# Water and Equity in the Texas Hill Country

**Final Report:**
The Hill Country Conservation Network

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**Report Partners:**

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THCCN PARTNERS INVOLVED IN THIS PROJECT:

National Wildlife Federation Texas Coast and Water Program

The Meadows Center for Water and the Environment, Texas State University

EDF Environmental Defense Fund

Texas A&M NRI Natural Resources Institute

The Watershed Association

hill country alliance

Texas Water Trade

*This project made possible with support from the Water Funders Initiative*

**June 2022**

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# Executive Summary

The Texas Hill Country Conservation Network (THCCN) was created to coordinate a conservation partnership organization to scale up the impact of conservation-focused organizations in the region. The partnership understands that in order to achieve their respective missions, they need to create a culture of inclusion and equity by actively seeking input and participation from all stakeholder communities, particularly those communities comprised of underserved or at-risk populations. The project goal is to provide a baseline, holistic understanding of where diversity, equity and inclusion (DEI) and environmental justice (EJ) issues intersect with water issues and challenges within the Hill Country. Below is a list of key findings and action items stemming from this research project organized by the report's three sections:

## Demographics in the Hill Country

- A series of historical events played an important role in the current demographic makeup of the Hill Country. Development and shifting of Communities At-Risk (see note for definition at end of Executive Summary) were not random but instead were influenced by historic drivers, such as key pieces of legislation and changing workforce opportunities.
- In review of Hill Country demographics, Communities At-Risk are primarily found in urban areas where greater employment opportunities also are located. In contrast, rural Texas Hill Country demographics are predominantly white and older populations. The predominant community of color in the Hill Country is Latino followed by African American.
- Action: Programming and engagement strategies of Communities At-Risk should consider location, cultural relevancy, and the predominant communities being served. For location, the nexus of data for Communities At-Risk and water challenges can serve to address water equity challenges and opportunities for meaningful community engagement. The term *water challenges* is used in this report as an umbrella term to encompass the water issues described in data sets and mapping outputs from web tool.
- Action: With respect to history, we continue to shape the Hill Country with current collective decisions – strategic and purposeful planning may be beneficial, as history often repeats itself. THCCN programming and engagement strategies should identify complementary actions driven by network organization missions to facilitate opportunities of water equity engagement.
- Population density, age, and race and ethnicity (as variables) are expressed primarily at a regional scale (urban and rural), where urban areas are characterized by diverse, younger and higher density population groups, and rural areas are characterized by less diverse (primarily white), older and lower density populations.
- In contrast, poverty, income, unemployment, labor, and education (as variables) are expressed at a local scale, meaning zip codes or neighborhoods define a given area. In Bexar County, for example, these variables are expressed within the county locally compared to more regional differences. This is not surprising given drivers in vulnerability indices

described in the report are framed by these factors, resulting in the demographic makeup of the Hill Country.

- Action: Communities At-Risk are locally distributed and not random within urban areas. Within rural areas, zones of Latino prevalence are small compared to land mass. Mapping of Communities At-Risk is helpful for THCCN and other water programming and engagement efforts for serving underserved communities.
- Action: Language can be an important barrier to water resources for Communities At-Risk, particularly for safety (flooding and drought). Preference for Spanish materials manifested as low in rural areas compared to other parts of the state. This may be associated with preferences in receiving information or that pockets of Latino community respondents were too small in rural areas to influence overall survey results. Some bilingual programming efforts may be beneficial.
- Hill Country rural landowners are primarily non-Hispanic white, male and older, reflective of rural communities. Policymaker structure also is reflective of their county population with respect to race, age, and ethnicity, similar to rural and urban counties, with some exceptions.
- Action: Because pockets of Communities At-Risk are small in number in rural areas, they may not be well represented in policy-maker structure. THCCN program and engagement strategies might include:
    - Strategic and meaningful, compensated, long-term, targeted training, involving high contact hours, particularly for water leadership positions and for rural county leadership positions, as these involve complex systems, unique community cultures and specific processes and skills.
    - Long-term mentorship and supportive personal networks within professional settings – assign several individuals that are a match for recruits to create a safe environment where there is freedom to ask questions, push boundaries and gain experience, to fall and learn without fear in a supportive work family, and to receive redirection and responsibilities with expectations for success, not a lowering of standards.
- Action: There was congruence between models of Communities At-Risk where each of the three approaches validated one another. A shortcoming of many of these modelling approaches is that they may not specifically include water challenges in a more comprehensive fashion, thus, integrating location of Communities At-Risk and explicit water challenges as was conducted in this study would aid THCCN programming and engagement efforts. Further mapping at higher or more local resolutions may be beneficial in future efforts.

## Water Characteristics in the Hill Country

- Pressure and demand for water resources will only continue to increase in the coming years for the state in both urban and rural areas. It will be a significant social, economic and

demographic issue, defined by specific parameters such as water supply, water quality, flood risk, affordability and accessibility.

- Not surprisingly, the majority of water challenges are concentrated in and around urban centers, and they overlap with Communities At-Risk identified in key areas within the Hill Country (south San Antonio, south Austin, and Uvalde, among other cities.).
- Action: Development of a water equityscape demonstrates the overlap with vulnerable community indices and water challenges. Data suggest that Communities At-Risk are exposed to these challenges in some cases at a disproportionate rate. THCCN can use this approach to identifying high-priority areas in programming and engagement efforts. Further mapping at higher or more local resolutions may be beneficial in future efforts.

## Water Survey in the Hill Country

- Most communities and respondents had personal experiences with either flood and/or drought. Drought and overall water availability weighed heavily on Hill Country survey respondents' minds, yet they also felt current water dependability and affordability were good or satisfactory, suggesting water futures may be more of the driver for the concern.
- Dependency on groundwater is high (50-60%), placing great pressure on Hill Country water sources and posing significant challenges moving forward, which were validated by expressed respondent concerns. Regarding groundwater wells, well management, and the role of managers, there was a heavy emphasis on well responsibility at the hands of both groundwater conservation districts and well owners.
- With respect to dependability and access, people felt they have dependable water sources and quality, yet there is a real concern that these may not be a reality in the future. Also, once safety has been breached, it might take some community members a long time to trust their water source again, thereby, increasing their cost of water.
- Respondents felt opportunities to recreate existed in the Hill Country, although policymakers felt water users had more time to recreate than was their reality. Improving recreation access, making it easier for people to recreate may be beneficial along with addressing other barriers such as time to recreate.
- There was a preference for in-person and community meetings with respect to information sharing and access. Written media also was a preferred source but not to the same degree as the former items.
- There appears to be communication among water professionals, water providers, and water leaders; however, increasing and/or maintaining communication with water users would be helpful.

# Introduction

## Background

The Texas Hill Country is home of the headwaters of 13 of Texas' rivers and sustains life from the rural communities of Central Texas through the rapidly growing cities of the I-35 corridor to the bays and estuaries of the Gulf of Mexico. The Texas Hill Country Conservation Network (hereafter The Network or THCCN) was created to coordinate a conservation partnership response to sprawling development, climate change, and booming population growth, and to scale up the impact of conservation-focused organizations working throughout the Hill Country (18 county service region, Figure 1). Specific goals of the Network include the following:

- Permanently protect 100,000 acres of open space
- Pass strategic county and city bonds totaling $400M for land conservation
- Develop a Hill Country-wide Watershed Conservation Plan
- Secure investments in green infrastructure in all 18 Hill Country counties

## Project Overview

Environmental conservation has long been interwoven with dynamics of racial oppression and exclusion related to race, class, and gender. The Texas Hill Country has not escaped the effects of this history and dynamics; however, the Network recognizes they lack an understanding of this history and ways racism and exclusionary practices continue to impact conservation efforts. Furthermore, the Network understands that to achieve their mission to maximize protection of the Hill Country's natural resources through enhanced collaboration, they must work to create a culture of inclusion and equity by actively seeking input and participation from all stakeholder communities, particularly Communities At-Risk (see note for definition at end of Introduction) and other underserved communities who are often excluded. The Network's success depends upon the ability to recognize historic and present-day inequities while including, supporting, celebrating and learning from the diverse voices of the Texas Hill Country and the regions its natural resources support. Several member organizations in The Network are focused on water sustainability projects (supported from Water Funders Initiative) to address diversity, equity, and inclusion (DEI) and environmental justice (EJ) issues and make the transformative changes needed. A comprehensive understanding of DEI and EJ issues as related to water in the Hill Country would support these measures.

## Goals and Objectives

The project goal is to provide a baseline, holistic understanding of where DEI and EJ issues intersect with water within the Hill Country. THCCN focus areas include advancing sustainable land and water management practices and ensuring healthy, clean water sources for people and the environment. This project will provide a baseline understanding of underlying equity and environmental justice issues that intersect with the THCCN's work and identify communities that are potentially impacted by and experiencing water inequity and water injustice within the THCCN's 18 county region (Figure 1). Specific project objectives, defined and to be implemented by 3 primary tasks, include (Task I) collect and curate demographic data within the project area, (Task II) collect water management information from underserved

communities via surveys and interviews, and (Task III) synthesize collected information and offer key recommendations for the Network to increase community engagement.

