.*

[35] *Id.*

[36] *Id.*

must use the water so as to leave enough for such lower proprietor."[37] The Court further explained that if there is a lack of water or diminished supply, which may not be sufficient to "answer the natural wants of the different proprietors living on it," then the artificial uses for either irrigation or manufacturing are not allowed.[38]

Reasonable Use is the primary standard for governing groundwater law in Illinois. Alternatively, the standard of beneficial use is implicated within a water quality (rather than quantity) perspective. The Groundwater Protection Act adopted the policy that groundwater is of "vital importance to the general health, safety, and welfare."[39] As such, the policy is administered by utilizing the groundwater resources of Illinois for "beneficial and legitimate purposes," as well as preventing waste and managing the resources to maximize the benefits for the people of Illinois.[40] Further, the Groundwater Protection Act, defines "resource groundwater" as "groundwater that is presently being or in the future capable of being put to beneficial use by reason of being suitable quality."[41]

ii. Location of Use

Given the similarities mentioned above in groundwater and surface water jurisprudence, some practitioners note that the "terms 'riparian landowner' and 'overlying landowner' should be considered interchangeable in Illinois water law doctrine."[42] Similar to the use of surface water, the groundwater withdrawals are also subject to the reasonable use limitation, regardless of the location of use.

Although the Water Use Act does not explicitly mention the transport of groundwater, some practitioners have analyzed this issue within the context of the reasonable use of surface water. A report given to the Illinois Groundwater Association in 1985 suggested that "the right to transport water for use off overlying land does not exist without

[37] *Id.*

[38] *Id.*

[39] 415 ILCS 55/2(b) (West, West through P.A. 101-622).

[40] *Id*.

[41] 415 ILCS 55/3(j) (West, West through P.A. 101-622).

[42] Gary R. Clark, P.E., *Illinois Groundwater Law: The Rule of Reasonable Use*, at 22, Ill. Dept. of Transp. Div. of Water Resources (1985).

statutory authority."[43] Further, the report explained that the usufructuary right is "incidental to the ownership of the riparian land and limited to the riparian proprietor."[44] Although courts have not explicitly analyzed this issue from the perspective of groundwater transfers, the existing case law suggests that the transfer of groundwater may not be allowed in Illinois. In *Batavia Manufacturing Company v. Newton Wagon Company,* the Illinois Supreme Court reasoned that a riparian proprietor's contract that conveyed surface water rights to another for power purposes "could not be a sale of the water of the river, or of its momentum, (which they could only own the right to use on their own soil) [as] it could but amount to an estoppel of their right to use the momentum of so much water."[45]

However, there are some situations in which Illinois law grants the right to transport and sell water.[46] In particular, this authority grants users within the state to sell water to various water utilities: including municipalities (i.e., counties),[47] Conservancy Districts,[48] and Water Authorities.[49] Although an individual may not be able to sell and transport groundwater from his overlying land, it appears that there is statutory authority to sell groundwater to water utilities.

c. Loss of Water Rights

The use of groundwater in a wasteful or malicious matter is not permitted and my result in enjoinment of use.[50] Water rights may be enjoined if they violate the rule of Reasonable Use under the Water Use Act. Groundwater withdrawals may also be restricted in the case of emergencies, as the Water Use Act provides the mechanism for this authority.[51]

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[43] *Id*. at 23.

[44] *Id.*

[45] *Batavia Mfg. Co. v. Newtown Wagon Co.,* 91 Ill. 230 (1878).

[46] *See* 65 ILCS 5/11-125-1 (West, West through P.A. 101-622).

[47] *See* Ill. Rev. Stat. Ch. 24, Par. 33-3107 & 34-3110.

[48] *See* Ill. Rev. Stat., Ch. 42, Par. 393.

[49] *See* Ill. Rev. Stat. Ch. 111 2/3, Par. 228, § 6.

[50] 525 ILCS 45/4 (West, West through P.A. 101-622).

[51] 525 ILCS 45/2 (West, West through P.A. 101-622).

In order to stop a person or landowner from using water in a way that exceeds reasonable use, the party that has been "irreparably injured" must file a suit.[52] There does not seem to be any way for the state to monitor or prevent potential violations of the reasonable use rule.[53] If an entity believes that another user has violated reasonable use, the only course of action is to take the matter to court.[54] Some practitioners note that when a riparian (or overlying landowner) "is using more than his just proportion of the water available for artificial uses...such use perhaps is an unreasonable use as a matter of law, and it is for a jury to determine the extent to which other riparian proprietors are damaged as a result of that unreasonable use."[55]

In *Citizens Opposing Pollution v. ExxonMobil Coal U.S.A*., the court held that the citizens group was entitled to bring an enforcement action when the coal company's withdrawal of groundwater violated the rule of "reasonable use," as set for in the Water Use Act.[56] Because the citizens group alleged that the company was withdrawing four million gallons of water per week from a community aquifer, which affected the level of contamination, there was a question of whether this particular use was "reasonable," rather than "wasteful or malicious." However, this citizens group could not force the circuit court to review the groundwater withdrawal terms of the company's mining permit under the Mining Act's citizen suit provision.[57]

Any person who fails to register a point of withdrawal under the groundwater emergency restrictions of the Water Use Act may be guilty of a petty offense. Any person convicted of a second or subsequent offense is guilty of a Class C misdemeanor.[58]

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[52] *Behrens v. Scharringhausen*, 22 Ill. App. 2d 326, 328, 161 N.E.2d 44, 45 (1959)

[53] NOTE: A Watershed Moment: Reforming the "Reasonable Usage" Standard of Water Extraction Rights in Illinois, 2017 U. Ill. L. Rev. 2009, 2023.

[54] Email from Wes Cattoor, Acting Section Chief, Engineering Studies, IDNR Office of Water Resources, to Margaret M. Reed, Student of Law, Texas A&M Coll. of Law (July 10, 2019, 08:24 CST) (on file with author).

[55] *See* Clark, *Illinois Groundwater Law: The Rule of Reasonable Use.*

[56] *Citizens Opposing Pollution v. ExxonMobil Coal U.S.A*., 936 N.E.2d 181 (Ill. App. Ct. 5th Dist. 2010).

[57] *Id.*

[58] 525 ILCS 45/7 (West, West through P.A. 101-622).

4. Well Drilling

Any person (or corporation, etc.), that is responsible for a groundwater withdrawal that is classified as a high-capacity well, high-capacity intake, or public water supply, shall participate in the Illinois State Water Survey's Illinois Water Inventory Program.[59] The Water Use Act defines "high-capacity well" as "a well located on a parcel of property where the rate or capacity of water withdrawal of all wells on the property is equal to or in excess of 100,000 gallons during any 24- hour period." Further, the Water Use Act defines "public water supply" as "all mains, pipes, and structures through which water is obtained and distributed to the public...actually used or intended for use for the purpose of furnishing water for drinking or general domestic use and which serve at least 15 service connections or which regularly serve at least 25 persons at least 60 days per year."[60] Unless one of the exemptions is applicable, these groundwater users are compelled to report their withdrawals pursuant to section 45/5.3 of the Water Use Act.[61]

Within a preemptive context, on the occasion that a person proposes to develop a new point of withdrawal that happens to be a high-capacity well, this person must notify the District (Soil & Water Conservation District) before construction of the well begins. The District will then notify any other potential water systems that may be impacted by the proposed well. Pursuant to this aforementioned Water Conflict Resolution provision, these reviews are also made available to the public.[62]

In Illinois installation, modification, and sealing of water wells must be done by a licensed contractor unless the well qualifies under a few narrow exceptions.[63] Among other infractions, a license may be revoked for violating the Act or any rules related to water drilling or pump installation.[64] A permit must be obtained from the Department or approved local health department before a water well can be constructed, deepened, modified, or sealed.[65] An application for a permit must include a plan and a drawing of

[59] 525 ILCS 45/5.3 (West, West through P.A. 101-622).

[60] 525 ILCS 45/4 (West, West through P.A. 101-622).

[61] 525 ILCS 45/5.3 (West, West through P.A. 101-622).

[62] 525 ILCS 45/5 (West, West through P.A. 101-622).

[63] Ill. Admin. Code tit. 77, § 920.30(a) (Lexis Advance through May 31, 2019).

[64] Ill. Admin. Code tit. 77, § 915.110(c) (Lexis Advance through Jan. 3, 2020).

[65] Ill. Admin. Code tit. 77, § 920.130(a) (Lexis Advance through Jan. 3, 2020).

the proposed construction.[66] Monitoring wells are governed separately from water wells. and they have their own specific guidelines.[67]

Construction and permitting of water wells in Illinois are governed by the 77 Ill. Adm. Code Part 920 Illinois Water Well Construction Code. This Code specifically governs the "minimum standards for the location, construction, and modification of water wells, monitoring wells and closed loop wells that are not otherwise subject to regulation under the Environmental Protection Act."[68] All water wells that are subject to that Code must be constructed by a licensed contractor of wells and pumps in Illinois.[69] They must also be reported to the Department within 30 days of construction.[70] Wells that are abandoned must be sealed within 30 days by a licensed water well driller.[71] There are specific sealing requirements for different types of wells.[72] Notification of sealing must be made to an approved agency 48 hours before the start of the sealing process.[73]

Water well pump installation is governed by the 77 Ill. Adm. Code Part 925 Illinois Water Well Pump Installation Code. All pumps used to obtain water from a well, except for monitoring wells, must comply with minimum standards for installation set forth by this Code.[74] The installation of pumps may only be done by or under the supervision of a licensed contractor.[75] Certain wells and pumps may have to meet the requirement for disinfection.[76]

5. Hydraulic Connection and Regulation

The Court in *Bridgman*, which applied the Reasonable Use rule to groundwater, in fact relied upon an old case law from 1842 that had applied the Reasonable Use rule to

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[66] *Id.* at § 920.130(b).

[67] Ill. Admin. Code tit. 77, § 920.170 (Lexis Advance through Jan. 3, 2020).

[68] Ill. Admin. Code tit. 77, § 920.20 (Lexis Advance through Jan. 3, 2020).

[69] Ill. Admin. Code tit. 77, § 920.30(a) (Lexis Advance through Jan. 3, 2020).

[70] *Id*. at § 920.30(b).

[71] Ill. Admin. Code tit. 77, § 920.120(a) (Lexis Advance through Jan. 3, 2020).

[72] *Id.* at § 920.120(b)(1)-(7).

[73] Ill. Admin. Code tit. 77, § 920.120(e) (Lexis Advance through Jan. 3, 2020).

[74] Ill. Admin. Code tit. 77, § 925.20(a) (Lexis Advance through Jan. 3, 2020).

[75] Ill. Admin. Code tit. 77, § 925.30(a) (Lexis Advance through Jan. 3, 2020).

[76] Ill. Admin. Code tit. 77, § 925.50(a) (Lexis Advance through Jan. 3, 2020).

surface water (*Evans v. Merriweather*). Also, the Groundwater Protection Act marks the distinction between "groundwater" and "underground water" in its definition section by including explicit explanations of both.[77] There is no apparent priority among users of hydraulically linked surface and ground waters. Additionally, there is no statutory scheme that authorizes liability for surface water or groundwater interference.

6. Aquifer Recharge and Underground Storage

Illinois does not currently incentivize or facilitate any aquifer recharge or underground storage projects.

7. Water Management Plan(s)

Illinois has established a state water plan that is overseen by The State Water Plan Task Force. This task force is comprised of multiple agencies that work together to address twelve key issues identified by the 1984 Illinois State Water Plan: Critical Issues, Cross-Cutting Topics, Operating Issues. These agencies meet regularly to keep the plan up to date and to publish supporting documents about their assigned issues. [78]

Regional water planning organizations are also present in the state of Illinois. In 2006, Governor Blagojevich issued an executive order to develop a "comprehensive program for state and regional water supply planning."[79] The Illinois Department of Natural Resources was directed to oversee the process along with the Illinois State Water Survey. The Illinois Department of Natural Resources creates and funds Regional Water Supply Planning Committees (RWSPC). These committees are responsible for reviewing and providing input for water supply and demand reports conducted by the Illinois State Water Survey (ISWS). The RWSPC then "develops a regional water supply planning report addressing the shortages, conflicts, conservation measures and other recommendations." [80]

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[77] 415 ILCS 55/3(g), (k) (West, West through P.A. 101-622).

[78] Illinois Department of Natural Resources, *State Water Plan Task Force*, https://www.dnr.illinois.gov/WaterResources/Pages/StateWaterPlanTaskForce.aspx (last visited Mar. 27, 2020).

[79] State of Illinois Executive Department, Executive Order for the Development of State and Regional Water-Supply Plans (Jan. 9, 2006), https://www2.illinois.gov/Documents/ExecOrders/2006/execorder2006-1.pdf (last visited Mar. 27, 2020).

[80] Illinois Department of Natural Resources, *Water Supply*,

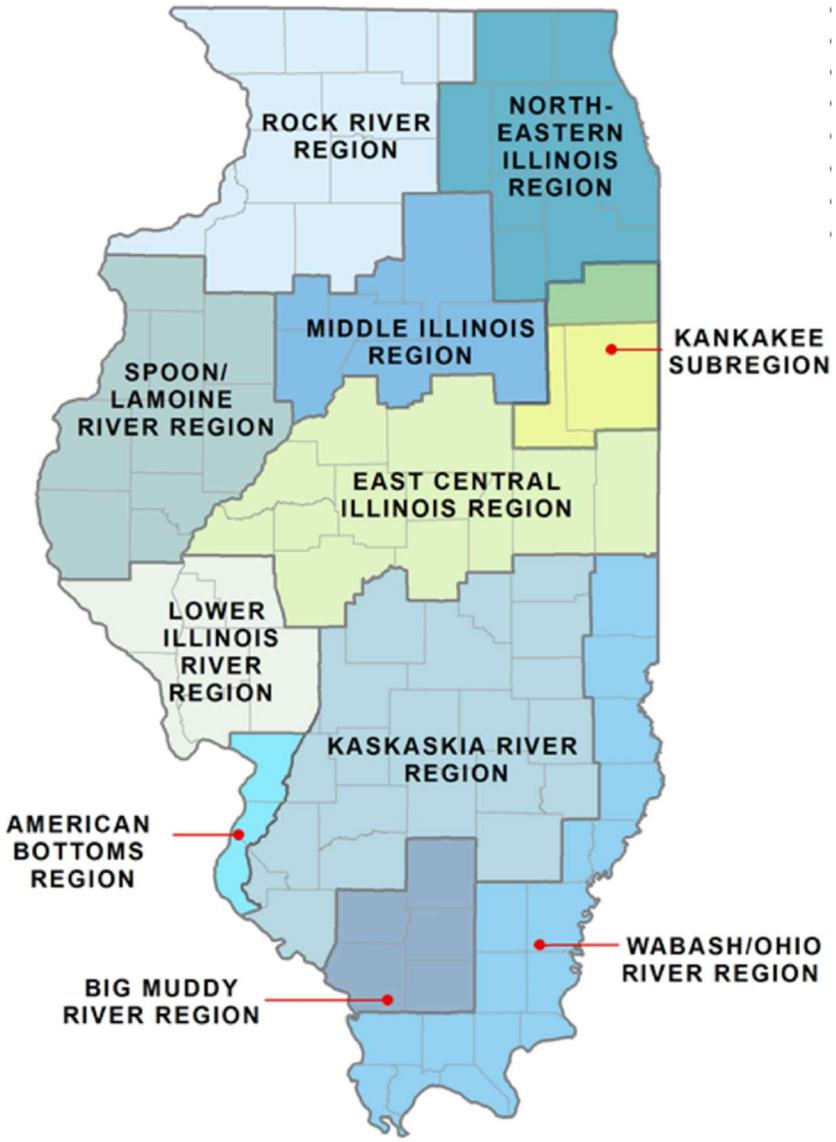

Fig. E.2. Illinois Planning Regions[81]

According to the ISWS, there are eleven regions in the state of Illinois. Reports are in various stages of completion. Funding from IDNR was suspended in 2015 for all

https://www.dnr.illinois.gov/WaterResources/Pages/WaterSupply.aspx (last visited Mar. 27, 2020).

[81] Illinois Department of Natural Resources. *Planning Regions*, https://www.isws.illinois.edu/illinois-water-supply-planning/planning-regions (last visited Mar. 27, 2020).

RWSPC activities. Regions that had already begun their reports received additional funding from IDNR in November of 2017 to complete their projects. "Currently, the ISWS, Middle Illinois Region, Rock River Region, and Northeast Region are being funded through State FY19."[82] It is unclear if the remaining five regions that have not begun planning will receive funding to do so. Currently, none of them have a start date but are expected to begin sometime in the near future, according to the ISWS.[83]

The RWSPCs for Illinois are each responsible for different water resources in the state. "Regional water supply planning in the East Central Illinois Region has focused on the Mahomet Aquifer System and the Sangamon River Watershed." [84] The RWSPC for the East Central Illinois Region published their findings and recommendations in 2018.[85]

"Regional water supply planning in Northeastern Illinois has focused on the deep Cambrian-Ordovician sandstone aquifers, the shallow bedrock aquifers, and the Fox River Watershed."[86] The Chicago Metropolitan Agency for Planning (CMAP) has taken the lead for regional planning in Northeastern Illinois. They published their plan, *Water 2050*, in 2010. This plan "recommends collaborative planning and management in lieu of more government regulation to guard against groundwater overuse and the potential conflicts that groundwater shortage could someday cause."[87] Under their recommendation, CMAP assisted in the initiation of the Northwest Water Planning alliance to represent more than 70 communities in the creation of a plan to share groundwater resources.[88] Water 2050 was updated in 2014, and in 2015 CMAP began

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[82] Email from Wes Cattoor, Acting Section Chief, Engineering Studies, IDNR Office of Water Resources, to Margaret M. Reed, Student of Law, Texas A&M Coll. of Law (July 3, 2019, 01:35 CST) (on file with author).

[83] Illinois State Water Survey, *Illinois Water Supply Planning*, https://www.isws.illinois.edu/illinois-water-supply-planning (last visited Mar. 27, 2020).

[84] Illinois State Water Survey, *East Central Illinois*, https://www.isws.illinois.edu/illinois-water-supply-planning/east-central-illinois-basin (last visited Mar. 27, 2020).

[85] Carol Ammons et al., Mahomet Aquifer Protection Task Force: Findings and Recommendations (Dec. 21 2018), http://hdl.handle.net/2142/102744 (last visited Mar. 27, 2020).

[86] Illinois State water Survey, *Northeastern Illinois*, https://www.isws.illinois.edu/illinois-water-supply-planning/northeastern-illinois (last visited Mar. 27, 2020)..

[87] CMAP, *Northwest Water Planning Alliance*, https://www.cmap.illinois.gov/programs/water/supply-planning/nwpa (last visited Mar. 27, 2020).

[88] CMAP, *Northwest Water Planning Alliance Stratigic Plan: 2014-16*, (Sept. 2014), https://www.cmap.illinois.gov/documents/10180/296668/FY14-0112%20NWPA%20Strategic%20Plan%20September/245df797-7461-4052-b4cf-9c0d9d2ef47f (last visited Mar. 27, 2020).

to develop a more comprehensive plan building off of the recommendations of Water 2050. The resulting plan, *ON TO 2050*, was adopted in October of 2018.[89]

"Regional water supply planning in the Middle Illinois Region is focused on the Cambrian-Ordovician Sandstone aquifers, the shallow bedrock aquifers, the sand and gravel aquifers, and the Illinois and Vermillion Rivers."[90] The Tri-County Regional Planning Commission (TCRPC) and the Middle Illinois Basin committee (MIBC) began planning in 2014, but in 2015, they lost funding from the IDNR. They were able to finish their assessment with additional funding from the IDNR in 2017. In 2018 TCRPC finalized and published their assessments for water supply and demand in their region. Unfortunately, they are currently awaiting funding to develop and publish their recommendations.[91]

"Regional water supply planning in the Kaskaskia River region has focused on surface water available in the region, with particular interest on the two federal reservoirs, Lake Shelbyville and Lake Carlyle. Groundwater resources are limited within the region."[92] The Southwestern Illinois Resource Conservation & development Committee was in charge of leading a team of stakeholders and representatives from various industry backgrounds to produce the final planning and recommendations report.[93] This team started in 2010 and published its findings in 2012.[94] Currently, there does not seem to be any plans to update the 2012 water supply plan.

"Regional water supply planning in the Rock River Region is focused on flow in the

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[89] CMAP, *ON TO 2050*, (Oct. 2018), https://www.cmap.illinois.gov/documents/10180/905585/ON+TO+2050+Comprehensive+Regional+Plan+FINAL.pdf/dfe78ce3-8601-1b1d-a0e9-77893a2a0b2a (last visited Mar. 27, 2020).

[90] Illinois State Water Survey, *Middle Illinois*, https://www.isws.illinois.edu/illinois-water-supply-planning/middle-illinois-basin (last visited Mar. 27, 2020).

[91] Tri-County Regional Planning Commission, *Middle Illinois Basin Water Supply Planning Outreach Report*, https://tricountyrpc.org/documents/middle-illinois-basin-water-supply-planning-outreach-report/ (last visited Mar. 27, 2020).

[92] Illinois State Water Survey, *Kaskaskia River*, https://www.isws.illinois.edu/illinois-water-supply-planning/kaskaskia-river-basin (last visited Mar. 27, 2020).

[93] Heartlands Conservancy, Kaskaskia Basin Water Supply Plan, https://www.heartlandsconservancy.org/kaskaskia.php (last visited Mar. 27, 2020).

[94] Kaskaskia Basin Water Supply Planning Committee, *Kaskaskia Basin and Vicinity 2050 Water Supply Assessment and Recommendations* (Dec. 2012), https://www.isws.illinois.edu/iswsdocs/wsp/outside/Comprehensive_Evaluation_Plan_Kaskaskia_Basin_2050.pdf (last visited Mar. 27, 2020).

Rock and Green Rivers, the impact of groundwater withdrawals from Cambrian-Ordovician sandstone, shallow bedrock, and sand and gravel aquifers, and the potential for contamination in shallow groundwater systems that could adversely impact water supply."[95] The water demand report was published in January of 2019.[96] It is unclear if a publication addressing supply levels and recommendations are to follow.

"Regional water supply planning in the Kankakee Watershed is focused on the Silurian Dolomite aquifer (shallow bedrock), the sand and gravel aquifers, and the Kankakee and Iroquois Rivers."[97] The water demand report for this region was also published in January of 2019.[98] At this time, there are no publications for water supply or recommendations from the planning committee in this region.

The regions of Spoon and LaMoine River, Lower Illinois River, American Bottoms, Wabash and Ohio River, and Big Muddy River have not yet begun planning. [99]

8. Regulatory Authorities

New groundwater users in Illinois of more than 100,000 gallons on any given day are subject to review by the Illinois State Water Survey.[100] This review is done primarily to determine the impact of a particularly large withdrawal on neighboring uses.

The Water Use Act includes a complaint investigation and review process, an administrative hearing and appeals process, and a penalties provision.[101] Persons investigating complaints or reviews of existing or proposed wells on behalf of the

[95] Illinois State Water Survey, *Rock River Region*, https://www.isws.illinois.edu/illinois-water-supply-planning/rock-river-region (last visited Mar. 27, 2020).

[96] Scott C. Meyer et al., *Water Demand in The Rock River Water Supply Planning Region*, *2012-2060* (Jan. 2019), http://hdl.handle.net/2142/102368 (last visited Mar. 27, 2020).

[97] Illinois State Water Survey, *Kankakee Watershed*, https://www.isws.illinois.edu/illinois-water-supply-planning/kankakee-watershed (last visited Mar. 27, 2020).

[98] Scott C. Meyer et al., *Water Demand in the Kankakee Water Supply Planning Region*, 2010-2060 (Jan. 2019), http://hdl.handle.net/2142/102367 (last visited Mar. 27, 2020).

[99] Illinois State Water Survey, *Planning Regions*, https://www.isws.illinois.edu/illinois-water-supply-planning/planning-regions (last visited Mar. 27, 2020).

[100] 525 ILCS 45/5 (West, West through P.A. 101-622).

[101] 525 ILCS 45/1 et seq. (West, West through P.A. 101-622).

Illinois Department of Agriculture or Soil and Water Conservation District,[102] "may enter upon private property for the purpose of conducting an investigation and may review any records pertaining to pumping data."[103]

Under the Groundwater Emergency Restrictions provision in the Water Use Act, a Water Conservation District may recommend restrictions on groundwater withdrawals in certain parts of the state.[104] In particular, there may be restrictions in certain locations, such as any county in Illinois with a population greater than 100,000, through which the Mackinaw River flows.[105] Presumably, this may be an indirect recognition of the hydrologic link between surface and groundwater, but it is uncertain how often this authority is exercised. This provision also sets out detailed procedures for implementing restrictions.

The regulatory authorities may be contacted at the following addresses:

Illinois Department of Natural Resources
http://www.dnr.state.il/us/.
One Natural Resources
Springfield, IL 62702-1271
Tel: 217-785-5500; Fax: 217-524-4177

Illinois Department of Agriculture
https://www.agr.state.il.us/groundwater-monitoring/
State Fairgrounds
P.O. Box 19281
Springfield, IL 62794-9281
Tel: 217-782-2172

Illinois Environmental Protection Agency
http://www.epa.state.il.us/.
1021 North Grand Avenue East, P.O. Box 19276,
Springfield, IL 62794-9276
Tel: 217-782-5544

[102] 525 ILCS 45/4 (West, West through P.A. 101-622).

[103] 525 ILCS 45/5.2 (West, West through P.A. 101-622).

[104] 525 ILCS 45/5.1 (West, West through P.A. 101-622).

[105] 525 ILCS 45/5.1 (West, West through P.A. 101-622).

9. Special Districts

Illinois does not have any special groundwater districts.

10. Transboundary Arrangements

It does not appear that Illinois is party to any transboundary arrangements or conflicts.

11. Native American Rights

It does not appear that Illinois grants exemptions, benefits, or concessions to Native American Tribes.

F. Indiana

The State of Indiana's groundwater (and surface water) governance system can be characterized as a modified Rule of Capture system because groundwater "falls within the principle that gives to the owner of the soil all that lies beneath the surface."[1]

1. Definitions, Basis of Rights, Standards, and Interactions

The Indiana Code defines "groundwater" as "all water occurring beneath the surface of the ground regardless of location and form."[2] Even early in water law jurisprudence (i.e. 1860), Indiana courts noted the difference between common law of percolating groundwater and the "law which applies to rivers and flowing streams."[3] Indiana case law recognizes four categories of water sources.[4] Specifically, the different water sources include: i) surface waters that flow in well-defined channels; ii.) surface waters ("dispersed" waters) that lack a well-defined channel; iii.) subsurface waters (i.e., underground watercourses) that are within a watercourse with definable boundaries; and iv.) subsurface waters (i.e., percolating groundwater) that lack a definite channel and that percolate or filter from the lands of one to the lands of another proprietor.[5]

[1] *New Albany & Salem R.R. v. Peterson*, 14 Ind. 112, 114 (1860).

[2] Ind. Code Ann. § 14-25-7-3 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[3] *New Albany & Salem R.R.,* 14 Ind. at 114. *See generally* 6-IN Waters and Water Rights I, page 5, Stephen L. Lucas.

[4] 6-IN Waters and Water Rights I, page 1, Stephen L. Lucas.

[5] *Town of Avon v. West Central Conservancy District*, 957 N.E.2d 598, 604 (Ind. 2011); *Gagnon v. French Lick Springs Hotel Co.*, 163 Ind. 687, 72 N.E. 849 (Ind. 1904).

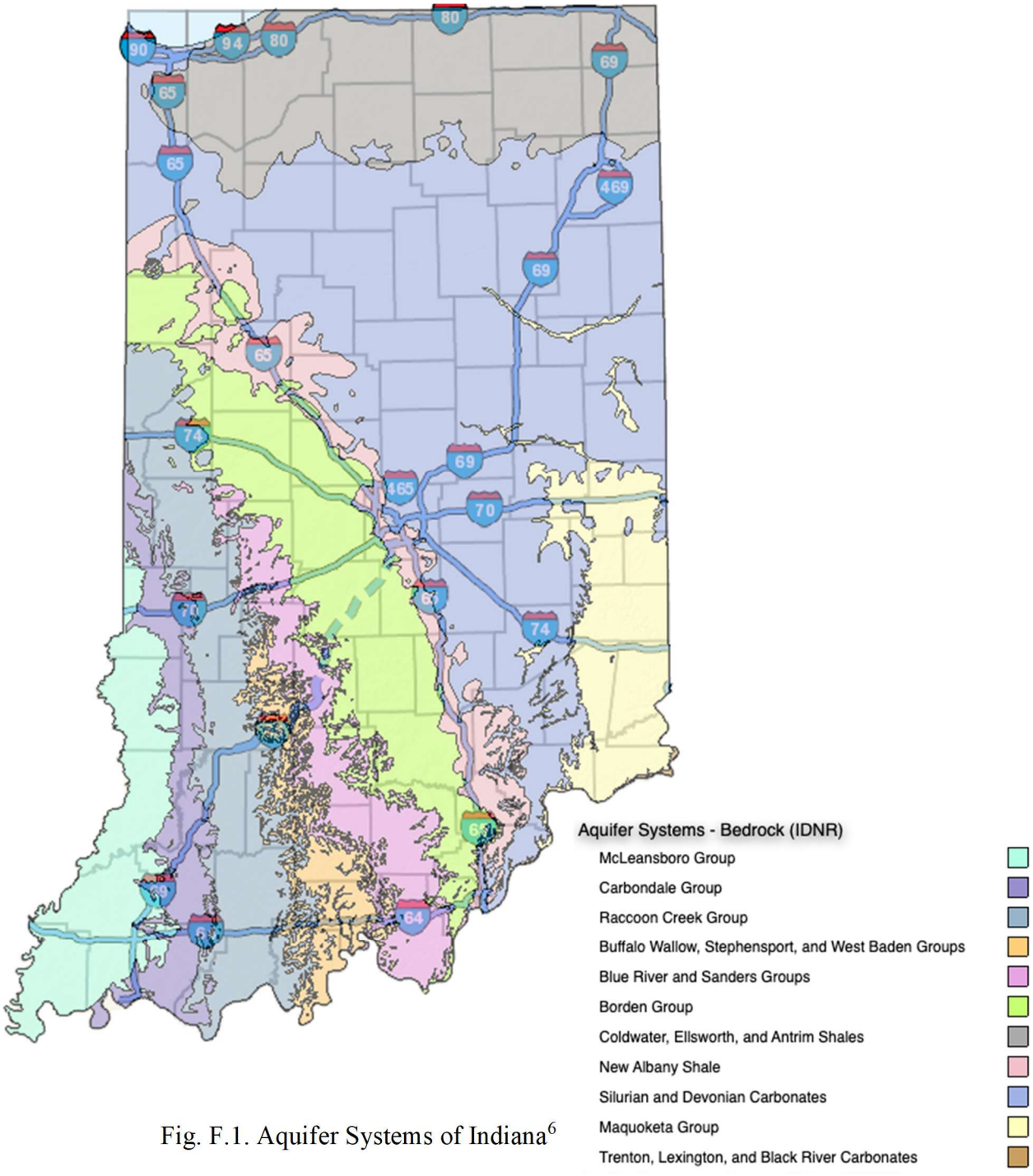

Fig. F.1. Aquifer Systems of Indiana[6]

[6] Indiana Geological Survey, Indiana Map, created with ArcGIS tool at https://maps.indiana.edu/MapGallery.html (last visited Mar. 27, 2020).

The addition of limitations has modified the Rule of Capture system in Indiana. In *Gagnon v. French Lick Springs Hotel Co.*, the Indiana Supreme Court held that the Rule of Capture applies unless the appropriator is using it maliciously.[7] The court stated that "[w]here the diversion of the water is purely malicious, and is detrimental to another proprietor, it may be prevented by injunction."[8] Ultimately, the court in this case recognized that further exceptions and departures from the pure Rule of Capture system might be necessary in the future.[9]

In *Wiggins v. Brazil Coal and Clay Corp.*, the court reaffirmed the Rule of Capture and rejected the Restatement (second) of Torts §858.[10] It declared that groundwater "may be put to use to the fullest extent to further enjoyment of the land, however this right does not extend to causing injury gratuitously or maliciously to nearby lands and their owners."[11]

Furthermore, in *Natural Resources Comm'n v. Amax Coal Co.*, the court "recognized that Indiana's statute implementing the federal Surface Mining Control and Reclamation Act establishes an exception to common law groundwater rights."[12] This exception in the Surface Mining Control and Reclamation Act (SMCRA) "grants the Indiana Department of Natural Resource the authority to regulate a coal company's use of groundwater."[13] Another situation that could be deemed an exception was addressed in *City of Valparaiso v. Defler*, where "the court found that the rule stating that parties that remove subsurface property (traditionally minerals) must leave sufficient support for the surface soil owned by another applies to percolating groundwater."[14]

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[7] Jesse J. Richardson, Jr., *Water and Economic Development in Indiana: Modernizing the State's Approach to a Critical Resource* (2014) (on file with authors).

[8] *Gagnon v. French Lick Springs Hotel Co.*, 72 N.E. 849, 851 (Ind. 1904).

[9] *Id.* at 851.

[10] *Wiggins v. Brazil Coal and Clay Corp*., 452 N.E.2d 958, 962 (Ind. 1983).

[11] *Id*.

[12] Jesse J. Richardson, Jr., *Water and Economic Development in Indiana: Modernizing the State's Approach to a Critical Resource* (2014) (on file with authors); *Natural Resources Comm'n v. Amax Coal Co.*, 638 N.E.2d 418 (Ind. 1994).

[13] *Id.*

[14] Jesse J. Richardson, Jr., *Water and Economic Development in Indiana: Modernizing the State's Approach to a Critical Resource* (2014) (on file with authors); *Natural Resources Comm'n v. Amax Coal Co.*, 638 N.E.2d 418 (Ind. 1994); *City of Valpraraiso v. Defler*, 649 N.E.2d 1177 (Ind. App. 1998).

For users who withdrawal less than 100,000 gallons per day in a restricted use area, the basis for the right to extract groundwater is overlying landownership. The person who owns the overlying land has a right to the groundwater underneath the land because, when groundwater is present beneath the surface, Indiana considers the resource to be part of the land.[15] In contrast, water is not considered present and, thus, no longer belongs to the owner of the underlying land, when the groundwater "percolates away underground through porous earth from beneath one lot to surrounding lands."[16] In general, the basis for the right to extract groundwater in Indiana is this overlying land ownership, although this right is qualified by Indiana's extensive jurisprudence regarding qualifications of a beneficial use.[17]

Within restricted use areas,[18] users must obtain a permit from the DNR to withdraw or use groundwater in excess of 100,000 gallons per day in addition to any quantity that was used at the time the restricted area order becomes effective.[19] If granted, such users are deemed to be a "significant water withdrawal facility."[20] In determining whether to grant or refuse such a permit, the DNR will consider: (1) the effect of the withdrawal of additional groundwater from the restricted use area will have on future supplies in the area; (2) what use is to be made of the water; (3) how the withdrawal will affect present users of groundwater in the area; (4) whether the future natural replenishment is likely to become more or less; (5) whether future demands will be more or less; and (6) whether additional withdrawal is in the best interest of the public.[21]

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[15] Ind. Code Ann. § 14-25-1-2(b) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[16] *Wiggins*, 452 N.E.2d at 963.

[17] *Id.* at 964.

[18] "Restricted use areas" are DNR-designated areas where the withdrawal of groundwater "exceeds or threatens to exceed natural replenishment." Ind. Code. Ann. § 14-25-3-4(a) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.). In such areas, users are restricted to withdraw no more than 100,000 gallons per day in addition to the quantity they may have been withdrawing at the time the designation is assigned to the area, unless a permit is secured. Ind. Code Ann. § 14-25-3-6 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[19] Ind. Code. Ann. § 14-25-3-6 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[20] Ind. Code Ann. § 14-25-7-15 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[21] Ind. Code Ann. § 14-25-3-8 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

The Indiana Code defines "beneficial use" as the use of water for "any useful or productive purpose," including various types of uses referenced below as examples.[22] As described by the Court in *Wiggins*, although groundwater can be used "to the fullest extent to further enjoyment of the land," the landowner does not have the right to withdraw water with the malicious intent to harm the neighboring landowner.[23]

2. Sources of Law

The State of Indiana relies on various sources of law to govern its allocation system, including case law, statutes, and regulations. These include Indiana Supreme Court cases (i.e., *Wiggins*, *New Albany*), subsequent interpretations of these high court decisions (*City of Valparaiso*, *Allstate Ins. Co*), and Title 14, Article 25 "Water Rights and Resources" of the Indiana Code. The Indiana Code also codifies the Emergency Groundwater Resources Act, providing various laws that affect certain groundwater users. The DNR's groundwater regulations for groundwater wells are located in Articles 12 & 13 of the Indiana Administrative Code, which specify the various well construction standards referenced below.

Both case law and statutes are the foundation of Indiana's groundwater allocation system. In 1994, the Indiana Supreme Court reasoned that the Surface Mining Control and Reclamation Act establishes an exception to the common law, such that the Indiana Department of Natural Resources has the "authority to regulate" a coal company's use of groundwater.[24] Scholars suggest that conflicts between competing groundwater users and problems associated with courts' application of the strict common law doctrines resulted in the Indiana legislature enacting state legislation directed at alleviating "groundwater emergencies."[25]

[22] Ind. Code Ann. § 14-25-7-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[23] *Wiggins*, 452 N.E.2d at 964.

[24] *Natural Res. Comm'n v. Amax Coal Co*., 638 N.E.2d 418 (Ind. 1994).

[25] 6-IN Waters and Water Rights I, page 6-7, Stephen L. Lucas. The legislation was given statewide application in 1985.

