hill country alliance

Tools for Managing Groundwater in the Texas Hill Country

What Groundwater Conservation Districts, Counties, Cities and Residents Can Do To Protect Groundwater in the Region

Introduction

It is often said that water is the lifeblood of the Texas Hill Countr y– but the real credit for our region's success is the water we cannot see: our region's groundwater supply. Hill Country groundwater is a drinking water source for countless communities – from small rural cities like Bandera and Leakey, to fast developing communities like Fredericksburg and New Braunfels, to our region's largest metropolis – San Antonio. Groundwater also feeds our crystal clear rivers – 12 of the state's 15 major rivers have their headwaters in the Hill Country and receive inflows from springs. However, the Hill Country is growing at a staggering rate. New developments are placing increasing demand on our aquifers at the same time that the region is experiencing more frequent drought. Most of this growth is happening in unincorporated areas where regulation is limited.

In the face of such unprecedented change, we must use every tool in our toolbox to manage groundwater for the people, plants, and animals that call the Hill Country home. This paper lays out the available tools for managing groundwater within groundwater conservation districts, counties, cities, and individuals. Groundwater Conservation Districts are emphasized throughout this guide because they are the state's preferred method for managing groundwater; however, these districts cannot effectively manage long-term groundwater supply without the support of county and city leadership and the informed input of their constituents.

Like groundwater itself, knowing who can do what to manage groundwater can feel evasive and mysterious. This resource is meant to demystify the available tools for groundwater management and make groundwater planning and management more accessible across the Hill Country.

Contributors & Acknowledgments

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Groundwater Management Tools At-a-Glance

Groundwater Conservation Districts (GCDs)

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2. Set pumping limits for nonexempt wells
3. Require reports on well usage to enforce pumping limits on permitted wells
4. Develop and enforce drought contingency plans (including moratoriums)
5. Enact production curtailments to achieve the Desired Future Conditions (DFCs)
6. Create groundwater management zones to manage local conditions

Non-Regulatory Tools

7. Develop the science to inform GCD decision making
8. Provide educational materials on water conservation and reuse, as well as input on the development of alternative water supplies

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2. Set minimum lot sizes for lots with septic systems and water supply wells
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4. Invest in land protection to promote recharge

Cities

1. Promote low impact development practices
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3. Encourage rainwater harvesting and other alternative water sources
4. Invest in wastewater reuse

Residents

1. Get to know your local GCD
2. Share your concerns at public meetings
3. Support the development of the science needed for the development of groundwater management zones and more protective Desired Future Conditions
4. Support legislative efforts to grant GCDs and counties more tools to protect aquifer levels
5. Do your part as a steward of Hill Country groundwater

Groundwater Conservation Districts (GCDs)

Groundwater Conservation Districts (GCDs) are the state' preferred method for managing groundwater, so it's important to understand what they are, what they do, and why.

Groundwater Conservation Districts (GCDs) are local government entities, independent from cities or counties, created to protect aquifers and manage the use of groundwater. GCDs are granted authority in Chapter 36 of the Texas Water Code to manage groundwater production through various methods, including well spacing and production limitations.

Most GCDs are created by legislative action. A GCD's **enabling legislation** determines how it funds its operations and outlines specific duties and powers. Each GCD puts forth its own rules and regulations based on local aquifer conditions, economic factors, and enabling legislation.

Chapter 36

Chapter 36 of the Texas Water Code lays out the authorities and responsibilities of Groundwater Conservation Districts and Groundwater Management Areas. It also defines the joint planning process (i.e. Desired Future Conditions), and the production permitting process.

Managing Groundwater: To what end?

The **fundamental mandate** of a GCD is to balance the protection of groundwater with a landowners' right to produce water. In other words, GCDs must minimize long-term impacts to the environment and existing well owners[1] while ensuring that property owners have access to their groundwater rights.