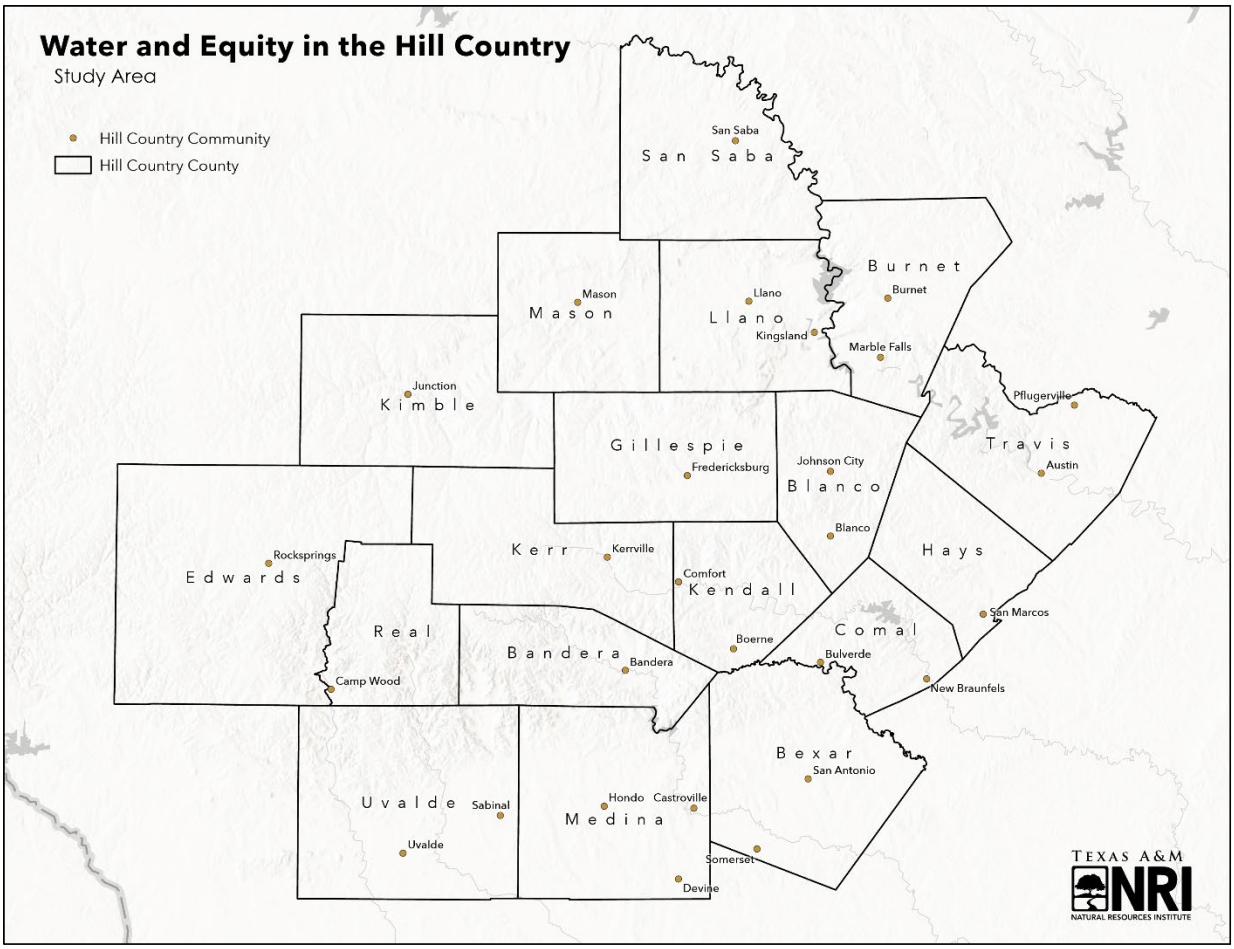


Figure 1. Study area of 18 counties in the Texas Hill Country. Source: TNRIS.

Note: Publicly available data was accessed for this report. This data is produced by different agencies whose terminology for various population groups differ. The term *Communities At-Risk* is used in this report as an all-encompassing term to describe the same populations covered by the datasets. By nature of the data, "low income" and "people of color" (both EPA definitions) encompass many Communities At-Risk. A list of some definitions of key terms by data source would be helpful to understanding descriptions in this report:

1. White or Non-Hispanic White: "Individuals who responded 'No, not Spanish/Hispanic/Latino' and who reported 'White' as their only entry in the race question (Census Bureau 2021)"
2. African American or Black: A person having origins in any of the Black racial groups of Africa (Census Bureau 2021).
3. Asian: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam (Census Bureau 2021).
4. Hispanic or Latino: refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race (Census Bureau 2021)
5. Indigenous Groups or Native Americans: A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment (Census Bureau 2021).
6. Low-Income: The EPA uses the term "low-income" to describe households whose household income is less than or equal to twice the federal "poverty level" (Source: EPA EJScreen).
7. Minority: In some reports by the EPA, the term "minority" is used to describe people of color (see definition above). The term Minority Communities is used to describe communities primarily made up of people of color, as described here.
8. People of Color: Individuals who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino. That is, all people other than non-Hispanic white-alone individuals. The word "alone" in this case indicates that the person is of a single race, not multiracial (Source: EPA EJScreen). Communities At-Risk, At-Risk Communities, and Communities of Color are defined and described in this context.
9. Poverty Threshold: The Census Bureau sets income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's poverty threshold, then that family is considered in poverty (Source: Census Bureau).
10. Distressed Communities, Susceptible Communities, and Socially Vulnerable Communities: These are additional terms used by various organizations to describe people of color and indices associated with people of color.

Note: Common data source acronyms used in this report include,

2022 State Water Plan, SWP
Center for Disease Control, CDC
Distressed Communities Index, DCI
Economic Innovation Group, EIG
Environmental Protection Agency, EPA
Environmental Protection Agency EJ SCREEN, EPA EJScreen
Groundwater Conservation Districts, GCD
Multi-Resolution Land Characteristics Consortium, MRLC
National Agricultural Statistics Service, NASS
National Land Cover Database, NLCD
National Oceanic and Atmospheric Administration, NOAA
Safe Drinking Water Information System, SDWIS
Social Vulnerability Index, SVI
Texas Commission on Environmental Quality, TCEQ
Texas Comptroller of Public Accounts, TCPA
Texas Department of Transportation, TXDOT
Texas Natural Resources Information system, TNRIS
Texas Water Development Board, TWDB
The Nichols Institute for Environmental Policy Solutions, NIEPS
United States Census Bureau, US Census
United States Department of Agriculture, USDA
United States Department of Agriculture Census of Agriculture, USDA COA

# Section 1: Demographics in the Hill Country

## Overview

A deliverable for this project involved providing a broad overview of historic and current demographics in the Texas Hill Country, with an emphasis on people of color. This section is divided into 5 distinct topical areas: historic demographics, current demographics, landowner demographics, policymaker demographics, and locations of Communities At-Risk (see note for definition at end of section). Our review provides an understanding of the history that shaped the current demographics of the region as it pertains to Communities At-Risk and water resources. The main source for demographic data draws from the U.S. Census American Community Survey. This survey counts people based on their *usual residence* and uses language from the Census Bureau and EPA.

## Historical Demographics

In this section, we provide a summary of historical events, describe the people of the Hill Country to the end of the 20th century, and summarize implications of demographics to the Hill Country's natural resources. First, we provide a general history of the people of the Hill Country. We acknowledge the lifelong work of historians (academics and others) across the country whose work has been incorporated into this report. We especially acknowledge Dr. Armando Alonzo, historian and professor at Texas A&M University, who kindly provided a general history of the Hill Country for this report, one of his specialty areas. The history of people of color in the Hill Country and natural resource use is emphasized in the summary. Understanding collective actions influencing communities translates into an understanding of current Texas Hill Country demographic trends. Finally, a brief status of demographic trends vis-a-vis Hill Country natural resources is presented. Because of the heavy historical context, an extensive literature review is footnoted in this section. Much of the information presented involves the life's work of many individuals and fields of study (natural resources, economics, demography, sociology, history, natural resource history, anthropology, race and ethnic studies, etc.). We describe report findings at a high level and provide references for further reading. While considering broad fields of study, the historical narrative focuses on early social, political, and demographic transactions, where natural resources changed hands over time, sometimes by force, and evolved into the current demographic makeup and natural resource distribution of the Texas Hill Country. It is important to know that historical narratives describing people of color have sometimes involved the erasure of "defeated" cultures, people, and their accomplishments. We attempt to describe historical events honoring all families from the past, without politicizing or passing judgement on events, decisions, or individuals, and instead presenting and synthesizing facts for natural resource related professionals and offering a general familiarity with the interrelationships that have influenced Texas communities and natural resources over time.

### *General History*

From prehistory to the present time, the inhabitants of Texas have benefited from the utilization of its natural resources, including its rivers and streams, lakes, bays, flora and fauna, fish, and lands. Native Americans who arrived in Texas about 11,000 years ago practiced

survival strategies that involved both cooperation and conflict over the use of the most accessible resources. For the hundreds of hunter-gatherer bands who occupied the macro-region from Northeast Mexico to central and southwest Texas, wild animals, especially deer and bison, fish, pecans, berries, and the prickly pear fruit were the most important products of the land.[1]

With the arrival of Europeans in Texas in the late 17th century, a second and more intensive level of competition over resources arose. Both the French and Spaniards made new demands on Natives and through that process, occupied their lands. The French established an interdependent relationship with Caddoan peoples in Northeast Texas and with other Natives in the South, but Spaniards failed in the same area. The latter, however, had greater success in South Texas with Natives originally grouped together as Coahuiltecans, drawing them into the early missions. While La Salle's French colony near present Victoria, Texas was short-lived, Spain introduced institutions, including missions, presidios, towns, and farming and ranching enterprises, that made significant inroads into Native territories and resources.[2] Multiple causes greatly diminished the Native populations of Texas, few survived the traumatic ordeal of colonization. With the end of the missions in the 1790s, the former mission residents moved into towns and mixed with local Hispanic settlers.[3]

Moreover, Spaniards introduced new concepts regarding natural resources that have important implication to this day. They believed that, in theory and law, land and all resources belonged to the king who could at his pleasure grant land to private individuals and legal entities. Consequently, ownership of natural resources based on the legal right of private property

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[1] Donald E. Chipman and Harriet Denise Joseph, **Spanish Texas, 1519-1821**, rev. ed., 2010, 8-9, 16-17; A Ray Stephens, **Texas: A Historical Atlas**, Norman, 2010, 30-33. Also see Armando C. Alonzo, "Indigenous Communities along El Camino Real de los Tejas National Historic Trail in Central and Southwest Texas," unpublished report, National Park Service, Rocky Mountain Division, Santa Fe, New Mexico, May 1, 2022, 1, 5-8. These two sources offer brief descriptions of the main Native groups of Texas at the time of European colonization. The newest scholarship indicates that Coahuiltecan is a misnomer for the tribes that resided from northern Coahuila to South Texas because linguistic and historical research has identified at least seven different groups. Above Austin, Texas, the Native groups were distinct from the South Texas and Coahuila groups. Apache and later Comanche were intruder bands that occupied the Great Plains region of Texas and vied for the buffalo herds with local bands as far as southwest Texas. Idem.

[2] There is an extensive literature on La Salle's colony and the Spain's colonies in Texas and adjacent provinces. On Texas, see Chipman and Joseph, **Spanish Texas**; on Coahuila, see Maria Elena Santoscoy, Laura Gutierrez, Martha Rodriguez, and Francisco Cepeda, **Breve historia de Coahuila**, Serie Breves Historias de los Estados de la Republica Mexicana, Mexico City, 2000; On Nuevo Santander [Tamaulipas], see Armando C. Alonzo, **Tejano Legacy: Rancheros and Settlers in South Texas, 1734-1900**, Albuquerque, 1998.