3. Scope of Right

a. Groundwater Ownership

Indiana follows a modified Rule of Capture system (referred to as the 'English Rule' or 'Absolute Dominion') with respect to groundwater; it is the overlying landowner who "owns" the water. However, case law and subsequent statutes and regulations have provided some limitations to this ownership. Some of these limitations include malicious use and the statutory beneficial use requirement. Courts have revisited the ownership of percolating groundwater in the state of Indiana in various contexts, but the Supreme Court of Indiana has made it clear that restrictions on groundwater use does not mean a lack of groundwater ownership.[26] In essence, "the Indiana modification to the English Rule limited the permissible use of ground water, but did not abandon the common law status of ground water as the property of the landowner."[27]

b. Scope of Use

i. Permitted and Preferred Uses

The term "beneficial use" means the use of water resources for "any useful and productive purpose."[28] In particular, types of "beneficial uses" include: "domestic, agricultural (irrigation), industrial, commercial, power generation, energy conversion, public water supply, waste assimilation, navigation, fish and wildlife, and recreational uses."[29] It is notable that the definition of "beneficial use" does not include a catch-all phrase, making it unclear whether or not other types of uses are considered beneficial under this chapter of the Indiana code.

In *Prohosky v. Prudential Ins. Co. of Am.*, the Seventh Circuit relied on *Wiggins* when it reversed a temporary injunction entered by the district court against a farming operation. The 8,000-acre farming operation irrigated its crops with spraying rigs supplied by groundwater wells; however, malfunctions occasionally caused water to be

[26] *Allstate Ins. Co. v. Dana Corp.*, 759 N.E.2d 1049, 1055 (Ind. 2001).

[27] *Id.*

[28] Ind. Code Ann. § 14-25-7-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[29] *Id*.

sprayed on uncultivated areas of the farm. The Seventh Circuit did not consider this contrary to the beneficial use doctrine because "absent proof of injury to an adjacent landowner," the gratuitous use of groundwater is not a violation when it is "minimal and only incidental" to the beneficial use of that water.[30]

Water permits are not required outside of restricted use areas, but the DNR maintains an inventory for water withdrawn by "significant" water users (more than 100,000 gallons) throughout the state.[31] Owner of a "significant water withdrawal facility" must register within three months after the facility is completed, meaning that, presumably, registration is not a requirement to begin water withdrawals if the facility complies with construction standards.[32] However, failure to register constitutes a Class B infraction (and a separate infraction each day that a violation occurs).[33]

The standard for preference is beneficial use.[34] Indiana places a higher preference "on residential domestic use, followed by agriculture and livestock industrial, mining, recreational, and then all other "beneficial uses."[35]

Although the Indiana Code does not have a statutory hierarchy for purposes of use, the state's Emergency Groundwater Rights Act (EGRA) does provide protective relief for "nonsignificant groundwater withdrawal facilities," when the water supplies of those users who withdraw smaller quantities of groundwater are harmed by groundwater withdrawal facilities capable of withdrawing more than 100,000 gallons per day.[36] In this context, presumably, most domestic users cannot withdraw more than 100,000 gallons. Therefore, it seems that protective relief is likely available for most domestic

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[30] *Prohosky v. Prudential Ins. Co. of Am*. 767 F.2d 387, 394 (7th Cir. 1985).

[31] Ind. Code Ann. § 14-25-7-15 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[32] *Id*.

[33]Ind. Code Ann. § 14-25-7-17 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[34] *See* Jesse J. Richardson, Jr., *Water and Economic Development in Indiana: Modernizing the State's Approach to a Critical Resource* (2014) (on file with authors); Indiana Dep't of Natural Resources, Division of Water, *Indiana's Water Shortage Plan* (2015), https://www.in.gov/dnr/water/files/watshplan.pdf (last visited Mar. 27, 2020).

[35] Jesse J. Richardson, Jr., *Water and Economic Development in Indiana: Modernizing the State's Approach to a Critical Resource* (2014) (on file with authors).

[36] Ind. Code Ann. § 14-25-4-17 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

users, but not available for certain significant withdrawal facilities that pertain to industrial, agricultural, or mining users.

ii. Location of Use

Indiana law does not address the location of use once groundwater is withdrawn. If a user wants to withdraw more than 100,000 gallons of water a day in a restricted use area, they must apply for a permit. The DNR may consider the location of use while contemplating the approval of the permit because out of basin use has the potential to impact future replenishment.[37]

c. Loss of Water Rights

There is no evidence that an Indiana landowner can lose their water rights. However, a landowner may be enjoined from pumping groundwater if the withdrawals are maliciously intended to harm neighboring groundwater users. There appears to be a spectrum regarding the extent of pumping that could result in an injunction. In *Irving Materials, Inc.*, while pumping from a gravel pit damaged neighboring landowner wells, these property owners were denied compensation for the damages.[38] Similarly, in *Wiggins*, the Indiana Supreme Court overruled the Court of Appeals, reinstating the trial court decision to find in favor of the surface coal mining operation that drained a nearby lake.[39] Because the damage was not deliberate, the plaintiff was denied recovery.[40] In *Gagnon v. French Lick Hotels*, within the context of business rivals, a business owner operate a substantial pump with the intention of draining the groundwater to the detriment of his business competitor.[41] The trial court enjoined this malicious operation of the groundwater pump. The Indiana Supreme Court affirmed the decision, reasoning that the pumping of groundwater, to the detriment of another user, may be prevented by an injunction.[42] As mentioned before, the 7th Circuit held that wasteful use could result in the granting of relief, but only if that waste harmed neighboring lands.

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[37] Ind. Code Ann. § 14-25-3-8(4) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[38] *Irving Materials, Inc. v. Carmody*, 436 N.E.2d 1163 (Ind. App. 1982).

[39] *Wiggins*, 452 N.E.2d at 963-64.

[40] *Id.*

[41] *Gagnon v. French Lick Hotels*, 163 Ind. at 696, 72 N.E. at 851.

[42] *Id.*

4. Well Drilling

Indiana's Department of Natural Resources regulates groundwater wells. The online application requires a project description indicating the nature of the project, location information, a disturbed area drawing with proposed project limits and incidental construction, project pictures, and applicant and property owner information.[43]

The Department of Natural Resources also regulates the licensing of a water well drillers and well water pump installers.[44] The Indiana Code defines a "water well driller" as "a person who operates well drilling or driving equipment or engages in the drilling or driving of wells."[45] Alternatively, a "water well pump installer" is defined as "a person who installs or repairs water well pumps."[46] A "well" is defined as "a hole drilled or driven to: (1) obtain geologic information on aquifers; (2) monitor the quality or quantity of ground water; (3) obtain ground water; or (4) utilized the geothermal properties of earth formations."[47] A person "may not be a water well driller or water well pump installer without a license" issued by the Department of Natural Resources. Furthermore, the licensee must carry the license and present it "for inspection by a representative of the department upon request."[48] A person may apply for a license to the Natural Resources Commission on a form "prescribed by the commission."[49] The application must be "accompanied by a minimum license fee of one hundred dollars," and, unless the applicant has had the license for less than one year, "a license renewal must be accompanied by . . . a copy of the continuing education verification of attendance forms; and . . . a statement by the applicant attesting that the applicant has

[43] Ind. Dep't of Nat. Res., *General Information* (2018), http://www.in.gov/dnr/water/4961.htm (last visited Mar. 27, 2020).

[44] Ind. Code Ann. § 25-39-1.5-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[45] Ind. Code Ann. § 25-39-2-15 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[46] Ind. Code Ann. § 25-39-2-15.5 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[47] Ind. Code Ann. § 25-39-2-16 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[48] Ind. Code § 25-39-3-1 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[49] Ind. Code § 25-39-3-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

complied with the continuing education requirements."[50] To qualify for a license, an applicant must be at least eighteen years old, provide three references ("two (2) of whom are water well drillers, water well installers, or licensed plumbing contractors familiar with the applicant's work experience and competency"), and "have successfully completed a competency examination prepared and administered by the department."[51] Each licensee must keep records of each well drilled, and those records must include "[t]he location of the well," "[t]he depth and diameter of the well," "[t]he date the contractor completed the well," "[t]he character and thickness of materials or formations drilled," "[t]he static water level and performance data of the well," and "[a]ny other information required by rule."[52]

The Natural Resources Commission is charged with establishing regulations regarding "well siting, construction, and operation standards" that address well placement, well drilling procedures, well drilling operations and pumping equipment, contamination precautions, well casing and water well pump specification and installation, well grouting procedures, well screen design and installation, pitless adapter units, pumping apparatus installation, well disinfection techniques, sealing and plugging abandoned wells, and "[o]ther generally accepted standards relating to the drilling, operation, or abandonment of wells."[53]

The Code defines an "abandoned well" as one "whose original purpose and use have been discontinued for more than five (5) years; or . . . that is in such a state of disrepair that using it to obtain ground water is impractical or a health hazard."[54] Any well "abandoned before January 1, 1988, must be sealed by the use of a well cap, or in accordance with rules adopted by" the Natural Resources Commission.[55] An "owner of

[50] *Id.*

[51] Ind. Code § 25-39-3-3 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[52] Ind. Code § 25-29-4-1 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[53] Ind. Code § 25-39-4-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[54] Ind. Code Ann. § 25-39-2-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[55] Ind. Code Ann. § 25-39-3-6 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

land upon which a well that is abandoned after December 31, 1987, must have the well plugged by a water well driller within one (1) year after it is abandoned."[56]

The Director of the Department of Natural Resources "may suspend or revoke the license of a licensee who has . . . (a)cted as a licensee without a license . . . , (s)ecured a license through error or fraud . . . , [or] [f]ailed to comply with any of the requirements" of the law.[57] Additionally, the Director "may refuse to grant, renew, or restore a license to a person who has . . . (a)cted as a licensee without a license in violation of this article . . . , [s]ecured a license through error or fraud . . . , [or] [f]ailed to comply with any of the requirements" of the law."[58] Ultimately, any "person who recklessly, knowingly, or intentionally acts as a water well driller or a water well installer without a license" violates Indiana law.[59] Additionally, "[a] person who fails to keep the records or file the reports required by [Ind. Code] 25-39-4-1 or who knowingly files any report containing false information" or who fails "to submit records for each water well drilled" violates Indiana law.[60]

5. Hydraulic Connection and Regulation

In *Wiggins,* the defendant, a coal company that was pumping groundwater, was not liable for lowering the level of the plaintiff's lake formed by groundwater because the defendant was making beneficial use of the water on his land and did not act maliciously.[61] The same principle of gratuitous and malicious injury seems to apply to ground/surface water interaction even though Indiana does not expressly regulate interactions between surface waters and groundwaters in their code.

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[56] Ind. Code Ann. § 25-39-4-6 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[57] Ind. Code Ann. § 25-39-4-7 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[58] *Id.*

[59] Ind. Code Ann. § 25-39-5-1 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[60] Ind. Code Ann. § 25-39-5-2 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[61] *Wiggins*, 452 N.E.2d at 958.

6. Aquifer Recharge and Underground Storage

It does not appear that the state regulates, encourages, or facilitates aquifer recharge or underground storage programs.

7. Water Management Plan(s)

In 2014, the Indiana Chamber of Commerce asked the Indiana legislature to create a state water management plan.[62] As a result of the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement, Indiana passed the Indiana Statewide Goals for Water Use and Efficiency.[63] A vital goal of this agreement is to retain the quality of groundwater within the Great Lakes-St. Lawrence River Basin.[64] There are no updates scheduled for the Indiana Statewide Goals for Water Use and Efficiency at this time.

Furthermore, to preemptively consider water shortages, "Indiana has in place a registration and reporting program for Significant Water Withdrawal Facilities (SWWF) that collects information with regard to the location, type of use, and quantity of water use."[65] As a part of this, "the Natural Resources Commission is required to 'take and maintain an inventory of significant uses of water withdrawn from the surface or ground.'"[66] Additionally, "the Director of the Indiana Department of Natural Resources [must] . . . appoint a Water Shortage Task Force . . . charged with developing and implementing an updated water shortage plan and to address other surface water and ground water issues."[67] The Water Shortage Task Force was required to "complete an initial revision of the 1994 Water Shortage Plan before July 1, 2009, which was completed on schedule.[68] However, it does not appear that there are any additional updates scheduled at this time.

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[62] Casey Kuhn, *Why Business Leaders Say Indiana Needs a Water Plan*, Indiana Public Media (2014), https://indianapublicmedia.org/news/study-future-water-shortages-hurt-indiana-business.php (last visited Mar. 27, 2020).

[63] Ind. Dep't of Nat. Res., *Report on Indiana Water Use Efficiency and Conservation* (2019), https://www.in.gov/dnr/water/6364.htm (last visited Mar. 27, 2020).

[64] *Id.*

[65] *Id.*

[66] *Id.*

[67] *Id.*

[68] Ind. Dep't of Nat. Res., *Indiana's Water Shortage Plan* (2019), https://www.in.gov/dnr/water/3124.htm (last visited Mar. 27, 2020).

8. Regulatory Authorities

Indiana Department of Natural Resources (DNR) administers relief under the Emergency Regulation of Groundwater Rights (EGRA) section of Indiana code.[69] The DNR has the authority, when it has reason to believe it is necessary and in the public interest, to designate certain areas within the state of Indiana as restricted use areas.[70] Within these restricted use areas, a person must obtain a permit from DNR to withdraw or use a quantity of groundwater in excess of one hundred thousand (100,000) gallons per day.[71]

The DNR's primary responsibility is to administer the EGRA, utilizing its agency authority to investigate and inspect "significant withdrawal facilities" under specified circumstances. From a monitoring perspective, the DNR, in conjunction with the United States Geological Survey, is obligated to administer a "voluntary monitoring program."[72] Within this program, volunteers may provide monitoring data to the DNR.[73] Indiana's EGRA prescribes a "24-hour Investigation" provision. The legislation maintains that within twenty-four hours after receiving a written complaint from the owner of a "nonsignificant withdrawal facility," alleging that the water well on the property in the owner's possession has either failed to furnish the well's normal supply of water, or failed to furnish potable water, the DNR director shall ensure that an onsite investigation occurs.[74] Interestingly, this authorizes the DNR to monitor both the *quantity and quality of groundwater* withdrawals in the state of Indiana and to alleviate disputes involving both quantity and quality.

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[69] Ind. Code Ann. § 14-25-4 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[70] Ind. Code Ann. § 14-25-3-4(a) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[71] Ind. Code Ann. § 14-25-3-4(a) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.); Ind. Code Ann. § 14-25-3-6 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[72] Ind. Code Ann. § 14-25-7-12.5(a) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[73] *Id*.

[74] Ind. Code Ann. § 14-25-4-8 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

In addition, the DNR retains additional duties, including to conduct a continuing assessment of water availability, maintain an inventory of significant uses of water withdrawn from the surface or ground, and plan for the development and conservation of the water resource for beneficial uses.[75] Further, the Indiana Code prescribes various powers for the "Commission," including the authority to investigate and inspect water users, establish rules for minimum groundwater levels, and when necessary for administration of the chapter, require metering (or reasonable measurements) of water withdrawals and reporting of these withdrawals from "significant" water users.[76]

The Indiana state agency that is primarily responsible for monitoring water pollution issues is the Indiana Department of Environmental Management (IDEM), although the DNR does retain some authority to regulate water quality issues pertaining to coal mining under the Surface Mining Control and Reclamation Act.[77]
Interestingly, nothing in Indiana's statutory provisions suggests that the DNR occupies the field for determining "restricted use areas" or for obtaining a permit. Local authorities are free to make their own regulations regarding restricted use areas and minimum permitting thresholds.[78]

9. Special Districts

The Department of Natural Resources "may by rule or order, when the department has reason to believe it is necessary and in the public interest, designate certain areas of Indiana where the withdrawal of ground waters exceeds or threatens to exceed natural replenishment as restricted use areas."[79] It does not appear that the DNR has designated any restricted use areas.

If a groundwater user withdraws groundwater "in amounts exceeding one hundred thousand (100,000) gallons per day" prior to an area being designated as restricted use,

[75] Ind. Code Ann. § 14-25-7-11 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[76] Ind. Code Ann. § 14-25-7-12 (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.). The DNR ("Commission") must establish the minimum levels of groundwater, based on the level of groundwater in aquifers below which further withdrawals would be significantly harmful to the water resource of the area.

[77] 30 U.S.C.A. § 1201 et seq 30 (West, Westlaw through P.L. 116-91).

[78] *Town of Avon v. W. Cent. Conservancy Dist*., 957 N.E.2d 598, 608 (Ind. 2011).

[79] Ind. Code Ann. § 14-25-3-4(a) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

that user must "file with the department a certified statement of the average daily amount of ground water used before the designation of the area as a restricted use area."[80] The correct and timely filing of this certificate will exempt an existing user from having to obtain a permit from the DNR.[81]

10. Transboundary Arrangements

The Indiana legislature approved the Transboundary Water Resources Authority in July of 2017.[82] It establishes a transboundary water resources authority to study the ownership rights of groundwater resources for Indiana and Kentucky and make recommendations on the content of an Indiana-Kentucky compact. The authority is required to report annually until 2022.[83] Ultimately, this bill put in place a "mechanism for discussions" for Indiana and its neighboring states regarding how those states will preserve water resources and "not enter into a water war."[84] However, this is only a call for an authority to study water resources and allocation, not a binding agreement with any state.

Indiana is also a party to the Great Lakes Compact. The Great Lakes Compact is a binding agreement among the eight Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin), which "bans new or increased diversions" within the Great Lakes water system "with limited and strictly regulated exceptions."[85] This limit on new or increased diversions applies to

[80] Ind. Code Ann. § 14-25-3-11(a) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[81] Ind. Code Ann. § 14-25-3-11(b) (West, Westlaw through all legis. enacted by the 2019 First Reg. Sess. of the 121st General Assemb.).

[82]WaterWired, *Indiana Watches Its Groundwater . . . and Kentucky's Too: Hoosiers Create Transborder Water Resources Authority* (2018), http://aquadoc.typepad.com/waterwired/2017/07/indiana-wants-to-watch-its-groundwaterand-kentuckys-too.html (last visited Mar. 27, 2020).

[83] H.B. 1211, 2017 Leg. Sess. (Ill. 2017), https://iga.in.gov/legislative/2017/bills/house/1211#digest-heading (last visited Mar. 27, 2020).

[84] WaterWired, *Indiana Watches Its Groundwater . . . and Kentucky's Too: Hoosiers Create Transborder Water Resources Authority* (2018), http://aquadoc.typepad.com/waterwired/2017/07/indiana-wants-to-watch-its-groundwaterand-kentuckys-too.html (last visited Mar. 27, 2020).

[85] Paula Lombardi, *Great Lakes Compact—Friend or Foe*, Siskinds (2018), https://www.siskinds.com/envirolaw/great-lakes-compact-friend-foe/ (last visited Mar. 27, 2020).

groundwater as well.[86] Comparable domestic legislation is binding on the Canadian provinces of Ontario and Quebec.[87] The Great Lakes Commission issues annual reports regarding its revenues and expenses[88] and has adopted a Strategic Plan that "articulate[s] the *outcomes* it seeks to advance over the five-year timeframe of its strategic plan."[89] The most recent strategic plan for the Great Lakes Commission applies to 2017-2022.[90]

11. Native American Rights

It does not appear that Indiana has any Indian reservations or agreements with Native Americans regarding groundwater.

[86] See definitions for "Waters of the Basin or Basin Waters" and "Withdrawal" in Article 1.2, as well as Articles 1.4.2, 3.4.3, 4.1.6, 4.2.14.5.1, 4.9.1, 4.9.3, 4.9.4, 4.12.5, and 4.12.6 in Great Lakes—St. Lawrence River Basin Water Resources Compact, https://www.gsgp.org/projects/water-management/great-lakes-agreement-and-compact/ (last visited Mar. 27, 2020).

[87] Paula Lombardi, *Great Lakes Compact—Friend or Foe*, Siskinds (2018), https://www.siskinds.com/envirolaw/great-lakes-compact-friend-foe/ (last visited Mar. 27, 2020).

[88] Great Lakes Comm'n, *Annual Reports*, https://www.glc.org/about/annual-report/ (last visited Mar. 27, 2020).

[89] Great Lakes Comm'n, *Strategic Plan for the Great Lakes Commission* (2017), http://www.glc.org/wp-content/uploads/2013/07/GLC-strategic-plan_Final_Adopted-Jan-13-2017.pdf (last visited Mar. 27, 2020).

[90] *Id.*

G. Louisiana

Louisiana applies the Rule of Capture to groundwater ownership, treating it as a "liquid mineral" under the law. Use for a beneficial purpose and registration with the State Commissioner is required for Louisiana groundwater users. While no procedure exists for wholesale loss of groundwater rights in the state, the State Commissioner may place restrictions on particular uses.

1. Definitions, Basis of Rights, Standards, and Interactions

Groundwater in Louisiana is "water suitable for any beneficial use percolating below the earth's surface which contains fewer than 10,000 mg/l total dissolved solids, including water suitable for domestic use or supply for a domestic water system."[1] In Louisiana, an aquifer is "a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring."[2]

[1] La. Rev. Stat. Ann. § 38:3097.2(6) (LexisNexis, Lexis Advance through Act 234 of 2019 Legislation with the exception of Acts 184, 207, and 226).

[2] La. Admin. Code tit.43 § XVII.201 (LexisNexis, Lexis Advance through changes received as of June 30, 2019).

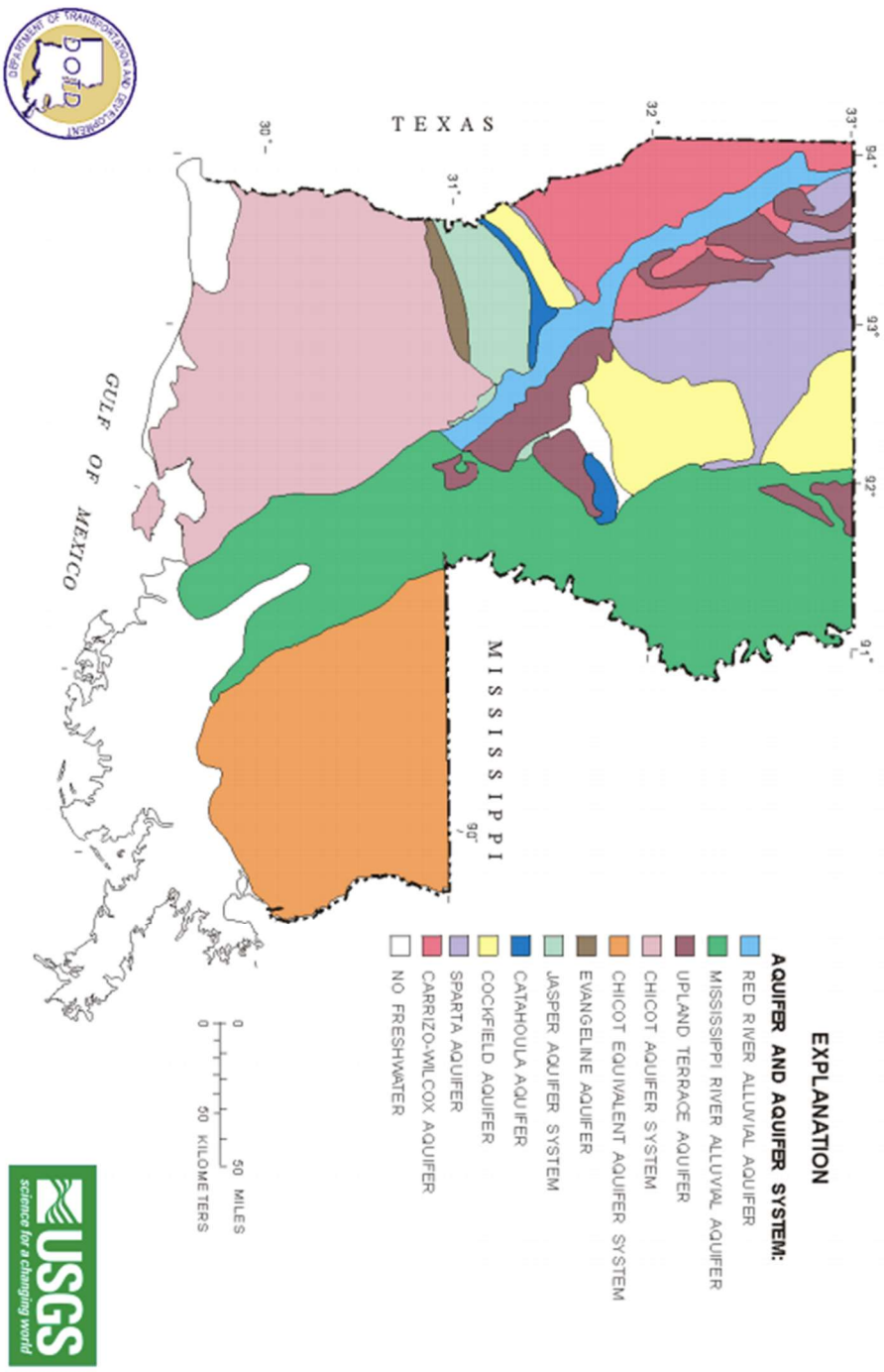

Fig. G.1. Aquifer systems of Louisiana[3]

[3] Louisiana Department of Natural Resources, *Surface extent of Louisiana's aquifers and aquifer systems*, http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/LA.Aquifer.Map.pdf (last visited

In 1963, Louisiana's appeals court applied the Rule of Capture to groundwater ownership.[4] In that case, the plaintiff alleged that the defendant's withdrawals from a shared sand formation depleted the freshwater available to the plaintiff for domestic use, decreasing the plaintiff's property value.[5] The defendant was an oil operator using the freshwater to inject into an oil formation, but the plaintiff alleged saltwater was alternatively available for that purpose.[6] The court reasoned that without specific comparative authorities on groundwater in existing state case law, groundwater could be compared to oil and gas, and therefore found "(w)ater is a liquid mineral."[7] For purposes of consistency, the court decided to apply the English Common Law Doctrine of Rule of Capture to groundwater, and not the American rule of Reasonable Use, reasoning that the body of the state's existing jurisprudence addressing oil and gas already relies on the Rule of Capture.[8] The Rule of Capture permits the use of water to any extent and for any use the owner of the surface desires, subject only to restrictions against avoidable injuries to a neighbor.[9] The court also opined that the long-term regulation and control of the water supply is a matter for the legislature to address.[10]

Today, the standard for injury to another's groundwater use is governed by the Minerals Code, which states that "[a] person with rights in a common reservoir or deposit of minerals may not make works, operate, or otherwise use his right so as to deprive another intentionally or negligently of the liberty of enjoying his rights, or that may intentionally or negligently cause damage to him."[11]

The Louisiana Civil Code provides that,

> "[u]nless otherwise provided by law, the ownership of a tract of land carries with it the ownership of everything that is directly above or under it. The owner may

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Mar. 27, 2020).

[4] *Adams v. Grigsby*, 152 So. 2d 619, 621 (La. Ct. App.), *writ refused*, 244 La. 662, 153 So. 2d 880 (1963).

[5] *Id*. at 620.

[6] *Id*.

[7] *Id*. at 623.

[8] *Id*.

[9] *Id*.

[10] *Id*. at 624.

[11] La. Stat. Ann. § 31:10 (West, Westlaw through the 2019 Reg. Sess.).

> make works on, above, or below the land as he pleases, and draw all the advantages that accrue from them, unless he is restrained by law or by rights of others."[12]

Springs and wells are considered parts of groundwater and the surface owner may capture these components under the doctrine of accession.[13] Under the Rule of Capture theory, however, percolating waters are generally not considered owned until reduced to actual possession and control of the claimant with the surface right to withdraw -- that is, the substances are subject to ownership only when withdrawn.[14]

All users of groundwater in the state are required to register with the State Commissioner in which they must detail their intended beneficial use.[15] The Commissioner classifies each user as domestic, municipal, industrial, agricultural, recreational, or therapeutic, and has the discretion to require periodic registration renewal for specific wells.[16] "Beneficial use" is defined as the use of groundwater for domestic, municipal, industrial, agricultural, recreational or therapeutic purposes.[17] When groundwater users within the state register their use with the Commissioner, they must detail a specific beneficial use, but no other statutory or regulatory requirements for beneficial use exist.[18]

2. Sources of Law

Louisiana addresses groundwater governance within the Natural Resources Policy detailed in its constitution, in Administrative Code providing for Groundwater and Water Wells Management, and by statute via the Water Resources Commission, which governs groundwater use, contamination, irrigation districts, and other special districts. The locations of each subject in Louisiana law are listed below.

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[12] La. Civ. Code Ann. Art. 490 (West, Westlaw through the 2019 Reg. Sess.).

[13] James M. Klebba, *Water Rights and Water Policy in Louisiana: Laissez Faire Riparianism, Market Based Approaches, or A New Managerialism?*, 53 La. L. Rev. 1779, 1819 (1993).

[14] *Adams v. Grigsby*, 152 So. 2d 619, 621 (La. Ct. App.), *writ refused*, 244 La. 662, 153 So. 2d 880 (1963); *see also* La. Atty. Gen. Op. No. 83-522 (1983).

[15] La. Rev. Stat. 38:3094 (West, Westlaw through the 2019 Reg. Sess.).

[16] *Id*.

[17] La. Rev. Stat. 38:3092 (West, Westlaw through the 2019 Reg. Sess.).

[18] La. Rev. Stat. 38:3094 (West, Westlaw through the 2019 Reg. Sess.).

Natural Resources Policy: La. Const. Art. IX, § 1 (1974).

Statute - Public Contracts, Works and Improvements Code: Utilization of Groundwater Resources: La. Rev. Stat. Ann. 38:3091 et seq.

Regulation - Ground Water Management: La. Admin. Code Tit. 43, Pt. VI, Ch. 1 et seq.

Statute: Water Resources Commission: La. Rev. Stat. Ann. 3097.4

Statutes - Groundwater Contamination: La. Rev. Stat. Ann. 2015.1, La. Rev. Stat. Ann. 915, La. Rev. Stat. Ann. 4.1

Regulations - Water Wells: 56 La. Admin. Code Pt I, 101 et seq., La. Rev. Stat. 38:3098

Irrigation Districts: La. Rev. Stat. Ann. § 38:2101.

Sabine River Authority: La. Rev. Stat. Ann. §§ 38:2321 et seq.

Water Conservation Districts: La. Rev. Stat. Ann. §§ 38:2501 et seq.

Soil and Water Conservation Districts: La. Rev. Stat 3:1204 et seq.

Rule of Capture: *Adams v. Grigsby*, 152 So. 2d 619 (La. Ct. App.), *writ refused*, 244 La. 662, 153 So. 2d 880 (1963).

3. Scope of Right

a. Groundwater Ownership

The Louisiana Constitution states that

> "(t)he natural resources of the state, including air and water, and the healthful, scenic, historic, and esthetic quality of the environment shall be protected, conserved, and replenished insofar as possible and consistent with the health, safety, and welfare of the people. The legislature shall enact laws to implement this policy."[19]

[19] La. Const. Ann. art. 9, § 1 (West, Westlaw Jan. 1, 2020).

The Louisiana groundwater statutory provisions provide that the utilization of groundwater resources is a matter of public interest.[20] The purpose of the "Utilization of Groundwater Resources" chapter is to provide for the efficient administration and gathering data of groundwater in Louisiana.[21] Despite these provisions, which indicate public ownership interests in the use of groundwater resources, the ability to capture groundwater, thereby reducing it to possession and ownership, is appurtenant to surface rights:

> "Unless otherwise provided by law, the ownership of a tract of land carries with it the ownership of everything that is directly above or under it. The owner may make works on, above, or below the land as he pleases, and draw all the advantages that accrue from them, unless he is restrained by law or by rights of others."[22]

b. Scope of Use

i. Permitted and Preferred Uses

Any "beneficial use," such as the use of groundwater for domestic, municipal, industrial, agricultural, recreational or therapeutic purposes, is allowable under the Louisiana Groundwater Code, but this list is non-exclusive.[23]

The Louisiana groundwater statutory provisions do not define a hierarchy of preferred groundwater uses. One section of Louisiana civil code addressing the use of *surface water* states a preference for agricultural or aquacultural users of water since that type of movement "ultimately provides value to the resource in several ways as these uses provide for additional pathways for integration of the water into the hydrological cycle. Some of these value-adding processes include recharging aquifers by percolation into the groundwater (…)"[24] The code specifies that the state legislature finds "there is no

[20] La. Rev. Stat. Ann. 38:3091 (West, Westlaw through the 2019 Reg. Sess.).

[21] *Id*.

[22] La. Civ. Code Ann. art. 490 (West, Westlaw through the 2019 Reg. Sess.).

[23] La. Rev. Stat. 38:3092 (West, Westlaw through the 2019 Reg. Sess.).

[24] La. Rev. Stat. 9:1104 (West, Westlaw through the 2019 Reg. Sess.).

prohibited donation by agricultural and aquacultural uses of these sorts."[25] However, no section of state code addresses value-adding uses of groundwater estates.

The legislative history of the groundwater management program indicates the long-term groundwater management goals of sustainability, preservation, consideration of the economic impact on the state's citizens and its role in interstate commerce, and efficient administration in use and management of groundwater resources.[26] While the state permits groundwater use for any "beneficial use," the above principles also inform the Commissioner's regulation and classification of groundwater uses.[27]

ii. Location of Use

Louisiana's Rule of Capture permits the use of water to any extent and for any use a party legally accessing the surface estate desires, subject only to restrictions against avoidable injuries to a neighbor.[28] However, this right is not necessarily appurtenant to ownership of the surface tract. The Rule of Capture provides that percolating waters are unowned until reduced to the actual possession and control of the claimant with the surface right to withdraw.[29] However, to gain a surface right to withdraw groundwater, actual ownership or legal access to mineral rights, such as through a lease, is required.[30]

Louisiana statutes do not address statewide standards for the transport of groundwater within or outside groundwater basins. However, one section of state criminal code provides that no person, firm, or entity shall transport underground or surface water from St. Tammany Parish to anybody located outside of that parish, except for persons or entities engaged in the sale of bottled water from wells within the parish.[31] The two-state groundwater conservation districts in the state must report any sale of groundwater to an out of state user in their semiannual report to the Commissioner.[32]

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[25] *Id*.

[26] La. Rev. Stat. 38:3097(A) (West, Westlaw through the 2019 Reg. Sess.).

[27] La. Rev. Stat. 38:3092 (West, Westlaw through the 2019 Reg. Sess.).

[28] *Adams v. Grigsby*, 152 So. 2d 619, 623 (La. Ct. App.), *writ refused*, 244 La. 662, 153 So. 2d 880 (1963).

[29] *Adams v. Grigsby*, 152 So. 2d 619, 621 (La. Ct. App.), *writ refused*, 244 La. 662, 153 So. 2d 880 (1963); *see also* La. Atty. Gen. Op. No. 83-522 (1983).

[30] La. Civ. Code Ann. Art. 490 (West, Westlaw through the 2019 Reg. Sess.).

[31] La. Rev. Stat. 14:224 (West, Westlaw through the 2019 Reg. Sess.).

[32] Department of Natural Resources Office of Conservation, *Groundwater Conservation District*

c. Loss of Water Rights

No Louisiana cases discuss the loss of groundwater ownership rights. However, Louisiana law permits *use restrictions* on groundwater ownership. According to the Louisiana Ground Water Management Administrative Code, groundwater users who wish to drill certain wells (domestic, drilling, drought relief, or replacement wells) must submit notifications to the groundwater Commissioner, who may exempt those notification requirements for "just cause."[33] The Commissioner may also place restrictions on the use of the well, such as fixing production quantities, designating spacing of wells, and metering the wells.[34] Under the Louisiana State Code, the Commissioner requires registration of wells producing over 50,000 gallons per day and may require registration of smaller wells, in the commissioner's discretion.[35] That statutory provision allows the Commissioner to require particular well owners or lessees to install control devices on free-flowing water wells producing an excess of 5,000 gallons per day, to control runoff from wells, and to allow entry of state officials for data collection and inspection purposes.[36] The Commissioner may also impose withdrawal restrictions in areas of groundwater concern.[37] Anyone found to have falsified documents in order to avoid these regulations is subject to be fined "not more than five thousand dollars, or imprisoned not more than six months, or both".[38] In addition, water users may be fined for violation of Chapters 13-A, 13-A-1, and 13-B under the Louisiana Code.[39] The Commissioner may issue an order to compel compliance with regulations, but no section of Louisiana civil, state, or administrative code discusses the wholesale loss of groundwater rights.

Reporting Checklists, http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/Act425/potpurri425.pdf (last visited Mar. 27, 2020).

[33] La. Admin. Code tit.43 § VI.701 (Lexis Advance through changes received as of June 30, 2019)

[34] *Id*. at § VI.705.

[35] La. Rev. Stat. 38:3094 (West, Westlaw through the 2019 Reg. Sess.).

[36] *Id*.

[37] La. Rev. Stat. 38:3097.6(B) (West, Westlaw through the 2019 Reg. Sess.).

[38] La. Rev. Stat. Ann. § 38:3095 (LexisNexis, Lexis Advance through Act 237 of 2019 Legislation with the exception of Acts 207 and 226).

[39] La. Rev. Stat. Ann. § 38:3097.3(F) (LexisNexis, Lexis Advance through Act 237 of 2019 Legislation with the exception of Acts 207 and 226).