Additionally, all GCDs must participate in a **joint planning process** to determine regional planning goals, known as **Desired Future Conditions (DFCs)**. As outlined in Chapter 36, GCDs must work with other GCDs in their Groundwater Management Area (GMA) to update their DFCs every 5 years. The goal of the joint planning process is for GCDs to coordinate their groundwater usage and manage aquifers cooperatively. Once DFCs have been determined, GCDs are required to create management plans and accompanying rules to achieve the DFC.

The ABCs of the Groundwater Joint Planning Process[2]

TWDB: The Texas Water Development Board is the state agency responsible for overseeing state and regional water planning, providing financial assistance for local government water projects, and studying the state's surface water and groundwater resources.

GMA: Groundwater Management Areas are designated by the TWDB for regional planning purposes. These areas span multiple counties and GCDs and roughly align with major aquifer boundaries. GCDs within a GMA meet to jointly develop DFCs for the GMA.

DFC: A Desired Future Condition (DFC) is a quantifiable condition of an aquifer at a specified future time. It may be based on aquifer levels, spring flows, or volumes of water in the aquifer (example: average drawdown not to exceed 75 feet at the end of 50 years). According to Chapter 36 of the Texas Water Code, GMAs must consider environmental and socioeconomic impacts, as well as impacts on private property rights, when determining the DFCs.

[1] The precise language in Chapter 36 of the Texas Water Code is that GCDs must "provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater"
[2] Definitions borrowed with permission from the Texas Alliance for Groundwater Districts

GCD Regulatory Tools

Chapter 36 of the Texas Water Code lays out a set of regulatory tools that GCDs can use to manage groundwater in their districts. While GCDs share a common toolbox, it's important to remember that their rules will vary based on their enabling legislationand local aquifer conditions.

Tool #1: Set well spacing requirements and minimum lot sizes

One of the main tools that GCDs have to manage groundwater is requiring spacing between wells. These spacing requirements can be set between wells, between a well and a property line, or based on lot size. By regulating well spacing, GCDs can protect existing well owners from some of the negative impacts of nearby pumping, and can effectively limit the number of wells drawing down the aquifer within a particular district.

Well Spacing: Well spacing rules dictate how much space must be maintained between new wells and existing wells and property lines. Often, the required distance will vary based on the maximum pumping rate of the proposed well. For example, in the Cow Creek GCD covering Kendall County, spacing requirements between wells range from 100 to 2,400 feet depending on the pumping capacity of the well.

Minimum Lot Sizes: Setting a minimum lot size for new wells is another tool to regulate well spacing. Minimum lot sizes will vary district-to-district based on local aquifer conditions. For example, the Headwaters GCD covering Kerr County set a 7 acre minimum lot size for new wells in their East Kerr Management Zone, and a 5 acre minimum lot size in other parts of the county. The Bandera River Authority and Groundwater District in neighboring Bandera County raised its minimum lot size to 10 acres in 2022 in response to local aquifer conditions.

Tool #2: Set pumping limits for nonexempt wells

GCDs can issue permits that limit pumping for *nonexempt* wells based on reasonable use and/or acreage, and site-specific hydrogeologic conditions.

Reasonable Use: When a GCD issues permits based on a doctrine of reasonable use, they assess each permit application to see if the requested amount of pumping reasonably matches the intended use. For example, when considering a permit for a new industrial facility, they may look to industry standards for water usage when evaluating a permit application.

Acreage: If GCDs have additional permit requirements based on acreage, it is often referred to as a correlative cap. With a correlative cap, permit holders must obtain enough acres of groundwater rights to support their permit. For example, in the Central Texas GCD, if a permit holder wants to pump water from the Ellenburger-San Saba aquifer, they must control 1 acre of land over that aquifer for every 1 acre-foot of water they want to pump. This is a correlative cap, not a right, and the GCD considers other criteria when determining the permitted amount.

Site-specific conditions: In all cases, when determining whether to approve or amend a permit, GCDs must consider the best available science and local aquifer conditions. They must also consider whether the proposed use of water unreasonably affects existing groundwater and surface water resources or existing permit holders.