[3] This author examined the history of Natives in one San Antonio mission to examine their economic role, social composition of families, and causes for their decline in population. Armando C. Alonzo, "A History of Mission Espada from its Beginnings to 1900," unpublished report, National Park Service, Rocky Mountain Division, Santa Fe, New Mexico, October 2014.

There is a brief discussion of secularization of the missions and causes for the decline of Native population in Texas' missions. With secularization, only very few surviving Natives received small parcels of land to farm. See Armando C. Alonzo, "Master Craftsmen in Spanish Texas," **Revista**, Southwestern Mission Research Center, Tucson, vol. 53-54, no. 176, 2019-'20, 36-'37.

became paramount, though some resources were deemed to belong to the king, such as minerals, including salt deposits that in the case of present-day Texas were exploited since the last quarter of the 17th century by Spaniards from Nuevo León and Coahuila, much older political jurisdictions than Texas.[4]

From the Spanish-era to modern Texas, sovereignties granted land to settlers to promote settlement and economic development. Initially, Spain granted land to missions, towns, and settlers.[5] Then Mexico, the Republic of Texas, and the state of Texas all successively granted land to individuals and in later years to railroads and other economic interests. Spanish, Mexican, Anglo and European settlers occupied millions of acres of land that were heavily used for both farming and ranching purposes.[6]

In the region covered by the Hill Country (as defined in this project), each of the main groups that received or purchased land settled a different area of the Hill Country territory. With colonization, northward-moving Spaniards and Mexicans acquired rights to land in San Antonio and along the San Antonio River towards Espíritu Santo (Goliad, Texas) as well as in other parts of Texas.[7] Composed of immigrants from Alsace-Lorraine, Henri Castro's colony occupied a small district a few miles west of San Antonio, with Castroville as its main town site. These settlers acquired more lands towards the southwest. German immigrants arrived in the 1840s and moved towards the counties from New Braunfels to Fredericksburg. Anglos who arrived in Mexican Texas during the 1820s gradually moved to southwest Texas and obtained lands there.[8]

The quality of the soils and rainfall in the Hill Country varies considerably. Generally, the better lands are in the vicinity of Bexar County and towards the southwest district of this region. The northwestern part of the territory contains hilly terrain, with thin and rocky soils.[9] Rainfall in the Hill Country diminishes from east to west. While there are rivers that cross the territory,

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[4] Armando C. Alonzo, "A History of Ranching in Nuevo Santander's Villas del Norte, 1730s—1848," in Richmond F. Brown, ed., **Coastal Encounters: The Transformation of the Gulf South in the Eighteenth Century**, Lincoln, 2007, 191-'92.

[5] Ibid., 192, 197.

[6] Thomas Lloyd Miller, **The Public Lands of Texas, 1519-1970**, Norman, 1973.

[7] Chipman and Joseph, **Spanish Texas**, 51-52 and 141-'42; Stephens, **Historical Atlas**, 49-50. In Texas, the first important stockraisers were the missionaries who taught the Natives both farming and ranching practices. Initially town citizens called **vecinos** received small tracts for farming. Some Texans later asked for and obtained grants for ranching purposes. However, private ranchers increased slowly in number and were not significant in Texas until the last quarter of the 18th century. See Jesus F. de la Teja, **San Antonio de Bexar: A Community on New Spain's Northern Frontier**, Albuquerque, 1995, 75-76, 84-86, 99-104. In the adjacent colony of Nuevo Santander, **vecino** landholders were dominant in number and production, and they received hundreds of land grants. In fact, the value of their production was many times larger than Texas, which also had a much smaller population than Nuevo Santander. See Alonzo, "Ranching in Nuevo Santander."

[8] On Anglo colonists, see Stephens, **Historical Atlas**, 74-76. For the Castroville and German immigration to the Hill Country district northwest of New Braunfels, ibid., 119-'21.

[9] Ibid., 11-12.

except for the Colorado and Brazos, the rivers carry little water.[10] Consequently, the advent of irrigation farming in the early 20th century was and remains dependent on aquifers.[11]

Rights to water was a parallel development to land grants because of the aridity and semi-aridity of lands in Texas. Typically, small farmers in San Antonio and El Paso received rights to water, measured in the number of hours that a property owner could draw water from a stream or **acequia**, a system of canals and laterals from a major source of water.[12] With a small population until the late 19th century, competition and conflict over water sources was not extensive.

While trade and commerce were basic industries, agriculture and related businesses remained the primary occupations in the Hill Country. Farming was significant in the Blackland prairie soils in the eastern sections of Bexar, Comal, Hays, and Travis Counties. During the 19th century, the region lacked an urban infrastructure, except for San Antonio, which saw a rapid rise in population after the Civil War with the growth of military service, trade and commerce in South Texas and Northern Mexico, and the expansion of the commercial ranching economy characterized by the cattle drives to the North (1860s-late 1880s). A railroad from Galveston to San Antonio built in 1870s and two other lines in 1885 that passed through the city before reaching the international border at Laredo and Eagle Pass also began to expand market opportunities for the merchant class (and facilitated migration from Mexico).[13]

The Black population was historically low in the Hill Country counties, though a few counties, including Bexar and Travis had enslaved populations. Bexar County counted less than 400 in 1850, though the number grew to 1,395 in 1860.[14] Travis County, with a larger cotton economy than Bexar County, had 791 enslaved people in 1850 and 3,136 in 1860.[15] After the Civil War, the freedmen and women found low-skilled employment in San Antonio and Austin and, despite a short opening during Reconstruction, quickly declined in social standing and politics.[16]

After the fall of the Alamo (1835), Tejanos faced an increasingly difficult time as they attempted to negotiate their citizenship vis-à-vis the ascendant Anglos. They lived precariously because their loyalty was questioned, even though they based their rights on their historic ties to homeland and as supporters of Texas independence. Anglos violently attacked cart drivers in

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[10] See map of average annual rainfall in ibid., 13.

[11] The Edwards Aquifer, a major aquifer runs diagonally from Del Rio on the border to Austin. The bulk of the urban population lives over this aquifer. The other two aquifers in the Hill Country territory are the Edwards-Trinity and the Carrizo-Wilcox. See Stephens, **Historical Atlas**, 17-19. Map of Major Aquifers, 18.

[12] De la Teja, Bexar, water rights.

[13] John A. Booth and David R. Johnson, "Power and Progress in San Antonio Politics, 1836-1970 in David R. Johnson, John A. Booth and Richard J. Harris, eds. **The Politics of San Antonio: Community, Progress & Power**, Lincoln, 1983, 6-8. Christopher Long, "Bexar County," Handbook of Texas Online, accessed May 1, 2022, https://www.txhaonline.org/handbook/entries/bexar-county. Texas State Historical Association.

[14] Ibid.

[15] Ibid.; Vivian Elisabeth Smyrl, "Travis County," Handbook of Texas Online, accessed May 1, 2022, https://www.txhaonline.org/handbook/entries/travis-county. Texas State Historical Association.

[16] For a succinct description of Reconstruction in Texas, see Stephens, **Historical Atlas**, 17-'79.

the 1850s and sought to curtail their political rights.[17] Moreover, because of complex causes, Tejanos lost control of their lands by the last third of the 19th century, and they drifted into the larger towns and cities of the region.

Through immigration, Mexicans gradually became more numerous with the growth of agriculture and related industries after the Civil War. San Antonio's central location and its connections to Northern Mexico for trade and commerce facilitated this economic expansion. Largely unskilled laborers, Mexicans settled in small towns, rural districts, and cities. They earned low wages, and very few branched out to business or landownership.

For Blacks and Mexicans, discrimination, oppression, and violence directed towards them were very real concerns. During and post-Civil War era, a spree of banditry, murders, and other crimes affected much of Texas. Mexicans were particularly singled out for vigilante violence often for crimes that they did not commit. Blacks suffered from racial prejudice before and after the end of slavery. Lynching of both minorities were common in West and South Texas. The dominant Anglo society in much of Texas believed in an ideology that whites were superior, and that Blacks and Mexicans were an inferior people.[18] Consequently, opportunities for economic improvement were illusory for both groups, with the position of Blacks set in place by discriminatory decisions of courts and legislation—de jure--and that of Mexicans from the harmful effect of de facto discrimination buttressed by Southern attitudes and mores. This condition prevailed throughout the Hill Country, except for Bexar County, where political bosses relied on Mexican voters, and to a lesser extent on Blacks, for a share of the votes to maintain power in the San Antonio and in the county for which they received some patronage, lessening some of the harshest effects. However, "boss rule" in San Antonio did not alleviate the social-economic conditions of these minorities, water and sanitation services were inadequate, and at times serious outbreaks of disease occurred in the 1880s and 1890s and resulted in loss of lives. Still, the overall situation of Blacks and Mexicans as minority groups

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[17] Raul A. Ramos, **Beyond the Alamo: Forging Mexican Ethnicity in San Antonio, 1821-1861**, Chapel Hill, 2008.

[18] For the history of violence towards Tejanos and Mexicans, see F. Arturo Rosales, **Chicano! The History of the Mexican American Civil Rights Movement**, Houston, 1996, 9-12; Ramos, **Beyond the Alamo**; William D. Carrigan and Clive Webb, **Forgotten Dead: Mob Violence against Mexicans in the United States, 1848-1928**, 44-50. Historians assert that economic competition and prejudice were the causes of violence towards Mexicans after 1848. The origin of anti-Mexican attitudes and prejudice is complex. David F. Weber asserted that it could be traced to the conflicts between colonial Spain and England. See Weber, "Scare More than Apes: Historical Roots of Anglo-American Stereotypes of Mexicans in the Border Region," in **Myth and the History of the Hispanic Southwest**, Albuquerque, 1988, 153-'67. Another historian argues that it was a result of Southerners' racial ideology towards Blacks superimposed on Tejanos. See Arnold de Leon, **They Called Them Greasers: Anglo Attitudes towards Mexicans in Texas, 1821-1900,** Austin, 1983. Still others argue that it is a result of a political ideology that saw Mexico and Mexicans as a failure in comparison to Americans and the United States and that the War with Mexico fundamentally shaped this view. See Shelley Streeby, "Imagining Mexico in Love and War: Nineteenth-Century U.S. Literature and Visual Culture," in John Tutino, **Mexico and Mexicans in the Making of the United States**, Austin, 2012, 83-109.

relegated their populations to poor, powerless classes unable to change their condition until the modern civil rights era of the mid-20th century.[19]

Due to downturns in the market economy for Texas wool and livestock and environmental calamities in the 1890s, ranchers, businessmen, and railroad promoters saw an opportunity to promote commercial farming. One key to unlock the potential for commercial agriculture was the need to build new railroads in South Texas to reach distant markets. Soon, additional railroads were built in South Texas, and in 1904, the St. Louis, Brownsville, Mexican Railway arrived in the Lower Valley.