4. Well Drilling

Wells producing more than 50,000 gallons per day must register wells.[40] The Commissioner may require registration of smaller wells at his or her discretion.[41] The well permit application must provide the drilling date, the name of the driller, the current ownership, and any other information the commissioner may reasonably require.[42] The Commissioner may also make reasonable rules and regulations "to require that all users of groundwater within the state register with the commissioner showing the number, location, and capacity of wells owned or operated by them or solely for their benefit and designating the beneficial use or uses of groundwater by them."[43] "The commissioner shall then classify each user as a domestic, municipal, industrial, agricultural, or recreational or therapeutic user of ground water" upon the basis of registration information.[44]

Well drilling, in general. requires a license, which must be renewed yearly.[45] Every person, firm or corporation engaged or desiring to engage in the business of drilling water wells must file an application with the office for a drilling license after filling out the necessary paperwork and paying a fee of either $50 or $100, depending on the number of wells drilled yearly.[46] Licenses expire on June 30th of each year and are renewable annually upon completion of six hours of continuing education and payment of the required renewal fee of another $50 or $100.[47] If the licensee is too far delinquent in their payments or had their license revoked, they may be considered as a new applicant instead of a renewing applicant.[48] The State of Louisiana Department of Natural Resources is responsible for well-drilling oversight.

[40] La. Rev. Stat. 38:3094(A)(1) (West, Westlaw through the 2019 Reg. Sess.).

[41] *Id*.

[42] La. Rev. Stat. 38:3094 (West, Westlaw through the 2019 Reg. Sess.).

[43] *Id.* at 38:3094(A)(2).

[44] *Id*. at 38:3094(2).

[45] La. Rev. Stat. 38:3098(A)-(B) (West, Westlaw through the 2019 Reg. Sess.).

[46] La. Rev. Stat. 38:3094(A)(1)-(2) (West, Westlaw through the 2019 Reg. Sess.).

[47] *Id*. at 38:3094(A)-(B).

[48] *Id.* at 38:3094(E)-(F).

5. Hydraulic Connection and Regulation

No section of state code or administrative regulations discuss interactions between ground and surface water. No state case law discusses hydraulically linked surface and ground waters.

6. Aquifer Recharge and Underground Storage

The state of Louisiana does not regulate, encourage, or facilitate aquifer recharge or underground storage programs.

7. Water Management Plan(s)

In 2012, Louisiana created a Water Management Advisory Task Force to assist the Commissioner of Conservation and the Water Resource Commission in the development and implementation of a comprehensive water management program.[49] The Task Force meets once a year and reports its progress to the Commissioner and the Commission.[50]

It does not appear that Louisiana has been successful in the development of a statewide water management plan. In 2011 the Louisiana Department of Natural Resources published a technical report containing recommendations for a statewide groundwater Management Plan.[51] The Water Resource Commission issued an interim report to the Louisiana Legislature in 2012 outlining ten key improvements that need to be made towards efficiently managing Louisiana's groundwater Resources.[52] The Water

[49] La. Rev. Stat. Ann. § 38:3097.7(B)-(C) (LexisNexis, Lexis Advance through Act 237 of 2019 Legislation with the exception of Acts 207 and 226).

[50] La. Rev. Stat. Ann. § 38:3097.7(D)(2) (LexisNexis, Lexis Advance through Act 237 of 2019 Legislation with the exception of Acts 207 and 226).

[51] Office of Conservation Louisiana Department of Natural Resources, *Recommendations for a Statewide Groundwater Management Plan* (Dec. 7, 2011), http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/20111206_GWPLAN_FINALTECHAPP.pdf (last visited Mar. 27, 2020).

[52] Louisiana Ground Water Resources Commission, *Managing Louisiana's Groundwater Resources* (Mar. 15, 2012), http://www.dnr.louisiana.gov/assets/docs/conservation/groundwater/12.Final.GW.Report.pdf (last visited Mar. 27, 2020).

Resource Commission has since issued updates in 2013 and 2014 on their progress towards addressing each of their ten recommendations.[53]

Given the gap between the 2014 update and 2020, it does not appear that any mandated amount of time exists between updates. There is also no indication that progress is being made on the state water plan by the Water Management Advisory Task Force.

8. Regulatory Authorities

Office of Conservation within Louisiana Department of Natural Resources: Through enabling laws and regulations, the Office of Conservation is responsible for the protection, conservation, preservation, and sustainability of Louisiana's aquifer systems, including management of groundwater withdrawals and monitoring and designation of Areas of Ground Water Concern.[54]

Commissioner of Conservation: The state legislature gave some management and regulatory authority to the Commissioner of Conservation -- to evaluate notifications to drill, require water well registration, and establish Areas and Critical Areas of Ground Water Concern. The authorities granted exclusively to the Commissioner within Act 446 of 2001 and Act 49 of 2003, combined with restrictions within Louisiana Revised Statute 36:806 (which prevents the LDNR Secretary, Deputy Secretary, and Undersecretary from exercising, reviewing, administering, or implementing the quasi-judicial, licensing, permitting, regulatory, rulemaking, or enforcement powers or decisions of the Commissioner) clearly establish the Commissioner as the state's chief groundwater sustainability manager. The Commissioner may determine areas of groundwater concern, designate critical areas of groundwater concern, and declare a Ground Water Emergency.[55] You can visit their website at: http://www.dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=46

Soil and Water Conservation Commission: Created by the state legislature in 1938, soil and water conservation commission provide general regulatory oversight of

[53] Louisiana Water Resources Commission, *Management Recommendations Status Update* (Jan. 2014), http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/NEWS_RELEASE/WRC_ManagementRecommendations_StatusUpdate_Jan2014.pdf (last visited Mar. 27, 2020).

[54] La. Rev. Stat. 38:3097.3; 30:962(1) (West, Westlaw through the 2019 Reg. Sess.).

[55] La. Rev. Stat. 38:3097.5 (West, Westlaw through the 2019 Reg. Sess.).

conservation district programs.[56] You can visit their website at: http://www.ldaf.state.la.us/conservation/state-soil-and-water-conservation-commission/

Ground Water Resources Commission/Program: Act 446 of the Louisiana Legislature established the Ground Water Resources Commission (LGWRC) in 2001. The GWRC manages the state's groundwater resources by issuing regulations and policies under statutory authority to address aquifer sustainability and groundwater withdrawal and conservation issues.[57] The link to their website is: http://www.dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=455

Water Management Advisory Task Force: Established by Act 446 of the Louisiana Legislature in 2001, the Task Force addresses groundwater issues and aids the Commissioner of conservation and the water resource commission to develop water resource management programs.[58] The Task Force's plans "should stress conservation as the primary mechanism for the protection of the state's ground water resources."[59] You can visit their website at: https://www.legis.la.gov/legis/BoardMembers.aspx?boardId=739

9. Special Districts

In Louisiana, areas may be designated as water conservation districts.[60] Areas of groundwater concern may also be created in geographic locations of high priority.[61]

The Louisiana state code provides a procedure through which geographic areas within the state may apply to become water conservation districts.[62] Thirty-four of those

[56] La. Rev. Stat. 3:1204 (West, Westlaw through the 2019 Reg. Sess.).

[57] Ground Water Resources Program, *Office of Conservation*, http://www.dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=455 (last visited Mar. 27, 2020).

[58] La. Rev. Stat. 38:3097.7 (West, Westlaw through the 2019 Reg. Sess.).

[59] *Id*. at 38:3097.7(1)(B).

[60] *Id*.

[61] La. Rev. Stat 38:3097.2; 38:3097.6 (West, Westlaw through the 2019 Reg. Sess.).

[62] La. Rev. Stat. 3:1204 (West, Westlaw through the 2019 Reg. Sess.).

districts exist in the Louisiana Water Conservation Code.[63] Currently, only two of the thirty-four are focused specifically on groundwater conservation (Capital Area and Sparta).[64]

Act 425 in the 2017 Regular Section amended and reenacted a portion of title 13 of the Louisiana Code. Act 425 grants the Commissioner of Conservation the power to require individual groundwater conservation districts to submit semiannual reports. If the reports are not satisfactory, then monthly reports may be required until the Commissioner is satisfied with the information provided.[65] Each report must include the amount of water used by each sector, current and future saltwater intrusion levels, and current and future sale of water outside of the state, including the price paid.[66]

Areas of groundwater concern are areas in which, under current use and environmental conditions, aquifer sustainability is not being maintained due to "a salt-water front, water level decline, or subsidence, resulting in unacceptable environmental, economic, social, or health impact, or causing serious adverse impact to an aquifer."[67] Those areas may be designated critical areas of groundwater concern where a Commissioner finds sustainability cannot be maintained without imposing withdrawal restrictions.[68] The Commissioner may impose withdrawal restrictions in areas of groundwater concern where considering the following: groundwater needed for human consumptive use and public safety, uses other than human consumption and public safety, historical use, ability (including economic) of a user to utilize alternative water sources, and the user's conservation efforts and reductions in water use.[69] Users may file applications with the Commissioner to designate areas of groundwater concern, but the state provides no complete list of designated areas.

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[63] La. Rev. Stat. 38:2501 et seq. (West, Westlaw through the 2019 Reg. Sess.).

[64] Department of Natural Resources Office of Conservation, *Groundwater Conservation District Reporting Checklists*, http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/Act425/potpurri425.pdf (last visited Mar. 27, 2020).

[65] La. Rev. Stat 38:3097.2(G) (West, Westlaw through the 2019 Reg. Sess.).

[66] Department of Natural Resources Office of Conservation, *Groundwater Conservation District Reporting Checklists*, http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/Act425/potpurri425.pdf (last visited Mar. 27, 2020).

[67] La. Rev. Stat 38:3097.2 (West, Westlaw through the 2019 Reg. Sess.).

[68] *Id.*

[69] La. Rev. Stat. 38:3097.6(B) (West, Westlaw through the 2019 Reg. Sess.).

10. Transboundary Arrangements

It does not appear that Louisiana is party to any transboundary arrangements or conflicts.

11. Native American Rights

It does not appear that Louisiana grants exemptions, benefits, or concessions to Native American Tribes.

H. Missouri

The state of Missouri adopted the rule of reasonable use to govern the allocation of groundwater in *Higday v. Nickolaus*.[1] The *Higday* opinion also expressly abandoned the absolute dominion rule as it pertained to groundwater in Missouri, explaining that the rule of reasonable use "recognizes that the nature of the property right is usufructuary rather than absolute as under the English rule."[2] However, legal scholars also consider the Missouri groundwater allocation system to represent a "comparative reasonable use doctrine."[3] See section (3)(b)(ii) below for a discussion on why scholars believe that Missouri does not follow the "American Rule" for reasonable use—even though the Missouri Court of Appeals applied the Rule in *Citizens for Groundwater Prot. v. Porter*.[4]

1. Definitions, Basis of Rights, Standards, and Interactions

Missouri defines ground water as: "Percolating groundwaters include all waters which pass through the ground beneath the surface of the earth without a definite channel and not shown to be supplied by a definite flowing stream. They are waters which ooze, seep, filter, and otherwise circulate through the interstices of the subsurface strata without definable channel."[5]

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[1] *Higday v. Nickolaus*, 469 S.W.2d 859, 866 (Mo. App. 1971); *See also* 6-MO Waters and Water Rights I, Peter N. Davis, Missouri, page 3-4 of 15 (explaining that Missouri also follows the rule of reasonable use previously adopted for surface watercourses under the riparian doctrine). *Higday* rejected earlier Missouri case law, from almost three-quarters of a century prior to the *Higday* decision, which suggested that the state may apply the "absolute ownership rule" to groundwater. *See generally Springfield Waterworks Co. v. Jenkins*, 62 Mo.App. 74 (1895).

[2] *Higday v. Nickolaus*, 469 S.W.2d 859, 866 (Mo. App. 1971).

[3] Joseph W. Dellapenna, *A Primer on Groundwater Law*, 49 Idaho L. Rev. 265, 290-92 (2013). (Today, the reasonable use rule is embedded in the Restatement (Second) of Torts, § (1979). Dellapenna considers Missouri to be one of about ten states that apply the reasonable use rule today). *See also* Richard Gaffney, et.al., *A Summary of Missouri Water Laws*, Water Resources Report No. 51, Missouri State Water Plan Series Vol. VII (2000).

[4] *Citizens for Groundwater Prot. v. Porter*, 275 S.W.3d 329 (Mo. App. 2008).

[5] Higday, 469 S.W.2d at 865.

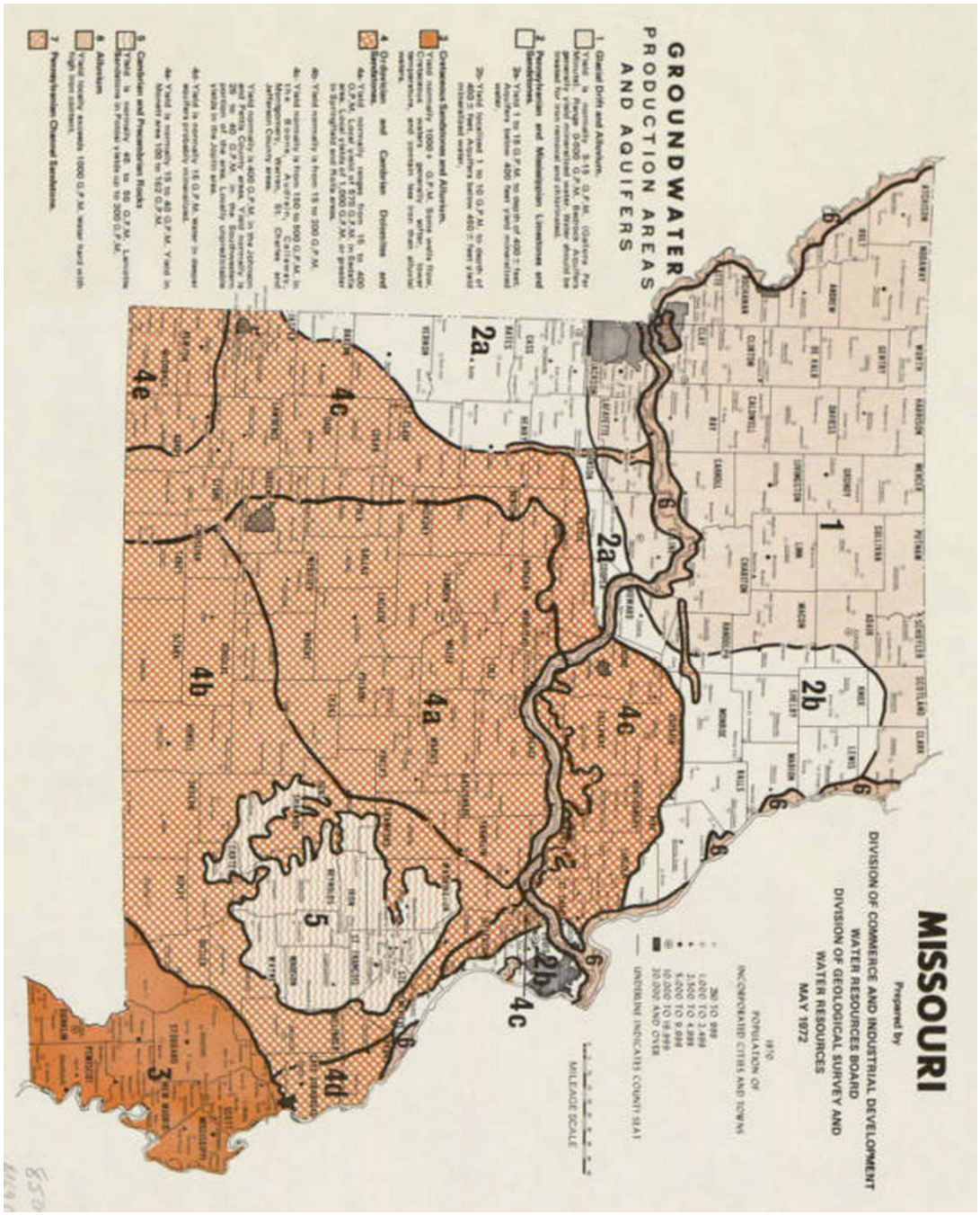

Fig. H.1. Groundwater Resources of Missouri[6]

[6] Missouri Division of Commerce and Industrial Development, et.al., Groundwater Production Areas and Aquifers (1972), *available at* The State Historical Society of Missouri, [Map of] Missouri Groundwater, https://digital.shsmo.org/digital/collection/Maps/id/67/ (last visited Mar. 27, 2020).

Overlying landowners are entitled to withdraw groundwater. Within the application of the reasonable use rule, "a landowner may use the underlying groundwater"—pursuant to the particular individual's overlying land ownership—"freely for any purpose incidental to his beneficial enjoyment of the land."[7] Overlying land ownership thus maintains the basis for the right, because "water is not severable from the land through or under which it flows."[8] The landowner may convey the usufructuary right to use the groundwater, but not the water itself.[9] Nevertheless, an individual's overlying land ownership "does not carry with it any ownership of vested rights to underlying groundwater not actually diverted and applied to beneficial use."[10]

The standard for the right to use groundwater is reasonable use, such that landowners may use groundwater either on overlying or non-overlying land, so long as the use does not disturb a neighboring landowner of the groundwater necessary for the beneficial enjoyment of the land.[11] Therefore, beneficial use is a factor in the determination of reasonableness, which the Court considers on a case-by-case basis. In *Bollinger*, the Missouri Supreme Court held that " a riparian has 'the right to the flow of the stream in its natural course and in its natural condition in respect of both volume and purity, except as affected by reasonable use by other proprietors ..."'[12]

2. Sources of Law

Missouri Supreme Court case law, notably *Higday v. Nickolaus*, is the overarching chief source of law for groundwater allocation in Missouri. *Higday*, as well as subsequent case law enforcing *Higday*, are the controlling source of law. Missouri is unique for the fact that it has very limited statutory law regarding the water rights of individual members of the public.[13] Less than a decade before the *Hidgay* decision, the Supreme

[7] *City of Blue Springs v. Central Dev. Ass'n*, 831 S.W.2d 655, 658 (Mo.App. W.D. 1992).

[8] *Id.* at 659.

[9] *Id.*

[10] *Id.* at 658 (finding persuasive an analysis regarding the migratory nature of percolating groundwater set forth by the Court in V*illage of Tequesta v. Jupiter Inlet Corp*., 371 So.2d 663 (1979)).

[11] *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. App. 1971), *City of Blue Springs v. Central Dev. Ass'n*, 831 S.W.2d 655 (Mo. App. 1992). *See generally* 6-MO Waters and Water Rights I, Peter N. Davis, Missouri, page 4 of 15.

[12] Peter N. Davis*, 6-MO Waters and Water Rights I*, Missouri, 4 (citing *Bollinger v. Henry*, Mo., 375 S.W.2d 161, 166 (1964)).

[13] *Higday*, 469 S.W.2d at 869 at fn. 15 (citing *Bollinger v. Henry*, Mo., 375 S.W.2d 161, 165 (1964)).

Court of Missouri also applied the rule of reasonable use to determine the surface water rights of riparian owners.[14]

Missouri does not have a statutory permit system as a source of law for wells or diversions. However, large diversions of groundwater and surface water (i.e., averaging over 100,000 gallons per day), must be registered with the Missouri Department of Natural Resources ("MDNR").[15] The user withdrawing major quantities of water must file an official registration document with the MDNR, and include the following information: name and address, location of water source, type of water source, point in the water source from which it is proposed to withdraw, the amount in gallons of water withdrawn, as well as other requirements.[16] If a user diverts more than 100,000 gallons per day of groundwater without registering, this unregistered withdrawal of groundwater may be declared a nuisance, and the director may request that the attorney general file an action in the name of the state for an injunction to stop the withdrawal.[17]

3. Scope of Right

a. Groundwater Ownership

Although an overlying landowner has a usufructuary right to use underlying groundwater for any beneficial purpose, he does not own the water.[18] This is because percolating groundwater is migratory, such that "a landowner does not own it in the absolute sense."[19] Because the landowner does not own the water, presumably this suggests that the state holds the water in trust for public use, although this notion has not been codified by statute or referenced in case law.

This necessarily follows from the physical characteristic of percolating water. It is migratory in nature and is a part of the land only so long as it is in the land. There is a

[14] *Bollinger v. Henry*, 375 S.W.3d 1. c. 166 (Mo. 1964).

[15] Mo. Rev. Stat. Ann. §§ 256.400-.410 (West, West through 2019 1st Reg. & 1st Ex. Sess. 100th Gen. Assemb.).

[16] Mo. Rev. Stat. Ann. § 256.410 (West, West through 2019 1st Reg. & 1st Ex. Sess. 100th Gen. Assemb.).

[17] Mo. Rev. Stat. Ann. § 256.415 (West, West through 2019 1st Reg. & 1st Ex. Sess. 100th Gen. Assemb.).

[18] *City of Blue Springs* at 658.

[19] *Id.*

right of use as it passes through the subsurface, but there is no ownership in the absolute sense. It belongs to the overlying owner in a limited sense, that is, the landowner has the unqualified right to capture and control it in a reasonable way with an immunity from liability to neighbors for doing so. When it is reduced to possession and control, the water ceases to be percolating water and becomes personal property. But if it flows or percolates from the land, the landowner loses all right and interest in the water the instant it passes beyond the boundaries of the property, and when it enters the land of a neighbor it belongs to that neighbor in the same limited way.

A landowner's right to groundwater underlying the land is to the usufruct of the water and not to the water itself. Ownership of the land does not carry with it any ownership of vested rights to subsurface groundwater not actually diverted and applied to beneficial use.[20]

b. Scope of Use

i. Permitted and Preferred Uses

Higday references various groundwater uses that are permissible under the Reasonable Use rule, including agriculture, manufacturing, irrigation, mining, municipal use, "or any purpose by which a landowner might legitimately use and enjoy his land, even though in doing so he may divert or drain the groundwater of his neighbor."[21]

The conflict in *Higday* witnessed a defendant municipality that sought to extract groundwater from its land and transport it for sale on land not overlying the aquifer, and that would deprive the plaintiffs of the beneficial use of the normal water table, leading to the eventual impoverishment of their lands.[22] The Court suggested that if the City were to limit its withdrawals to a quantity that would maintain the water table, then the municipality's plan to sell water away from the premises may be an allowable use under the facts pleaded.[23]

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[20] *Id.* (finding persuasive an analysis regarding the migratory nature of percolating groundwater set forth by the Court in V*illage of Tequesta v. Jupiter Inlet Corp*., 371 So.2d 663 (1979)).

[21] Higday, 469 S.W.2d at 866.

[22] *Id.* at 870.

[23] *Id.*

Although there is no statutorily imposed hierarchy for purposes of groundwater uses in Missouri, case law suggests that the rule of reasonable use allows any type of groundwater use, so long as it is reasonable and used for the beneficial enjoyment of that land. Application of this rule is founded on the determination of what constitutes reasonable use. The standard for preference is best understood against the backdrop of the reasonable use legal standard put forth by the Court in *Higday*.

Comparative reasonable use is ascertained on a case-by-case basis by an examination of many factors, such that the fundamental measure of the "overlying owner's right to use groundwater is whether it is for purposes incident to the beneficial enjoyment of the land from which it was taken."[24] The factors that determine reasonableness include: the persons involved, their relative positions, the nature of their uses, the comparative value of their uses, the climatic conditions[25], and other relevant factors, such as all facts and circumstances pertinent to the issues.[26] Missouri's reasonable use doctrine articulates a priority of uses "by which existing water resources may be allocated most *equitably* and *beneficially* among competing users, private and public."[27] Contrastingly, the American Rule requires on-site use of groundwater and forbids export for off-site uses.[28] Missouri does not follow the American Rule, since "groundwater can be used on-site or off-site, but off-site use is a factor in determining reasonableness. Off-site use is barred only if it deprives a neighbor of groundwater necessary to beneficial enjoyment of his land."[29]

ii. Location of Use

Landowners may use groundwater either on overlying land (on-site) or on non-overlying land (off-site), although off-site use is a factor in the determination of reasonableness.[30] Accordingly, Courts may decide to prohibit off-site use if the use

[24] *Id.*

[25] Climatic conditions appear to include, based on further analysis in *Higday,* "[t]he movement, supply, rate of evaporation and many other physical characteristics of groundwater [that] are now readily determinable." *Higday,* 469 S.W. at 869.

[26] *Higday v. Nickolaus*, 469 S.W.2d at 859; *see generally* 6-MO Waters and Water Rights I, Peter N. Davis, Missouri, page 4 of 15.

[27] *Higday v. Nickolaus*, 469 S.W.2d 859, 869 (Mo. App. 1971).

[28] Peter N. Davis*, 6-MO Waters and Water Rights I*, Missouri, 4.

[29] *Id.*

[30] *Higday*, 469 S.W.2d at 859; *City of Blue Springs*, 831 S.W.2d at 655; *see generally,* Davis, *supra* note 28.

deprives a neighboring landowner of the groundwater necessary for the beneficial enjoyment of the land.[31] The determination of whether groundwater can be used on non-overlying land will likely employ an analysis similar to that in *Higday* discussing the reasonableness of the transport of water by a landowner. Presumably, whether groundwater can be used on non-overlying land (in addition to overlying land), depends on a comparison of the reasonableness of competing uses and a determination of whether an adjoining landowner is deprived of the beneficial enjoyment of the land. For example, if a neighboring landowner's ability to withdraw groundwater is injured by a landowner who uses groundwater on non-overlying land, courts will consider the various *Higday* factors to determine if such a use is unreasonable because it is non-beneficial.[32]

Because the governance of Missouri groundwater is rooted in common law, this leads to an interesting conundrum. In 2008, the Court of Appeals in *Citizens for Groundwater Prot. v. Porter* reasoned that Missouri follows the "American Rule of Reasonable Use," which if correct, would require the on-site use of groundwater and forbid the export of groundwater for use on non-overlying land.[33] In support of the application of the "American Rule of Reasonable Use," Citizens for Groundwater quoted *Higday* to hold that the export of water to an off-site ethanol plant was unlawful.[34] Scholars suggest, however, that the Court in *Citizens for Groundwater* incorrectly applied and misinterpreted the quote in *Higday*—primarily because the *Higday* Court was simply just describing the "American Rule of Reasonable Use."[35] Later in the decision, *Higday* expressly adopted the rule of "Reasonable Use," when that Court adhered to the analogous rule of reasonable use for riparian surface water users in the Bollinger decision.[36] In discussing the discrepancy, Peter Davis states that, "The Citizens court completely overlooked this statement in Higday and, thus, misconstrued Higday's holding and applied the wrong rule to percolating groundwater. Therefore, Citizens should not be cited or followed in future Missouri percolating groundwater cases on this

[31] *Higday*, 469 S.W.2d at 859; *City of Blue Springs*, 831 S.W.2d at 655; *see generally,* Davis, *supra* note 28.

[32] *Higday*, 469 S.W.2d at 866.

[33] *Citizens for Groundwater Prot.*, 275 S.W.3d at 329.

[34] *Id.* at 349-50 (quoting *Higday*, 469 S.W.2d at 866).

[35] Davis, *supra* note 28.

[36] Peter N. Davis, *6-MO Waters and Water Rights I, Missouri*, 5.

issue."[37] As of this writing, legal databases (e.g., Westlaw, LexisNexis) indicate that *Citizens for Groundwater* has not been cited yet with regard to this particular issue, though this is certainly a potential source of future controversy.

Under the reasonable use rule, an overlying land owner, such as a municipality, may not withdraw groundwater and transport it for sale or other use away from the land from which it was taken if the result of this transport impairs and injures the groundwater supply of an adjoining landowner.[38] In light of a thorough comparison of the reasonableness of competing uses, the impairment of other groundwater users suggests that this transport may be unreasonable because it is non-beneficial.[39] Peter Davis explains that, "Diversion for off-site municipal water supply use is lawful in the absence of a present injurious interference with neighboring groundwater uses."[40]

c. Loss of Water Rights

In Missouri, the right to use groundwater is a usufruct right and not an interest in the water, thus, the unused groundwater rights cannot be severed from the land.[41] The common law groundwater rights prescribed by Missouri courts have no fixed duration, although large withdrawers must report their usage annually.[42] Pursuant to the rule of reasonable use, Missouri courts have authority to enjoin a landowner when the withdrawal of groundwater is shown to threaten the ability of adjacent landowners to procure their respective property right to the reasonable use of the groundwater underlying their land.[43] Thus, although an overlying landowner may not expressly lose groundwater rights, that rights holder may be enjoined from exercising those rights without limitations. Injunctive relief, according to *Higday*, requires the application of the principles of equity under all circumstances.[44] "The relative convenience and

[37] Davis, *supra* note 28.

[38] *Higday*, 469 S.W.2d at 866.

[39] *Id.*

[40] Davis, *supra* note 28 (citing *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. App. 1971); *City of Blue Springs v. Central Dev. Ass'n*, 831 S.W.2d 655 (Mo. App. 1992)).

[41] *Id.*

[42] Mo. Rev. Stat. Ann. § 256.410 (West, West through 2019 1st Reg. & 1st Ex. Sess. 100th Gen. Assemb.).

[43] *Higday*, 469 S.W.2d at 866.

[44] *Id.* at 871.

inconvenience and the comparative injuries to the parties and to the public should be considered in granting or refusing an injunction."[45]

Courts have the ability to enjoin the withdrawals of groundwater by major- and non-major water users, if these uses are determined not to disturb a neighboring landowner of the groundwater necessary for the beneficial enjoyment of that landowner's land.

4. Well Drilling

Missouri has well-constructed regulations that are designed to ensure contamination from the surface does not enter the subsurface from an improperly constructed well. The regulations establish minimum specifications. The "Water Well Drillers' Act" issues permits to contractors that meet the minimum statutory requirements of the Act.[46] The MDNR's Geological Survey is responsible for the overskirt of well drilling. Their contact information is listed below.

Missouri Department of Natural Resources
Geological Survey Program
PO Box 250
Rolla, MO 65402-0250
Phone: (573)-368-2100
Email: mowaters@dnr.mo.gov
https://dnr.mo.gov/geology/geosrv/

5. Hydraulic Connection and Regulation

Missouri divides groundwater into two classes: i) Percolating Groundwater – water under the surface, which oozes, seeps, and filters "through the interstices of the subsurface strata," lacking a definable channel; and ii) Underground Streams – water that passes through or under the surface in a definite (or reasonably ascertainable) channel.[47] The party seeking to establish the source as an underground stream has the burden of proof to do so because subterranean waters are presumed to be percolating

[45] *Id.*

[46] Mo. Rev. Stat. Ann. §§ 256.606-613 (West, West through 2019 1st Reg. & 1st Ex. Sess. 100th Gen. Assemb.).

[47] 6-MO Waters and Water Rights I, Peter N. Davis, *Missouri*, page 2 of 15 (citing the definition of the two categories of subterranean waters from *Higday*, 469 S.W.2d at 865).

groundwater.[48] As an example of ground/surface water interaction, the distinction between percolating groundwater and underground streams may not be as important because the same rule of Reasonable Use applies to both classes of water resources.[49]

The Court's reasoning in *Higday*, which focused on the reasonable use of groundwater, relied on *Bollinger v. Henry*, another Missouri Supreme Court case that used reasonableness pursuant to the riparian rights of surface water.[50] In reference to Missouri's surface water governance system set forth in Bollinger, the *Higday* Court explained, "We believe the same rule should apply to subterranean percolated waters … The application of such a uniform legal standard would also give recognition to the established interrelationship between surface and groundwater and would, therefore, bring into one classification all waters over the use of which controversy may arise."[51]

6. Aquifer Recharge and Underground Storage

Missouri Does not regulate, encourage, or facilitate aquifer recharge or underground storage. However, in November 2018 the Missouri DNR held a meeting to discuss the Groundwater Budget focusing on natural recharge, withdrawals, and storage.[52]

7. Water Management Plan(s)

Missouri develops statewide water management plans. The Missouri DNR is directed by Missouri statutory law, Section 640.415, RSMo, to "… develop, maintain and periodically update a state water plan for a long-range, comprehensive statewide program for the use of surface water and groundwater resources of the state, including existing and future need for drinking water supplies, agriculture, industry, recreation, environmental protection and related needs …" As such, the department has begun the

[48] *Higday*, 469 S.W.2d at 869; *City of Blue* Springs, 831 S.W.2d at 655.

[49] *Higday*, 469 S.W.2d at 869 (Mo. App. 1971); 6-MO Waters and Water Rights I, Peter N. Davis, *Missouri*, page 2 of 15.

[50] *Higday*, 469 S.W.2d at 869-70 (Mo. App. 1971) (citing *Bollinger v. Henry*, 375 S.W. 161 (Mo. 1964)).

[51] *Id.*

[52] Workgroup Meeting, Missouri Water Resources Plan, Combined Technical Workgroup Meeting (Dec. 31, 2018, 9:00 AM – 12:00PM), https://dnr.mo.gov/mowaterplan/documents/2018-11-techworkslides.pdf (last visited Mar. 27, 2020).

process of updating the state water plan and anticipates completion of the plan by Fall 2019.[53]

8. Regulatory Authorities

The MDNR's Geological Survey Program operates and maintains a groundwater level observation well network for monitoring Missouri's aquifers. Collection and analysis of groundwater data provides knowledge of available water quantity, aquifer response to water use, groundwater recharge and aquifer characteristics.[54] Information can be found on their website: https://dnr.mo.gov/geology/geosrv/

9. Special Districts

Missouri has employed "Soil and Water Conservation Districts" to provide technical support with the design, implementation, and maintenance of practice.[55] These districts do not directly affect the quantity of groundwater allocations, as their primary duty is to promote conservation among the water-intensive agricultural industry in America's heartland. However, these districts are generally set up by county, so regional governance of groundwater in the future could assign boundaries based on these already established districts.[56]

Certain regions in Missouri restrict conveyances of water, such that no water user can convey water withdrawn from within the Southeast Missouri Regional Water District when this withdrawal and subsequent conveyance to a location outside the district would interfere with the reasonable and customary activities of a major water user registered and located in such district.[57] However, currently there are no programs to regulate, encourage, or facilitate aquifer recharge or underground storage programs.

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[53] *Missouri Water Resource Plan*, Missouri Dep't Nat. Resources, https://dnr.mo.gov/mowaterplan/ (last visited Mar. 27, 2020).

[54] *Groundwater: The Hidden Resource*, Missouri Dep't Nat. Resources, https://dnr.mo.gov/geology/wrc/groundwater.htm (last visited Mar. 27, 2020).

[55] Missouri Dep't of Natural Resources, *Soil and Water Conservation Districts*, http://swcd.mo.gov/ (last visited Mar. 27, 2020).

[56] 10 CSR 70-1.010, "Rules of Department of Natural Resources."

[57] Mo. Rev. Stat. Ann. § 256.433 (West, West through 2019 1st Reg. & 1st Ex. Sess. 100th Gen. Assemb.).

10. Transboundary Arrangements

It does not appear that Missouri is party to any transboundary arrangements or conflicts.

11. Native American Rights

It does not appear that the state grants exemptions, benefits, or concessions to Native American Tribes.

I. Mississippi

Prior to modern statutory changes, Mississippi followed the absolute ownership rule for groundwater.[1] In 1985, the state enacted the Water Resources Act, completely altering Mississippi's water management law.[2] Mississippi now follows what has been described as a "regulated riparian statute system."[3] Similar to other regulated riparian states, Mississippi governs both surface water and groundwater by the same rules.[4]

1. Definitions, Basis of Rights, Standards, and Interactions

Under the 1985 Water Resources Act, Mississippi defines groundwater to be "water occurring beneath the surface of the ground."[5] Under the Administrative Code, it defines "domestic use" as the use of water for ordinary household purposes, the water of noncommercial farm livestock, poultry, and domestic animals, and the irrigation of home gardens and lawns.[6]

[1] *Bd. of Supervisors v. Miss. Lumber Co*., 31 So. 905, 906 (Miss. 1902).

[2] Richard J. McLaughlin, Mississippi, 6 Waters and Water Rights I (LexisNexis 2014).

[3] McLaughlin, *supra* note 2; Joseph W. Dellapenna, The Law of Water Allocation in the Southeastern States at the Opening of the Twenty-First Century, 25 UALR L. Rev. 9, 78 (2002); Joseph W. Dellapenna, A Primer on Groundwater Law, 49 Idaho L. Rev. 265, 302 (2013).

[4] McLaughlin, *supra* note 2; Joseph W. Dellapenna, A Primer on Groundwater Law, 49 Idaho L. Rev. 265, 307 (2013).