Are there any additional requirements for Public Water Supply Systems?

It's becoming more and more common to see new Public Water Supply Systems (PWS) in unincorporated areas of the Hill Country. Whether they're providing water to large subdivisions, RV parks, or rental units, these PWS must receive TCEQ approval and may also have to apply for a groundwater permit through their local GCD.

To protect the welfare of local citizens, some Hill Country GCDs require that new PWS provide a daily Livable Minimum Standard to all connections. This ensures that developers limit density to unit numbers that their groundwater permit can safely support. For example, in Kerr County, the Headwaters GCD requires a new PWS to allocate 432 gallons per day for each connection.

Exempt vs. Nonexempt Wells

According to Chapter 36 of the Texas Water Code, wells are exempt from permitting if they are used only for domestic use – or for providing water to livestock or poultry – and if the well is: located on a tract of land larger than 10 acres; and incapable of producing more than 25,000 gallons of groundwater a day.

While many GCDs follow this definition for exempt wells, GCD rules or enabling legislation can alter the definition. For example, the enabling legislation of the Trinity Glen Rose GCD says that the maximum production capacity for an exempt well in the district is 10,000 gallons per day (a stricter requirement than Chapter 36's 25,000 gallon per day limit).

Exempt wells must be registered with the local GCD, but they do not need a permit and are not subject to production curtailments. In contrast, **nonexempt wells** must get a permit from their local GCD. These permits are subject to pumping limits and production curtailments (see Tools #4 and #5).

Tool #3: Require reports on well usage to enforce pumping limits on permitted wells

Most GCDs require that permit holders submit annual reports of their pumping levels– with some requiring monthly reporting. The numbers in these annual reports can be

calculated from the pump capacity and hours pumped; but more commonly, well usage is tracked with a meter. A majority of districts require metering for some users, with many districts requiring meters for all permitted wells. New metering technology can enable real-time reporting, but few permitted wells have installed this technology.

Tool #4: Develop and enforce drought contingency plans (including moratoriums)

One of the most challenging responsibilities of a GCD is to manage groundwater production during drought conditions when the aquifers are most stressed. GCDs can develop drought contingency plans that include moratoriums and production curtailments to conserve aquifer levels during drought conditions.

Moratoriums: A moratorium stops all permitting for a certain period of time. During the 2022 drought, the Hill Country Underground Water Conservation District enacted a moratorium on issuing new permits on wells used for irrigation, municipal, and commercial purposes within Gillespie County.

Production Curtailments: A production curtailment reduces the allowable pumping for groundwater permit holders for a certain period of time. For example, in December 2022, Central Texas GCD enacted a mandatory 15% water use reduction for permitted users in response to critical drought conditions. At the Barton Springs Edwards Aquifer Conservation District, drought-induced production curtailments are built into each individual permit. These curtailments vary based on permit type and aquifer management zone, and increase with drought severity.

Tool #5: Production Curtailments to achieve the Desired Future Condition

GCDs may also enact production curtailments in order to achieve the Desired Future Conditions (DFCs). For example, the Clearwater Underground Water Conservation District has rules in place which allow it to proportionally reduce permit levels when the achievement of the Desired Future Conditions is threatened. By reducing permit levels for existing users, they allow for new permits without exceeding the pumping levels that would threaten the DFC.

Another strategy is to grant conditional permits. The Barton Springs Edwards Aquifer Conservation District (BSEACD) has a DFC for the Edwards Aquifer based on the springflow at Barton Springs. To protect springflow and achieve their DFC even during drought, the BSEACD began implementing interruptible and conditional production permits requiring up to complete stopping of pumping during drought. BSEACD also has rules that a production permit may be reduced or curtailed if the authorized volume is determined to cause unreasonable impacts or failure to achieve the applicable DFC of the aquifer.