Landowners—ranchers for the most part— and real estate speculators, and promoters of town and farm development, commenced an intensive campaign to lure new settlers from the Midwest and the South to buy virgin farmland. This transformation of ranching lands to farmland occurred in three new districts, namely the Gulf Coastal lands below Houston, in the Magic Valley of the Lower Rio Grande, and the Winter Garden district southwest of San Antonio. Besides cheap labor and a good climate, a key promise to the "new farmers" was the availability of water to irrigate the new croplands, especially in the Lower Valley and the Winter Garden district, which is part of the Hill Country territory. In this district, landowners and speculators tapped into the Edwards Aquifer using artesian drilling methods. Within two decades, these districts underwent rapid farm development that depended on cheap labor readily available in Northern Mexico.[20]

At first Mexicans came and went as work demands in farming and ranching necessitated their employment. Then in 1910 a long revolution broke out in Mexico. It stimulated increased migration concurrent with the intensification of town and farm development projects in South Texas. In addition to laborers, a small class of businessmen exited Mexico due to the turbulent and dangerous times. These settled in the larger towns and cities of the region, particularly San Antonio and Austin. However, most Mexicans joined the swelling army of several hundred thousand laborers, many of whom followed the state's large cotton harvest from one district to another from the early summer to the start of winter.

During the 20th century, the Black and Mexican American population in Texas expanded rapidly, and both groups faced major social, economic, and political hurdles that limited opportunities for advancement, despite their own enduring efforts and support from others that challenged legal and de facto discrimination and segregation in public facilities. In effect, the persistence of de jure discrimination and limited work opportunities restricted Black lives social, politically,

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[19] Booth and Johnson, "San Antonio Politics," in Johnson, Booth, Harris, eds. **The Politics of San Antonio**, chapter 1, 3-27.

[20] On the Winter Garden district, see Mark Odintz, "Winter Garden Region," Handbook of Texas Online, accessed May 1, 2022, https://www.tshaonline.org/handbook/entries/winter-garden-region. Texas State Historical Association. On the Coastal Bend and Magic Valley, see Armando C. Alonzo, "Orígenes de una sociedad y economía binaciónal: El noreste de Mexico y el sur de Texas, 1848-1940," Roberto García Ortega, Socorro Arzaluz Solano and Jesus Manuel Fitch Osuna, eds., **Territorio y Ciudades en el Norte de México**, Colegio de la Frontera Norte, Mexico City, 2009, 59-89.

and economically. Blacks responded to the harshest treatment with lawsuits, some of which eventually proved successful in bringing down barriers in politics and education the 1950s and 1960s.[21] Through their organizations, they continue to be active in protecting their civil and political rights.

For Mexican Americans, segregation in public facilities, low levels of education, limited employment possibilities, and manipulation of their votes by politicians combined to keep them as second-class citizens through much of the 20th century. During World War II, Mexicans and Mexican Americans contributed to the war effort at home and abroad as fighting men. They faced considerable discrimination that, despite the opportunity that the war created in employment, their condition of inequality persisted. Their efforts in organizing civil rights advocacy groups such as League of United Latin American Citizens (LULAC) (1929) and the American GI Forum (1948) finally paid off with the U.S. Supreme Court decision, **Hernandez vs. Texas (1954)**, which declared that under the 14th Amendment to the U.S. Constitution Mexican Americans could not be treated as a "class apart." The Supreme Court stated that Mexican Americans were entitled to "equal protection of the law" and thus they could not be discriminated as a separate class of people.[22] Still, discriminatory barriers in employment, education, housing, voting and political representation, and other public arenas fell gradually, mainly through litigation. Some cases were victories, other lawsuits did not succeed.[23] This recent legal history indicates that Mexican Americans must remain constantly vigilant to protect civil, political, and other rights.

At the end of the 20th century, some progress had been made to improve the economic and political standing of both Mexican Americans and Blacks in the Hill Country, but much remained to be done. Both groups are highly urban, though some remained resident in the smaller counties of this large territory. Civil rights have largely been secured, but at times racism rears its ugly head in dominant-minority group issues, such as the battle over inequitable school funding, lack of adequate municipal service improvements, and other matters. Sometimes larger issues are used to pit one group against another. For example, recent immigration policy creates conflict and division between Hispanics, a group that includes many immigrants, and others who see immigrants as lawless and who required public resources to stay afloat.

On the matter of access to water from the aquifers in the territory, it is a battle between cities and the rural communities. Still, in the new century, it remains critical for compromise and collaboration to conserve and wisely utilize the natural resources of the Hill Country. It is a

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[21]See the excellent brief history of African Americans in Stephens, **Historical Atlas**, 336-'39.

[22] Ibid., 340, 342-43. On the efforts of LULAC to improve the condition of Mexican Americans and Mexicans during the war, see Emilio Zamora, Mexican Workers and Job Politics during World War I: Claiming Rights and Righting Wrongs in Texas. On Mexican American efforts to improve their condition during the 1960s and 1970s, see Rosales, **Chicano!**. The literature on the Chicano Movment and earlier 20th century reforms is extensive.

[23] One key organization in major litigation efforts is the Mexican American Legal Defense and Education Fund. Teresa Palomo Acosta, "Mexican American Legal Defense and Education Fund," Handbook of Texas Online, accessed May 1, 2022, https://www.tshaonline.org/handbook/entries/mexican-american-legal-defense-and-educational-fund.

tough but not insurmountable challenge that should involve the participation of Blacks and Mexican Americans as well as the dominant Anglo population in the search for viable solutions.

In closing, the project goal was to describe the demographic history of the Hill Country with respect to Communities At-Risk. The above section provided an overview of historical events shaping the Hill Country from pre-colonization to the end of the 20th century. Many historic events influenced all Hill Country communities, such as railroads. Some collective decisions had compounding effects on Communities At-Risk. Examples include slavery, land dispossession, segregation, and other collective decisions at federal, state, and local levels, such as laws, codes, rules, social norms, etc., that reached Communities At-Risk in the Hill Country and influenced aspects of their lives, such as poverty, displacement, loss, separation and exclusion from resources, opportunities, and benefits.

Collective decisions influence a community's access to opportunities and wealth accumulation, to include educational, socioeconomic, and residential opportunities, as examples. All communities are a sum of their parts and a sum of their historical processes. Just as communities are influenced by current economic pressures, they are simultaneously influenced by past collective decisions. In this section, we mentioned a few historical collective decisions that influenced the current demographic profile, the parts if you will, of the Hill Country. The demographics of the Hill Country are not random.

We also have provided an overview summary (not all encompassing) of historical factors influencing today's Texas Hill Country Communities At-Risk. This project sought to determine the status of Communities At-Risk with respect to natural resources, and a full discussion of Communities At-Risk is incomplete without at least an overview of "how we got here" as educational attainment, wealth accumulation, and public natural resources in a primarily private lands and natural resource state are inextricably linked. The relevance and success of natural resource conservation efforts will be influenced by all communities, to include Communities At-Risk, and by participation in natural resources, along with an understanding that the history of all Texas communities is linked to our collective future and that historical information may help guide future collective decisions towards a more sustainable Texas.

## Current Demographics

In this section, we see our history in action. Past collective decisions have shaped the Hill Country's current demographic profile. A description of the Hill Country population as a whole and specific race and ethnic characteristics, along with age are provided. Socioeconomic characteristics of the Hill Country community are described, including poverty, income, unemployment, and educational attainment. Landowner and policymaker demographics are also described, along with Communities At-Risk within the Hill Country.

### *Population Density*

As of the 2019 American Community Survey (5-year average), there were 3,854,850 people living in the Hill Country. A large majority of these people live in Bexar and Travis counties

(1,952,843 and 1,226,805 people, respectively, totaling 3,179,648). Moving west from those counties, the Texas Hill Country becomes much less populous, with some counties having fewer than 5,000 people such as Mason and Kimble (Table 1). The region has experienced rapid population growth in recent years. Between 2009 and 2019, for example, the Texas Hill Country grew 20%, with much of that growth concentrated in Bexar and Travis counties. Percent population growth was highest in Hays, Kendall, and Comal counties, which grew by 34%, 28%, and 26% during that period (Table 1).

Table 1. Population by county and time period in the Texas Hill Country.

| County | 2009 Population | 2019 Population | 2009-2019 Growth (%) |
|---|---|---|---|
| Bandera | 20,137 | 22,215 | 9.4 |
| Bexar | 1,584,817 | 1,952,843 | 18.9 |
| Blanco | 9,037 | 11,478 | 21.3 |
| Burnet | 43,402 | 46,530 | 6.7 |
| Comal | 104,960 | 141,642 | 25.9 |
| Edwards | 1,908 | 1,918 | 0.5 |
| Gillespie | 23,488 | 26,459 | 11.2 |
| Hays | 141,371 | 213,366 | 33.7 |
| Kendall | 31,294 | 43,769 | 28.5 |
| Kerr | 47,410 | 51,843 | 8.6 |
| Kimble | 4,485 | 4,373 | -2.6 |
| Llano | 18,150 | 21,047 | 13.8 |
| Mason | 3,890 | 4,186 | 7.1 |
| Medina | 44,844 | 50,057 | 0 |
| Real | 2,966 | 3,408 | 13.0 |
| San Saba | 5,904 | 5,991 | 1.5 |
| Travis | 966,761 | 1,226,805 | 21.2 |
| Uvalde | 26,623 | 26,920 | 1.1 |

*Source: ACS 2019 (5-Year Estimates)

### *Age*

As a whole, 50% of the population is 34 years or younger. At the extremes, 24% of the population is 18 and younger, and 12% is 65 and older. While this would suggest a population that has relatively well-balanced age groups, the distribution of old and young people varies across counties. Generally, more rural counties appear to be older, while counties along the I-35 corridor appear to be younger. For example, in Llano, 36% of the population is 65 years and older, compared to Travis County, where only 9% of the population is over 65 (Figure 2).

### *Race and Ethnicity*

In total, the Texas Hill Country is more “White” and more “Hispanic or Latino” than both the state and national averages. Approximately 79% of people in the Hill Country identify as “White Alone”, and 47% identify as “Hispanic or Latino”, compared to 74% and 39% at the state level,

and 72% and 18% at the national level (ACS 2019). The most Hispanic counties are located in the southern counties of the Hill Country: namely, Bexar, Medina, Uvalde, and Edwards (Figures 3-4). Additionally, within more rural counties, cities have greater numbers of Hispanics than their rural outskirts.