[5] Miss. Code Ann. § 51-3-3(n) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[6] Miss. Admin. Code Pt. 7, Ch. 1, R. 1.1(K) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

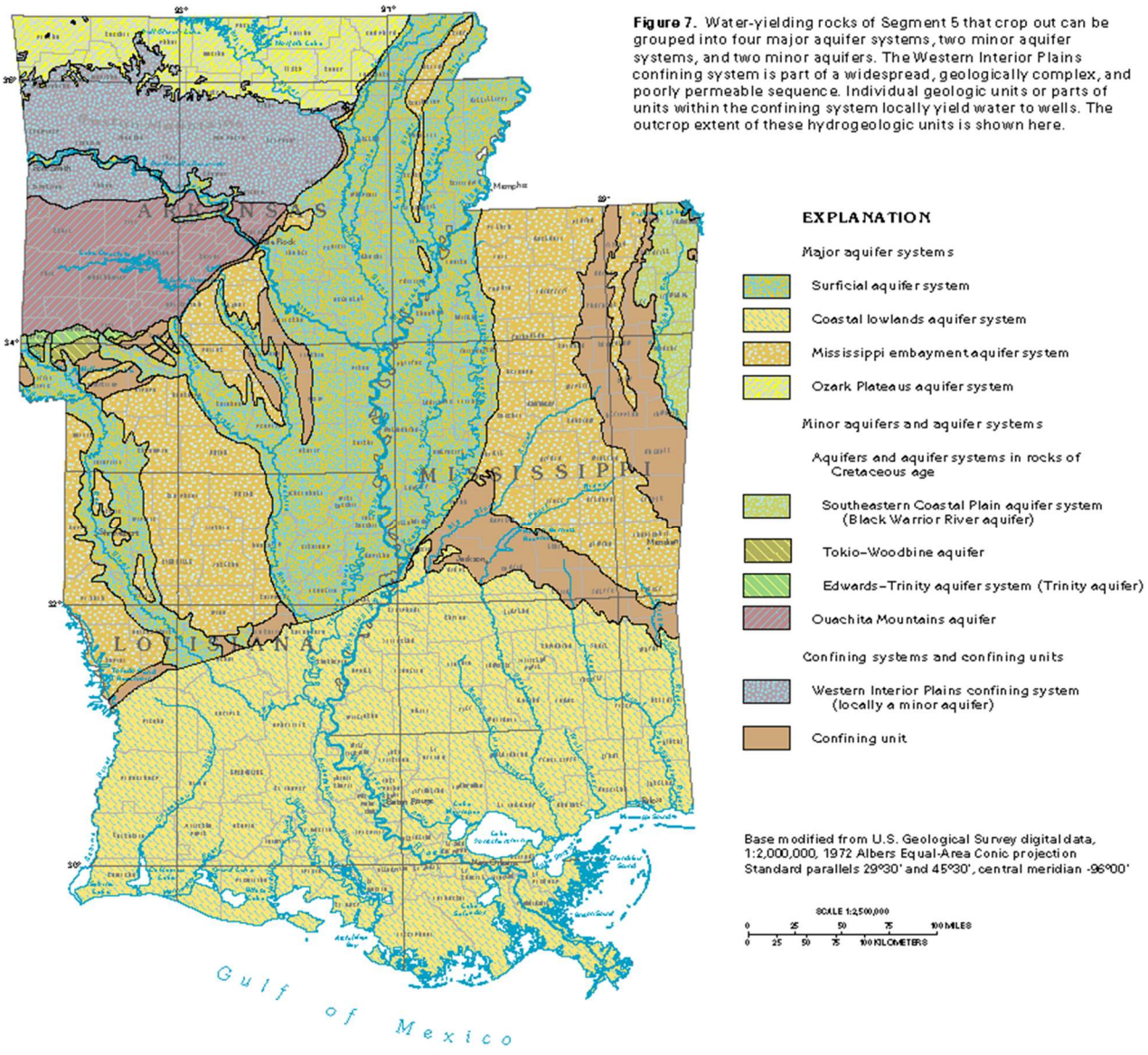

Fig. H.1 Major Aquifer Systems of Mississippi[7]

[7] USGS, *Groundwater Atlas of the United States: Arkansas, Louisiana, Mississippi* (Fig. 7), https://pubs.usgs.gov/ha/ha730/ch_f/F-text1.html (last visited Mar. 27, 2020).

That 1985 Water Resources Act provides that no person shall use water without first obtaining a permit.[8] More specifically, no person in Mississippi may begin drilling a groundwater well until the Environmental Permit Board (Permit Board) issues an appropriate groundwater use permit.[9] The permitting requirement does not apply to authorized emergency situation in Rule 1.2.K or to exempted groundwater withdrawals in Rule 1.4.A.[10] Groundwater withdrawal wells are exempted from the permitting requirements if the well: i) is used for domestic purposes and provides water to only one household; or ii) has a surface casing diameter less than six inches.[11] However, a permit is required for anyone "developing real property for resale" who wants to withdraw well water, regardless of surface casing diameter, if their proposed use is to maintain or enhance an impoundment of surface water for aesthetic purposes.[12]

Although the permit system controls, the Permit Board does consider overlying land ownership. In a recent Mississippi Supreme court case, the Permit Board analyzed five factors, including overlying land ownership, to determine whether groundwater withdrawal permits are reasonable.[13] In Waters and Water Rights Treatise, Professor McLaughlin notes that, "Because the right to use water flows from the ownership of land overlying the water, a permit can be transferred upon a transfer of ownership of the land on which the permitted water is to be used," so long as the new permit is modified to reflect the new owner.[14]

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[8] Miss. Code Ann. § 51-3-5 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[9] Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(C)) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[10] Miss. Admin. Code at Pt. 7, Ch. 1, R. 1.2(K), 1.4(A).) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[11] *Id.* at Pt. 7, Ch. 1, R. 1.4(A)(1)-(2)

[12] Miss. Code Ann. § 51-3-7(1) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[13] *Riverbend Util. v. Env. Quality Permit Bd.*, 130 So.3d 1096, 1105 (Miss. 2014).

[14] McLaughlin, *supra* note 2; Miss. Code Ann. § 51-3-15 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

2. Sources of Law

The 1985 Water Resources Act created a permit system to determine the right to use water.[15] The primary source of law for the water allocation system is the statutes under Title 51, Chapter 3, of the Mississippi Code Annotated. Although there is no list of factors in statute or regulation for the Permit Board to consider when determining whether to approve a groundwater withdrawal permit, the Mississippi Supreme Court recently outlined five factors that the Permit Board contemplates.[16] These include: i) ownership of land, ii) use of water, iii) amount of water, iv) well spacing, and v) drawdown of the aquifer.[17]

3. Scope of Rights

a. Groundwater Ownership

All surface water and groundwater belong to the people of Mississippi and are subject to regulation by the state.[18] Therefore, both surface and groundwater are considered property of the State.[19] When someone applies for a groundwater withdrawal permit, they do not necessarily receive a "water right," but rather a "right to use water."[20]

b. Scope of Use

i. Permitted and Preferred Uses

The Permit Board approves applications for allowable types of uses that "utilize water for beneficial purposes, within reasonable limitations," as long as the proposed use does not unreasonably affect the public interest.[21] The requirement to get a permit applies

[15] McLaughlin, *supra* note 2.

[16] *Riverbend Util.*, 130 So.3d at 1102-03.

[17] *Id.* at 1105.

[18] Miss. Code Ann. § 51-3-1 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[19] McLaughlin, *supra* note 2

[20] Miss. Code Ann. § 51-3-13 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020); McLaughlin, *supra* note 2.

[21] Miss. Code Ann. § 51-3-13 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

statewide to all non-exempted uses. Under the permit system, the Permit Board may deny a groundwater permit if the proposed use is not for a beneficial purpose, adversely interferes with existing permitted uses, or conflicts with public interest.[22]

Additionally, the Permit Board may deny a permit or issue a permit for less than the requested withdrawal rate or volume if the use is not for a beneficial purpose, or such use would adversely interfere with existing permitted uses or would conflict with the public interest.[23] A permit for a beneficial use that results in mining an aquifer may only be issued if the Permit Board finds that such use is essential to the safety of human life and property; or if the landowner provides written assurance the use is temporary, or submits a viable plan for acquiring the required water from another source, or demonstrates financial ability to develop the proposed alternate water supply.[24]

Mississippi outlines a hierarchy for purposes of use in areas where conflicts exist between competing interest or demands for groundwater supplies or where there is a potential for such conflicts in the future. Utmost priority is given to the beneficial use of public supply in permitting decisions, which includes public supply includes municipal supplies, rural water systems, private wells, and institutional uses. [25] Secondary priority is given to the beneficial uses for agricultural use, industrial use, livestock use, and commercial use in equal standing in permitting decisions; and each applicant may be required to explore options involving the conjunctive use of surface water.[26] Use for livestock includes water for commercial cattle, hogs, and other animal operations.[27] Commercial use includes water for hotels, restaurants, water bottling companies, casinos, and other similar uses.[28] Groundwater permit applications for the enhancement of wildlife habitat and other recreational uses, including water to enhance waterfowl management, maintain the lowest priority level and are lower than public supply, agricultural, industrial, livestock, and commercial uses.[29]

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[22] *Id.*

[23] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(E).

[24] *Id.* at Pt. 7, Ch. 1, R. 1.2(E)(1)-(3).

[25] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.4(B)(1); *Riverbend Util. v. Env. Quality Permit Bd.*, 130 So.3d 1096, 1105 (Miss. 2014).

[26] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.4(B)(2)(a)-(d).

[27] *Id.* at Pt. 7, Ch. 1, R. 1.4.B(2)(c).

[28] *Id.* at Pt. 7, Ch. 1, R. 1.4.B(2)(d).

[29] *Id.* at Pt. 7, Ch. 1, R. 1.4.B(3).

As previously mentioned, a permit is required for the right to use water for a beneficial purpose.[30] The Permit board has the duty to approve all applications based on the "utilizations of water for beneficial purposes, within reasonable limitations, provided the proposed use does not prejudicially and unreasonably affect the public interest."[31]

The regulations provide several examples of what does not constitute beneficial use.[32] First, the use of large volumes of groundwater for "once-through, non-contract cooling purposes" is not a beneficial use of groundwater, as the regulation prohibits the use of more than 20,000 gallons per day for this purpose.[33] Mississippi also prohibits the use continuous discharge of groundwater from "uncontrolled free-flowing wells," as this constitutes waste and may be prohibited by the Permit Board, regardless of the size of the well.[34] The Permit Board also maintains the right to deny permits if they determine that other withdrawals are not beneficial uses.[35]

Unless otherwise exempted, permit applications must include: maximum volume of water required, estimated dates for initial use of the water, estimated withdrawal rate, maps of location of well, and a fee of ten dollars.[36] Additionally, any change in withdrawal or change in use of water requires an application for a temporary or permanent change.[37]

Beneficial use appears to be the primary standard for preference of use. However, reasonable use language qualifies the standard. Mississippi state law encourages the conjunctive use of groundwater and surface water "for the reasonable and beneficial use of all water resources of the state."[38] Furthermore, Mississippi groundwater must be put

[30] Miss. Code Ann. § 51-3-13 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020); McLaughlin, *supra* note 2.

[31] Miss. Code Ann. § 51-3-13 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[32] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.4(D).

[33] *Id.* at Pt. 7, Ch. 1, R. 1.4(D)(1).

[34] *Id.* at *Pt.* 7, Ch. 1, R. 1.4(D)(2).

[35] *Id.* at Pt. 7, Ch. 1, R. 1.4(D)(4).

[36] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(D)(1)-(2).

[37] Miss. Code Ann. § 51-3-45 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[38] Miss. Code Ann. § 51-3-1 (West, West through 2019 Reg. Sess. effective upon passage as approved

to beneficial use to the fullest extent, thus prohibiting waste, unreasonable use, or unreasonable method of use.[39]

All permitted water in the state is subject to the principle of beneficial use.[40] The permit system's policy declaration notes that "the water resources of the state [are required] to be put to beneficial use to the fullest extent of which they are capable," as the statute also prohibits waste, unreasonable use, and unreasonable methods of use.[41] It is the duty of the Permit Board to approve all applications which utilize water for beneficial purposes, within reasonable limitations, provided the proposed use does not prejudicially or unreasonably affect the public interest.[42] The statute's definition of beneficial use is vague, defined as, "the application of water to a useful purpose as determined by the [Commission on Environmental Quality (CEQ)], but excluding waste of water."[43] The Permit Board also considers "use of water," in its determination of whether a groundwater withdrawal application is reasonable or not.[44]

ii. Location of use

Aside from considering "ownership of the overlying land," in the Permit Board's decision process, Mississippi does not seem to prohibit the location of groundwater use to overlying land.[45] Because the Permit Board considers withdrawal applications on a case-by-case basis, they may consider location of use in the permit application process, along with the other factors.[46]

Professor McLaughlin notes one exception to the rule that water must be used on overlying land. Water withdraw from an aquifer by a governmental agency or nonprofit

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through Jan. 1, 2020).

[39] *Id.*

[40] *Id.*

[41] *Id.*

[42] Miss. Code Ann. § 51-3-1345 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[43] Miss. Code Ann. § 51-3-3 45 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[44] *Riverbend Util.*, 130 So.3d at 1105.

[45] *Id.*

[46] *Id.*

water association (to supply water for household, industrial, commercial needs) does not have to use water on overlying or adjoining land.[47]

The statutory system does not explicitly prohibit the transport of water for use on non-overlying land; however, the statutes also do not authorize such transport. According to one secondary source, intrabasin transfers in Mississippi are authorized, however this source did not reference a statute or regulation acknowledging this claim.[48]

c. Loss of Water Rights

In Mississippi, water rights may be lost. The Permit Board may not issue a water use permits for longer than ten years.[49] If the permit holder fails to submit an application for reissuance prior to the expiration of the permit, the water right will automatically terminate upon the expiration date.[50] Six months prior to the final date of the ten-year period, the Permit Board shall mail actual written notice to the permit holder.[51]

The Permit Board may revoke the right to use water, though the Board normally gives the permit holder at least sixty days notice prior to taking final action[52]. Several conditions may result in the revocation of a permit, including: i) noncompliance with conditions in the permit; ii) failure by the landowner/permit holder/applicant to disclose all relevant facts during the application and permitting process, and iii) using the water resources of the state in a manner deemed contrary to public interest.[53]

Any person aggrieved by the action of the Permit Board to issue, deny, transfer, modify, or revoke a permit may request an evidentiary hearing before the Permit Board.[54] Procedures for these hearings and further appeals of decisions are set forth in Miss.

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[47] McLaughlin, *supra* note 2.

[48] Margaret Myszekski, Don R. Christy, and James E. Kundell. A Comparison of Groundwater Laws and Regulations from Southeastern States 8 (March 2005, University of Georgia, Athens, Georgia).

[49] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(F)(2).

[50] *Id.* at Pt. 7, Ch. 1, R. 1.2(F)(3)(c).

[51] Miss. Code Ann.§ 51-3-9 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[52] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(H).

[53] *Id.* at Pt. 7, Ch. 1, R. 1.2(H)(1)-(3).

[54] Miss. Code Ann. § 51-3-49 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020); 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(I).

Code. Ann. § 49-17-29. Applicants may also appeal the decision of the Permit Board, which was the issue in the recent Mississippi Supreme Court case.[55]

4. Well Drilling Regulations

Mississippi regulates water well drilling, the installation of pumps or other equipment in water wells, and the drilling of boreholes that may penetrate water bearing strata.[56] Boreholes include freshwater wells, wells for geo-thermal systems, environmental monitoring, geotechnical investigations, and seismic exploration, and other similar activities.[57]A license or license renewal is required for any person, or any company, corporation, or other business entity engaging in the aforementioned wells or boreholes.[58] Licenses cannot be transferred or assigned.[59] Additionally, applications for a license must "be accompanied by a notarized affidavit signed by the applicant certifying that the individual applicant or the company's designee has a minimum of three (3) years qualifying experience in the practice for which the license is being sought."[60] The Mississippi Department of Environmental Quality (MDEQ) maintains the register of licensees and oversees all well operations.[61]

5. Hydraulic Connection and Regulation

Mississippi regulates the interaction between ground and surface water. The ground and surface water resources within the state are to be integrated in their use, storage, allocation, and management.[62] The policy of the Legislature is that conjunctive use of groundwater and surface water shall be encouraged for the reasonable and beneficial use of all water resources of the state.[63] When assessing interference with permitted

[55] *Riverbend Util*., 130 So. 3d at 1101.

[56] 11 Miss. Admin. Code Pt. 7, Ch. 2, R. 2.2(A).

[57] *Id.*

[58] *Id.*

[59] *Id.*

[60] *Id.*

[61] 11 Miss. Admin. Code Pt. 7, Ch. 2, R. 2.2(A); Miss. Code Ann. § 51-3-16 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[62] Miss. Code Ann. § 51-3-1 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[63] *Id.*

water rights, the Permit Board considers "whether the wells will be spaced in a manner to avoid interference with existing wells," in the permit application process.[64]

In areas where conflicts exist between competing interests or demands for surface water and groundwater supplies, or where there is a potential for such conflicts to arise in the future, the beneficial uses identified below will be given priority in the following order: public supply, industrial or commercial supply, and use for the enhancement of wildlife habitat and other recreational uses.[65] Public supply includes municipal supplies, rural water systems, private water systems, private wells, and institutional uses (such as schools, churches, and military bases).[66] Industrial and commercial uses include uses for agriculture and commercial livestock.[67] Beneficial uses of water for industrial and commercial uses have equal standing in permit decisions with all other beneficial uses included in this category.[68] The use of water for the enhancement of wildlife habitats and other recreational include water used to enhance an area for wildlife and/or waterfowl management; water used for irrigation of vegetation other than commercial crops; and other non-essential uses for leisure activities.[69]

When there is interference, the Permit Board can modify, terminate or decline to reissue a permit for good cause after providing the permittee an opportunity for a hearing where the permittee is entitled to be represented by legal counsel and call witnesses and present evidence on his behalf.[70]

6. Aquifer Recharge or Underground Storage

Mississippi does not regulate, encourage, or facilitate aquifer recharge or underground water storage.

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[64] *Riverbend Util.*, 130 So. 3d at 1104-05.

[65] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.4(B).

[66] *Id.* at Pt. 7, Ch. 1, R. 1.4(B)(1).

[67] *Id.* at Pt. 7, Ch. 1, R. 1.4(B)(2).

[68] *Id.*

[69] *Id.* at Pt. 7, Ch. 1, R. 1.4(B)(3).

[70] Miss. Code Ann. § 51-3-9(3) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

7. Water Management Plan(s)

The CEQ, through its Office of Land and Water Resources (OLWR), is required to study the state's existing water resources, means and methods of conserving and augmenting such waters, existing and contemplated needs and uses of water for protection and procreation of fish and wildlife, irrigation, mining, power development, and domestic, municipal, and industrial uses, and all other related subjects, including drainage, reclamation, flood-plain or flood-hazard area zoning, and selection of reservoir sites.[71] However, Mississippi has never implemented a water management plan.

8. Regulatory Authorities

CEQ sets state policy, adopts rules, and hears enforcement cases.[72] It also has regulatory power over groundwater. The Commission can adopt, enforce, repeal, or modify rules and regulations, and make exceptions and grant exemptions based on enumerated provisions, such as minimizing waste, well design/standards, protection against saltwater encroachment.[73] Along with enforcement authority, the CEQ also has authority to impose a civil penalty for offenses (not more than $25,000 for each offense).[74] The CEQ's website may be accessed at:
https://www.mdeq.ms.gov/about-mdeq/commission-on-environmental-quality/

OLWR is charged with conserving, managing, and coordinating a comprehensive state water management plan.[75] No plans have been finalized and there have been no plans issued. Within the MDEQ is the OLWR, which regulates water supply. The agency regulates water quantity issues affecting the beneficial use of these resources in the best

[71] Miss. Code Ann. § 51-3-21(1) (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[72] *Id.*

[73] Miss. Code Ann. at § 51-3-25 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[74] Miss. Code Ann. § 51-3-55 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[75] Miss. Code Ann. § 51-3-16 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020); Miss. Code Ann. § 51-3-21 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

interest and welfare of the citizens of the state.[76] OLWR's website may be accessed at: https://www.mdeq.ms.gov/water/water-availability-and-use/.

The Permit Board issues water use permits, but may also delegate its authority to act on permit applications to the MCEQ's Executive Director.[77] The Permit Board is composed of the heads of various health and natural resources agencies.[78] The Permit Board's authority primarily involves permitting decisions. The Permit Board has the authority to issue or reissue any permit based on the regulations of the Commission.[79] It may also issue or reissue any temporary permit; may modify or revoke any permit for failure to adhere to permit conditions; or deny the issuance, reissuance, or modification of any permit if the proposed use is found to be contrary to the public interest.[80] Therefore, Permit board has the authority, whether operating in "special water use areas" or not, to deny permits found to be contrary to the public interest or to attach conditions to issued permits.[81] Information on the Permit Board may be accessed on their website: https://www.mdeq.ms.gov/permits/permit-board/.

The MDEQ) is the regulatory agency charged with implementing policy set by the MCEQ. The MDEQ's website may be accessed at: https://mdeq.state.ms.gov.

9. Special Districts

The State of Mississippi does not have any special groundwater districts.

10. Transboundary Arrangements

Mississippi is not a state party to a trans-boundary arrangement. However, Mississippi is involved in a trans-boundary conflict with Tennessee. In 2015, Mississippi filed a lawsuit against Tennessee over groundwater usage. In the case, Mississippi claimed that

[76] Miss. Code Ann. § 51-3-25 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[77] *Id.*

[78] Miss. Code Ann. § 49-17-28 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[79] Miss. Code Ann. § 51-3-15 (West, West through 2019 Reg. Sess. effective upon passage as approved through Jan. 1, 2020).

[80] *Id.*

[81] 11 Miss. Admin. Code Pt. 7, Ch. 1, R. 1.2(A).

"the city of Memphis is pumping so intensively from the Sparta-Memphis Sand Aquifer, which extends across state lines" that it has caused a cone of depression to form in the water table beneath the city's wells that is altering the direction the groundwater travels, pulling water that would otherwise stay beneath Mississippi's state lines into Tennessee.[82] Because ground water from Mississippi is being diverted into Tennessee, Mississippi asserted a claim for $615 million in compensation for that diverted water.[83] In response, Tennessee claimed that "the water is an interstate resource, and thus, the Court needs to determine how much water each state is entitled to use."[84] The Supreme Court served as the trial court and appointed a Special Master to run a trial-like process.[85] The Special Master, the Honorable Eugene E. Siler of the U.S. Court of Appeals for the 6th Circuit, is considering whether "the case should be treated as an interstate water dispute," which, if found to be so, could mean that the case is dismissed with no apportionment. The last evidentiary hearings concluded on May 30th, 2019.[86]

11. Native American Rights

The Mississippi Band of Choctaw are the only federally recognized tribe within the state of Mississippi.[87] However, no data regarding water rights or uses is available for the Tribe.[88]

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[82] Brett Walton, *Mississippi's Claim That Tennessee is Stealing Groundwater is a Supreme Court First*, Circle of Blue (2016), https://www.circleofblue.org/2016/groundwater/states-lag-management-interstate-groundwater/ (last visited Mar. 27, 2020); Brief for United States as Amicus Curiae, *State of Mississippi v. State of Tennessee*, May 2015, at 2, 4.

[83] *Id.*

[84] Catherine Janasie, *Mississippi v. Tennessee Case Update*, Sea Grant L. Center (2018), http://nsglc.olemiss.edu/blog/archive/2018/oct/19/index.html.

[85] Catherine Janasie, *Mississippi v. Tennessee Case Update*, Sea Grant L. Center (2018), http://nsglc.olemiss.edu/blog/archive/2018/oct/19/index.html (last visited Mar. 27, 2020).; Scotusblog, http://www.scotusblog.com/case-files/cases/mississippi-v-tennessee/ (last visited Mar. 27, 2020).; special master documents at: http://www.ca6.uscourts.gov/special-master (last visited Mar. 27, 2020).

[86] *Id.*

[87] Mississippi Band of Choctaw Indians, http://www.choctaw.org/ (last visited Mar. 27, 2020).

[88] *Id.*

J. Oregon

The State of Oregon utilizes prior appropriation with the modification of a permit system, through which rights to use state-owned water are perfected and recognized by the state.[1] In general, both surface and groundwater rights permitting are handled through the same permit system by the Oregon Water Resources Department (WRD). As with all prior appropriation regimes, if groundwater availability becomes limited, groundwater users with earlier perfection or vested dates are given priority of use.[2]

1. Definitions, Basis of Rights, Standards, and Interactions

The state of Oregon statutorily defines groundwater as "any water, except capillary moisture, beneath the land surface or beneath the bed of any stream, lake, reservoir or other body of surface water within the boundaries of this state, whatever may be the geologic formation or structure in which such water stands, flows, percolates, or otherwise moves."[3]

A person can gain the right to use state-owned groundwater by filing a permit with the WRD. Unless a certain use falls within statutorily recognized exceptions (see Section 4.b.i. below), any person or entity who desires to use water in Oregon must obtain a water right, which is gained through the acquisition of a water-use permit. Permits are given priority by the date in which the WRD receives them.[4] Subsequently, the permit must be perfected into a water right to be protected from junior users. The steps for perfecting a groundwater right are as follows:

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[1] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 5 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[2] *Id.*

[3] Or. Rev. Stat. Ann. § 537.515(5) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[4] Or. Rev. Stat. Ann. § 537.620(2) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

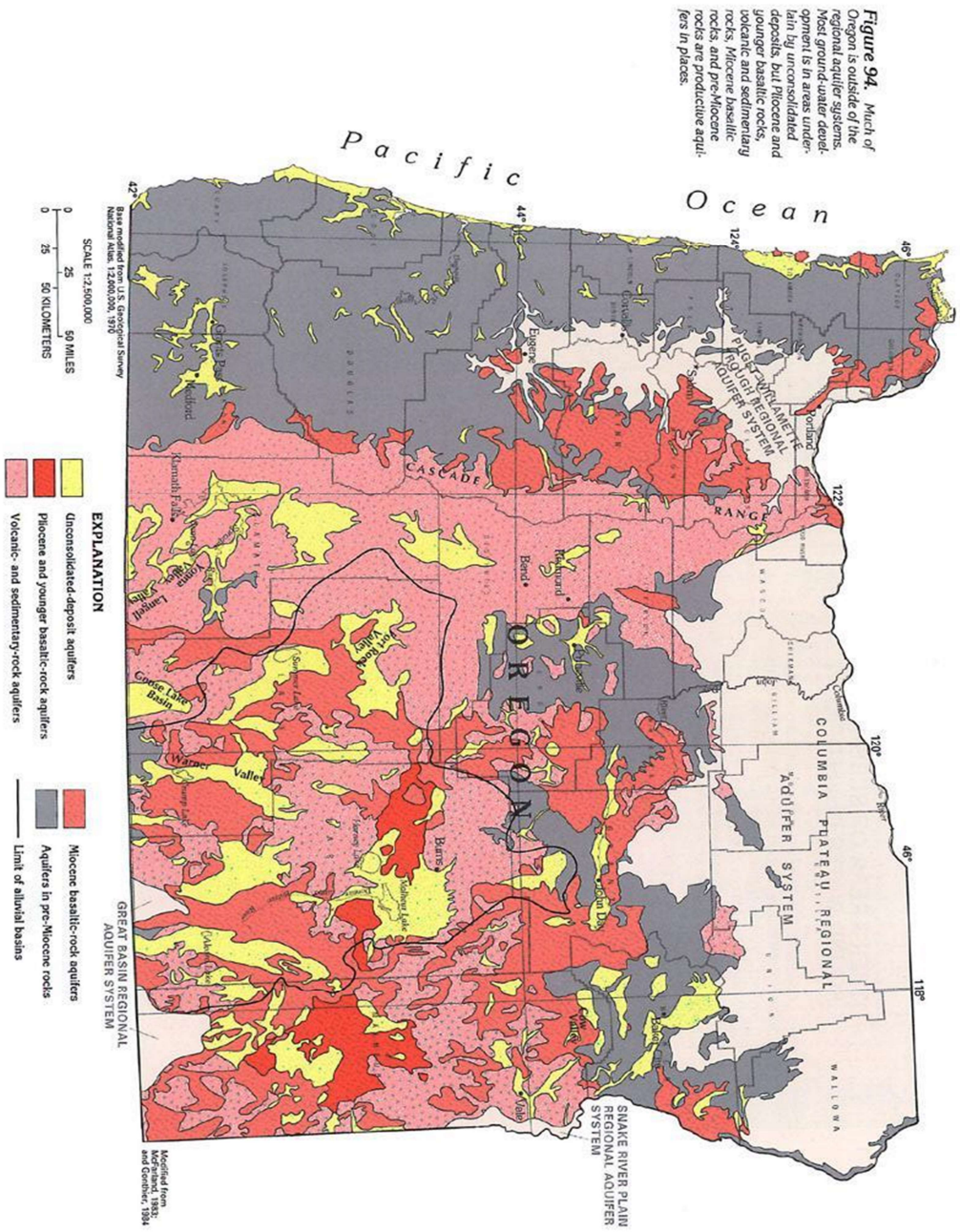

Fig. J.1. Oregon Aquifers excluding Reginal Aquifer Systems[5]

[5] USGS, *Groundwater Atlas of the United States: Idaho, Oregon, Washington (Fig. 94)*, https://pubs.usgs.gov/ha/ha730/ch_h/H-other_areas.html (last visited Mar. 27, 2020).

a. Request water-use permit from Oregon Department of Water Resources

The application must be complete, not defective, and include the fees required by the WRD. If the application is satisfactory, the WRD will grant the applicant priority based upon the date the WRD received the application. Overlying landowners are not the only ones who can gain a permit to groundwater beneath their land -- other prospective groundwater users can gain the right to use the groundwater beneath the land, but those users must prove that they have received permission from the overlying landowner to use the underlying groundwater.[6] Once the WRD determines an application is complete, and a priority date is assigned, the WRD evaluates the following: whether or not the use requested in the application violates a statute or agency rule (including basin division programs); whether or not the quantity of groundwater requested is available at the times of year the applicant requires the water; and whether or not the groundwater request is restricted due to its location in a critical groundwater area.[7]

While the permit application is presumed to be in the public interest, the WRD must consider a variety of factors to determine if that presumption is overcome.[8] Factors include whether the sought use is detrimental to:

> [c]onserving the highest use of the water for all purposes, including irrigation, domestic use, municipal water supply, power development, public recreation, protection of commercial and game fishing and wildlife, fire protection, mining, industrial purposes, navigation, scenic attraction or any other beneficial use to which the water may be applied for which it may have a special value to the public.[9]

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[6] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 16 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[7] Or. Rev. Stat. Ann. § 537.620(4)(a-b) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[8] Or. Rev. Stat. Ann. § 537.153(2) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[9] Or. Rev. Stat. Ann. § 537.170(8) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018

Additionally, the WRD must give public notice of the potential water right, so as to receive public comments from interested parties.[10] In addition, when an application "discloses the probability of wasteful use or undue interference with existing wells or that any proposed use or well will impair or substantially interfere with existing rights to appropriate surface water by others . . . the Water Resources Department may impose conditions or limitations in the permit to prevent the same or reject the same . . . ."[11] After evaluating whether a completed application seeks to use water for a beneficial use, the WRD "*shall* approve all applications made in proper form which contemplate the application of water to a beneficial use, unless the proposed use conflicts with existing rights."[12] Thus, it appears that Oregon law seeks to protect the water rights of nearby users, including surface users, from harm.

b. Construct wells and diversions systems and put water to beneficial use

Upon approval of the permit application, the applicant is given a certain amount of time (as stipulated in their newly approved permit) to "prosecute the construction of any proposed irrigation or other work with reasonable diligence and complete the construction within a reasonable time" not exceeding five years from the approval date, or 20 years for municipalities.[13] Extensions are allowed if the appropriator can show either that government requirements have impeded construction efforts, or that the appropriator has made a good faith effort to comply, and an extension is reasonable given circumstances such as costs and market prices.[14]

Spec. Sess. of the 79th Leg. Assemb.).

[10] Or. Rev. Stat. Ann. § 537.620(5) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[11] Or. Rev. Stat. Ann. § 537.629(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[12] Or. Rev. Stat. Ann. § 537.160(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[13] Or. Rev. Stat. Ann. §§ 537.230(1), 537.230(2) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[14] Or. Rev. Stat. Ann. §§ 537.230(3), 539.010(5) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

c. Prove water use to receive a water right certificate

To perfect a groundwater right, the applicant must hire a certified water right surveyor to map and examine the water use.[15] After a satisfactory survey is completed and a map is submitted to the WRD, the water right is perfected, and a water right certificate is issued to the new water right holder.[16] At this point, the water right is now protected in relation to its priority date.[17]

In addition to the statutory permit system, appropriators who prove groundwater use before the enactment of Oregon's water code can vest water rights without proceeding through the same permit application system as new appropriators.[18] Under the law, any person who proved their own, or their predecessor's, beneficial use of groundwater before August 3, 1955, and registered that use with the WRD, received recognition of a right to that beneficial use. With that WRD recognition, the rights holder could then appropriate groundwater to the extent of the maximum beneficial use that occurred at any time between August 3, 1953, and August 3, 1955.[19]

With regard to what constitutes a valid use under Oregon law, the statutes provide that "[b]eneficial use shall be the basis, the measure and the limit of all rights to the use of water in this state."[20] The standard of "beneficial use" applies to all water use, including groundwater. Despite the importance of this standard, a specific definition of "beneficial use" does not appear in Oregon statutes, other than it is "without waste."[21] However,

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[15] Or. Rev. Stat. Ann. § 537.230(5) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[16] Or. Rev. Stat. Ann. § 537.230(4) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[17] Or. Rev. Stat. Ann. § 537.150(2) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[18] Or. Rev. Stat. Ann. § 537.585 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[19] Or. Rev. Stat. Ann. §§ 537.585, 537.605, 537.610 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[20] Or. Rev. Stat. Ann. § 540.610 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.); See also *In Re Waters of Deschutes River*, 134 Or. 623 (1930).

[21] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 6 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited

specific uses have been noted as beneficial and desirable, such as "existing and contemplated needs and uses of water for domestic, municipal, irrigation, power development, industrial, mining, recreation, wildlife, and fish life uses and for pollution abatement . . . ."[22] Another statutorily recognized beneficial use is that of recharging aquifers.[23] Additionally, storing groundwater in a personal reservoir or pond before beneficial use of that water is made is allowed but may require a of variety permits depending on the effects that the reservoir has on existing surface water.[24] Uses related to those just previously enumerated might be found to be beneficial as well. For example, the use of water to leach boron from soils was found to be a beneficial use because it increased crop productivity.[25]

2. Sources of Law

Groundwater law in Oregon is derived primarily through statutes. These statutes were enacted through a variety of legislation, most notably through the Water Rights Act of 1909 as amended and Groundwater Act of 1955. Ambiguities or conflicts are clarified or resolved through the courts as needed. General water appropriation is addressed in title 45, chapter 537 of Oregon Revised Statutes, with specific groundwater laws beginning at §537.505, although much of the same permitting rules that apply to surface water also apply to groundwater.

3. Scope of Right

a. Groundwater Ownership

The state of Oregon owns surface and groundwater within its jurisdiction, and potential water users can gain the right to use the water, but not to own it.[26]

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[22] Or. Rev. Stat. Ann. § 536.300 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[23] Or. Rev. Stat. Ann. § 537.135(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[24] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 22 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[25] See *Benz v. Water Resources Com'n*, 94 Or. App. 73, 77 (1988).

[26] Or. Rev. Stat. Ann. § 537.525 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

b. Scope of Use

i. Permitted and Preferred Uses

Generally, the state of Oregon allows non-wasteful, beneficial use as specified in the water-use permit issued to the water user. A use cannot violate a statute or agency rule, and a use cannot infringe on the water rights of other water users. Additionally, there are certain uses that are not only allowed but explicitly exempt from the permitting process, including: water for stock watering purposes; watering any lawn or non-commercial garden not exceeding one-half acre in area; watering lawns, grounds, and fields not exceeding 10 acres in area; watering of schools located within a critical groundwater area; single or group domestic purposes in an amount not exceeding 15,000 gallons per day; single industrial or commercial purpose not exceeding 5,000 gallons per day and which do not include irrigation or watering to promote plant growth; and watering for down-hole heat exchange purposes.[27] However, exempt uses must be beneficial and without waste; such uses will constitute a right for appropriating groundwater equal to that of a groundwater right certificate issued under ORS 537.700. [28] Exempt groundwater users are still subject to regulation by the WRC to regulate, reduce, or stop groundwater withdrawals when they interfere with "senior" water rights.[29] The WRC will utilize a priority date for determining priority status by the exempt well's log filling date as specified under ORS 537.765.[30]

Overdraft refers to drawing groundwater from an aquifer at such a rate as to exceed the "sustained yield" of a groundwater basin. The term "overdraft" is similar to the common term "aquifer mining." Overdraft of an aquifer is not permitted under Oregon law, and actions by government agencies, absent voluntary agreements by area groundwater users, to curb groundwater use and prevent excessive aquifer depletion are legitimate.[31]

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[27] Or. Rev. Stat. Ann. § 537.545(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[28] *Id.* at 537.545(2).

[29] *Id.* at 537.545(4).

[30] *Id*.

[31] *Doherty v. Oregon Water Resources Director*, 308 Or. 543, 551 (1989); *see* Or. Rev. Stat. Ann. § 537.745 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.); *see also* Or. Rev. Stat. Ann. § 537.525(9) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

"Sustained yield" is "the amount of water that can be withdrawn from [the groundwater basin] annually without exceeding the long-term mean annual water supply to the reservoir. Withdrawals exceeding this supply must come from storage within the reservoir, which results in long-term water level declines."[32]

Because Oregon law mandates that water be used in a non-wasteful way, water users can only use the amount of water needed for the purpose enumerated in their permit, and not more.[33] Unfortunately, this "use it or lose it" system does not encourage efficiency in water use. To encourage efficient water use and conservation, Oregon utilizes a water conservation program, wherein water that is saved through more efficient practices can be transferred or sold, used on additional lands owned by the appropriator, or dedicated to the stream or aquifer that would otherwise be affected.[34] Once a water user has shown increased water efficiency, the WRD will allocate 25 percent of the conserved water to benefit the state (for an instream water right), and 75 percent to the applicant, unless more than 25 percent of the project costs originate from government funding, or if the applicant voluntarily proposes a higher allocation to the state. A new water right certificate will then be issued with the original priority date reflecting the reduced quantity of water used with the improved technology. The priority dates assigned to the state's instream flow certificate and the applicant's portion of conserved water must be the same, although the instream flow right can be assigned the same date as the original water right but with a one-minute junior time to the original right.[35]

Generally, Oregon law does not provide a preference for one kind of use over another, except in situations in which the Governor officially declares a drought.

> If there is a conflict between users, the date of priority determines who may use the available water. If the rights in conflict have the same date of priority, then

[32] *Doherty*, 308 Or. at 550.