Tool #6: Create groundwater management zones to manage local conditions

Within their jurisdictions, GCDs can establish groundwater management zones for a specific location with separate rules in addition to the district's primary rules. For example, in early 2020, the Hays Trinity GCD established the Jacob's Well Groundwater Management Zone (GMZ) to protect local aquifer pressure and springflow at Jacob's Well. Permitted wells within the Jacob's Well GMZ are subject to production cutbacks when flow from Jacob's Well averages six cubic feet per second or less during any 10-day period. Additionally, new nonexempt wells within the Jacobs Well GMZ can only be drilled and completed in the Lower Trinity Aquifer.

Notably, not all management zones have to require a more limited use of water. In the case where a GCD wanted to encourage users to use a deeper aquifer instead of a shallower and declining one, they could create a management zone with higher pumping limits in the deeper aquifer.

GCD Non-Regulatory Tools

Beyond rules and regulations, GCDs have a variety of non-regulatory tools at their disposal for managing groundwater.

Tool #7: Develop the science to inform GCD decision making

Creating management plans and developing rules that achieve the DFC requires strong science to inform decision making. While the Texas Water Development Board provides some groundwater data and models, GCDs can invest in better science and modeling. These investments can range from installing new monitoring wells for additional data to working with hydrogeologists to better understand groundwater-surface water interactions. This science is critical to supporting rule changes that are protective of aquifer levels, private property, and springs.

For example, the Headwaters GCD produced a study of water availability in Kerr County, which showed that the eastern part of the county was increasingly vulnerable to declining aquifer levels. This resulted in the development of the East Kerr County Groundwater Management Zone (GMZ), which has higher minimum lot size requirements than the rest of the county and a stricter correlative cap on pumping. For the development of the Jacob's Well GMZ, Hays Trinity GCD supported the scientific studies that ultimately showed the connection between pumping in the Upper and Middle Trinity Aquifers and the flow at Jacob's Well, enabling it to create the GM.

Tool #8: Provide educational materials on water conservation and reuse, and support the development of alternative water supplies

To relieve pressure on groundwater supplies, GCDs can educate community members on alternative water supplies, such as rainwater harvesting and wastewater reuse.

Education: The Cow Creek GCD has a series of educational videos on creating a rainwater harvesting system, harvesting greywater, and capturing condensation from air conditioning units.

Supporting research on alternative water supplies: The Barton Springs Edwards Aquifer Conservation District has invested in researching the feasibility of aquifer storage and recovery (ASR) and brackish groundwater desalination. They also encourage and assist District permittees to diversify their water supplies.

Thinking outside-the-box

Beyond developing rules, science, and educational materials, GCDs have several outside-the-box tools at their disposal that– despite not being common in the Hill Country– are supported by the Texas Water Code.

These include:

– Support and encourage land trusts and nonprofits on efforts to promote groundwater conservation and the conservation of critical recharge zones and site-specific features

– Support counties in running public bond elections when appropriate to address groundwater issues of mutual interest

– Apply for grant funding to increase groundwater conservation efforts (e.g. offer incentives for rainwater harvesting) and conduct aquifer research

County Tools

While the responsibility of groundwater permitting and regulation is assigned to GCDs, counties have certain tools they can use to complement GCDs in their groundwater management.

Tool #1: Set water availability requirements

According to the Texas Local Government Code,[3] if groundwater is the source of water for a proposed subdivision, counties have the authority to require developers to certify that adequate groundwater is available to meet the needs of that subdivision. Some counties have an interlocal agreement with their GCD whereby the groundwater availability study must be reviewed by the GCD. This is the case with the Cow Creek GCD and Kendall County, and the Clearwater Underground Water Conservation District and Bell County.

Some counties have taken these water availability requirements a step further. In Comal County, subdivision applicants must prove that their water supplier can provide water for their subdivision and all subdivisions that the water supplier has committed to serve for the next 20 years.[4] As a result of this requirement, the County has denied several subdivision proposals.