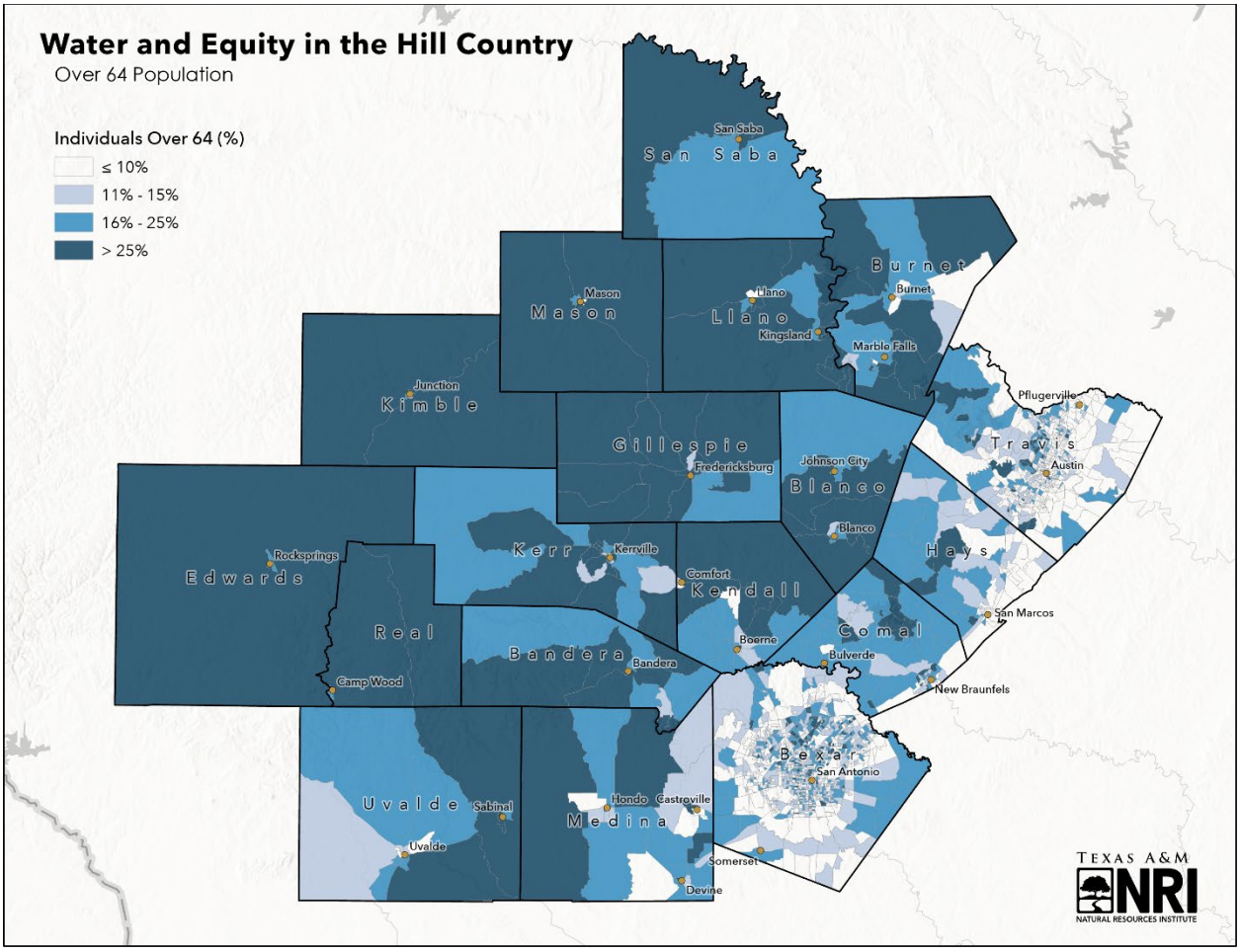



Figure 2. Percent population over 64 years of age by county in the Texas Hill Country. Source: US Census.

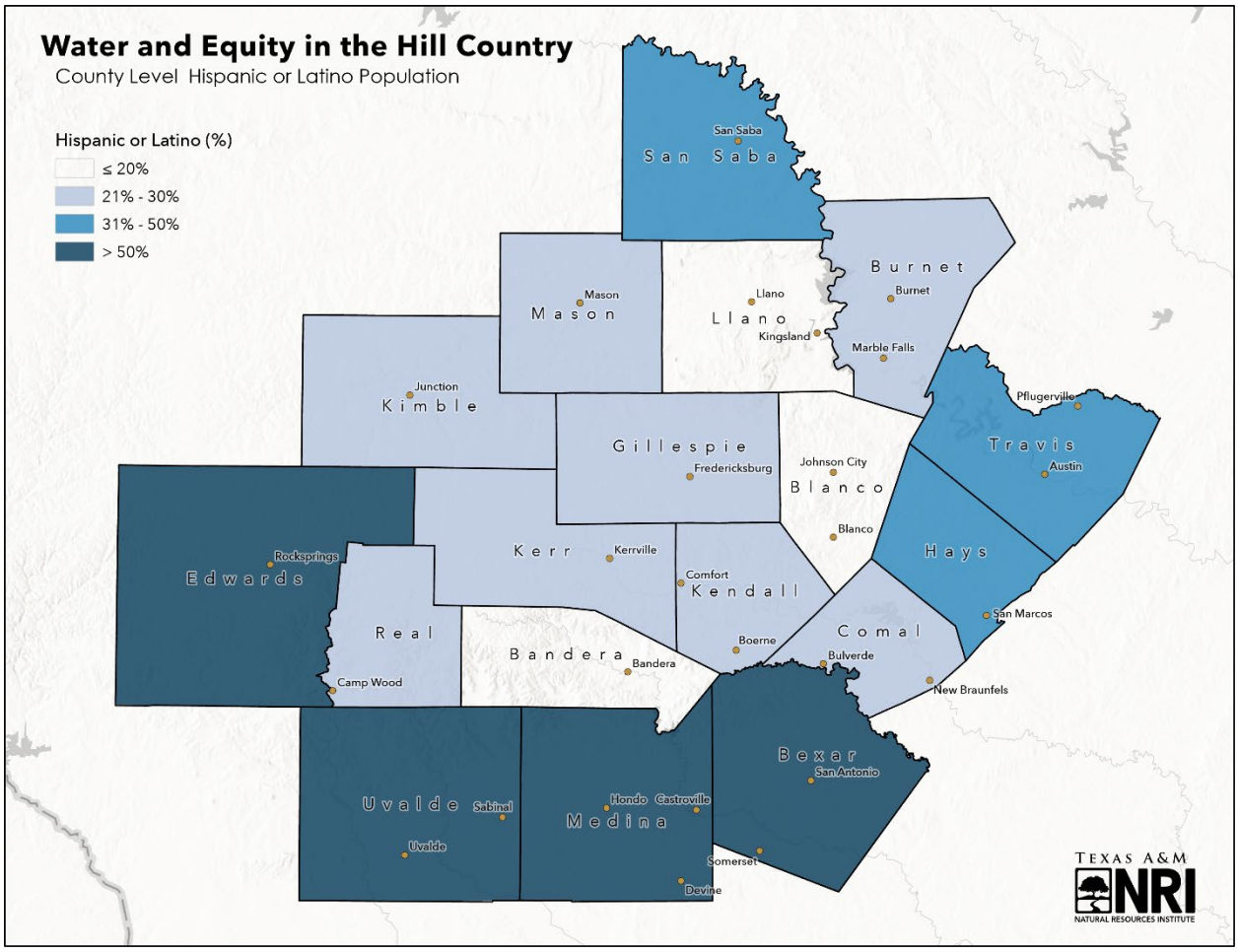



Figure 3. Percent Hispanic or Latino population by county in the Texas Hill Country. Source: US Census.

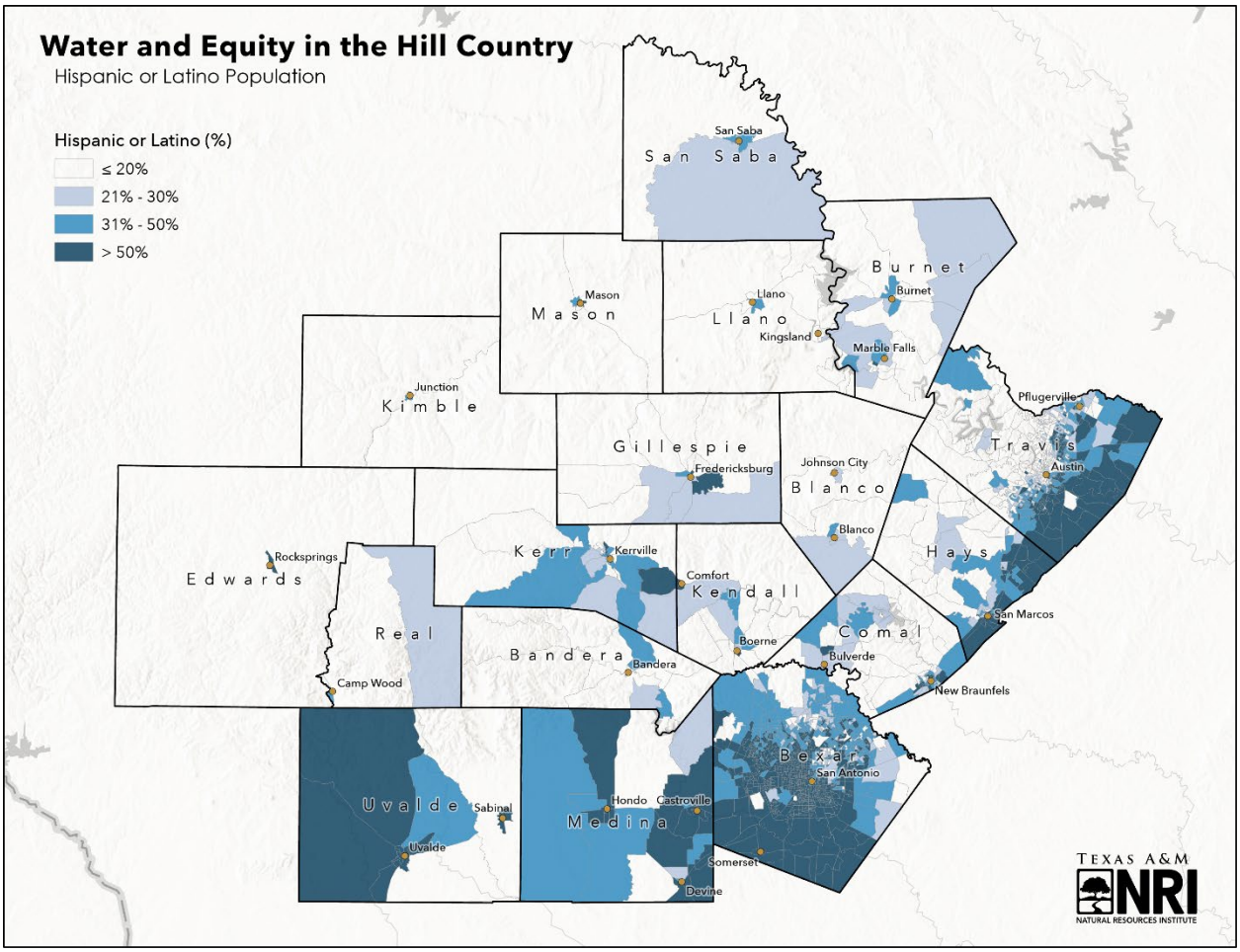



Figure 4. Percent Hispanic or Latino population by census block group in the Texas Hill Country. Source: US Census.