[33] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 20 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[34] Or. Rev. Stat. Ann. § 537.463 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[35] Oregon Water Resources Department, *Allocation of Conserved Water*, https://www.oregon.gov/OWRD/programs/WaterRights/Conservation/Pages/AOCW.aspx (last visited Mar. 27, 2020).

the law indicates domestic use and livestock watering have preference over other uses. However, if a drought is declared by the Governor, the WRD can give preference to stock watering and household consumptive purposes, regardless of the priority dates.[36]

ii. Location of Use

Water rights in Oregon are appurtenant to the land on which the rights are perfected.[37] This means that the water right is perpetually tied to the land on which the water is used, even if the land's ownership changes, so long as it is continually used and not forfeited.[38] The water can be used on non-overlying land, but the location of use must be designated in the water-use permit, and the location of, and purpose of, the use must comply with that permit, or else the user might forfeit their right.[39] A groundwater right holder may change the place or purpose of use, but they must apply to and receive approval by the WRD.[40] Irrigation districts and municipalities, however, have been granted flexibility by statute. They may use water on non-appurtenant lands not described in the approved permit if the rate and use originally allowed is not exceeded, the water continues to be used for municipal purposes, and other vested water rights are not impeded.[41]

Groundwater may be transferred outside of its basin of origin, but consent by the Oregon legislature is required to do so if the transfer is above 50 cfs.[42] An application to move groundwater outside of its own basin must include an analysis of a variety of factors, such as the amount of water available in the originating basin, projected future

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[36] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 6 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[37] Or. Rev. Stat. Ann. § 537.705 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[38] *Id.*

[39] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 35 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020); see subsection (c) of this section for more on forfeiture.

[40] Or. Rev. Stat. Ann. §§ 537.705, 540.520, 540.530 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[41] Or. Rev. Stat. Ann. § 540.510(3) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[42] Or. Rev. Stat. Ann. § 537.810(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

groundwater needs in the originating basin, any harm that will be done to surface and groundwater resources, any correlation between the groundwater to be appropriated and surface water within the originating basin, adverse effects on existing water rights and uses, and whether there are any alternatives to transferring groundwater out of its original basin.[43] Municipalities are exempted from these requirements if they have historically transported water from one basin to another for the purpose of supplying a regional water service.[44] In order to ensure that water supplies are sufficient within a particular water basin, "the Water Resources Commission shall reserve an amount of water adequate for future needs in the basin of origin, including an amount sufficient to protect public uses, and subordinate the out-of-basin use to that reservation."[45]

c. Loss of Water Rights

All water rights in Oregon are considered perpetual unless they are forfeited according to either Ore. Rev. Stat. § 540.610 or Ore. Rev. Stat. § 537.720. When a water user "fails to use all or part of the water appropriated for a period of five successive years, the failure to use shall establish a rebuttable presumption of forfeiture of all or part of the water right."[46] The owner may also abandon a water right by announcing, under oath, an intent to abandon the water right, after which the WRD cancels that right.[47] Failure to perfect a permit or record transfers or beneficial use within the allotted time can result in the permit's cancellation.[48] Also, a violation of the terms of an approved permit or certificate may cause the right to be canceled.[49]

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[43] Or. Rev. Stat. Ann. § 537.803(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[44] Or. Rev. Stat. § 537.810(4) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[45] Or. Rev. Stat. Ann. § 537.809 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[46] Or. Rev. Stat. Ann. § 540.610(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[47] Or. Rev. Stat. Ann. § 540.621 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[48] See *Green v. Wheeler*, 254 Or. 424 (1969) (Holding that landowners' failure to record water permit transfer as well as failure to record construction of well was grounds for cancellation of water permit after repeated timely notices of the problem by state agency).

[49] Or. Rev. Stat. Ann. § 537.720 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

The WRD must give written notice by certified mail to the legal owner of the property to which the right is appurtenant.[50] Subsequently, the landowner has 60 days to protest the decision to cancel the water right on that land. If there is no protest by the end of the 60 days, the right is canceled by the WRD.[51] If a protest is filed, the WRD must hold a hearing, and the landowner or water appropriator must rebut the presumption of forfeiture or else show that the water included in the right at issue was used to its full extent.[52] A water user must rebut the forfeiture in order to keep their right, and they may do so by showing one or more of the following: they are a municipality that would be harmed by forfeiting the rights; the rights holder is unable to use the water due to economic hardship; the land in question was withdrawn from water use by an act of Congress; a state agency suspends the use of the water; the non-use was a result of using reclaimed or re-used water as a substitute for appropriated water; water was not used because it was not available; water use was not necessary due to climate (so long as rights holder was and is able and willing to use their appropriated water); or the water in the right in question was included in a pending transfer application.[53] Additionally, if the WRD fails to begin cancellation proceedings within 15 years of the alleged forfeiture, the right cannot be canceled due to that particular non-use.[54]

4. Well Drilling

Oregon defines a water well as "an artificial opening or artificially altered natural opening, however made, by which groundwater is sought, or flows under natural pressure, or is artificially withdrawn or injected."[55] A well is classified as private or domestic if it serves the drinking, culinary, or household uses of three households or less and is not used as a public water supply.[56]

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[50] Or. Rev. Stat. Ann. § 540.631 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[51] Or. Rev. Stat. Ann. § 540.641(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[52] *Id.* at 540.641(2).

[53] Or. Rev. Stat. Ann. § 540.610(2)(a)-(n) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[54] *Id.* at 540.610(2)(f).

[55] Oregon Water Resources Department, *Water Well Owner's Handbook: A guide to water wells in Oregon*, 2 (Feb. 2019), https://www.oregon.gov/OWRD/WRDPublications1/Well_Water_Handbook.pdf (last visited Mar. 27, 2020).

[56] *Id.*

The State of Oregon prefers that professional licensed well contractors construct wells. A well permit is not required when utilizing a professional licensed well contractor. However, a landowner may choose to construct their own well by applying for a Landowner's Water Well Permit from the WRC. The landowner must pay a $500.00 application fee, post a $10,000.00 Bond or letter of credit with the State, and comply with all provisions of ORS §§ 537.505 - 795, 992.[57]

Contractors must be licensed and meet the following minimum requirements to construct wells in Oregon: (1) be at least 18 years old at the time of application; (2) pass a written examination conducted by the WRC to determine fitness to operate as a water well constructor; (3) pay a license fee and examination fee; and (4) possess a minimum of one year experience, during the previous 36 month period, in water supply well construction, conversion, alteration, and abandonment.[58]

Exempt water users must provide the WRC with a map showing the exact location of a new well on the tax lot, and file the exempt groundwater use with the WRC, within 30 days after the completion of the well.[59] The exempt water user must also submit a fee of $300.00 to the WRC.[60]

Wells that have four or more service connections or service a public or commercial premise with at least ten individuals are subject to Oregon Health Authority (OHA) regulations.[61] All real estate transfers or sales that possess a well for domestic use require that the seller must have the water source tested and provide the test results to the OHA and buyer within 90 days of receiving the test results.[62]

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[57] Or. Rev. Stat. Ann. § 537.753(4) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[58] Or. Rev. Stat. Ann. § 537.747(3) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[59] Or. Rev. Stat. Ann. § 537.545(5) and (6) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[60] *Id.* at 537.545(7).

[61] Or. Rev. Stat. Ann. § 448.119 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[62] Or. Rev. Stat. Ann. § 448.271(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

Contact information for authorities responsible for the oversight of Well Drilling can be found at the following:

> Oregon Water Resource Commission.
> https://www.oregon.gov/OWRD/aboutus/Commission/Pages/default.aspx
>
> Oregon Health Authority, Drinking Water Services
> https://www.oregon.gov/oha/ph/HealthyEnvironments/DrinkingWater/Pages/index.aspx

5. Hydraulic Connection and Regulation

Oregon State law recognizes that when groundwater appropriation and use affect in-stream flows, the appropriation must be rejected or moderated to avoid depletion. Alternatively, mitigation measures must be introduced to offset the depletion and avoid harm to other water rights. The WRD must evaluate whether instream flows and rights will be affected by groundwater appropriation. In addition to private or municipal appropriators, the Oregon state government can apply to obtain in-stream water rights for an amount of water determined to be necessary for the health of the river and public use. These types of rights are protected and given a priority date like any other water right from both surface and groundwater users.[63]

Certain rivers in Oregon can be designated "scenic waterways," which declares the "best use" of the waterway to be for recreation or wildlife, mandates that the "free-flowing character" be maintained, and affords protection from adverse effects of groundwater appropriation.[64] In addition, withdrawals from the waterway cannot affect the waterway's flows or ability to sustain wildlife, and "moderation" of depletion is not permitted under Oregon law.[65]

The WRD cannot "experiment" with the effects between groundwater and surface water, in that sufficient knowledge is needed on how groundwater pumping will affect

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[63] Or. Rev. Stat. Ann. § 537.336 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[64] Or. Rev. Stat. Ann. § 390.835 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[65] *Waterwatch of Oregon, Inc. v. Water Res. Comm'n*, 199 Ore. App. 598, 616 (2005).

hydraulically connected aquifers and protected rivers before permits are granted.[66] The Oregon Court of Appeals said, "[t]he fact that there is a complex relationship between groundwater appropriations and surface flows that is difficult to measure does not excuse compliance with the statutory requirement that flows be maintained."[67]

Oregon law provides a system of mitigation credits in the Deschutes River Basin whereby new groundwater users must purchase credits from designated credit banks to use groundwater.[68] Through these banks, new allocators may purchase temporary or long-term mitigation credits to compensate for their water use. A temporary credit must be purchased annually to maintain a water permit and are measured and made available through in-stream leases to the credit banks by surface allocators.[69] Groundwater appropriators may also purchase permanent credits, which do not expire and are supplied through permanent water rights transfers to the mitigation credit banks.[70]

Appropriations to groundwater and surface water appear to be in separate spheres until they conflict. Where interference between groundwater and surface users occurs, the WRC may declare a critical groundwater area and restrict water withdrawals. The order declaring the area may restrict both existing and future uses to stabilize the resource, and can provide that certain sources of water (like groundwater) have preference over other sources (like surface water) regardless of established water right priority dates.[71] While related surface and groundwater are regulated through the maintenance of water rights and minimum instream flows, water shortages might lead to a preference for some out-of-stream uses over in-stream minimum flows.[72] During a drought, groundwater appropriators may have to curb their use if their groundwater use is determined to lower

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[66] *Waterwatch of Oregon, Inc.*, 199 Ore. App. at 612-14; see also *Diack v. City of Portland*, 306 Ore. 287 (1988).

[67] *Waterwatch of Oregon, Inc.*, 199 Ore. App. at 615.

[68] Or. Rev. Stat. Ann. § 537.746 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.); *See* Deschutes River Conservancy, *Streamflow Restoration*, https://www.deschutesriver.org/what-we-are-doing/streamflow-restoration/ (last visited Mar. 27, 2020).

[69] Deschutes River Conservancy, *Temporary Mitigation vs. Permanent Mitigation* (2016), https://www.deschutesriver.org/Temp_vs_Perm%20Mit%202016.pdf (last visited Mar. 27, 2020).

[70] *Id.*

[71] Oregon Water Resources Department, Water Rights in Oregon: An introduction to Oregon's Water Laws, 12 (August 2018), https://www.oregon.gov/OWRD/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[72] *Id.*

in-stream flows in a hydraulically linked gaining stream.[73] However, the Governor can allow certain uses to continue during a drought despite resulting low flows.[74]

6. Aquifer Recharge and Underground Storage

Oregon Legislature actively encourages aquifer and underground storage programs. The programs are regulated and supported by statute.

The Oregon Legislature has declared that:

> aquifer storage and recovery is a beneficial use inherent in all water rights for other beneficial uses. Aquifer storage and recovery is the storage of water from a separate source that meets drinking water standards in a suitable aquifer for later recovery and not having as one of its primary purposes the restoration of an aquifer.[75]

An individual may apply for limited short term or fixed duration license, not to exceed five years, to store and use water injected into an aquifer for aquifer storage and recovery testing.[76] In order to obtain a limited license from the WRD, an applicant must provide well construction information, water testing results from the injected water and the receiving aquifer, and hydrologic information pertaining to how the aquifer storage and recovery project will impact surrounding water rights. The applicant must also propose storage time, recovery rates, and recovery schedules to the WRD.[77] The water injected into an aquifer must meet specific quality standards set out by the Oregon Health Authority.[78] The applicant may apply for a permanent aquifer storage and recovery permit only after completing the test program under a limited license.[79]

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[73] Or. Rev. Stat. Ann. § 536.310 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[74] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 21 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[75] Or. Rev. Stat. Ann. § 537.531 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[76] Or. Rev. Stat. Ann. § 537.534(2) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[77] *Id.* at 537.534(3).

[78] Or. Rev. Stat. Ann. § 537.532(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[79] Or. Rev. Stat. Ann. § 537.534(4) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018

The WRD is the sole permitting agency for administering aquifer storage and recovery projects.[80] However, the Department of Environmental Quality and the Oregon Health Authority may comment on permits for projects and set conditions for the approved permit.[81]

7. Water Management Plan(s)

In 2012, the WRC adopted Oregon's first Integrated Water Resource Strategy (IWRS).[82] The IWRS is a statewide plan that is reviewed and updated every five years.[83]

8. Regulatory Authorities

In Oregon, the water authorities include the Water Resources Commission (WRC), Water Resources Department (WRD), and Oregon Drinking Water Services (DWS). The latter is part of the Oregon Health Authority (OHA). Further information, including contact information, can be found at the following links:

WRC - https://www.oregon.gov/OWRD/aboutus/Commission/Pages/default.aspx

WRD - http://www.oregon.gov/OWRD/pages/index.aspx

DWS - https://www.oregon.gov/oha/ph/HealthyEnvironments/DrinkingWater/Pages/index.aspx

The Water Resources Commission was "established by statute to set water policy for the state and oversee activities of the Water Resources Department in accordance with state law."[84] Essentially, it adopts and enforces all the rules that the WRD then

Spec. Sess. of the 79th Leg. Assemb.).

[80] Or. Rev. Stat. Ann. § 537.534(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[81] *Id*.

[82] Oregon Water Resources Department, *Oregon's 2017 Integrated Water Resource Strategy* (December 2017), https://www.oregon.gov/owrd/wrdpublications1/2017_IWRS_Final.pdf (last visited Mar. 27, 2020).

[83] Or. Rev. Stat. Ann. § 536.220(3)(e)(B) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[84] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water*

administers, including rules related to groundwater and wells. A representative is selected from each recognized basin in Oregon, plus one representative from each side of the Cascade mountain range.

The WRD is "charged with administration of the laws governing surface water and groundwater resources. The Department is organized into five divisions - Field Services, Technical Services, Water Rights Services, Administrative Services, and the Director's Office - all operating under the immediate authority of the Director."[85]

Oregon Drinking Water Services (DWS) administers and enforces drinking water quality standards for public water systems in the state of Oregon. They have authority to promulgate rules if the groundwater or well is used to serve a public water system.[86]

9. Special Districts

Oregon identifies basins as "basin divisions" where management, such as resource objectives, preferences among uses, water reservations, restrictions on news uses, and other policy tools are designed basin-by-basin.[87]

The designated Basin Divisions include the following: North Coast Basin; Willamette Basin; Sandy Basin; Hood Basin; Deschutes Basin; John Day Basin; Umatilla Basin; Grand Ronde Basin; Powder Basin; Malheur—Owyhee Basin; Goose and Summer Lakes Basin; Rogue Basin; Umpqua Basin; South Coast Basin; Mid Coast Basin; Columbia River Basin; Middle Snake River Basin.[88]

Laws, 5 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[85] *Id.* at 3.

[86] Oregon Health Authority, *Oregon Drinking Water Services,* https://www.oregon.gov/OHA/PH/HealthyEnvironments/DrinkingWater/pages/index.aspx (last visited Mar. 27, 2020).

[87] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 13 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020); Or. Admin. R. 690-500-0010 (West, Westlaw through rules pub. in Or. Bulletin, Dec. 2019); *See* Or. Admin. R. 690-502-0020 (West, Westlaw through rules pub. in Or. Bulletin, Dec. 2019).

[88] Or. Admin. R. 690-500-0010(3)(a)-(q) (West, Westlaw through rules pub. in Or. Bulletin, Dec. 2019).

Oregon designates certain basins as "Critical Ground Water Management Areas" where groundwater production, both future and current, must be limited to prevent overdrawing and protect fragile aquifer levels.[89]

Critical Groundwater Management Areas include the following: Cow Valley near Vale; The Dalles in Wasco County; Cooper Mountain-Bull Mountain in Washington County; and the Butter Creek, Ordnance (alluvial and basalt) and Stage Gulch areas in Morrow and Umatilla Counties.

Certain rivers are designated part of a "scenic waterway area," where groundwater pumping is restricted or limited relative to minimum in-stream flows necessary to sustain the free-flowing character of the waterway as well as wildlife and recreation.[90]

Designated Scenic Waterways include the following: Chetco River; Clackamas River; Deschutes River; Elk River; Grande Ronde River; Illinois River; John Day River; Klamath River; McKenzie River; Metolius River; Minam River; Molalla River; Nestucca River; North Fork of Middle Fork of Willamette River; Owyhee River; Rogue River; Sandy River; North Santiam River; North Umpqua River; Walker Creek; Wallowa River; Waldo Lake.[91]

The WRD can also designate "groundwater limited areas" which allow for statutorily exempt groundwater use, but halt any other new appropriations.[92]

Groundwater Limited Areas include: Sandy-Boring; Damascus, Gladtidings; Kingston, Mt. Angel; Sherwood-Dammasch-Wilsonville; Stayton-Sublimity; Parrett Mountain; Chehalem Mountain; Eola Hills; South Salem Hills; and Amity Hills-Walnut Hill.[93]

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[89] Or. Rev. Stat. Ann. § 537.525 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.); see *Doherty v. Oregon Water Resources Director*, 308 Or. 543 (1989).

[90] Or. Rev. Stat. Ann. § 390.835(1) (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[91] Oregon Parks and Recreation Department, *List of Scenic Waterways*, https://www.oregon.gov/oprd/BWT/Pages/SSW-list.aspx (last visited Mar. 27, 2020).

[92] Or. Rev. Stat. Ann. § 537.525 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.); Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 12 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited Mar. 27, 2020).

[93] Oregon Water Resources Department, *Water Rights in Oregon: An Introduction to Oregon's Water Laws*, 12 (August 2018), https://www.oregon.gov/owrd/WRDPublications1/aquabook.pdf (last visited

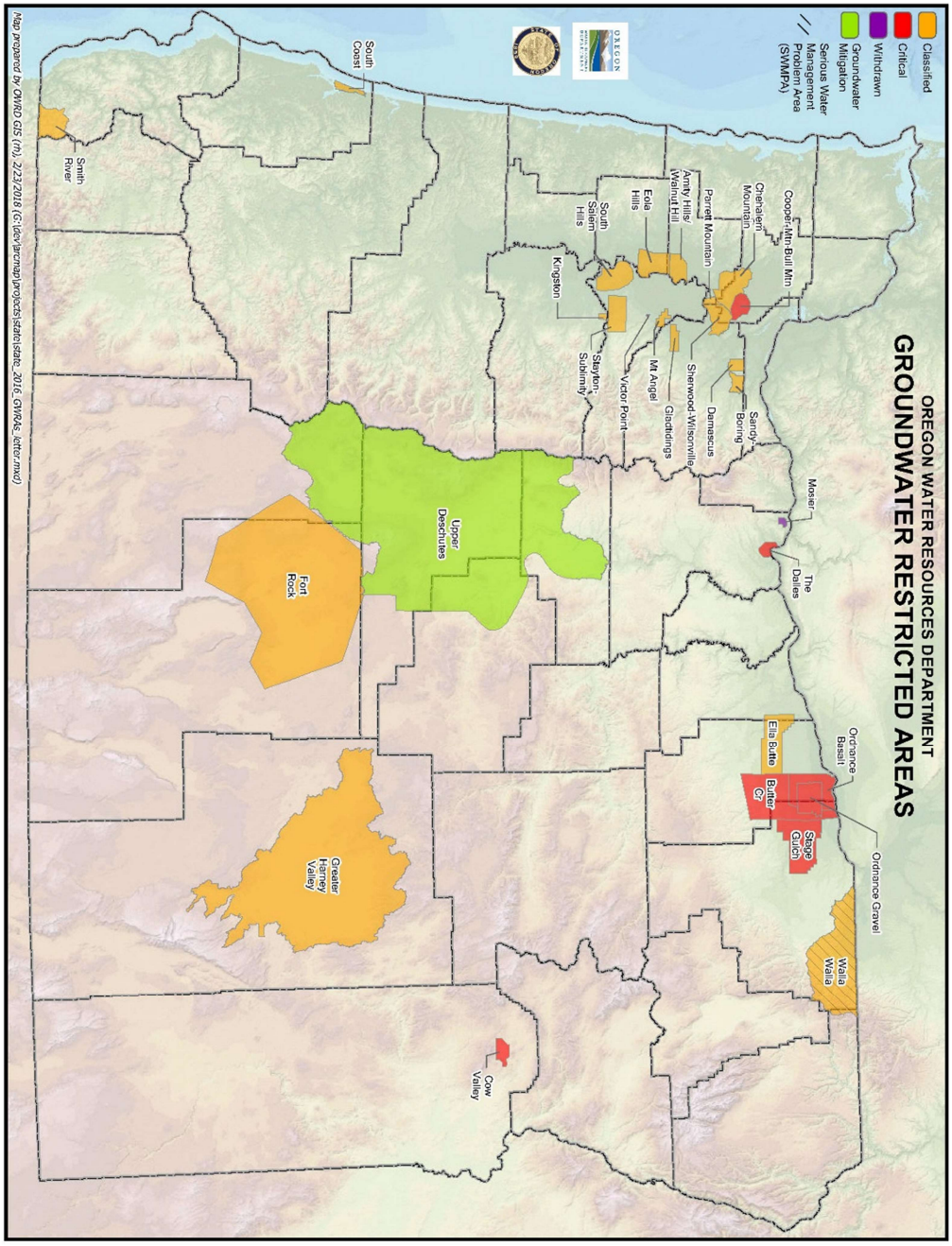

Fig. J.2. Groundwater Restricted Areas in Oregon[94]

Mar. 27, 2020).

[94] Oregon Water Resources Department, *Groundwater Restricted Areas* (2018), http://apps.wrd.state.or.us/apps/gis/gis_map_library/gis_map_details.aspx?gis_library_item_id=2894 (last visited Mar. 27, 2020).

10. Transboundary Arrangements

Oregon is a party to the Oregon-California Goose Lake Interstate Compact.[95] The Oregon-California Goose Lake Interstate Compact defines "water," "waters," and "water resources" to include "any water beneath the land surface or beneath the bed of any stream, lake, reservoir or other body of surface water within the boundaries of Goose Lake Basin."[96]

The primary purpose of the Oregon-California Goose Lake Interstate Compact is:

> To facilitate and promote the orderly, integrated, and comprehensive development, use, conservation, and control of the water resources of Goose Lake Basin; to further intergovernmental cooperation and comity and to remove the causes of present and future controversies by (a) providing for continued development of the water resources of Goose Lake Basin by the States of California and Oregon, and (b) prohibiting the export of water from Goose Lake Basin without consent of the legislatures of California and Oregon.[97]

The Oregon-California Goose Lake Interstate Compact remains in full effect until terminated at any time by consent of the legislatures of California and Oregon, and upon such termination, all rights then established hereunder shall continue unimpaired.[98]

11. Native American Rights

In 1997, the Warm Spring Tribe signed the Warm Springs Water Rights Settlement enacting the first water rights settlement between an Indian tribe, the state of Oregon, and the federal government.[99] Regarding groundwater, the agreement states that the

[95] Or. Rev. Stat. Ann. § 542.520 (West, Westlaw through laws enacted in 2018 Reg. Sess. and 2018 Spec. Sess. of the 79th Leg. Assemb.).

[96] *Id.*

[97] *Id.*

[98] *Id.*

[99] Judith V. Royster & Michael C. Blumm, Native American Natural Resources Law: Cases and Materials 472 (Carolina Academic Press 2002).

surface water rights can be exercised from groundwater within the Reservation, under the presumption that groundwater withdrawals within the Reservation are hydrologically connected to the rivers and streams running through and bordering the Reservation.[100]

[100] Warm Springs Tribes Water Rights Settlement Agreement, 18, https://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=1074&context=nawrs (last visited Mar. 27, 2020).

K. Tennessee

Tennessee defines groundwater as "any water beneath the surface of the ground, including those under the direct influence of surface water, and includes any water from any well, cave, and spring."[1] Tennessee courts have identified the governing groundwater rule to be Reasonable Use; however, many suggest that the court's description and application of Reasonable Use more closely resembles Correlative Rights.

1. Definitions, Basis of Rights, Standards, and Interactions

There are two types of groundwater in Tennessee law: subterranean streams and percolating groundwater. Subterranean streams only appear to exist in the eyes of the law where it can be proven that there is a defined channel below the surface.[2] These underground streams are governed by the same system of regulated riparianism that governs surface waters in the state.[3] Therefore, Tennessee groundwater laws and regulations refer only to percolating groundwater. Tennessee also supplies a definition for withdrawal, which is any recurring taking of water by an intake structure.[4] A recurring withdrawal of water is one that occurs for more than four days in a year.[5]

[1] Tenn. Comp. R. & Regs. 0400-45-08-.04(9) (Lexis Advance through May 31, 2019).

[2] *Tennessee Elec. Power Co. v. Van Dodson*, 14 Tenn. App. 54, 57-58 (1931).

[3] Robert M. Steele, *Understanding Tennessee Surface Water and Groundwater Rights and Regulations* (Sept. 27, 2011), https://www.tba.org/news/tennessee-water-laws-and-regulations (last visited Mar. 27, 2020).

[4] Tenn. Comp. R. & Regs. 0400-45-08-.04(17) (Lexis Advance through May 31, 2019).

[5] *Id.* at (12).

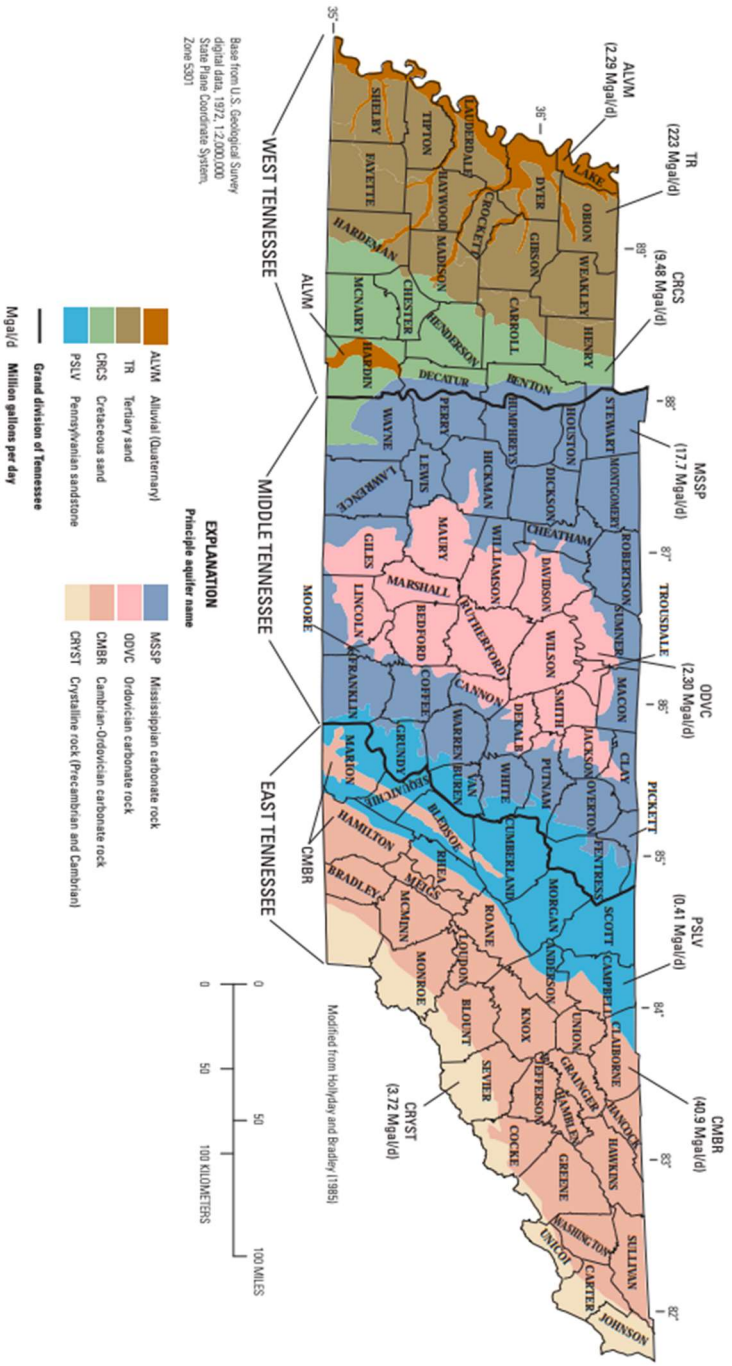

Fig. K.1. Principal aquifers in Tennessee[6]

[6] Robinson, J.A., 2018, *Public-supply water use and self-supplied industrial water use in Tennessee*, 2010: U.S. Geological Survey Scientific Investigation Report 2018-5009, 30 p., https://pubs.usgs.gov/sir/2018/5009/sir20185009.pdf (last visited Mar. 27, 2020).

While Tennessee's groundwater governance system is relatively undeveloped, it was defined in the state's seminal groundwater case, *Nashville, C. & St. L. Ry. v. Rickert*, as the rule of Reasonable Use.[7] Various scholars, however, have suggested that the court's description of the law more closely resembles the correlative rights doctrine.[8] The correlative rights doctrine limits landowners' groundwater rights to a reasonable share in view of similar rights of others.

The State of Tennessee holds the property rights to all waters in the state in public trust.[9] In general, Tennessee case law suggests that overlying land ownership includes the corresponding right to withdrawal groundwater below the property.[10] Since the State holds all waters in public trust, overlying landowners possess a usufruct right, rather than an ownership right to the water under their property.[11] In Tennessee, usufruct groundwater rights accrue to the owner of overlying lands, though the overlying land and corresponding rights may be contracted or leased to others.[12] Water companies in Tennessee are permitted to purchase or condemn land and groundwater rights to support water demand in their systems.[13] Tennessee courts have not yet directly addressed the severance process of groundwater estates from overlying land although it seems that overlying landowner's usufruct right to groundwater is inexplicably tied to the overlying property and cannot be severed.[14]

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[7] *Nashville, C. & St. L. Ry. v. Rickert*, 89 S.W.2d 889 (1935).

[8] Margaret Myszewski, Dan R. Christy, and James E. Kendell, *A Comparison of Groundwater Laws and Regulations from Southeastern States*, Univ. of Georgia. Carl Vinson Institute of Government; Robert M. Steele, Tennessee Water Laws and Regulations, Tennessee Bar Association (Sept. 27, 2011), http://www.tba.org/news/tennessee-water-laws-and-regulations (last visited Mar. 27, 2020); Alan M. Leiserson, *6-TN Waters and Water Rights I Treatise* (LexisNexis 2014).

[9] Tenn. Code Ann. § 68-221-702 (Lexis Advance through the 2019).

[10] Alan M. Leiserson, *6-TN Waters and Water Rights I Treatise* (LexisNexis 2014) (citing *Nashville, C. & St. L. Ry. v. Rickert*, 89 S.W.2d 889 (1935)).

[11] Robert M. Steele, *Understanding Tennessee Surface Water and Groundwater Rights and Regulations* (Sept. 27, 2011), https://www.tba.org/news/tennessee-water-laws-and-regulations (last visited Mar. 27, 2020).

[12] *Nashville, C. & St. L. Ry*., 89 S.W.2d 889 (1935).

[13] Tenn. Code Ann. § 65-27-101 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[14] Robert M. Steele, *Understanding Tennessee Surface Water and Groundwater Rights and Regulations* (Sept. 27, 2011), https://www.tba.org/news/tennessee-water-laws-and-regulations (last visited Mar. 27, 2020).

Regarding groundwater law, most Tennessee cases involve conflicts between property owners without elaborating on the basis of the right to withdraw groundwater. *Nashville, C. & St. L. Ry. v. Rickert* was the first and only case in Tennessee to directly address the issue of groundwater rights. *Rickert* establishes that ownership of real property also includes the groundwater withdrawal and use rights, such that after the conveyance of property, a seller cannot interfere with or deprive the purchaser of the ability to withdrawal water, which is of valuable incident to the property.[15] The precedential value of *Rickert* is uncertain because it is the only Tennessee case that has explicitly considered the state's groundwater governance system. Nevertheless, *Rickert* could presumably "stand for the proposition that an overlying owner does not have a right to a certain water level or pressure if another owner is making a *reasonable use* of the water."[16]

In *Rickert*, the plaintiff alleged that a defendant pumped a shared underground pool dry, that the water was not used "for any purpose, but (was pumped) out on the ground," and that defendant's rate of use deprived plaintiff of use of its spring.[17] The defendant alleged in response that the plaintiff and defendant's groundwater sources were not directly connected, that the defendant planned to use the waters for permissible purposes (a recreational swimming pool and sold to a municipality), and that the plaintiff's use of stream waters was wasteful.[18] The court found that the plaintiff had purchased the property for its appurtenant spring, that the defendant's rate of pumping caused the plaintiff's spring to run dry, and that the defendant could pump a considerable quantity from his own well without materially reducing the plaintiff's spring flow.[19] The court explicitly considered numerous doctrines of Reasonable Use, then decided that under related principles of equity, the defendant's use of his groundwater supply should be enjoined to the extent necessary to prevent impairing plaintiff's right to its own supply.[20] While the court stated that it was applying the Reasonable Use doctrine in this determination, the decision emphasized the injury of the plaintiff resulting from the unreasonable use by the defendant.[21] These considerations more closely resemble the

[15] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 889; *Miller v. Street*, 663 S.W.2d 797 (Tenn. Ct. App. 1983).

[16] Alan M. Leiserson, 6-TN Waters and Water Rights I Treatise (LexisNexis 2014) (emphasis added).

[17] *Nashville, C. & St. L. Ry*., 89 S.W.2d 889, 892 (1935).

[18] *Id.*

[19] *Id.* at 897.

[20] *Id.*

[21] 4 Waters and Water Rights § 11(1)(A) (Amy K. Kelley, ed., 3rd ed. LexisNexis/Matthew Bender

correlative rights doctrine leading commenters to suggest that the courts misnamed the test that they applied.[22] In addition, because the defendant sold the plaintiff the property containing the spring knowing that plaintiff intended to use a particular amount of groundwater towards its commercial purpose, the court's decision indicates that in this case, "reasonableness" of use may depend on the nature and scope of the underlying property right.[23]

Reasonable Use in the State of Tennessee is determined case by case and according to *Rickert*, must take into consideration the scope of the underlying property right.[24] Reasonable Use is further limited by the Correlative Rights doctrine whereby the reasonable use of groundwater by one landowner must take into consideration and not infringe upon the ability of another landowner's ability to extract groundwater for equally reasonable uses.[25]

2. Sources of Law

Common law generally governs Tennessee groundwater rights, although the common law doctrine is modified by several statutory enactments that affect groundwater use, including the Tennessee Water Resources Information Act,[26] the Inter-Basin Water Transfer Act,[27] and the Water Quality Control Act.[28]

The Water Resources Information Act requires surface and groundwater withdrawals exceeding 10,000 gallons daily to register with the state.[29] The purpose of the Water Resources Information Act is to institute a system of registration so that adequate

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2019).

[22] *Id.*

[23] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 897.

[24] *Nashville, C. & S. L. Ry.*, 89 S.W.2d at 897.

[25] *Id.* at 457, 896.

[26] Tenn. Code Ann. §§ 69-7-301--309 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[27] Tenn. Code Ann. §§ 69-7-201--212 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[28] Tenn. Code Ann. §§ 69-3-101--148 (West, Westlaw through 2019 First Ext. Sess. of the 111th Tenn. Gen. Assemb.).

[29] Tenn. Code Ann. § 69-7-304 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

information is available to document the demand for water and project growth, especially in light of groundwater withdrawal's potential to lower water tables and impact state water uses.[30]

The Inter-Basin Water Transfer Act requires entities with state-granted authority to acquire water or water rights by eminent domain or condemnation, or that acquire or supply water for the use or benefit of public water supply systems, to obtain permits for out-of-basin groundwater transfers where the loss of groundwater "has a significant potential to adversely affect" state surface waters.[31]

The Water Quality Control Act empowers a Board and Commission to set and enforce water quality standards for both ground and surface water.[32] Tennessee has not adopted a statewide permitting system, and disputes between groundwater users are handled through the courts. The seminal case for such disputes presumably would be Nashville, C. & St. L. Ry. v. Rickert since it remains the only Tennessee case to address percolating groundwater.

3. Scope of Right

a. Groundwater Ownership

The waters of the state of Tennessee "are the property of the state and held in public trust for the benefit of its citizens,"[33] such that the citizens of Tennessee "have a right to both an adequate quantity and quality of drinking water" and a right to "unpolluted waters."[34] This statute defines "waters" as all water, public or private, on or *beneath the surface of the ground* within Tennessee, unless the body of water is isolated and confined to a single private property and does not "effect a junction" with surface water

[30] Tenn. Code Ann. § 69-7-302 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[31] Tenn. Code Ann. § 69-7-204(a)(2) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[32] Tenn. Code Ann. §§ 69-3-101--148 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[33] Tenn. Code Ann. §§ 68-221-702; 69-3-102 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[34] Tenn. Code Ann. §§ 68-221-702; 69-3-102 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

or groundwater.[35] Additionally, because the waters are held in public trust for the use of the people of Tennessee, the government of Tennessee has "an obligation to take all prudent steps to secure, protect, and preserve this right."[36]

b. Scope of Use

i. Permitted and Preferred Uses

Other than the requirements of the Reasonable Use and Correlative Use doctrines and various permitting statutes, Tennessee law is silent on allowable types of groundwater use. Rather, state courts have generally interpreted the scope of "reasonable" groundwater use in relation to the property rights of overlying landowners. For example, in *Rickert,* the filling of a recreational pool was considered to be reasonable so long as it did not interfere with the ability of other users to withdrawal water for their reasonable uses.[37] Commentators have suggested "[r]easonable use factors might include purpose of the use, suitability to the aquifer or watercourse, economic value, social value, extent or potential for harm caused, practicality of avoidance or adjustment, and impacts on the rights of others."[38]

While Tennessee courts have relied on correlative rights subject to reasonable use limitations, no state court has further described the types or hierarchy of uses that are reasonable.[39] Tennessee law has demonstrated a narrow preference for high volume groundwater uses for human health and safety, as well as for agricultural purposes. These uses may withdraw groundwater in excess of 10,000 without registration.[40] "Agricultural purposes" is defined as "use in production or harvesting of an agricultural

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[35] Tenn. Code Ann. § 68-221-703(24) (West, Westlaw through 2019 First Extraordinary Sess. of the 111th Tenn. Gen. Assemb.). The provision further defines "ground water" as the "water beneath the surface of the ground, whether or not flowing through known or definite channels." *Id.* § 68-221-703(13). *See also Id.* § 69-3-103(44).