Tool #2: Set minimum lot sizes for lots with septic systems and water supply wells

Counties have the authority to require minimum lot sizes for lots with septic systems. These lot minimums are often higher when the lot also has a water supply well. For example, Hays County Development Services restricts lot size to 6 acres for individual septic system purposes if the lot will also use a water well on that lot. These requirements are much higher than the TCEQ minimum of ½ acre per septic system and well. By setting minimum lot sizes that are higher than the TCEQ minimum and supportive of GCD policies on lot sizes, a county can complement a GCD's regulation of well density.

Tool #3: Incentivize Conservation Developments

Counties can update their subdivision rules to encourage conservation practices. For example, Hays County adopted new subdivision rules in 2022 that included incentives for developers to preserve open space and limit impervious cover. By encouraging these practices, counties can help protect aquifer recharge.

Tool #4: Invest in land protection to promote recharge

Unlike GCDs, counties have the power to levy taxes to support investments in critical recharge lands. In 2022, voters in Kendall County voted in favor of a public ballot measure to increase property taxes by an average of $27 per household per year to raise $20 million to fund land conservation over critical recharge zones. These funds can be leveraged as match dollars, enabling communities to pull in state, federal, and philanthropic dollars for conservation, multiplying the impact of their tax expenditures.

In 2020, Hays County residents voted for the Parks & Open Spaces Bond (Proposition A) which called for the issuance of $75 million in general bonds to fund parks, open spaces, conservation lands, and other recreational opportunities over the next several years.

By protecting valuable recharge land, counties can protect aquifer health and complement GCDs' efforts to do the same.

[3] Texas Administrative Code Title 30 Section 230 And Local Government Code § 232.0032
[4] Comal County Water Availability Requirements IV(B)(25)

City Tools

Across the Hill Country, public water systems in cities represent some of the biggest groundwater users and therefore the biggest groundwater permit holders. Cities that depend on groundwater can help conserve our Hill Country aquifers by promoting water conservation.

Tool #1: Promote low impact development practices

Low Impact Development (LID) involves using techniques such as rainwater harvesting, permeable pavements, and green roofs to reduce stormwater runoff and increase groundwater recharge. Cities have an opportunity to both practice LID in public spaces and buildings, and require that new developments within city limits comply with LID best management practices. The City of Boerne requires new developments follow the best practices laid out in the City of Boerne LID Manual in both the design and construction phases of development.They also have impervious cover limits based on the density and type of development (e.g. residential developments with 1-2 dwelling units per acre can have a maximum of 30% impervious cover over the entirety of the development).

Tool #2: Develop strong drought contingency plans and enforce them

The state of Texas requires cities to adopt drought contingency plans (DCPs) that are enacted in times of drought. These plans must include four stages of increasing water use restrictions based on indicators such as reservoir levels. Specific actions for each stage, like public education campaigns, leak detection programs, and outdoor water use restrictions, must be outlined. For DCPs to be effective, a city should publicize their restrictions, educate their residents about the importance of compliance, and enforce restrictions. The City of Blanco has a good example of strict enforcement measures: any person who violates the DCP is guilty of a misdemeanor, and upon conviction receives a fine.

Tool #3: Encourage rainwater harvesting and other alternative water sources

Rainwater harvesting involves capturing and storing rainwater for non-potable uses, such as irrigation, toilet flushing, and laundry, which reduces demand for groundwater. Some Hill Country communities, like Blanco and Wimberley have adopted zoning and development codes that allow an increase in impervious cover for sites that implement rainwater harvesting. Wimberley also requires car washes to reuse a minimum of 50% of water from previous washes, and all new commercial buildings to collect and recycle air conditioner condensate.

Tool #4: Invest in water reuse

Wastewater reuse refers to the practice of treating wastewater to certain standards and reusing it for non-potable purposes, like irrigation, industrial processes, and toilet flushing. By investing in higher treatment standards for wastewater and setting up the infrastructure to reuse it, cities can create a dependable and cost-effective source of water that reduces pressures on groundwater resources. For example, the City of Kerrville reuses its wastewater for its golf course irrigation.