Additionally, 6.9% of the Hill Country identified as “Black or African American Alone,” 3.8% as “Asian Alone,” and 0.7% as “American Indian or Alaska Native Alone.” (Table 2).

Table 2. Percent race category for Texas Hill Country.

| Race Category | Population (%) |
|---|---|
| White | 79.0 |
| Black or African American Alone | 6.9 |
| Asian Alone | 3.8 |
| American Indian or Alaska Native Alone | 0.7 |
| Native Hawaiian or Other Pacific Islander Alone | 0.1 |
| Some Other Race Alone* | 6.3 |
| Two or More Races | 3.3 |

*ACS 2019 (5-Year Estimates)

**Within the “Some Other Race Alone” category, 6% of the 6.3% can be attributed to those identifying as Hispanic or Latino

Of the 6.9% of people identifying as “Black or African American Alone,” 94.1% are in Bexar and Travis counties. A few other areas stand out as having a large presence of people identifying as black (between 20% and 30% of the census block group). These are: Hondo (Medina), Marble Falls (Burnet), Mountain City (Hays), and San Marcos (Hays) (Figure 5).

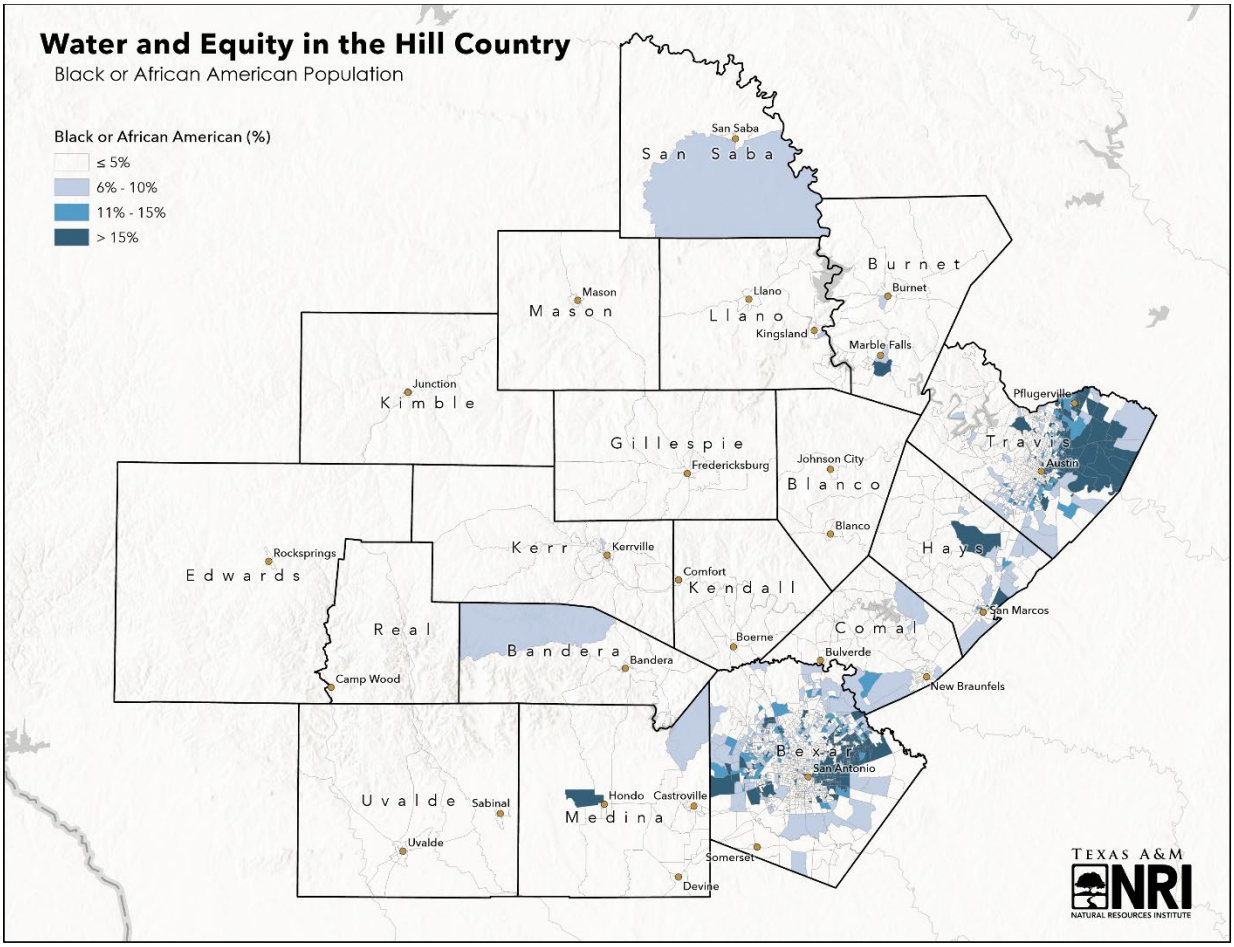



Figure 5. Percent Black or African American population by census block group in the Texas Hill Country. Source: US Census.

Likewise, of the 3.8% of people identifying as “Asian Alone,” 95% are in Bexar and Travis Counties, with some larger population hubs in Hondo, San Marcos, and the area Southwest of Kerrville (Figure 6).

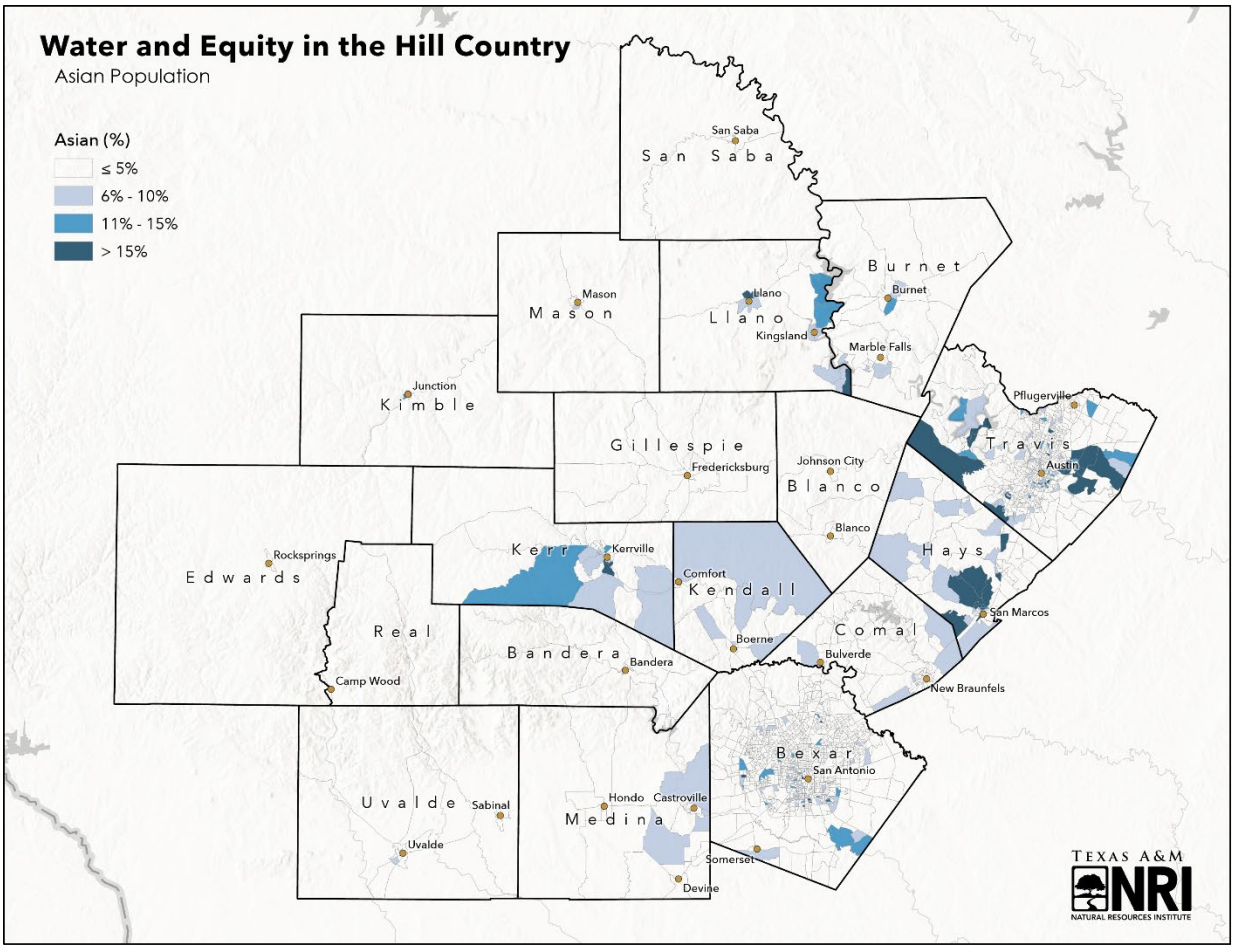



Figure 6. Percent Asian population by census block group in the Texas Hill Country. Source: US Census.

For those identifying as American Indian, 84.5% were in Bexar and Travis Counties. They had the largest representation in Gillespie County, where they represented 3.2% of the total population (Figure 7).