[36] Tenn. Code Ann. § 69-3-102(a) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[37] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 893.

[38] Robert M. Steele, *Understanding Tennessee Surface Water and Groundwater Rights and Regulations* (Sept. 27, 2011), https://www.tba.org/news/tennessee-water-laws-and-regulations (last visited Mar. 27, 2020).

[39] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 896.

[40] Tenn. Code Ann. § 69-7-304(c)-(d) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

product, including, but not limited to, irrigation of crops, nursery stock production as defined at § 43-1-112, and watering of poultry or livestock."[41] High volume, unregistered emergency withdrawals for human health and safety are permissible so long as they are not regularly recurring.[42]

Tennessee law permits any groundwater use by a property owner that is reasonable in light of the correlative rights of other, similar property owners. In the state's primary case governing groundwater, the court noted that only an unreasonable use or useless waste would sustain injunction against pumping from a shared groundwater source even though that pumping might temporarily decrease the availability of groundwater for other users.[43]

ii. Location of use

There are no statutes or cases that limit the location of groundwater use to overlying land. Courts have been lenient in characterizing almost any use of groundwater as reasonable as long as it is not wasteful and considers the correlative rights of others.[44] In light of the mandatory permitting for out of basin transfers, while reasonable use on overlying land is relatively flexible, it seems that Tennessee prefers that water stay at least within the basin of origin. Even commenters seem to be unsure of Tennessee's stance on non-overlying land use stating "[g]roundwater rights may also be restricted to (or favored for) water usage on the overlying land or within the same basin."[45]

The Inter-Basin Water Transfer Act requires "all persons or entities (1) that have been granted powers by the state to acquire water, water rights and associated property by eminent domain or condemnation; or (2) that acquire or supply water for the use or benefit of public water supply systems" to follow a permitting procedure for certain surface or groundwater withdrawals diverting water outside of a basin of origin.[46]

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[41] *Id.*

[42] *Id.*

[43] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 894.

[44] *Id.* at 892.

[45] Robert M. Steele, *Understanding Tennessee Surface Water and Groundwater Rights and Regulations* (Sept. 27, 2011), https://www.tba.org/news/tennessee-water-laws-and-regulations (last visited Mar. 27, 2020).

[46] Tenn. Code Ann. § 69-7-204(a)(1-2) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

Transferring groundwater out of the basin of origin will only require a permit under the Inter-Basin Water Transfer Act if the removal has "significant potential to adversely affect the flow of a Tennessee surface water."[47] The permits are issued by the Commissioner of Environment and Conservation.[48] Failure to apply for a permit or violating the conditions of a granted permit could result in a fine of up to $10,000 a day.[49]

c. Loss of Water Rights

Groundwater withdrawal rights may be lost where the underlying property right is lost; they can also be curtailed where permitting is required but not performed, or where the scope of reasonable use is exceeded and injury results to other property owners.

Rights to use groundwater in excess of 10,000 gallons per day may be curtailed, but not wholly lost, by statute where the water commissioner has reason to believe a person is withdrawing water without a valid registration, where one is required.[50] Groundwater rights also may be curtailed to the extent necessary to prevent the interference with another's reasonable use. In *Rickert*, the court enjoined the defendant's use of his groundwater to the extent necessary to allow the plaintiff reasonable use of a connected spring.[51]

In addition, Tennessee case law demonstrates that rights to groundwater established by easements may be lost where the property right is abandoned, or the use violates the easement's scope.[52] In *Miller*, the abandonment and scope of use of an easement containing a groundwater-fed spring were at issue.[53] The easement holders historically used buckets to move water from the spring, and owners of the underlying estate objected when the easement holders installed modern piping, alleging the alteration

[47] *Id.* at 69-7-204(a)(2).

[48] *Id.*

[49] Tenn. Code Ann. § 69-7-208(a) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[50] Tenn. Code Ann. § 69-7-307 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[51] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 897.

[52] *Miller v. Street*, 663 S.W.2d at 799.

[53] *Id.*

exceeded the easement's scope.[54] The court found that the modern method was reasonable under the circumstances and added no burden to the servient estate.[55] The court noted that the deed to the easement controls the water's primary use.[56] In this case, the deed specified the water was to be used for domestic purposes and the servient estate was granted the remainder; the new diversion method did not exceed the easement's scope of use. [57] The court also noted that abandonment requires "clear, unequivocal evidence of an intent to abandon," and irregular but continuing use did not point towards abandonment of the property right. [58]

Where registration requirements for high-volume uses have been violated, water commissioners may subject violators to civil penalties, but may not wholly remove the groundwater use rights appurtenant to surface ownership.[59] In the case of interference with another user's correlative rights to reasonable use, Tennessee courts may issue injunctions curtailing groundwater rights.[60] In addition, groundwater easements may be lost pursuant to court decision where a finding of abandonment is made.[61]

4. Well Drilling

Tennessee regulates well drilling through license requirements and promulgated standards. No person or entity may drill a well unless they hold a valid license from the Commissioner of Environment and Conservation. Well drillers must also report to the Commissioner when they have completed the well. The well shall be approved or disapproved by the Commission, as wells must be constructed and operated according to standards established by the Commission.[62] Drilling may not begin until the well owner or driller notifies the Commission of the intent to drill.[63]

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[54] *Id.*

[55] *Id.*

[56] *Id.*

[57] *Id.*

[58] *Id.* at 798-99.

[59] Tenn. Code Ann. § 69-7-307 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[60] *Nashville, C. & St. L. Ry*., 89 S.W.2d at 897.

[61] *Miller*, 663 S.W.2d at 799.

[62] Tenn. Code Ann. § 69-10-103(a) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[63] Tenn. Code Ann. § 69-10-111 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen.

If a user plans to withdraw over 10,000 gallons of groundwater (or surface water) per day, the Commissioner of the Tennessee Department of Environment and Conservation (TDEC) requires registration of the withdrawal.[64] The Tennessee Water Resources Information Act recognizes that because withdrawals have caused the groundwater table to lower in other states, there is potential for withdrawals to impact water uses in Tennessee.[65] The purpose of registration is to obtain the necessary information to both document current water demand and project future water demand.[66] After initially registering proposed withdrawals, annual registration of subsequent groundwater withdrawals of 10,000 gallons or more per day is required.[67] There are several exemptions to this provision, as a person withdrawing water for either "emergencies involving human health and safety" or "agricultural purposes" may withdraw water without having to register the withdrawal.[68] If planned withdrawals affect the surface water steam. then the person or industry will be required to obtain an Aquatic Resource Altercation Permit.[69] In addition, persons who intend to bottle and sell spring water must obtain approval from The Public Water System Division of the Department of Environment and Conservation.[70] The Tennessee Department of Environment and Conservation is responsible for all oversight of well-drilling activities.

Assemb.).

[64] Tenn. Code Ann. § 69-7-304(a) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[65] Tenn. Code Ann. § 69-7-302 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[66] *Id.*

[67] Tenn. Code Ann. § 69-7-304(a)-(b) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[68] Tenn. Code Ann. § 69-7-304(c)-(d) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.). For purpose of this section, the statute defines groundwater use for "agricultural purposes" as "use in production or harvesting of an agricultural product, including, but not limited to, irrigation of crops, nursery stock production as defined at § 43-1-112, and watering of poultry or livestock." Id. § 69-7-304(d).

[69] Department of Environment and Conservation, *Aquatic Resource Altercation Permit*, https://www.tn.gov/environment/permit-permits/water-permits1/aquatic-resource-alteration-permit--arap-.html (last visited Mar. 27, 2020).

[70] Department of Environment and Conservation, *Plans Review and Approval for Public Water Systems*, https://www.tn.gov/environment/permit-permits/water-permits1/plans-review-and-approval-for-public-water-systems.html (last visited Mar. 27, 2020).

5. Hydraulic Connection and Regulation

Tennessee case law follows a regime that classifies underground water as either percolating water or an underground stream. This distinction is significant because different governance systems and permitting requirements apply to withdrawal of surface water and groundwater. However, most existing state law does not recognize nor regulate the interaction between the two systems. The only statute that references the interaction of groundwater and surface waters is the Inter-Basin Water Transfer Act. That Act requires entities with state-granted authority to acquire water or water rights by eminent domain or condemnation, or that acquire or supply water for the use or benefit of public water supply systems, to obtain permits for out-of-basin groundwater transfers where the loss of groundwater "has a significant potential to adversely affect" state surface waters.[71] No cases have interpreted the terms of this requirement. Except for the preference for surface waters described above under the Inter-Basin Water Transfer Act, no Tennessee case or statute has clarified the priority of use between users of hydraulically linked surface and ground waters.

Under the Inter-Basin Water Transfer Act, where groundwater withdrawal by an entity with state-granted authority to acquire water or water rights by eminent domain or condemnation, or that acquire or supply water for the use or benefit of public water supply systems, is likely to significantly and adversely affect state surface waters, the withdrawal permit application will be denied.

6. Aquifer Recharge and Underground Storage

It does not appear that Tennessee regulates, encourages, or facilitates aquifer recharge or underground storage programs.

7. Water Management Plan(s)

Historically, it appears as though Tennessee has left much of the water management up to the regional authorities in the state.[72] However, on January 25, 2018, the Governor

[71] Tenn. Code Ann. § 69-7-204(a)(2) (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[72] *See* Tenn. Dep't of Env't & Conservation, *Water Resources Regional Planning*, https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-regional-planning.html (last visited Mar. 27, 2020).

announced that he had "appointed a steering committee to develop a statewide plan for future water availability in Tennessee," which would "include an assessment of current water resources and recommendations to help ensure the state has an abundance of water resources to support its future population and economic growth."[73] The plan named TN H_2O can be found at:
https://www.tn.gov/content/dam/tn/environment/documents/TN_H2O_REPORT.pdf.

It does not appear that there is a set schedule for finalizing and issuing the water plan, but, the working group that developed the Water Plan recommended that there be an update every five years to the "comprehensive Tennessee water resource assessment."[74]

8. Regulatory Authorities

The Department of Environment and Conservation issues permits for use in excess of 10,000 gallons of groundwater per day but lists no monitoring or inspection requirements.[75] The Department's website is available at:
http://www.tennessee.gov/environment/

9. Special Districts

Tennessee permits Watershed Districts, which are board-governed entities that may purchase and sell land with the purpose to conserve soil and water, prevent floods, and develop district water resources.[76] These districts issue Watershed Management Plans that identify potential issues and make recommendations for future protection. They do not have any enforcement mechanisms and serve mainly to inform policy decisions.[77]

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[73] Envtl. Protection, *Tennessee Panel Developing Statewide Water Plan* (2018), https://eponline.com/articles/2018/01/25/tennessee-developing-state-water-plan.aspx (last visited Mar. 27, 2020).

[74] *TN H_2O: Tennessee's Roadmap to Securing the Future of Our Water Resources* 35 (2018), https://www.tn.gov/content/dam/tn/environment/documents/TN_H2O_REPORT.pdf (last visited Mar. 27, 2020).

[75] Tenn. Code Ann. § 69-7-307 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[76] Tenn. Code Ann. § 69-6-118 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[77] Department of Environment and conservation, *Watershed Management Approach*, https://www.tn.gov/environment/program-areas/wr-water-resources/watershed-stewardship/watershed-management-approach.html (last visited Mar. 27, 2020).

Tennessee also allows Soil Conservation districts, similar corporate entities, to carry out, maintain, and operate improvements for flood prevention, conservation development, utilization, and disposal of water.[78]

10. Transboundary Arrangements

In 2015, Mississippi filed a lawsuit against Tennessee over the matter of water usage. In the case, Mississippi claimed that "the city of Memphis is pumping so intensively from the Sparta-Memphis Sand Aquifer, which extends across state lines" that it has caused a cone of depression to form in the water table beneath the city's wells that is altering the direction the groundwater travels, pulling water that would otherwise stay beneath Mississippi's state lines into Tennessee.[79] Because groundwater from Mississippi is flowing into that bowl, Mississippi claimed that they deserved $615 million in compensation for that loss.[80] Alternatively, Tennessee claimed that "the water is an interstate resource, and thus, the Court needs to determine how much water each state is entitled to use."[81] Because this was a suit between states, the Supreme Court served as the trial court and appointed a Special Master to run a trial-like process.[82] The Special Master, in this case, is the Honorable Eugene E. Siler of the U.S. Court of Appeals for the 6th Circuit, and he will be considering whether "the case should be treated as an interstate water dispute," which, if found to be so, could mean that the case is dismissed with no apportionment. The evidentiary hearings concluded on May 30th, 2019.[83] The parties have 90 days to prepare and propose rulings to the special master.

[78] Tenn. Code Ann. § 43-14-218 (West, Westlaw through 2019 First Ex. Sess. of the 111th Tenn. Gen. Assemb.).

[79] Brett Walton, *Mississippi's Claim That Tennessee is Stealing Groundwater is a Supreme Court First*, Circle of Blue (2016), https://www.circleofblue.org/2016/groundwater/states-lag-management-interstate-groundwater/ (last visited Mar. 27, 2020); Brief for United States as Amicus Curiae, State of Mississippi v. State of Tennessee, May 2015, at 2, 4.

[80] *Id.*

[81] Catherine Janasie, *Mississippi v. Tennessee Case Update*, Sea Grant L. Center (2018), http://nsglc.olemiss.edu/blog/archive/2018/oct/19/index.html (last visited Mar. 27, 2020).

[82] *Id.*; Scotusblog, http://www.scotusblog.com/case-files/cases/mississippi-v-tennessee/; special master documents at: http://www.ca6.uscourts.gov/special-master (last visited Mar. 27, 2020).

[83] *Id.*

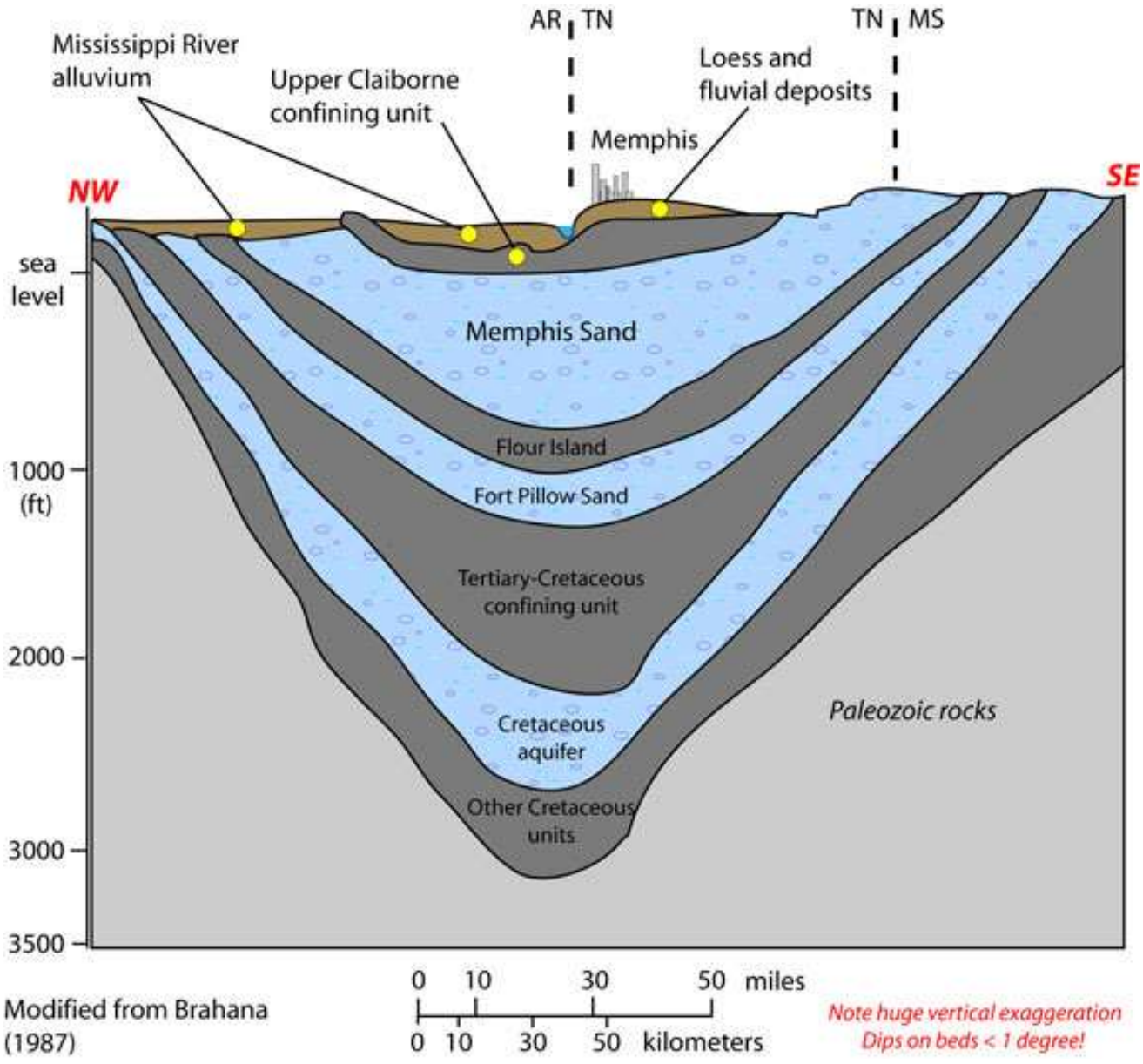

Fig. K.2. NW-SE cross section of aquifers beneath the Memphis and adjacent states of Arkansas and Mississippi[84]

[84] Michael E. Campana, *Mississippi v. Memphis: The Curious Case of the Memphis Sand Aquifer*, *in* Jean Fried and Jacques Ganoulis, Eds, Transboundary Groundwater Resources: Sustainable Management and Conflict Resolution (2016).

11. Native American Rights

There are no federally recognized Indian tribes in Tennessee today. However, Tennessee does have two unrecognized Indian tribes: the Chikamaka Cherokees and the Etowah Cherokee Nation.[85] It does not appear that Tennessee grants exemptions, benefits, or concessions to the unrecognized tribes.

[85] Native Languages of the Americas, *Native American Tribes of Tennessee*, http://www.native-languages.org/tennessee.htm (last visited Mar. 27, 2020).

L. Texas

Texas adopted the common law rule of capture system subject to modification and regulation by the Texas legislature. As stated by the Texas Supreme Court, "The rule of capture essentially allows, with some limited exceptions, a landowner to pump as much groundwater as the landowner chooses."[1] Following the English Common Law rule of absolute ownership, the Texas Supreme Court embraced the rule of capture in *Houston & T. C. Ry. Co. v. East* in 1904, and reaffirmed it in *Sipriano v. Great Spring Waters of Am., Inc.* in 1999.[2] While the purest form of the rule of capture allows nearly unlimited groundwater pumping, the state of Texas recognizes causes of action against groundwater pumping which negligently causes land subsidence, willful waste, or malicious injury to neighboring wells.[3]

1. Definitions, Basis of Rights, Standards, and Interactions

The Supreme Court of Texas has defined groundwater as "underground waters percolating, oozing, or filtrating through the earth."[4] A similar definition of groundwater has been codified in the Texas Water Code, which states that groundwater "means water percolating below the surface of the earth."[5] Additionally, Texas law does not appear to differentiate between underground freshwater and saline water in terms of overlying landowner ownership. This lack of distinction was found and affirmed in several cases, including *FPL Farming Ltd. v. Environmental Processing Systems, L.C.*, in which the court held that "saltwater is not treated any differently than freshwater . . . a distinction is not supported by the Texas Water Code."[6] The court drew its conclusion from a Texas Supreme Court case, *Robinson v. Robbins Petroleum Corp., Inc.*, in which the court held that "water is never absolutely pure unless it is treated in a laboratory . . . the saline content has no consequence upon ownership."[7]

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[1] *Sipriano v. Great Springs Waters of Am., Inc*., 1 S.W.3d. 75 (Tex. 1999).

[2] *Id.* at 79.

[3] See Section 4 of this Texas survey.

[4] *Houston & T. C. Ry. Co. v. East,* 81 S.W. 279, 280 (Tex. 1904); *Sipriano*, 1 S.W.3d at 79.

[5] Tex. Water Code § 36.001(5) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[6] *FPL Farming Ltd. v. Environmental Processing Systems, L.C*., 383 S.W.3d 274, 281 (Tex App. – Beaumont 2012).

[7] *Robinson v. Robbins Petroleum Corp., Inc*.,501 S.W.2d 865, 867 (1973).

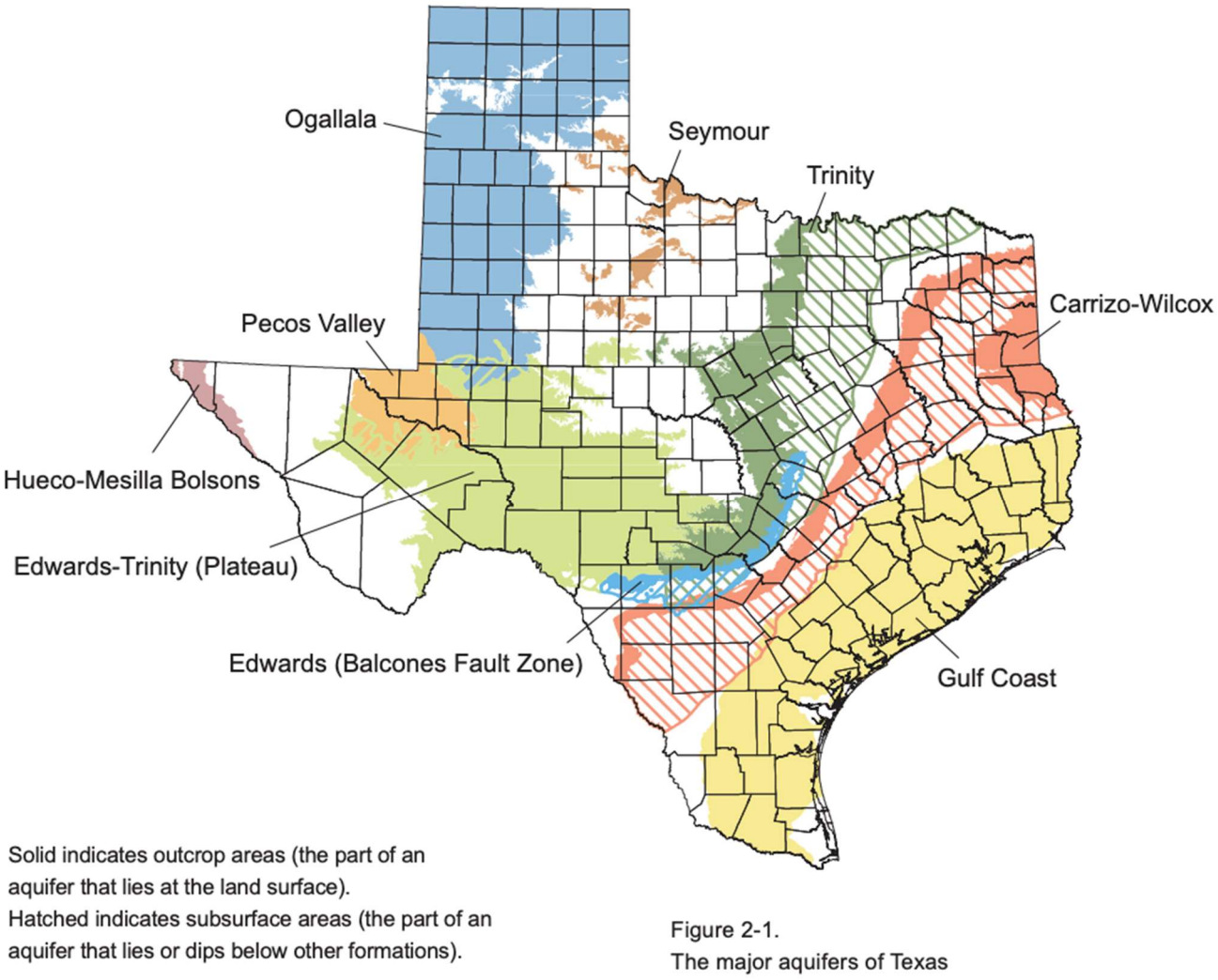

Figure L.1. Texas Aquifers[8]

In 2015, the Texas legislature passed HB 30, which directed the Texas Department of Water Development Board to study brackish aquifers around the state and designate Brackish Groundwater Production Zones.[9]

[8] Texas Water Development Board, *Aquifers of Texas*, https://www.twdb.texas.gov/groundwater/aquifer/ (last visited Mar. 27, 2020).

[9] Texas Water Development Board, House Bill 30 Projects (2015), http://www.twdb.texas.gov/innovativewater/bracs/HB30.asp (last visited Mar. 27, 2020).

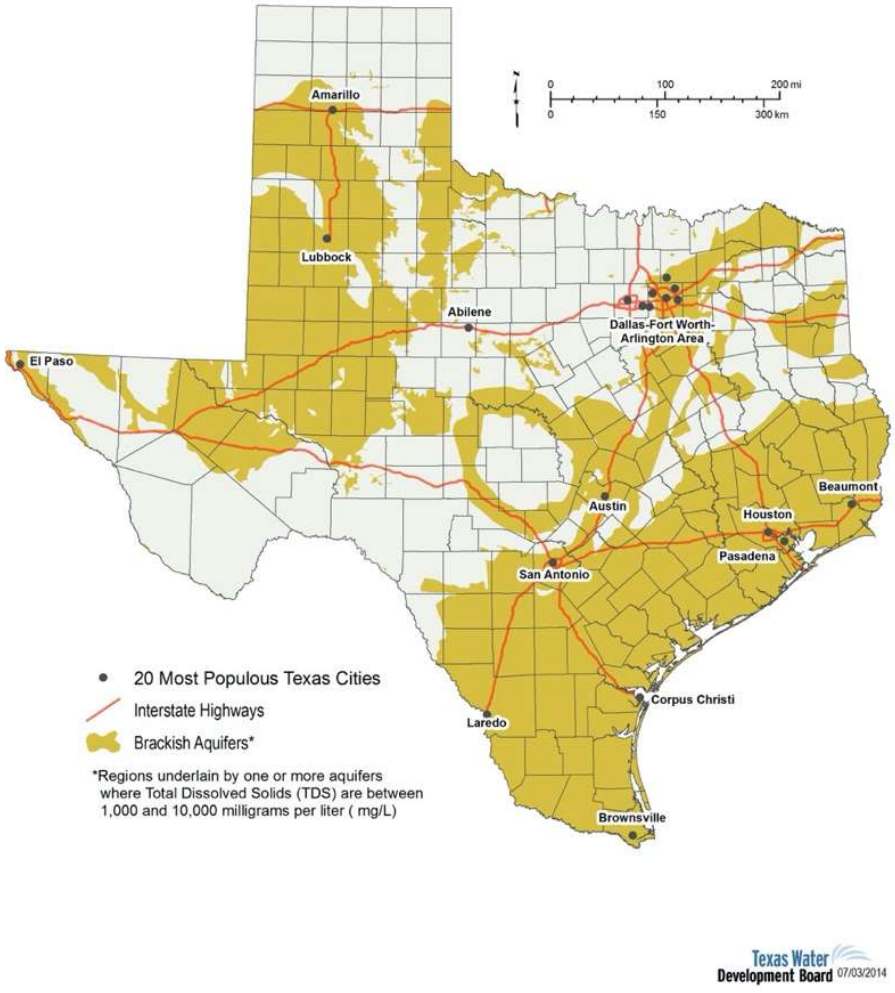

Fig. L.2. Brackish Aquifers of Texas[10]

The basis for the rule of capture is derived from English Common Law, which holds that an overlying landowner holds the right to capture the water below their land.[11] While the rule of capture reigns in Texas, this right has been modified through

[10] Texas Water Development Board, *Brackish Aquifers of Texas*, https://www.twdb.texas.gov/innovativewater/desal/maps.asp (last visited Mar. 27, 2020).

[11] *Houston & T. C. Ry. Co.,* 81 S.W. at 280; *Sipriano*, 1 S.W.3d at 79.

groundwater conservation districts (GCDs), which issue permits and regulate groundwater use within their jurisdictions. Additionally, the use of groundwater must be non-wasteful and lawful, with non-wasteful use including the standard of "beneficial use."[12] There is no standard pertaining to "reasonable use" as would be seen in a correlative rights regime, because the rule of capture does not recognize causes of action for groundwater use that affects neighboring wells, with the exceptions of malice, willful waste, or negligent subsidence. The rule of capture is the only groundwater regime in Texas and can only be modified through the state legislature.

While the rule of capture remains the law of groundwater in Texas, it is subject to regulation through legislation and local regulatory districts known as GCDs. In *Barshop v. Medina County Underground Water District*, the Supreme Court of Texas upheld the constitutionality of legislatively created GCDs, holding that "water regulation is essentially a legislative function . . . Grandfathering of existing users, the caps on water withdrawals, and the regional powers of the Authority, are all rationally related to legitimate state purposes in managing and regulating this vital resource."[13] The court in *Barshop* pointed to the Conservation Amendment of the Texas constitution, which states "the conservation of all . . . natural resources of the state are . . . public rights and duties; and the legislature may pass all such laws which may be appropriate thereto."[14] The power of the legislature and groundwater districts to regulate groundwater was also affirmed in *Sipriano*, where the court affirmed that the "responsibility for the regulation of natural resources, including groundwater, rests in the hands of the Legislature."[15]

2. Sources of Law

Texas groundwater law is a combination of case law, state statutes, and regulations by individual groundwater districts. Some of the seminal Texas Supreme Court cases related to groundwater law and groundwater districts include *East*, *Sipriano*, *Day*, *Bragg*, and *Barshop*. Collectively, these cases affirmed the rule of capture in Texas while recognizing the state legislature's ability and duty to regulate groundwater pumping and use, primarily through GCDs. While the courts play a vital role in defining, enforcing and arbitrating groundwater rights and groundwater disputes, the primary

[12] Tex. Water Code Ann. § 36.002(b)(1) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[13] *Barshop v. Medina County Underground Water District*, 925 S.W.2d 618, 633 (Tex. 1996).

[14] Tex. Const. Art. XVI, § 59(a).

[15] *Sipriano*, 1 S.W.3d at 77.

authority to issue groundwater regulations lies with the Texas Legislature, which has delegated much of the regulatory task to GCDs. The legislature derives this authority from the Conservation Amendment of 1917, and has since enacted a Water Code in which groundwater is addressed.[16] Groundwater Districts, which regulate groundwater pumping at the local level, are created through either the Texas Legislature itself or a petitioning process by area residents.[17]

3. Scope of Right

a. Groundwater Ownership

An ownership right in groundwater is vested in the owner of the overlying land. The Texas legislature has statutorily recognized that "a landowner owns the groundwater below the surface of the landowner's land as real property."[18] In *Edwards Aquifer Authority v. Day*, the Texas Supreme Court asserted further: "In *Elliff*, we restated the law regarding ownership of oil and gas in place . . . We now hold that this correctly states the common law regarding the ownership of groundwater *in place*."[19] Notwithstanding these ownership rights, landowner extractions of underlying groundwater can be restricted to prevent subsidence of neighboring land or malicious injury to another landowner, or on evidence of willful waste. In addition, these rights do not "prohibit a district from limiting or prohibiting the drilling of a well by a landowner for failure or inability to comply with minimum well spacing or tract size requirements . . . affect the ability of a district to regulate groundwater production . . . or require that a rule adopted by a district allocate to each landowner a proportionate share of available groundwater for production from the aquifer based on the number of acres owned by the landowner."[20]

Additionally, in *Day*, the Texas Supreme Court held that because landowner's have a property interest in groundwater beneath their land, those landowners may have a cause of action for a takings claim under the Texas and U.S. constitutions if a regulatory authority is deemed to go "too far." A takings claim for groundwater is reviewed based

[16] *See* Tex. Water Code §§ 35.001 *et. seq*; 36.001 *et. seq* (West, West through end of 2019 Reg. Sess. 86th Leg.).

[17] *See* 8 of this survey.

[18] Tex. Water Code § 36.002(a) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[19] *Edwards Aquifer Authority v. Day,* 369 S.W.3d 814, 831-32 (Tex. 2012) (Emphasis Added).

[20] Tex. Water Code Ann. § 36.002(d)1-3 (West, West through end of 2019 Reg. Sess. 86th Leg.).

on federal jurisprudence in this area, which, among other factors, includes assessing the character of the governmental action and the extent to which the authority's actions impact the owner's investment-backed expectations.[21] Regarding takings by GCDs, the Texas Supreme Court ruled in *Bragg v. Edwards Aquifer Authority* that "the Edwards Aquifer Authority need not prepare a TIA [Takings Impact Assessment] before adopting well-permitting rules pursuant to its statutory authority under the Edwards Aquifer Act. We further conclude that the TIA requirement does not apply to the Authority's enforcement of its rules by permitting actions,"[22] While this appears to be a small "victory" in favor of GCDs, similar parties were awarded damages for uncompensated "takings" of their water through reductions of their water production, which affected how much of their lands could be used for pecan orchards.[23] The court held that damages "should be valued with reference to the value of the commercial-grade pecan orchards immediately before and immediately after the provisions of the Act were implemented or applied"[24]

b. Scope of Use

i. Permitted and Preferred Uses

Landowners with a vested right in the water below their land are entitled to drill for, and produce, groundwater for lawful and non-wasteful use.[25] The definition of waste includes pumping water at a rate which causes un-usable water to infiltrate the groundwater reservoir, pumping water for non-beneficial use, pollution of groundwater, or willful or negligent allowance of produced water to flow into creek, rivers, lakes, or land other than the well-owner's (absent a permit).[26] Additionally, groundwater can be used on overlying land or transported elsewhere. GCDs cannot restrict a landowner from selling or transporting their groundwater off of their property, but may require permitting for out of district transfers.[27] It is worth noting that the Texas Supreme Court

[21] *Day,* 369 S.W.3d at 838-840.

[22] *Bragg v. Edwards Aquifer Auth*., 71 S.W.3d 729, 738 (Tex. 2002).

[23] *Edwards Aquifer Auth. v. Bragg*, 421 S.W.3d at 131.

[24] *Id.* at 152.

[25] Tex. Water Code Ann. § 36.002(b)(1) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[26] Tex. Water Code Ann. § 36.001(8)(A-F) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[27] Tex. Water Code Ann. §§ 36.122(c); 36.122(e) (West, West through end of 2019 Reg. Sess. 86th Leg.).

did not find the use of a waterway to transport groundwater as wasteful, despite the fact that the mode of transport resulted in losses of up to 75%, because the use itself was for a lawful and beneficial purpose.[28]

As previously stated, waste includes non-beneficial groundwater use. Accordingly, the statutory definition of "beneficial use" is provided as "agricultural, gardening, domestic, stock raising, municipal, mining, manufacturing, industrial, commercial, recreational, or pleasure purposes . . . exploring for, producing, handling, or treating oil, gas, sulphur, or other minerals; or . . . any other purpose that is useful and beneficial to the user."[29] While this definition seems quite broad, GCDs are allowed to narrow the definition of "beneficial use" within their jurisdictions.[30] For example, in the Edwards Aquifer Authority, water pumped from a groundwater source, stored in a lake, and then used primarily for recreational purposes was not a beneficial use for groundwater district permitting purposes.[31]

While this right is otherwise fairly unlimited absent groundwater district regulations, there are several overarching restrictions recognized by the Texas courts and Legislature. When the Texas Supreme Court adopted the rule of capture in 1904, it left open the possibility that legal actions could be made for malice or willful and wanton waste.[32] In *Friendsworth Development Company v. Smith*, several such causes of action were indeed judicially recognized. These causes of action assign liability for groundwater pumping where there is 1) malicious intention to injure neighboring land 2) willful waste of groundwater resources, or 3) negligent use that proximately causes the subsidence of neighboring land.[33] These restrictions are also recognized in the Texas Water Code.[34]

While GCDs cannot expressly prioritize certain uses over others, they can create exemptions for certain uses and use historical use as a measure for permitting. The Texas Water Code requires certain uses to be exempt from GCD permitting rules, such

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[28] *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798 (Tex. 1955).

[29] Tex. Water Code Ann. § 36.001(9)(A-C) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[30] *Id.* § 36.052(a), noting that "any special law governing a specific district shall prevail."

[31] *Day,* 369 S.W.3d at 822.

[32] *Houston & T. C. Ry. Co.*, 81 S.W. at 280.

[33] *Friendsworth Development Company v. Smith,* 576 S.W.2d 21, 30 (1978).