For more examples of what cities can do to promote water conservation, check out the Hill Country Alliance Leading by Example Guidebook at: ***https://hillcountryalliance.org/leading-by-example/***

How You Can Get Involved

1. Get to know your local GCD

All GCDs will have different rules based on their hydrogeologic conditions and enabling legislation. Learn about the rules and enabling legislation of your district by visiting their website or visiting with your local GCD. Your local GCD is also a resource to understand your local aquifers, their groundwater production capabilities and water quality issues, and local water well drilling and well usage. Many GCDs have social media and newsletters to stay informed. Finally, get to know your GCD board members by attending public GCD and GMA meetings and introducing yourself to them.

2. Share your concerns at public meetings

GCD, county, and city officials can all help shape the future of groundwater in the Hill Country. If you have concerns about declining well levels or the health of local waterways, share them with your local GCD, county commissioners, and city officials. You should also feel empowered to ask questions about the decision-making process. For example, how is your local GCD accounting for the impact on local wells when considering new permit applications?

The Desired Future Conditions, GCD management plans, and county and city rules and regulations, are all developed through public participation. Engagement with the process is imperative to achieving the best outcomes.

3. Support the development of the science needed for the development of groundwater management zones and more protective Desired Future Conditions

GCDs must make decisions based on the "best available science." If you have a well, you can support the development of this science by registering your exempt well and allowing your local GCD access to your exempt well to monitor aquifer levels.

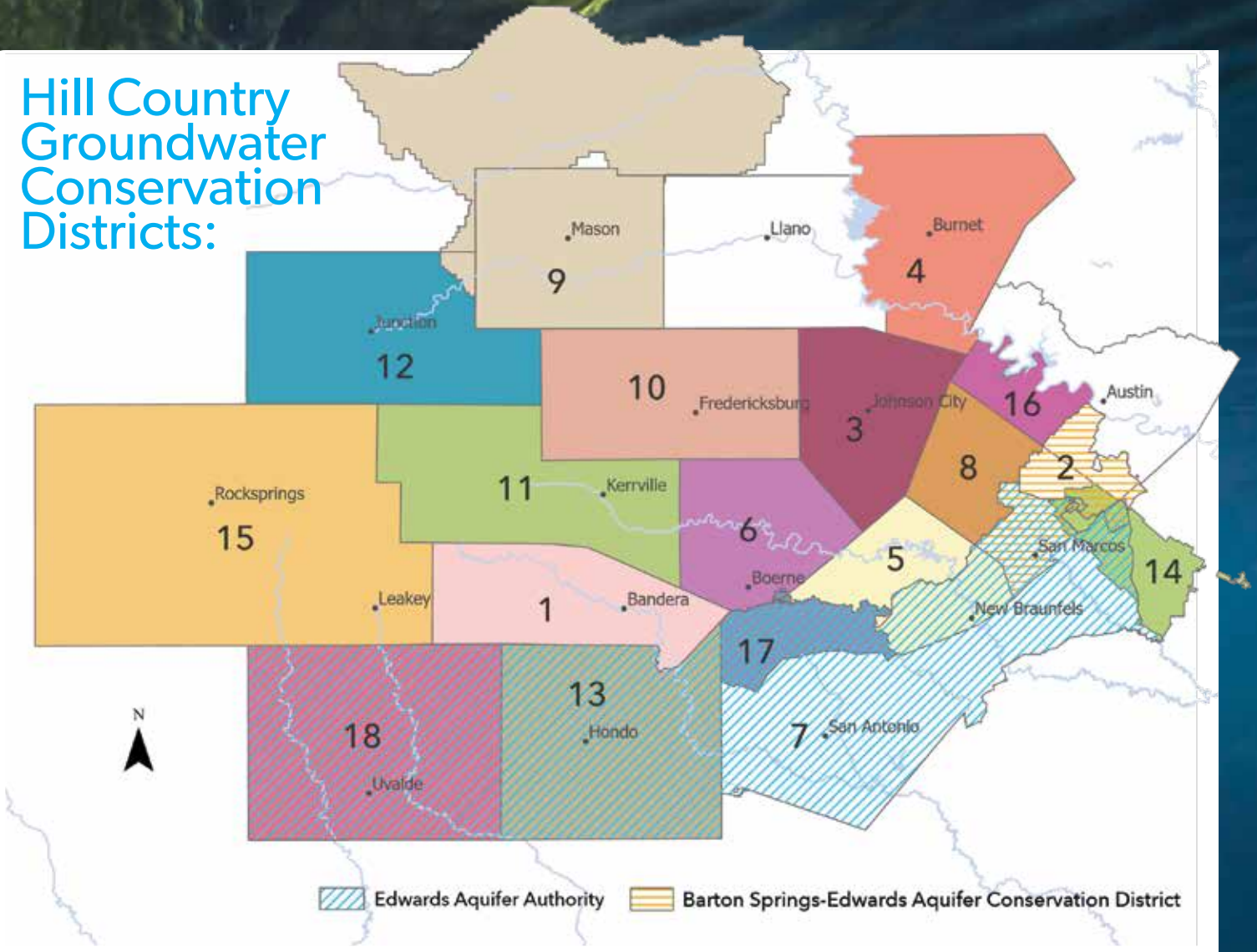
4. Support legislative efforts to grant GCDs and counties more tools to protect aquifer levels