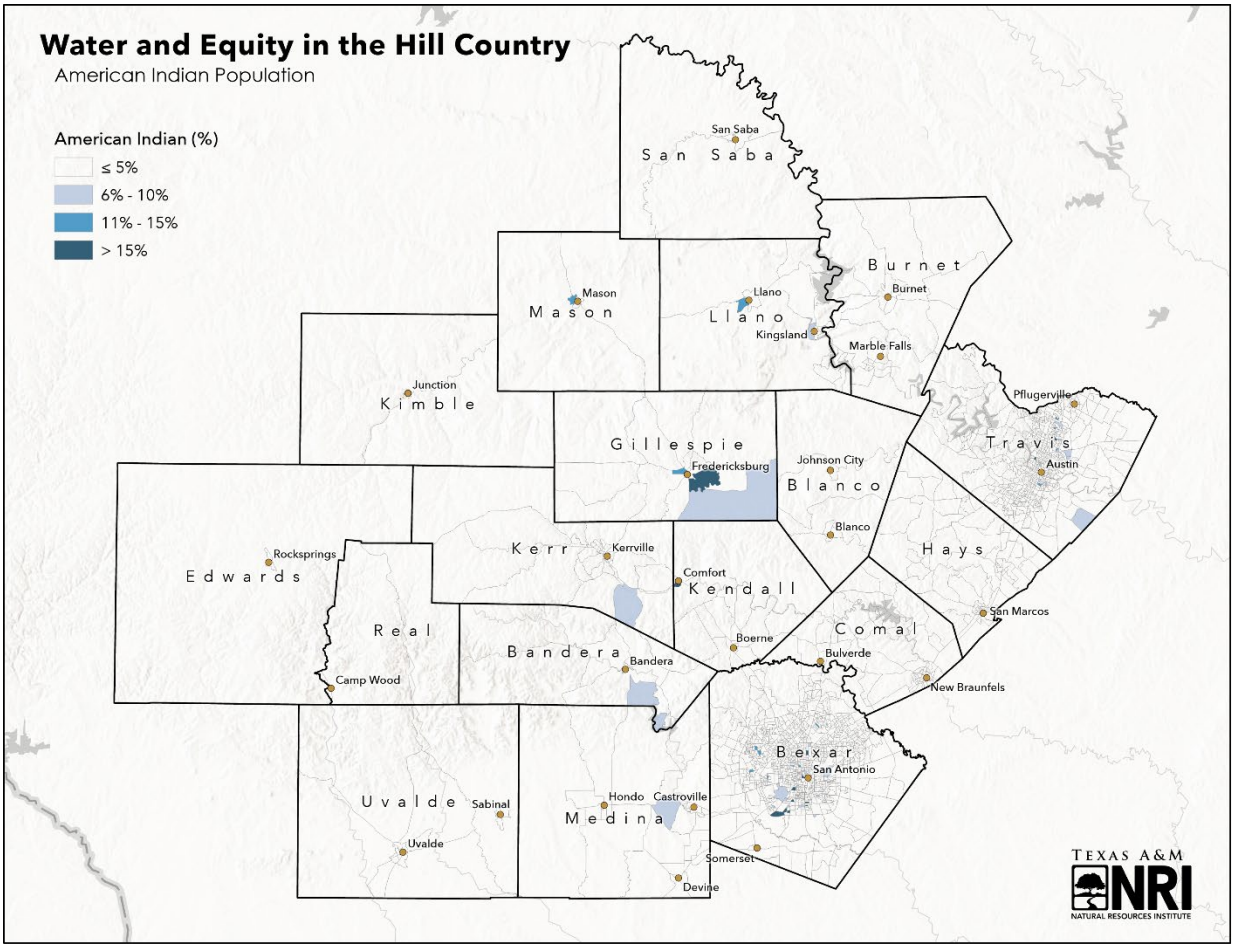



Figure 7. Percent American Indian population by census block group in the Texas Hill Country. Source: US Census.

As a whole, Communities At-Risk (i.e., those who do not identify as white and are also not Latino), tend to be more concentrated in the urban centers, relative to the rural outskirts. This is perhaps not surprising, given land ownership and workforce related opportunities.

### *Poverty Level*

Approximately 14% of people in the Hill Country are in poverty, defined by the poverty threshold, which is defined on a yearly basis by the US Census. Anyone below the poverty threshold is considered to be in poverty. The poverty threshold takes into account the number of people in a household, the age of the people in the household, and the household income. For example, in 2019, a person living alone and under the age of 65 would need to make less than $13,300 a year to be considered under the federal poverty threshold. If that person has two children, the threshold goes up to $20,598 (Census Poverty Thresholds).

Another metric for understanding poverty is to look at thresholds based on the "Ratio of Income to Poverty" i.e., a percent above the poverty line. For example, the EPA considers people to be *low income* if the household income is less than or equal to twice the federal poverty threshold (EPA). Based on this definition of "low income", 32% of the Hill Country

would be considered low income. These two metrics, percent under the poverty threshold and percent low income, are lower in the Hill Country than the state averages of 15% and 34% respectively.

At the county level, poverty appears to be greater in the counties further west. The exception to this is Bexar, which also has a poverty level above the regional average. The two poorest counties are Real and Kimble, where 25% and 22% of the population live under the poverty line, respectively (Figure 8).

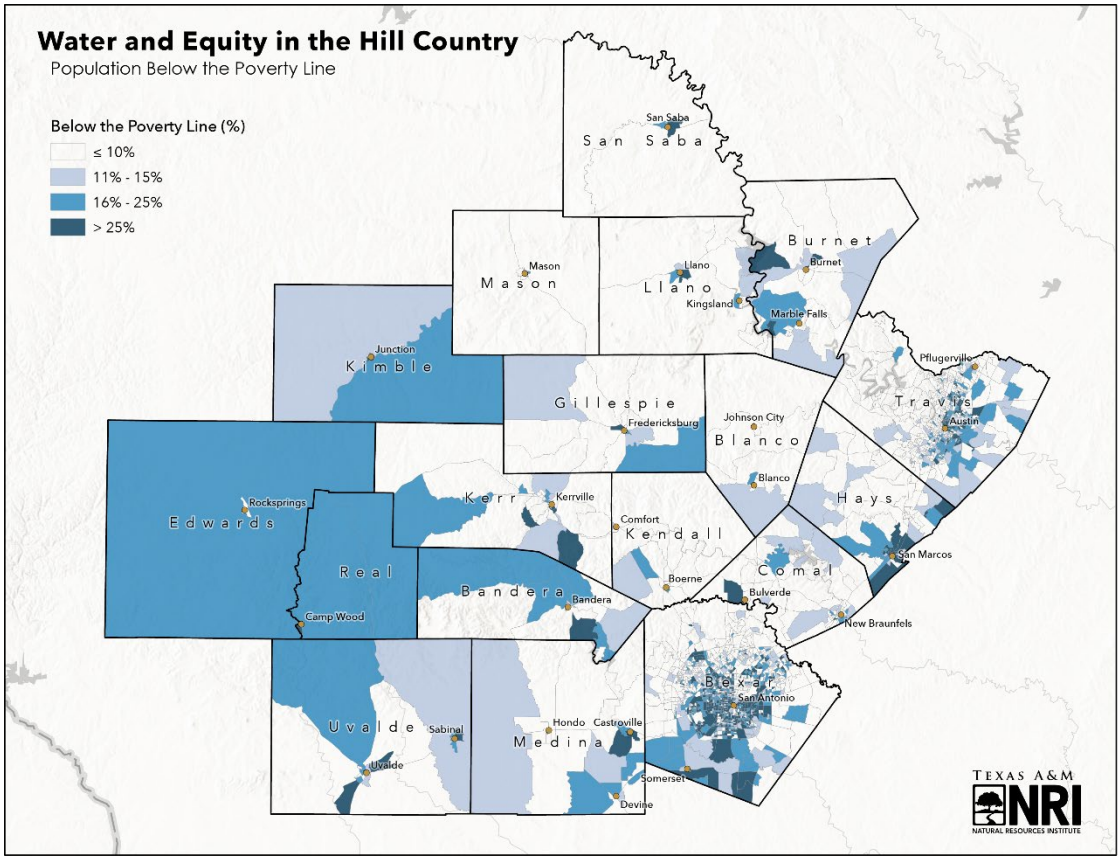



Figure 8. Percent population considered below the poverty line by census block group in the Texas Hill Country. Source: US Census.

Low Income Populations seem to follow a similar trend, with more rural counties further west having a larger portion of their population qualifying as low income (Figure 9). At the census block group level, a more nuanced picture emerges – poverty levels can vary drastically from neighborhood to neighborhood within counties. For example, in Uvalde, one census block group with 55% of the population considered low income borders a census block group of a similar size where only 33% of the census block group is considered low income. Another trend that emerges when looking at low-income communities is that they tend to be concentrated in more urban areas and town centers (Figure 10).