[34] Tex. Water Code Ann. § 36.002(b)(1) (West, West through end of 2019 Reg. Sess. 86th Leg.).

as wells used solely for domestic or livestock purposes and located on tracts that are 10 acres or larger and wells used solely for oil and gas rigs engaged in exploration and properly permitted by the Texas Railroad Commission.[35] In addition, GCDs can exempt uses from permits required by the Texas Water Code or the GCD's own requirements.[36] GCDs can also preserve existing and historic uses to the "maximum extent practicable" and allowable under Texas law.[37] For example, the Edwards Aquifer Authority Act, which established the Edwards Aquifer Authority (a GCD), provides that an existing groundwater user is entitled to "an amount of water equal to the user's maximum beneficial use of water without waste during any one calendar year of the historical period, unless the aggregate total of such use throughout the aquifer exceeds [a pre-determined cap]."[38] Additionally, if water levels dictate that less water be used from the Edwards Aquifer, the EAA provides that "an existing irrigation user must receive a permit of not less than two acre-feet a year for each acre of land the user actually irrigated in any one calendar year during the historical period; and . . . an existing user who operated a well for three or more years during the historical period must receive a permit for at least the average amount of water withdrawn annually during the historical period."[39]

ii. Location of Use

Groundwater can be used on overlying land or transported elsewhere. GCDs cannot restrict a landowner from selling or transporting their groundwater off of their property but may require permitting for out of basin transfers.[40]

[35] Tex. Water Code Ann. § 36.117(b)(1) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[36] *Id.* at § 36.117(a).

[37] Tex. Water Code Ann. § 36.116(b) (West, West through end of 2019 Reg. Sess. 86th Leg.); See also § 36.113(e) (West, West through end of 2019 Reg. Sess. 86th Leg.) ("The district may impose more restrictive permit conditions on new permit applications and permit amendment applications to increase use by historic users.").

[38] *Edwards Aquifer Authority v. Bragg*, 421 S.W.3d at 124-126.

[39] *Id.*

[40] Tex. Water Code Ann. §§ 36.122(c); § 36.122(e) (West, West through end of 2019 Reg. Sess. 86th Leg.).

c. Loss of Water Rights

Under the rule of capture, groundwater rights cannot be lost. However, the amount of water that is allowed to be used may be restricted by GCD regulations. Water rights can be severed from surface estate, and under the doctrine of accommodation the user of the groundwater estate is entitled to use the surface estate in order to produce groundwater.[41] The doctrine of accommodation provides that the mineral (or water) estate can use the land surface in the course of its operations, but the mineral or water estate owner must make reasonable accommodations to avoid interfering with existing uses of the surface estate.[42]

4. Well Drilling

Well drilling is regulated by the state of Texas via the Texas Department of Licensing and Regulation (TDLR). No person may offer to drill a well or hold themselves out to be a well driller unless they are licensed by the TDLR.[43] However, this requirement does not apply to persons drilling wells to dewater land for the purpose of constructing a road or highway or for persons drilling their own well on their own property for their own use.[44] In addition to being licensed, well drillers must keep and submit logs of every well they drill, repair, enlarge, or otherwise perform work on to the TDLR, Texas Commission on Environmental Quality (TCEQ), and the owner of the well.[45] Also, all wells must be completed according to standards and procedures promulgated by the TLDR.[46] Finally, GCDs may enforce certain laws and regulations related to capping and plugging of abandoned or deteriorated wells.[47]

Well regulation, including drilling, equipping, operating, or completing wells or substantially operating the size of the wells or well pumps are governed by GCDs.[48]

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[41] *Coyote Lake Ranch, L.L.C., v. City of Lubbock*, 498 S.W.3d 53, 64-65 (Tex. 2016).

[42] *See Getty Oil Company v. Jones*, 470 S.W.2d 618 (Tex. 1971).

[43] Tex. Occupation Code 1901.151 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[44] Tex. Occupation Code 1901.161; 1901.001(15) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[45] Tex. Occupation Code 1901.251 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[46] Tex. Occupation Code 1901.253 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[47] Tex. Occupation Code 1901.256 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[48] Tex. Water Code Ann. § 36.113 (West, West through end of 2019 Reg. Sess. 86th Leg.).

The minimum requirements placed on GCDs for permit applications for new wells include the following: the name and address of the applicant; the applicant's proof of ownership of the property (if the applicant is the owner of the property); a statement of the nature and purpose of the proposed use of the water and the amount of water for the proposed use; a water conservation plan, or in the alternative, a declaration that the applicant will comply with the GCD's management plan; the location of the well and the amount of water to be withdrawn; a water well closure plan; a drought contingency plan.[49]

The minimum requirements placed on GCDs for permit applications for renewing an operating permit for existing wells includes that the GCD consider the following: whether the proposed use of water unreasonably affects existing groundwater and surface water resources; whether the proposed use of water is dedicated to any beneficial use; whether the proposed use of water is consistent with the district's proposed management plan; and whether the applicant has agreed to avoid waste and achieve water conservation.[50]

The TDLR is responsible for well construction regulations and oversees the licensing of well drillers. Their information can be found on the following website: https://www.license.state.tx.us/LicenseSearch/

5. Hydraulic Connection and Regulation

Texas law does not create any liability between groundwater and surface water users. In *Pecos Co. Water Control & Imp. Dist. No. 1 v. Williams*, the court held that "the landowner owns the percolating water under his land and that he can make a non-wasteful use thereof . . ."[51] Even though the wells at issue in that case contributed to drying up the Comanche Springs, the landowners could not be stopped from using the groundwater under their land because they owned that water. The court seemed to leave open the possibility of legislation or local regulations regarding the issue when it referenced administrative rules in the oil and gas industry and pointed out that "the lands

[49] Tex. Water Code Ann. § 36.113 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[50] *Id.*

[51] *Pecos Co. Water Control & Imp. Dist. No. 1 v. Williams,* 271 S.W.2d 503, 505–06 (Tex. Civ. App. – El Paso 1954, writ ref'd n.r.e.).

here concerned are not presently included in a statutory water district."[52] The appeals court in Austin issued a similar holding in *Denis v. Kickapoo Land Co.*, where the court stated "it is immaterial that the springs so supplied with water were the sources of a stream or surface water course upon which riparian rights had vested, provided that the water was intercepted while it was still percolating through the soil before it had reached the surface of the ground at the springs."[53] One possible exception might be when groundwater levels affect spring flow and endangered species are present, but this is not a claim between landowners, and such a situation involves federal laws and agencies.[54]

6. Aquifer Recharge and Underground Storage

Aquifer management responsibility is given to GCDs that have aquifers within their boundaries. If more than one GCD has the same aquifer in their boundary, then the GCDs must jointly manage the aquifer.[55] GCDs may regulate the management of groundwater in the aquifers within their boundaries.[56]

In Region C, there are currently no plans to regulate, encourage, or facilitate aquifer storage.[57] "Studies of Aquifer Storage and Recovery (ASR) should continue, and pilot projects should be implemented if the strategy appears promising. ASR projects determined to be valuable should be added to future Regional Water Plans."[58]

In El Paso, Texas, which is located in Region E, the Hueco groundwater is recharge with treated surface water from the Jonathan Rogers Plant.[59]

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[52] *Id.* at 507.

[53] *Denis v. Kickapoo Land Co.,*771 S.W.2d 235, 238-39 (Tex. App. – Austin 1989, writ denied).

[54] *Sierra Club v. Lujan*, MO-91-CA-069, 1993 WL 151353, at *3 (W.D. Tex. Feb. 1, 1993).

[55] Tex. Water Code Ann. § 36.108 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[56] Tex. Water Code Ann. § 36.116 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[57] *See generally*, Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc., Region C. Water Plan 5.A10 (2016).

[58] Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc., Region C. Water Plan 5.A10-5.A11 (2016).

[59] Jon S. Albright, John B, Ashworth, and Jennifer Herrera, 2016 Far West Texas Water Plan 5-5 (2016).

Additionally, the City of Kerrville, located in Region J, injects excess treated surface water into the Trinity Aquifer through the ASR system.[60] "Kerrville will develop additional surface and groundwater supplies, storage option or modifications to the existing permits, and expansion of the ASR system if it can be shown that there are period when the City will not be able to use the permitted water from the Guadalupe River."[61]

Moreover, in Region L, "the Local Carrizo water management strategy involves the phased development or expansion of well fields in the Carrizo-Wilcox Aquifer1 for the purposes of meeting local municipal needs in Atascosa, Caldwell, Dimmit, Frio, Karnes, La Salle, Medina, Wilson, and Zavala Counties."[62] Region L employs the San Antonio Water System's (SAWS) ASR system.[63] Under this program, SAWS pumps water from the Edwards Aquifer when excess water is available under their existing permits, and stores it in the Carrizo Aquifer. This allows SAWS to store Edwards Aquifer water during wet times or low demand seasons, and recover the water during droughts, peak usage, or during high demand. Pumping from the Edwards Aquifer is regulated by the Edwards Aquifer Authority (EAA) based on groundwater permits, aquifer levels and spring flow.[64]

7. Water Management Plan(s)

The Texas Water Development Board ("TWDB") is responsible for creating a State Water Plan ("Water Plan") on a 5-year cycle.[65] The TWDB bases the State Water Plan off of the sixteen regional Water Plans.[66] The purpose of the Water Plan is to provide for the orderly development, management, and conservation of water resources across Texas. The Water Plan is considered a guide to state water policy, and must also contain legislative recommendations regarding facilitating more voluntary water transfers.[67]

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[60] Jon S. Albright, John B, Ashworth, and Jennifer Herrera, 2016 Plateau Water Plan 3-1 (2016).

[61] Jon S. Albright, John B, Ashworth, and Jennifer Herrera, 2016 Plateau Water Plan 5A-23 (2016).

[62] HDR Engineering, Inc., 2016 South Central Texas Regional Water Plan 5.1-3 (2016).

[63] Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc., Region C. Water Plan 5.A11 (2016).

[64] *Id.*

[65] Tex. Water Code Ann. § 16.051 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[66] *Id.*

[67] *Id.*

The TWDB has a website that reports data for the Water Plan by year, and may be accessed at: https://2017.texasstatewaterplan.org/statewide.

Each GCD, the Edwards Aquifer Authority, and the Harris-Galveston Subsidence District have their own water management plans.[68] In past years there has been a slight variance in the frequency that they are issued, some were updated after four to six years.[69] Each GCD is required as of May 1, 2021 to update their water management plans every five years.[70]

8. Regulatory Authorities

There are several agencies, departments, and/or committees involved in the creation and management of GCDs. These entities include: The TWDB, and the TCEQ.

The TCEQ facilitates a petition process for landowners who want to create a GCD. A groundwater planning and assessment team within TCEQ evaluates these petitions and assists landowners in creating a GCD and also evaluates and provides advice on proposals to create GCDs in the Texas legislature. Petitions to create GCDs are approved or rejected by the TCEQ, and the GCDs are then created with local voter approval.[71] The TCEQ also provides limited oversight and technical assistance to GCDs.[72] The Texas legislature may, through statute, modify the boundaries of existing GCDs or create new GCDs as needed.[73]

[68] Texas Water Development Board, Groundwater Conservation District Information, (last visited Jan. 16, 2020), https://www.twdb.texas.gov/groundwater/conservation_districts/gcdinfo3.asp (last visited Mar. 27, 2020).

[69] *Id.*

[70] Tex. Water Code Ann. § 36.108(d) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[71] Tex. Water Code § 36.013-015 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[72] *Groundwater Conservation Districts*, Texas Commission on Environmental Quality, (last visited Jan 16, 2020), www.tceq.texas.gov/groundwater/districts.html.

[73] TCEQ, *Priority Groundwater Management Areas and Groundwater Conservation Districts* (2013).

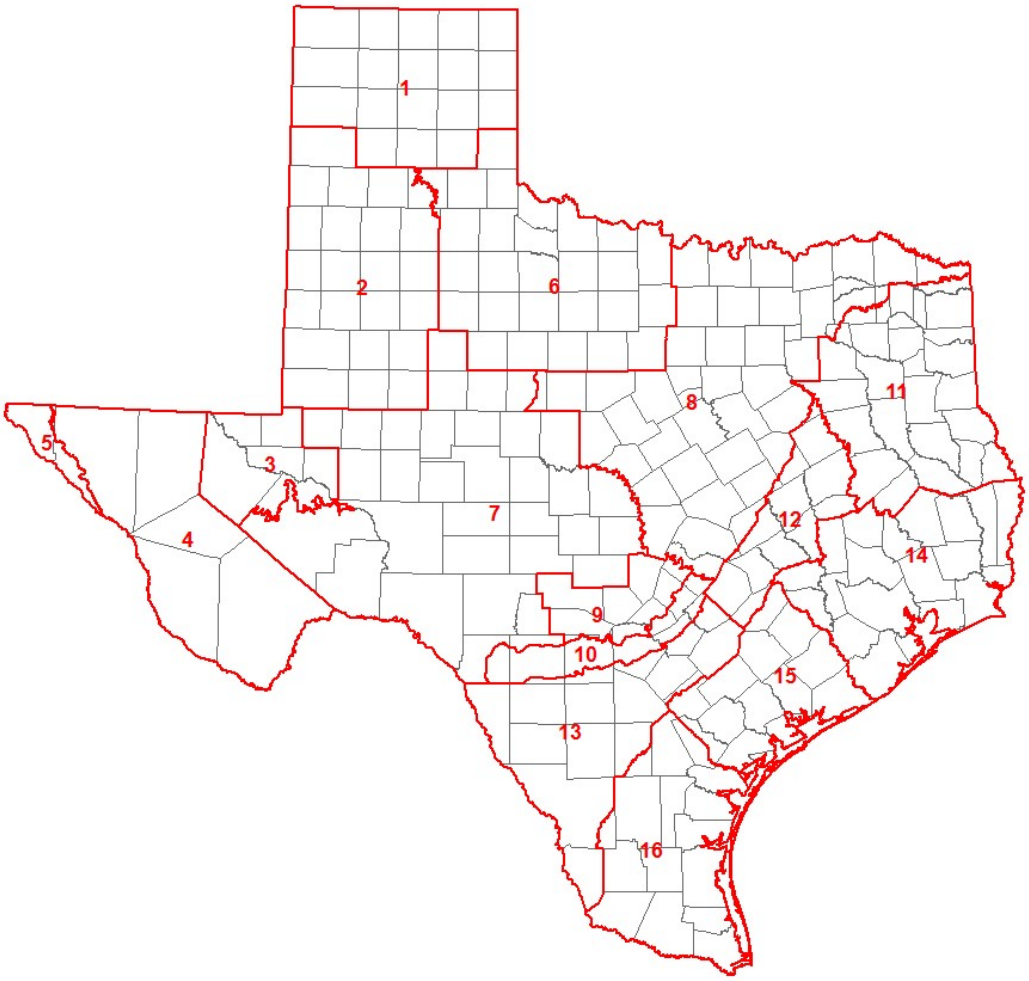

Fig. L.3. Groundwater Management Areas[74]

The TWDB does not substantively regulate groundwater or GCDs, but, in conjunction with the TCEQ, the TWDB designates groundwater management areas overlying known aquifers in which GCDs can be formed.[75] Additionally, every five years, GCDs must submit management plans for approval by the TWDB.[76] The TWDB and TCEQ

[74] Texas Water Development Board, *Groundwater Management Areas*, (last visited Jan. 16, 2020), https://www.twdb.texas.gov/groundwater/management_areas/ (last visited Mar. 27, 2020).

[75] Tex. Water Code § 35.004 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[76] Tex. Water Code Ann. § 36.1072 (West, West through end of 2019 Reg. Sess. 86th Leg.).

also work together to designate "priority groundwater management areas" (PGMAs), which are expected to face significant supply challenges in the future.[77] The TCEQ may be obligated to create or modify GCDs within these PGMAs.[78]

The primary goal of GCDs is "to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions . . . ."[79] GDCs have the power to levy taxes for the maintenance of the district, but are subject to voter approval by residents within the district.[80] Likewise, members of each GCD board must be voted upon by district residents.[81] GCDs may regulate the spacing of wells according to property boundaries, strength or capacity of wells, and other similar factors determined by the board of the GCD. GCDs may also regulate and restrict the amount of water that can be produced from a well, which can be based on tract size or the historical beneficial use of groundwater by a property.[82] It is important to recall, however, that Texas courts have recently found that certain groundwater production restrictions can result in a regulatory taking. This makes it unclear to what extent GCDs can or should limit or prohibit groundwater production.

[77] Tex. Water Code § 35.007 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[78] Tex. Water Code Ann. §§ 36.016; 35.012 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[79] Tex. Water Code Ann. § 36.015(b) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[80] *Id.*at § 36.0171 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[81] *Id.*

[82] *See* Tex. Water Code §§ 36.116(a-b); 36.101 (West, West through end of 2019 Reg. Sess. 86th Leg.); *see also Guitar Holding Co., L.P. v. Hudspeth County Underground Water Conservation District No. 1*, 263 S.W.3d 910 (Tex. 2008), holding "the amount of groundwater withdrawn and its purpose are both relevant when identifying an existing or historic use to be preserved."

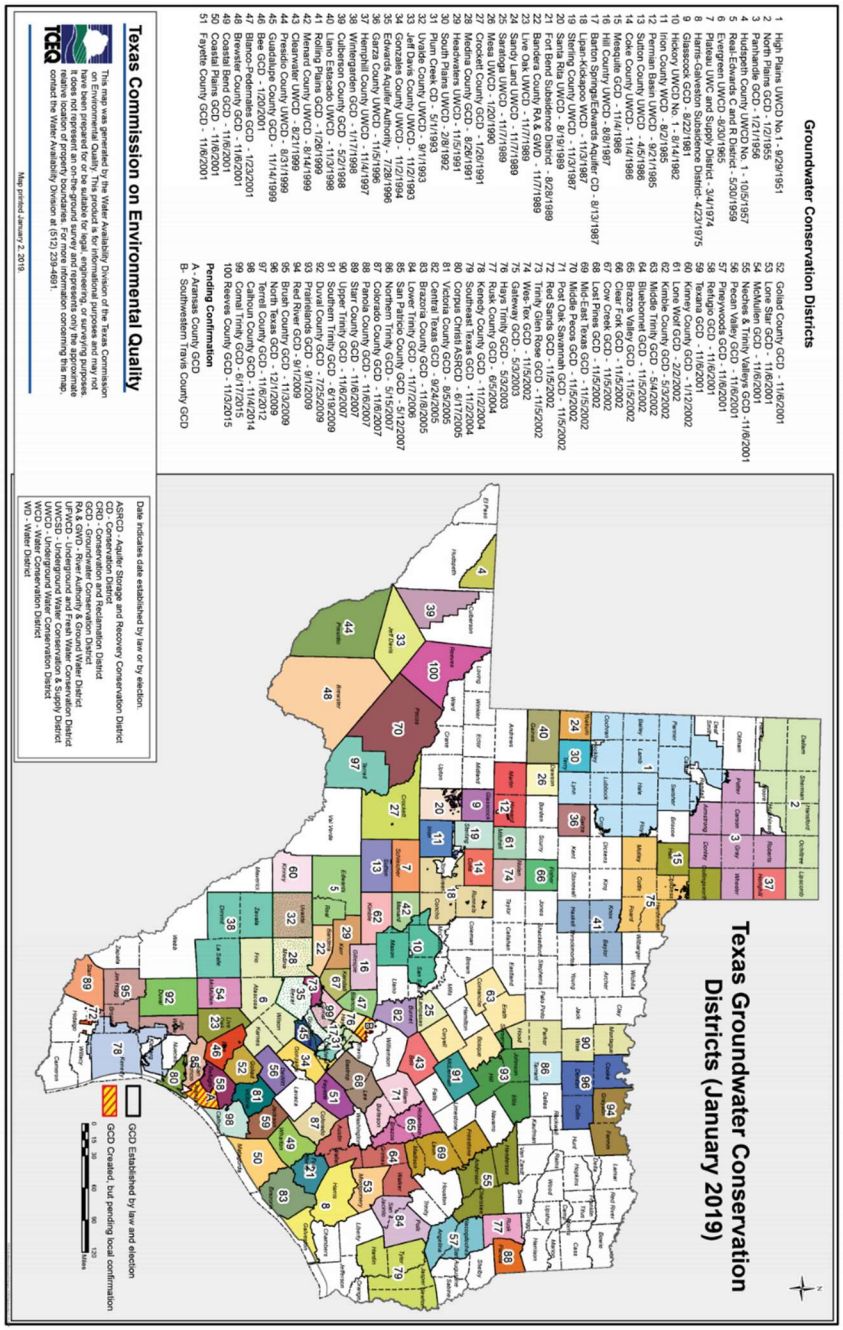

Fig. L.4. Groundwater Conservation Districts[83]

[83] Texas Commission On Environmental Quality, Texas Water Development Board, SFR- 053/17, *Priority Groundwater Management Areas and Groundwater Conservation Districts*, at 13, https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-17.pdf (last visited Mar. 27, 2020).

In addition to their own plans, groundwater districts within the same Groundwater Management Area must complete joint planning to determine the desired future conditions of the aquifer shared by the districts. Based on this goal, GCDs must plan their permitting to ensure this goal is met.[84] While there are no "special districts" in Texas, various GCDs within the same Groundwater Management Area have formed "alliances" to better manage water and plan for the future. Additionally, multiple Priority Management Areas have been designated, but special powers or authorities are not present in these areas.

There currently are 16 Groundwater Management Areas in Texas designated for planning purposes. Among these management areas, there are six "regional alliances" made up of GCDs sharing the same Groundwater Management Area. These regional alliances are: West Texas Regional Groundwater Alliance; Far West Texas Alliance of Groundwater Districts; Carrizo- Wilcox Aquifer Alliance; South Texas Regional Groundwater Alliance; Hill Country Groundwater Conservation District Alliance; and Southern Ogallala Regional Ground Water Alliance. In total, there are currently 100 separate GDCs in the state of Texas and two more are pending confirmation.[85] As of January, 2019, there were 7 PGMAs in the state of Texas. These are: Hill Country PGMA; Reagan, Upton, and Midland Counties PGMA; Briscoe, Hale, and Swisher Counties PGMA; Dallam County PGMA; El Paso County PGMA; Central Texas – Trinity Aquifer – PGMA; and the North-Central Texas – Trinity and Woodbine Aquifers –PGMA.[86]

[84] Tex. Water Code § 36.108 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[85] Texas Commission On Environmental Quality, Texas Water Development Board, SFR- 053/17, *Priority Groundwater Management Areas and Groundwater Conservation Districts*, at 13, https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-17.pdf (last visited Mar. 27, 2020).

[86] Texas Commission On Environmental Quality, Texas Water Development Board, SFR- 053/17, *Priority Groundwater Management Areas and Groundwater Conservation Districts*, at 18-21, https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-17.pdf (last visited Mar. 27, 2020).

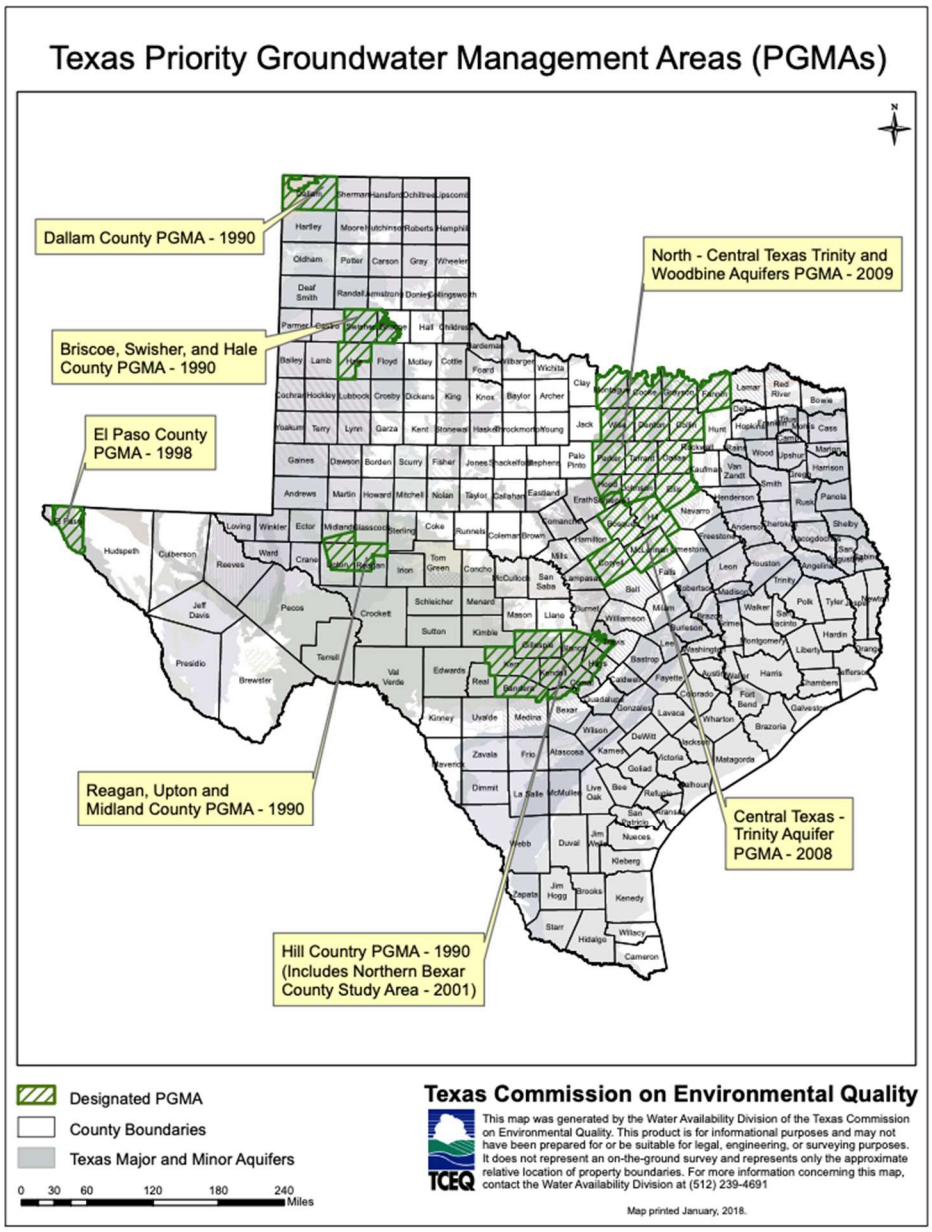

Fig. L.5. Priority Groundwater Management Areas[87]

[87] Texas Commission on Environmental Quality, *Texas Priority Groundwater Management Areas (PGMAS)*, https://www.tceq.texas.gov/assets/public/permitting/watersupply/groundwater/maps/pgma_areas.pdf (last visited Mar.27, 2020).

As mentioned in previous sections of this survey, local groundwater management is undertaken by GCDs. These Districts are the preferred method of groundwater regulation in Texas. The Districts must act toward avoiding water shortages, groundwater contamination, or land subsidence in a fair way using the best science available to them.[88]

Governing entities' contact information is listed at the following website: https://www.tceq.texas.gov/groundwater/districts.html

9. Special Districts

Texas has 100 GCDs and there are an additional two districts are pending confirmation.[89] The primary goal of GCDs is "to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions…"[90] GDCs have the power to levy taxes for the maintenance of the district, and these taxes, as well as members of the board, are subject to voter approval by residents within the district.[91] GCDs may regulate the spacing of wells according to property boundaries, strength or capacity of wells, and other similar factors determined by the board of the GCD. GCDs may also regulate and restrict the amount of water that can be produced from a well, which can be based on tract size or the historical beneficial use of groundwater by a property.[92] It is important to recall, however, that restricting groundwater production has resulted in a takings in the past. This makes it unclear to what extent GCDs can or should limit or prohibit groundwater production.

Groundwater districts within the same Groundwater Management Area must complete collective planning to better manage water and determine the desired future conditions

[88] Tex. Water Code Ann. § 36.0015(b) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[89] Texas Commission On Environmental Quality, Texas Water Development Board, SFR- 053/17, *Priority Groundwater Management Areas and Groundwater Conservation Districts*, at 13, https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-17.pdf (last visited Mar.27, 2020).

[90] Tex. Water Code Ann. § 36.015(b) (West, West through end of 2019 Reg. Sess. 86th Leg.).

[91] Tex. Water Code Ann. § 36.0171 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[92] *See* Tex. Water Code Ann. §§ 36.116(a-b); 36.101 (West, West through end of 2019 Reg. Sess. 86th Leg.); see also *Guitar Holding Co., L.P. v. Hudspeth County Underground Water Conservation District No. 1*, 263 S.W.3d 910 (Tex. 2008). (Holding "the amount of groundwater withdrawn and its purpose are both relevant when identifying an existing or historic use to be preserved).

of the aquifer shared by the districts. Based on this goal, GCDs must plan their permitting to ensure this goal is met.[93]

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The TWDB designates groundwater management areas covering all major and minor aquifers in the state.[95] However, these management areas do not have special powers or authorities of their own.

TWDB recognizes nine major aquifers and twenty-two minor aquifers.[96] Major aquifers include: Pecos Valley, Seymour, Gulf Coast, Carrizo-Wilcox, Hueco-Mesilla Bolsons, Ogallala, Edwards-Trinity (Plateau), Edwards (Balcones Fault Zone), and Trinity.[97] Minor aquifers include: Brazos River Alluvium, West Texas Bolsons, Lipan, Yegua-Jackson, Igneous, Sparta, Queen City, Nacatoch, Blossom, Woodbine, Rita Blanca, Edwards-Trinity (High Plains), Dockum, Rustler, Capitan Reef Complex, Blaine, Bone Spring-Victorio Peak, Marble Falls, Marathon, Ellenburger-San Saba, Hickory, and Cross Timbers.[98]

Priority Groundwater Management Areas (PGMAs) are areas identified by TCEQ as experiencing, or expected to experience within 50 years, critical groundwater problems including shortages of surface water or groundwater, land subsidence resulting from

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[93] Tex. Water Code Ann. §36.108 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[94] Texas Commission On Environmental Quality, Texas Water Development Board, SFR- 053/17, *Priority Groundwater Management Areas and Groundwater Conservation Districts*, at 13, https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-17.pdf (last visited Mar.27, 2020).

[95] Tex. Water Code Ann. § 35.004 (West, West through end of 2019 Reg. Sess. 86th Leg.).

[96] *See* Texas Water Development Board, *Major and Minor Aquifers Maps*, http://www.twdb.texas.gov/groundwater/aquifer/index.asp (last visited Mar.27, 2020).

[97] *Id.*

[98] *Id.*

groundwater withdrawal, or contamination of groundwater supplies. Once a PGMA is identified, TCEQ must make a specific recommendation on the creation of a GCD in the area. Citizens in the PGMA have up to two years to establish a GCD. If local action is not taken in this time frame, TCEQ is required to establish a GCD consistent with the original recommendation. Under either scenario, the resultant GCD would be governed by a locally elected board of directors.[99]

As of January, 2019, there were seven PGMAs in the state of Texas. These included: Hill Country PGMA; Reagan, Upton, and Midland Counties PGMA; Briscoe, Hale, and Swisher Counties PGMA; Dallam County PGMA; El Paso County PGMA; Central Texas – Trinity Aquifer – PGMA; and the North-Central Texas – Trinity and Woodbine Aquifers – PGMA.[100]

10. Transboundary Arrangements

In 1999, El Paso and Juárez signed a Memorandum of Understanding ("MOU"). The MOU recognized that water supply problems would worsen as both communities increase their populations. The MOU states that it is in the best interests of El Paso and Juárez to share groundwater information, such as groundwater pumping data.[101]

11. Native American Rights

It does not appear that the state grants exemptions, benefits, or concessions to Native American Tribes.

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[99] *See* Texas Commission on Environmental Quality, *Texas Priority Groundwater Management Areas (PGMAS)*, https://www.tceq.texas.gov/assets/public/permitting/watersupply/groundwater/maps/pgma_areas.pdf (last visited Mar.27, 2020).

[100] Texas Commission on Environmental Quality, *Summary Description of PGMAs*, (Jan. 2016), https://www.tceq.texas.gov/assets/public/permitting/watersupply/groundwater/maps/pgma_text.pdf(last visited Mar.27, 2020).

[101] Memorandum of Understanding/Convenio de Colaboración between the Junta Municipal de Agua Y Santeiento de Juarez, Chihuahua (JMAS) (City of Juarez Utilities) and the El Paso Water Utilities Public Service Board (PSB), of the City of El Paso, Texas ("MOU"), signed Dec. 6, 1999.

M. Washington

With a few exceptions, the primary system for acquiring water usage rights in Washington is prior appropriation. While the basis for a water right is first in time is first in right, an applicant for a water right must show that their use of the water must be beneficial in order to be considered for a permit.[1]

1. Definitions, Basis of Rights, Standards, and Interactions

Groundwater in Washington is defined as **"**all waters that exist beneath the land surface or beneath the bed of any stream, lake or reservoir, or other body of surface water within the boundaries of this state, whatever may be the geological formation or structure in which such water stands or flows, percolates or otherwise moves."[2] The state recognizes and defines a difference between 'natural groundwater' and 'artificially stored groundwater.'[3] Natural groundwater is water that exists and is recharged only by natural processes, while artificially stored groundwater becomes stored "artificially, either intentionally, or incidentally to irrigation and that otherwise would have been dissipated by natural processes."[4] Washington state defines a reservoir as "any naturally occurring underground geological formation where water is collected and stored for subsequent use as part of an underground artificial storage and recovery project."[5] This definition allows the Department of Ecology to issue reservoir permits to authorize ASR projects.[6] Subterranean streams are those that flow in a "distinct, permanent, well-known, and defined channel".[7] All underground waters in the state of Washington are presumed to be percolating unless it can be proven that a subterranean stream exists.[8]

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[1] *See* Wash. Rev. Code. Ann. § 90.44.090 & 90.54.020 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[2] Wash. Rev. Code Ann. § 90.44.035(3) (LexisNexis, Lexis Advance through 2019 Regular Session c 1-250).

[3] *Id*.

[4] *Id*. at 4-6.

[5] Wash. Rev. Code Ann. § 90.03.370(2)(a) (LexisNexis, Lexis Advance through 2019 Reg. Sess. c 1-250)

[6] Department of Ecology, *Aquifer storage, recovery, & recharge*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-recovery-solutions/Aquifer-storage-recovery-recharge (last visited Mar.27, 2020).

[7] *Evans v. Seattle*, 182 Wash. 450, 451, 47 P.2d 984, 984 (1935).

[8] *Id*.

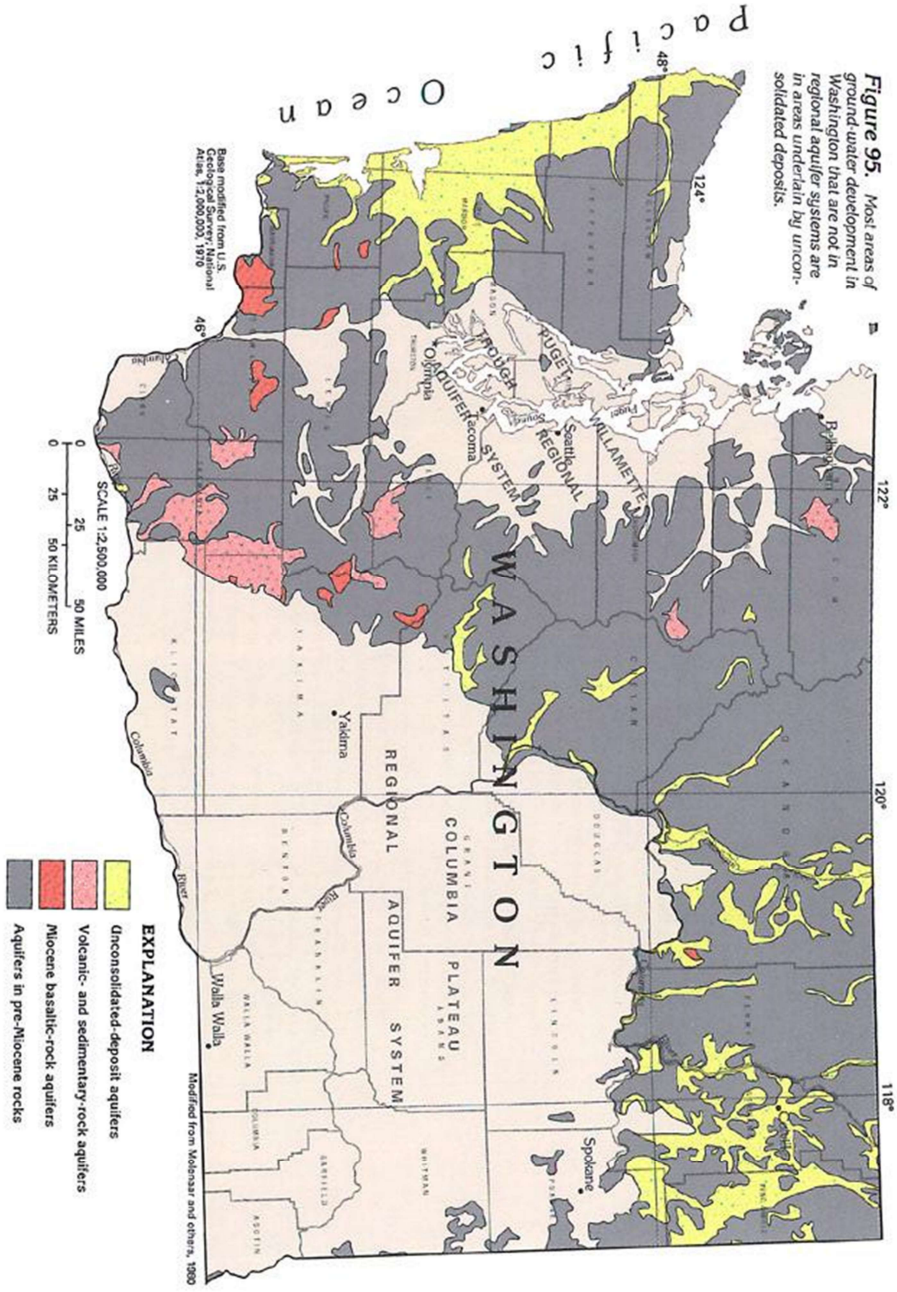

Fig. M.1. Washington Aquifers Excluding Regional Aquifer Systems[9]

[9] USGS, *Groundwater Atlas of the United States: Idaho, Washington, Oregon (Fig. 95),* https://pubs.usgs.gov/ha/ha730/ch_h/H-other_areas.html (last visited Mar.27, 2020).