Every legislative session, bills are introduced that seek to expand or diminish the powers of the GCDs and counties. Recently, there's been a push to expand funding for groundwater science and modeling. Efforts like these help your local GCDs better manage local aquifers by providing them with improved science. Letting your elected officials know that you support better science and funding for GCDs is an important way to support the work of your district.

5. Help steward Hill Country groundwater

Protecting our Hill Country aquifers will take participation from all levels of the community, including individual households. In addition to engaging GCDs and other policy makers in ways described in this pamphlet, you can do your part by using native,drought-tolerant plants in your landscaping and incorporating water conservation practices into your life.

Hill Country Groundwater Conservation Districts:



1. **Bandera County River Authority and Groundwater District** – Bandera County
2. **Barton Springs/Edwards Aquifer Conservation District** – Travis, Hays, and Caldwell counties
3. **Blanco-Pedernales Groundwater Conservation District** – Blanco County
4. **Central Texas Groundwater Conservation District** – Burnet County
5. **Comal Trinity Groundwater Conservation District** – Comal County
6. **Cow Creek Groundwater Conservation District** – Kendall County
7. **Edwards Aquifer Authority** – all or parts of Uvalde, Medina, Bexar, Comal, Hays, Caldwell, Atascosa, and Guadalupe counties
8. **Hays Trinity Groundwater Conservation District** – parts of Hays County
9. **Hickory Underground Water Conservation District** – all or parts of Kimble, Mason, Menard, McCulloch, and San Saba counties
10. **Hill Country Underground Water Conservation District** – Gillespie County
11. **Headwaters Groundwater Conservation District** – Kerr County
12. **Kimble County Groundwater Conservation District** – Kimble County
13. **Medina County Groundwater Conservation District** – Medina County
14. **Plum Creek Conservation District** – parts of Hays and Caldwell counties
15. **Real-Edwards Conservation and Reclamation District** – Real and Edwards counties
16. **Southwestern Travis County GCD** – parts of Travis County
17. **Trinity Glen Rose Groundwater Conservation District** – Northern Bexar County
18. **Uvalde County Underground Water Conservation District** – Uvalde County

Additional Resources:

To identify your GCD using your home address, please visit the Texas Alliance vof Groundwater Districts' GCD Index at: *www.texasgroundwater.org/resources/gcd-index/*

For more information on the groundwater joint planning process, please visit the Texas Water Development Board's Groundwater page at: *www.twdb.texas.gov/groundwater/*

*This map depicts existing groundwater conservation districts tasked with managing groundwater across the 17-county Texas Hill Country region.

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