Washington adopted a comprehensive water management code in 1917.[10] The 1917 water code established prior appropriation as the dominant water law in Washington.[11] After 1917, new surface water rights may be acquired only through compliance with the permit system, managed by the Department of Ecology, and existing water rights not put to beneficial use are forfeited.[12] The permit system, modified over time to require a permit for all water put to beneficial use, allows the state to implement the state water policy more efficiently.[13] The 1917 water code was extended to apply to groundwater in 1945.[14]

Appropriations of both groundwater and surface water today follow a "first in time, first in right" rule.[15] The Washington State Department of Ecology issues permits for water usage rights in public groundwater resources.[16] Before a groundwater permit can be issued to appropriate groundwater, the Department of Ecology "must investigate and affirmatively find (1) that water is available, (2) for a beneficial use, and that (3) an appropriation will not impair existing rights or (4) be detrimental to the public welfare."[17] The approval of groundwater permits is entirely at the discretion of the Department of Ecology.[18]

Some examples of activities deemed to be 'beneficial use' include:

> Uses of water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.[19]

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[10] Jeremy Lieb, A Solution to the Exempt Well Problem? *The New Role of Counties in Determining Legal Water Availability in Washington State*, 3 Wash. J. Envtl. L. & Pol'y 60, 64 (June 2013).

[11] Wash. Rev. Code. Ann. § 90.03.010 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[12] *Department of Ecology v. Abbott,* 694 P.2d 1071, 1072 (Wash. 1985).

[13] Wash. Rev. Code. Ann. § 90.03.010 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.); *Department of Ecology v. Abbott*, 694 P.2d 1071, 1072 (Wash. 1985).

[14] Lieb, supra note 6, 66.

[15] *Rettowski v. Department of Ecology*, 858 P.2d 232, 236 (Wash. 1993) (citing Wash. Rev. Code. Ann. § 90.03.010).

[16] Washington State Department of Ecology, *Water Rights*, http://www.ecy.wa.gov/programs/wr/rights/water-right-home.html (last visited Mar.27, 2020).

[17] *State v. Campbell Gwin*, LLC, 43 P.3d 4, 8 (Wash. 2002)(en banc); Wash. Rev. Code. Ann. § 90.03.290 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[18] *Hills v. State, Dept of Ecology*, 932 P.2d 139, 145 (Wash. 1997) (en banc).

[19] Wash. Rev. Code. Ann. § 90.54.020(1) (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

Specific uses are exempt from the permitting requirement. A groundwater withdrawal for the purposes of stock watering, watering of a lawn or non-commercial garden not exceeding one-half acre in area, single or group domestic uses in an amount not exceeding five thousand gallons a day, or for an industrial purpose in an amount not exceeding five thousand gallons a day are exempt from the groundwater permitting requirement.[20] So long as these withdrawals are used beneficially, the water right holds the same weight of law as a permit issued right.[21]

2. Sources of Law

The vast majority of Washington groundwater law is codified in two chapters.

Chapter 90.44 - Regulation of Public Groundwaters
Chapter 90.03 - Washington Water Code

3. Scope of Right

a. Groundwater Ownership

The State owns all groundwater in Washington. Groundwater is a public resource, and it is subject to appropriation by the Department of Ecology.[22] Those who hold groundwater permits issued by the Department have the right to put the water to beneficial use; they do not have a right to the water itself.

b. Scope of Use

i. Permitted and Preferred Uses

Uses of water that are declared to be beneficial include those that are for

> domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation

[20] Wash. Rev. Code Ann. § 90.44.050 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[21] *Id.*

[22] Wash. Rev. Code Ann. § 90.44.040 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

> of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.[23]

If a water permit holder finds that they are unable to put all or part of their permitted amount of water to beneficial use, they can place their unused portion in a water bank.[24] Water banks protect the permit holders from relinquishment statutes and allow other users to buy water use rights when less water is available from the Department of Ecology.[25] Water banks in the State of Washington also facilitate voluntary streamflow improvement, drought management, and water mitigation.[26]

To determine which use is first in priority for purposes of obtaining a groundwater right in Washington it is absolutely critical to understand that throughout the history of the state more than one system of obtaining water rights have been used, pre-1945 (riparian system modified by common law) and post-1945 (permit system based on prior appropriation).[27] Therefore because the groundwater code states that the right to use public waters after 1945 are granted subject to existing rights, it can be inferred that those uses and rights acquired before 1945 are superior to those acquired after 1945.[28] However, riparian rights may be limited. Furthermore, because the 1945 groundwater code exempts certain uses from the permitting process, it can be inferred that those uses are superior to those uses that require a permit.[29]

> Decisions to grant a groundwater application generally lies in the Department of Ecology's discretion, though it must deny an application if there is no unappropriated water available, if withdrawal will conflict with or impair existing rights, or if withdrawal will detrimentally affect the public interest.[30]

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[23] Wash. Rev. Code. Ann. § 90.54.020(1) (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[24] Wash. Rev. Code Ann. § 90.42.100(2) (LexisNexis, Lexis Advance through 2019 Reg. Sess.)

[25] Department of Ecology, *Water banks*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights/Trust-water-rights/Water-banks (last visited Mar.27, 2020).

[26] Wash. Rev. Code Ann. § 90.42.005(2)(d) (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[27] See Wash. Rev. Code. Ann. § 90.44.035; see also, Washington State Department of Ecology, *Water Rights*, http://www.ecy.wa.gov/programs/wr/rights/water-right-home.html (last visited Mar.27, 2020).

[28] Wash. Rev. Code. Ann. § 90.44.035 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[29] Wash. Rev. Code. Ann. § 90.44.050 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[30] *Postema v. Pollution Control Hearing Board*, 11 P.3d 726, 745 (Wash. 2000) (en banc).

The Department of ecology has created different groundwater zones that establish the priorities of right to withdrawal groundwater for each groundwater zone/area separately.[31] "The extent of protection provided by the Washington groundwater code depends upon a site-specific factual inquiry and technical analysis that takes into consideration both the geohydraulic characteristics of the aquifer and the state of pump and well construction technology."[32] "Allocation of waters among potential uses and users shall be based generally on securing the maximum net benefits for the people of the state. Maximum net benefits shall constitute total benefits less costs including opportunities lost."[33]

ii. Location of Use

Water permit applications do not restrict the location of water use to overlying land.[34] The location of use may be a factor when the Department of Ecology determines if the water would be put to beneficial use, and if the use of the water would be a detriment to society.[35]

c. Loss of Water Rights

The State of Washington follows the 'use it or lose it' rule. A water right may be lost if the water is not continuously used beneficially.[36] The Registration and Relinquishment Act of 1967 makes the beneficial use of water essential to the continued right to hold a water permit.[37] A permit holder is forced to forfeit their water use rights if the water is not put to beneficial use for a period of five or more years without sufficient cause.[38] A statutory forfeiture may be the result of willful failure to comply with the beneficial use standard, or it may result from abandonment.[39] In order to lose water use rights through statutory forfeiture, there must be proof of nonuse, but there does not need to be proof of an intent to

[31] Office of the Attorney General, *An Introduction to Washington Groundwater Law*, V:13-V:14 (January 2000).

[32] *Id.* at V:16.

[33] Wash. Rev. Code. Ann. § 90.54.020(2) (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[34] Department of Ecology, *Application for a Water Right Permit* (2015), https://fortress.wa.gov/ecy/publications/documents/ecy040114.pdf (last visited Mar.27, 2020).

[35] Department of Ecology, *Changing or Transferring and Existing Water Right* (2008), https://fortress.wa.gov/ecy/publications/documents/981802wr.pdf (last visited Mar.27, 2020).

[36] Office of the Attorney General, *An Introduction to Washington Groundwater Law*, VI:1 (January 2000).

[37] Wash. Rev. Code Ann. § 90.14.020(3) (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[38] Wash. Rev. Code Ann. § 90.14.160 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[39] *Id*.

abandon.[40] If there was 'sufficient cause' for the failure to meet the beneficial use standard, than the permit holder may be exempt from statutory forfeiture.[41] Once a water use right is forfeited, the rights revert to the state and become available for appropriation.[42]

Abandonment can also result in a water right being lost through common law abandonment if intent can be proven. Common law abandonment in the State of Washington is challenging to prove because the complaining party must prove that the abandoning party had the intent to abandon and executed an act of voluntary relinquishment.[43]

Oddly, Washington allows water rights to be taken by an individual through eminent domain "when found necessary for the storage of water for, or the application of water to, any beneficial use, including the right to enlarge existing structures employed for the public purposes mentioned in this chapter …"[44] "In condemnation proceedings the court shall determine what use will be for the greatest public benefit, and that use shall be deemed a superior one."[45] If the water right is condemned for irrigation purposes, then the taking should not hinder the ability of other users to irrigate their own land properly.[46]

Water rights that existed before the enactment of the 1945 Groundwater Code must have been registered on or before June 30, 1998.[47] Failure to register a statement of claim by this time resulted in the relinquishment of the water right.[48] As of 1967, a person cannot lose their water rights through adverse possession or prescription in the State of Washington.[49]

4. Well Drilling

Washington regulates well drilling and requires any person or entity to be licensed or employ or contract with a person or entity that is licensed by the State. Drilling, modifying, or

[40] Office of the Attorney General, *An Introduction to Washington Groundwater Law*, VI:4 (January 2000).

[41] Wash. Rev. Code Ann. § 90.14.140 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[42] Wash. Rev. Code Ann. § 90.14.160 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[43] Office of the Attorney General, *An Introduction to Washington Groundwater Law*, VI:10 (January 2000).

[44] Wash. Rev. Code Ann. § 90.03.040 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[45] *Id*.

[46] *Id*.

[47] Wash. Rev. Code Ann. § 90.14.068(1) (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[48] Wash. Rev. Code Ann. § 90.14.071 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[49] Wash. Rev. Code Ann. § 90.14.220 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

abandoning a water well requires a license from the Department of Ecology.[50] The Department of Ecology also promulgates standards and procedures for water well construction.[51] Construction standards may be modified depending on the specific conditions of the land.[52] At least 72 hours before construction begins, the landowner or well owner must notify the Department of Ecology of the intent to drill a well.[53] The landowner must also notify the Department of Ecology once the well is completed.[54]

5. Hydraulic Connection and Regulation

Instream flows are monitored and regulated in certain areas under the Streamflow Restoration Law. In a landmark 2016 decision, in *Whatcom County vs. Hirst* the Washington State Supreme Court recognized that science has proven that rivers and streams are generally connected to groundwater and new permits for exempt wells should not be approved if a well would impact a protected river or stream, or an existing water right.[55] The court's decision requires that each county make independent determinations about whether there is enough water to approve a building permit, rather than rely on the determinations of the Department of Ecology.[56] This development has led to many counties severely restricting building permits for houses relying on permits for exempt wells.[57] In the wake of the *Hirst* decision, the State of Washington passed a new Streamflow Restoration Law on January 18, 2018,[58] which helped clarify how counties issue building permits for homes that plan to use permit-exempt wells.[59] The law requires local governments to monitor and plan for the use of water resources before allowing new developments dependant on permit-exempt wells. A chief objective of the law is restored stream flows and healthy salmon populations.[60]

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[50] Wash. Rev. Code. Ann. § 18.104.030(6) (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.); Wash Rev. Code. Ann. § 18.104.070 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[51] Wash. Rev. Code Ann. § 18.104.030(4) (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[52] Wash. Rev. Code Ann. § 18.104.049 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[53] Wash. Rev. Code Ann. § 18.104.048 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[54] Wash. Rev. Code. Ann. § 18.104.050 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[55] *Whatcom Cty. v. W. Wash. Growth Mgmt. Hr'gs Bd.*, 186 Wash. 2d 648, 381 P.3d 1 (2016).

[56] *Id*.

[57] Department of Ecology, *Hirst Decision*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights/Case-law/Hirst-decision (last visited Mar.27, 2020).

[58] Wash. Rev. Code Ann. § 90.94.020 (LexisNexis, Lexis Advance through 2019 Reg. Sess. c 1-250).

[59] Department of Ecology, *Streamflow Restoration*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Streamflow-restoration (last visited Mar.27, 2020).

[60] Wash. Rev. Code Ann. § 90.90.94 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

Surface water rights are superior to groundwater use rights when the groundwater and surface water are hydraulically linked.[61] If the Department of Ecology finds "significant hydraulic continuity" between surface water subject to minimum in-stream flows and a proposed groundwater source, a subsequent application for a groundwater rights permit for that source may either be denied by the Department of Ecology or subjected to conditions to protect the established levels.[62] "Where it is clear that overriding considerations of the public interest will be served" the Department of Ecology can make exceptions for new groundwater permits to be issued where in-stream flows may be affected.[63]

There is no penalty for failing to comply with the Streamflow Restoration Law at this time. However, in *Hubbard v. Department of Ecology*, a Washington Appellate Court upheld the Department of Ecology's decision to restrict groundwater withdrawals in order to protect instream flows where a significant hydraulic continuity between the aquifer and river was established.[64]

6. Aquifer Recharge and Underground Storage

Washington does regulate and facilitate aquifer recharge and underground storage programs.[65] Aquifer storage and recovery (ASR) in the State of Washington is "a cost-effective way to capture and store water when it is available so it can be used during times when it is limited. Groundwater storage can serve the same purposes as surface water reservoirs, without many of the issues and costs related to dams."[66] There are strict permitting requirements for ASR projects, but permits are not required for projects using shallow aquifer recharge (SAR).[67] SAR "shares elements with ASR, but is not intended for storage and subsequent recovery."[68] SAR is used mostly for mitigating declining

[61] Wash. Rev. Code. Ann. § 90.44. 030 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

[62] *Hubbard v. State*, 936 P.2d 27 (Wash. App. Div. 3 1997).

[63] Wash. Rev. Code Ann. § 90.54.020(3)(a) (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[64] Office of the Attorney General, *An Introduction to Washington Groundwater Law*, V:30 (January 2000) (citing *Hubbard v. Department of Ecology*, 936 P.2d 27) (Wash. App. 1977)).

[65] Department of Ecology, *Aquifer storage, recovery, & recharge*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-recovery-solutions/Aquifer-storage-recovery-recharge (last visited Mar.27, 2020).

[66] *Id*.

[67] *Id*.

[68] *Id*.

groundwater levels by embracing natural snow and rain patterns.[69] Water flows over the surface and recharge is facilitated by diverting it to infiltration sites.[70]

Permits from the Department of Ecology are required before anyone can establish a reservoir for ASR.[71] The Department of Ecology is required by law to establish rules and to carry out reviews for ASR applications.[72] To develop an ASR project, all of the required authorizations and permits outlined by WACs 173-157-50 must be acquired, including the water rights to resource waters, a reservoir permit, a secondary permit, UIC registration, and a NPDES permit.[73] In addition to these permits, the application must also include a description of the hydrogeologic system prepared by a hydrogeologist licensed in the state of Washington, a project operation plan with a description of the pilot and operational phases of the ASR project prepared by an engineer or geologist licensed in the state of Washington, a description of the legal framework for the proposed project, an environmental assessment and analysis of any potential adverse conditions or potential impacts to the surrounding ecosystem(s) that might result from the project, a project mitigation plan, and a project monitoring plan.[74] Once the permits for an ASR project are approved, the water stored in the aquifer must adhere to water quality standards by preventing contamination and complying with the Safe Drinking Water Act and the Water Pollution Control Act.[75] All injection wells for ASR projects must be registered with the Department of Ecology.[76]

7. Water Management Plan(s)

The State of Washington mandates that all water resource inventory areas (WRIA) establish water resource management and development plans.[77] Since the implementation of the Watershed Planning Act in 1997, forty-four watershed planning groups have developed

[69] *Id*.

[70] *Id*.

[71] Wash. Rev. Code Ann. § 90.44.460 (LexisNexis, Lexis Advance through 2019 Reg. Sess. c 1-250)

[72] Wash. Rev. Code Ann. § 90.03.370(2)(b) (LexisNexis, Lexis Advance through 2019 Reg. Sess. c 1-250)

[73] Wash. Admin. Code § 173-157-050 (Lexis Advance through the 19-13 Wash. State Reg. (WSR), July 3, 2019).

[74] Wash. Admin. Code § 173-157-110 (Lexis Advance through the 19-13 Wash. State Reg. (WSR), July 3, 2019).

[75] Wash. Admin. Code § 173-218-010 (Lexis Advance through the 19-13 Wash. State Reg. (WSR), July 3, 2019).

[76] *Id.*

[77] Wash. Rev. Code Ann. § 90.82.005 (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

plans, and thirty-three have adopted their plans.[78] Only a select few have implemented priority actions.[79] Many WRIAs either did not participate in the Watershed Planning Act or were not able to reach a consensus on the final plans. The Department of Ecology does encourage WIRAs, local government partners, tribal nations, and nonprofit organizations to implement their local watershed plans by providing grants and loans.[80] In the 2017-19 funding cycle, the Department of Ecology provided over $1.5 million for select organizations to conduct surface or groundwater feasibility studies, improve water quality, monitor water use, and enhance stream flows.[81]

The only plans that must be updated are the ones that are affected by the *Hirst* decision.[82] Watershed districts that plan to use permit-exempt wells for water supplies to new developments must update or adopt new management plans by 2021.[83]

8. Regulatory Authorities

The Department of Ecology is responsible for evaluating applications for water rights. It is within their power to accept or reject applications. If a permit holder violates the conditions of their water use right as stated in their application, then the Department can revoke their permit and levy fines.[84] The Department also monitors water supply, and instream flows throughout the state.[85] The Department's website is:
http://www.ecy.wa.gov/water/groundwater.html

[78] Department of Ecology, *Watershed plan Archive*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Streamflow-restoration/Watershed-plan-archive (last visited Aug.1, 2019).

[79] *Id*.

[80] Department of Ecology, *Watershed plan implementation & flow achievement grants*, https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Watershed-planning-grants (last visited Mar.27, 2020).

[81] Department of Ecology, *2017-2019 Capital Budget* (2017), https://fortress.wa.gov/ecy/wrdocs/WaterRights/wrwebpdf/2017-19WRPIFA-ProjectList.pdf (last visited Mar.27, 2020).

[82] Department of Ecology, *Watershed plan Archive*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Streamflow-restoration/Watershed-plan-archive (last visited Mar.27, 2020).

[83] *Id*.

[84] Wash. Rev. Code Ann. § 90.03.600 (LexisNexis, Lexis Advance through 2019 Reg. Sess.)

[85] Wash. Rev. Code. Ann. § 43.21A.064 (West, Westlaw through 2020 Reg. Sess. of the Wash. Leg.).

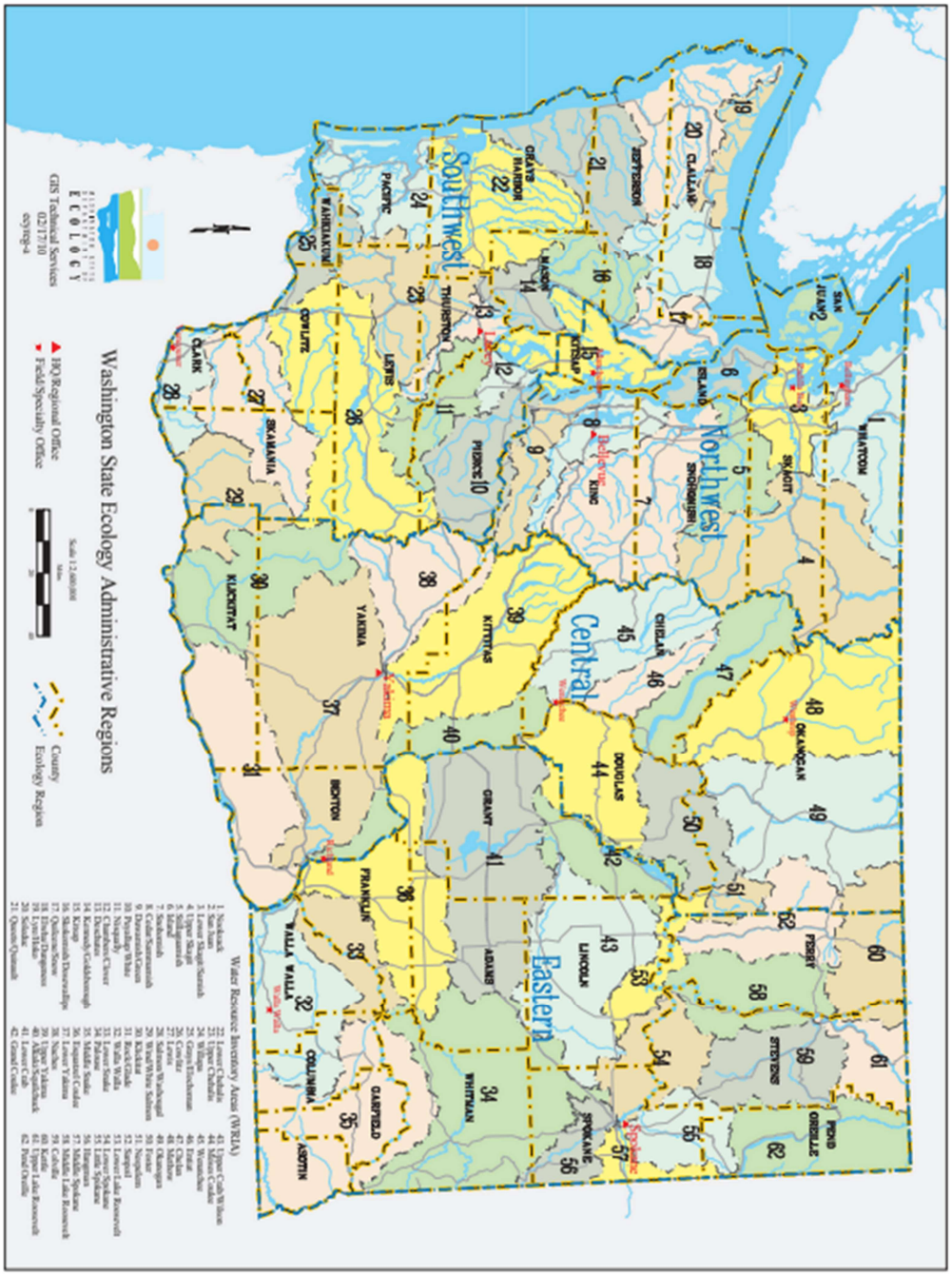

Fig. M.2. Washington Administrative Regions and Water Resources Inventory Areas[86]

[86] Department of Ecology, *State, County, and Watershed Maps for Washington*, https://ecology.wa.gov/Research-Data/Data-resources/Geographic-Information-Systems-GIS/Maps (last visited Mar.27, 2020).

9. Special Districts

Special groundwater districts exist in Washington for the "protection of water quality, assurance of quantity, and efficient management of water resources to meet future needs."[87] The Department of Ecology is in charge of identifying groundwater management areas (GMA) and scheduling the development of programs for those areas.[88] When identifying groundwater management areas, the Department of Ecology evaluates the threat level to each water source, including recharge restriction and over appropriation.[89]

GMAs are an essential part of protecting critical aquifer recharge areas (CARA). Establishing a GMA is the final step towards managing groundwater withdrawals in a CARA where the primary goal is to preserve the quality of Washington drinking water.[90]

It is noteworthy that documents in Washington often abbreviate groundwater management areas as 'GMA.' The Growth Management Act is also abbreviated as 'GMA.' This may lead to some confusion as these terms appear together in the Critical Aquifer Recharge Areas Guidance Document.

10. Transboundary Arrangements

In 1992 Washington and Idaho agreed to work together to manage water resources in the Palouse Basin Region.[91] The 1992 Palouse Basin Groundwater Management Plan established the Palouse Basin Aquifer Committee (PBAC).[92] The committee is composed "of representatives from Pullman and Moscow, City of Palouse, Whitman and Latah counties, Washington State University and the University of Idaho."[93] The PBAC monitors the aquifer and implements the Palouse Basin Groundwater Management Plan.[94] The

[87] Wash. Rev. Code Ann. § 90.44.400(1) (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[88] *Id*. at 90.44.400(2).

[89] *Id*. at 90.44.400(2)(a-f).

[90] Department of Ecology, *Critical Aquifer Recharge Areas Guidance Document* (2015), https://fortress.wa.gov/ecy/publications/documents/0510028.pdf (last visited Mar.27, 2020).

[91] Palouse Basin Aquifer committee, http://palousebasin.org/about/ (last visited Mar.27, 2020).

[92] Palouse Basin Aquifer committee, *2015 Information Update to 1992 Palouse Basin Ground Water Management Plan* (2015), http://palousebasin.org/wp-content/uploads/2018/06/150331_Final_PBAC_GWMP_Informational_Update.pdf (last visited Mar.27, 2020).

[93] Palouse Basin Aquifer committee, http://palousebasin.org/about/ (last visited Mar.27, 2020).

[94] Palouse Basin Aquifer committee, *2015 Information Update to 1992 Palouse Basin Ground Water Management Plan* (2015), http://palousebasin.org/wp-

management plan lays out specific guidelines for each state to adhere to when granting groundwater right permits within the aquifer.[95] The PBAC updated the 1992 Palouse Basin Groundwater Management Plan in 2015.[96] The plan will need to be updated or renewed in 2035.[97]

11. Native American Rights

Twenty-one tribes in Washington State have federally reserved rights to natural resources.[98] There are also out-of-state tribes that have treaty rights within the state.[99] In *United States v Winters*, federally recognized Indian tribes obtained implied water rights sufficient to fulfill the purposes of the reservation.[100] These water rights in Washington State are senior to other users, and the use of the water does not have to comply with state law. After the *Hirst* decision, Washington legislation mandated that federally recognized Indian tribes must be a part of the planning units for each water resource inventory area that would affect them.[101]

In April of 2019, the Department of Ecology, the Spokane Tribe, and the US Department of Justice reached an agreement to protect flows in the Chamokane Creek.[102] In *United States v. Anderson,* the Spokane Tribe alleged the drilling and use of permit-exempt wells was infringing on their right to adequate streamflow in the Creek.[103] The agreement specifies that stock and domestic use of the creek shall not be changed and a mitigation program will offset the impacts.[104]

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content/uploads/2018/06/150331_Final_PBAC_GWMP_Informational_Update.pdf (last visited Mar.27, 2020).

[95] *Id*.

[96] *Id*.

[97] *Id*.

[98] Department of Ecology, *Working with Tribal Governments*, https://ecology.wa.gov/About-us/How-we-operate/Tribal-relations (last visited Mar.27, 2020).

[99] *FEDERALLY RECOGNIZED INDIAN TRIBES WITH TREATY RESERVED RIGHTS. IN WASHINGTON STATE And THE STATE OF WASHINGTON* (2004), https://goia.wa.gov/sites/default/files/public/gov-to-gov/OutOfStateAccord.pdf?5p (last visited Mar.27, 2020).

[100] *Winters v. United States*, 207 U.S. 564, 28 S. Ct. 207 (1908).

[101] Wash. Rev. Code Ann. § 90.94.020(3) (LexisNexis, Lexis Advance through 2019 Reg. Sess.).

[102] Department of Ecology, *Chamokane Creek*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Chamokane-Creek (last visited Mar.27, 2020).

[103] *United States v. Anderson*, 736 F.2d 1358 (9th Cir. 1984).

[104] Department of Ecology, *Chamokane Creek*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Chamokane-Creek (last visited Mar.27, 2020).

The Yakima Basin is highly susceptible to drought, and is heavily relied on by the Yakama Indian Nation for hunting and fishing.[105] Because this basin has been the source of many water rights disputes, the state legislature approved funding for the Yakima River Basin Integrated Water Management Plan.[106] The plan specifies that groundwater storage will be implemented to help stabilize in stream flows necessary to protect salmon in the river.[107]

Nearly all of the federally recognized Indian tribes of Washington have dedicated natural resource departments. Their websites list the existence of the department, but do not detail what the departments do or if they enforce specific codes or statutes related to groundwater law. The Department of Ecology drafts water laws in conjunction with representatives from the tribes. This seems to imply that the tribes adhere to the policies that they help to create. The following is a link to the federally recognized tribes and their websites: https://goia.wa.gov/tribal-directory/federally-recognized-indian-tribes.

[105] Department of Ecology, *Yakima River Basin Integrated Plan*, https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-supply-projects-EW/Yakima-River-Basin-projects/Yakima-integrated-plan (last visited Mar.27, 2020).

[106] *Id.*

[107] Derek Sandisen, et al., *Yakima River Basin Integrated Water Resource Management Plan Final Programmatic Environmental Impact Statement* (2012), https://fortress.wa.gov/ecy/publications/documents/1212002.pdf (last visited Mar.27, 2020).

Fig. M.3. Washington Tribes and Tribal Reservations[108]

[108] Department of Ecology, *State, County, and Watershed Maps for Washington*, https://ecology.wa.gov/Research-Data/Data-resources/Geographic-Information-Systems-GIS/Maps (last visited Mar.27, 2020).

Appendix A: State Laws/Regulations Questionnaire

States Groundwater Rights - Laws and Regulations Questionnaire

1. Name of State:

2. Overview of groundwater governance system

    a. Definition of groundwater, underground water, aquifer, and any other relevant terms

    b. Characterize system (e.g., Prior Appropriation, Reasonable Use, Absolute Ownership, Correlative Rights, Restatement, or a Combination)

    c. Briefly describe the legal basis for right
        i. First in time, overlying land ownership, permit, etc.
        ii. Standards for right (e.g., beneficial use, reasonable use, etc.)
        iii. If a combination of systems, describe interactions

3. Identify the source(s) of law for the allocation system (e.g., chief case(s), statute(s), etc.)

4. What is the scope of the right?

    a. Who "owns" the water? (Is GW owned by individuals, (vested or use right) but held in trust by state? Does the public own groundwater or the right to use it?)

    b. Scope of limitations on use
        i. Allowable types of use

        ii. Preference of use (if any)
            1) Hierarchy for purposes of use (e.g., domestic, agriculture, industrial, mining, municipal, etc.)?
            2) Standards for preference (beneficial use, reasonable use, etc.)

        iii. Location of use (permitted/prohibited)
            1) Overlying vs. non-overlying land
            2) Transport of water (e.g., within a basin, outside a basin)

    c. Loss of water rights
        i. Can water rights be lost?

        ii. If yes, under what circumstances can right be lost? (e.g., abandonment, forfeiture, prescription, eminent domain)
        iii. What is the legal procedure for loss?

5. Does the state regulate well drilling?

a. If yes, briefly describe type of regulations. (e.g., licensing of contractors, permits for drilling, criteria for drilling, well-construction standards, etc.)

b. List state authorities responsible for well-drilling oversight

6. Does state law regulate the Ground/Surface Water Interaction?

a. If so, how?

b. Is there a priority among users of hydraulically linked surface and ground waters?

c. What is the liability for interference?

7. Does the state regulate, encourage, or facilitate aquifer recharge or underground storage programs? (Increase aquifer levels/health, keep water in aquifer, store excess water, etc.)

a. If so, briefly describe the programs, policies, and regulations that are in place.

b. What is the governmental entity/entities responsible for oversight of aquifer recharge/underground storage?

8. Statewide or Local Water Management Plans

a. Does the state develop a water management plan? (statewide or local management plans)
b. How often is a plan finalized and issued?

9. List the permitting/regulatory authorities for groundwater in the state

a. Who is/are the Agency/Department(s)

b. List contact information (website)

c. What is the scope of authority/responsibility? (permitting, monitoring, etc.)

d. Are there any special districts present?

i. Designated Basins/Districts
ii. Critical Groundwater management Areas

10.Transboundary Arrangements and/or Conflicts

a. Is the state a party to a trans-boundary arrangement that involves or pertains to groundwater resources? (agreement to store/trade/relinquish water or rights)

   i. What is the scope and objective of the arrangement?

   ii. How long does it last/ how often must it be renewed?

b. Is the state involved in a transboundary conflict that involves or pertains to groundwater resources? (litigation/dispute)
   i. Who are the parties?

   ii. What is the basic issue in dispute?

11. Native American Rights (pacts, agreements, exemptions, separate regime, etc.)

a. Does the state grant exemptions, benefits, concessions, etc. to tribes that involves or pertains to groundwater resources? If so, what are they?

b. If tribal groundwater rights are wholly or mostly separate from the state's regime, please prepare a separate summary of the tribe's groundwater legal regime following (to the extent possible) the same format as provided in this questionnaire. Please attach that summary to your completed summary for this state.

12. Additional Useful Information (including links)

Appendix B: Research Protocol

U.S. GROUNDWATER LAW SURVEY – RESEARCH PROTOCOL

TEXAS A&M UNIVERSITY SCHOOL OF LAW / ST. MARY'S UNIVERSITY SCHOOL OF LAW

Brief Synopsis: We are compiling a comprehensive survey of the various U.S. groundwater law regimes. This research will allow Professors Eckstein and Hardberger to analyze both regional and state comparisons, while also identifying parallels among the different legal regimes. Given the nature of the research, this will provide an expansive audience with a tool that provides laws and regulations for specific states, while also allowing for intra-state comparisons.

Each state differs in the amount of available law that is applicable to groundwater. Some states are rather innovative, while others hardly have a governance structure. Outlined below is a general approach and protocol, to provide guidance and facilitate our efforts to compile a final product that is uniform and consistent throughout.

A. Guidelines Before Starting Research

I. SEE COMPLETED STATE SURVEYS FOR A MODEL GUIDE BEFORE ANSWERING SURVEY QUESTIONS –

- Our shared Google Drive, in folder #1, contains completed state surveys completed. Please read these before beginning your first state survey, as our primary goal is to have a uniform product that represents all fifty states.
- If you cannot respond to one or more of the questions in the questionnaire, or you feel the information is not conclusive, please make note of this in your survey answers as the lack of laws in particular instances can also be significant.
- Different sources (i.e., cases, treatises, articles) may not agree on the classification of a groundwater legal regime. This is important in itself, so please mention it in the appropriate section.
- The sources will not explicitly yield an answer for every question, so do your best to reach the second level of analysis.

II. FOOTNOTES (BLUEBOOK RULES) –

- Provide footnotes for each referenced source and apply citation rules set out in the most recent version of the Bluebook.
- Please use pincites if quoting a case or citing a law review article. We want to make it as easy as possible for the Professors to edit the material, and other researchers to find the sources used.
- Do not use in-text citations for sources, *always use footnotes*
- Also, cite the full source for each citation, rather than using Id.'s. We want to make it as easy as possible to edit the final drafts. At that point, we can clean up and finalize the footnotes.

B. **Groundwater Law Research Process**

I. WATERS & WATER RIGHTS TREATISE (LEXISNEXIS) –

- Begin your research with this document, which provides an informative outline of water rights for each state. This information, however, is only a starting point, and the material contained in the treatise should be cross-referenced and verified by the actual case or statute.
- The Treatise will give clues to whether the groundwater law for the state is based on statutes or common law, or some derivative of both
- Before reviewing statutes or cases, review the Treatise to identify the particular sources of law for each state. You may cite the Treatise author's analysis if you find it informative and necessary (e.g., you cannot find any primary sources providing the same information).
- Upon reading this source as background, it will be more efficient to locate the relevant statutes and case law.
- To Access the Treatise, make sure you are logged in on Lexis and go to: https://advance.lexis.com/api/permalink/74077129-7464-4de0-a09d-504447e75cf7/?context=1000516. On the drop down menu, click on Part XI – River Basin and State Surveys, then click on the respective state and navigate to the appropriate section with groundwater law.

II. LAW REVIEW ARTICLES –

- Various scholars have written law review articles about state groundwater law. A quick Westlaw/Lexis search is advantageous. However, please be judicious in assessing whether to use such articles in your research, taking into account the experience and knowledge of the authors.
- If you come across law review articles that are reliable and relevant to your assignment or another state, please upload them to the "Misc. Groundwater Resources" folder in our Google Drive.

III. STATUTES (WESTLAW) –

- Westlaw is often the easiest database to use because you can save a range of statutes at a time.
- Each state is different, but when you locate the water law section, go to the right level, and you can save approximately twenty statutes at a time, which will make your research much more efficient
- To Access Ranges of Statutes: On the WestlawNext homepage, click on Statutes & Court Rules, click on the respective State & Title, on the page that lists the Statutes. Then click on the Select Delivery Method in top right (green arrow), Click Layout and Limits tab, then select desired range.

IV. REGULATIONS (WESTLAW) –

- This is an important aspect of the survey, because these rules often aren't mentioned in the Water Rights Treatise and the administrative regulations may have a direct effect on our target audience.
- These are the codification of the statutes and provide more details regarding the various state agencies' authority.
- To Access State Admin. Codes: On WestlawNext homepage, click on Regulations, then select respective state. Find the relevant state agency (e.g., Alabama Dept. of Natural Resources) and download regulations the same as Statutes.

V. CASE LAW –

- Save a pdf of each case referenced in your survey in our Google Drive within the individual state folder.
- Rather than summarizing opinions and risking the misinterpretation of particular intricacies, consider directly quoting significant rules, holdings, etc.
- Generally, case law should come after statutes and regulations, particularly if the court is interpreting various groundwater regulations and statutes.

VI. STATE AGENCY WEBSITE –

- A quick google search should take you to the particular agency (or agencies) that is in charge of each state.
- You can find the address here, along with related information
- These agency websites also have information on special districts, though many times the state has the authority to create districts, but has not chosen to do so.
- If you find any useful maps, charts, or other images on these websites, especially if they are in high resolutions, please save them to in our Google Drive within the individual state folder. Make sure to provide (either in your state survey or a separate text document) the web address where you found the image.

TEXAS A&M UNIVERSITY
SCHOOL OF LAW

ST. MARY'S
UNIVERSITY
SCHOOL *of* LAW