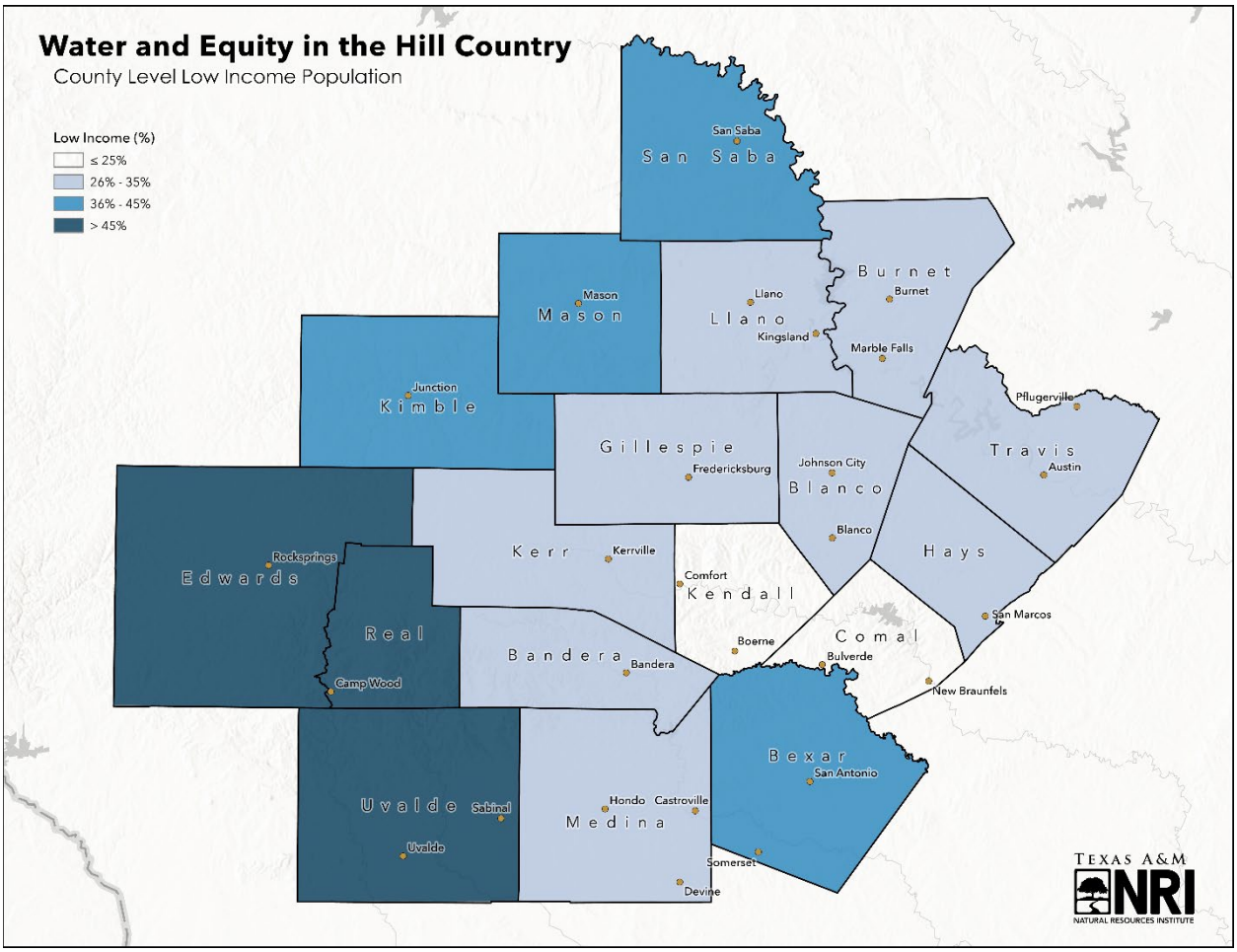



Figure 9. Percent population considered low income (below or equal to 2X federal poverty threshold) by county in the Texas Hill Country. Source: US Census.

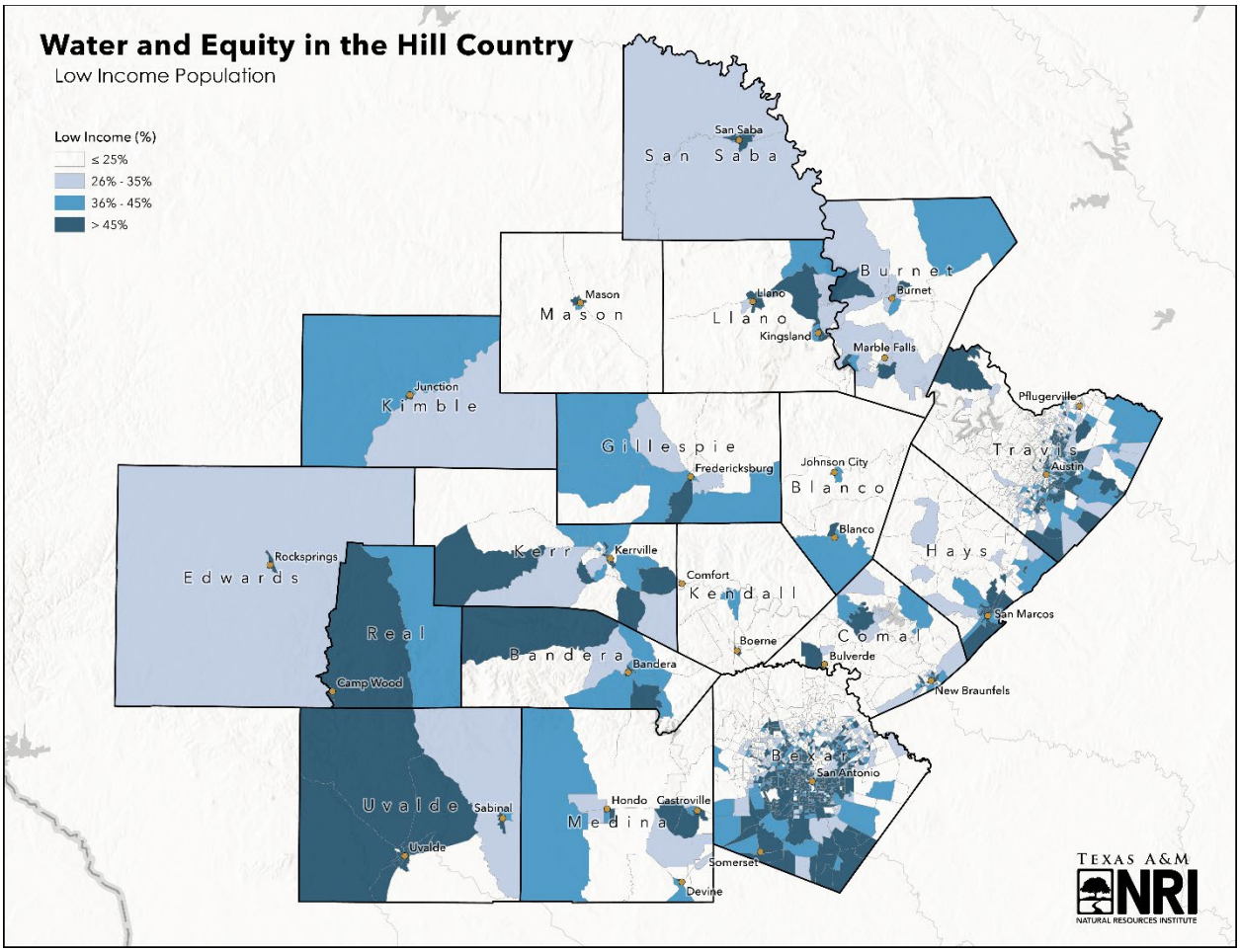



Figure 10. Percent population considered low income (below or equal to 2X federal poverty threshold) by census block group in the Texas Hill Country. Source: US Census.

### *Median Income*

Mapping median income at the county level, a clear and perhaps unsurprising pattern emerges – median income is higher in the more populous urban counties when compared to the more rural counties in the western part of the region (Figure 11). The Texas Water Development Board uses Median Income to help determine whether a community is considered an "Economically Distressed Area" (EDA) eligible for financial assistance through the Economically Distressed Areas Program (EDAP). EDAs must have "median household income less than 75 percent of the median state household income" (TWDB). In 2019, the median household income (2015-2019) was $61,874, so the 75% cutoff was $46,405 (Source: Census.gov). Based on this threshold, several counties in the Hill Country would qualify for financial assistance. Though EDAs are determined on the municipal level, county-level income could be a good indicator for EDAP qualifying areas in the more rural parts of the Hill Country.

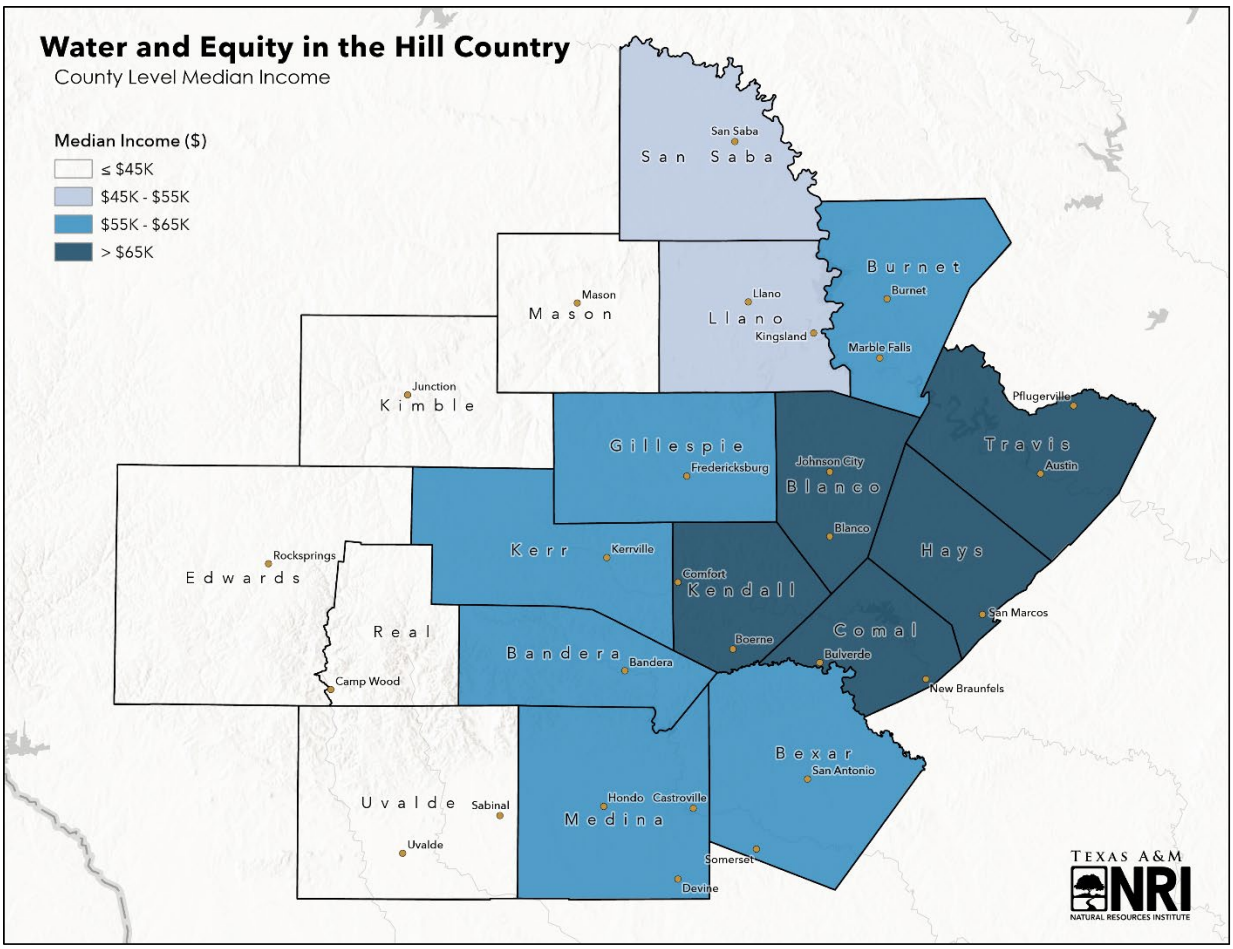



Figure 11. Median income ($) by county in the Texas Hill Country. Source: US Census.

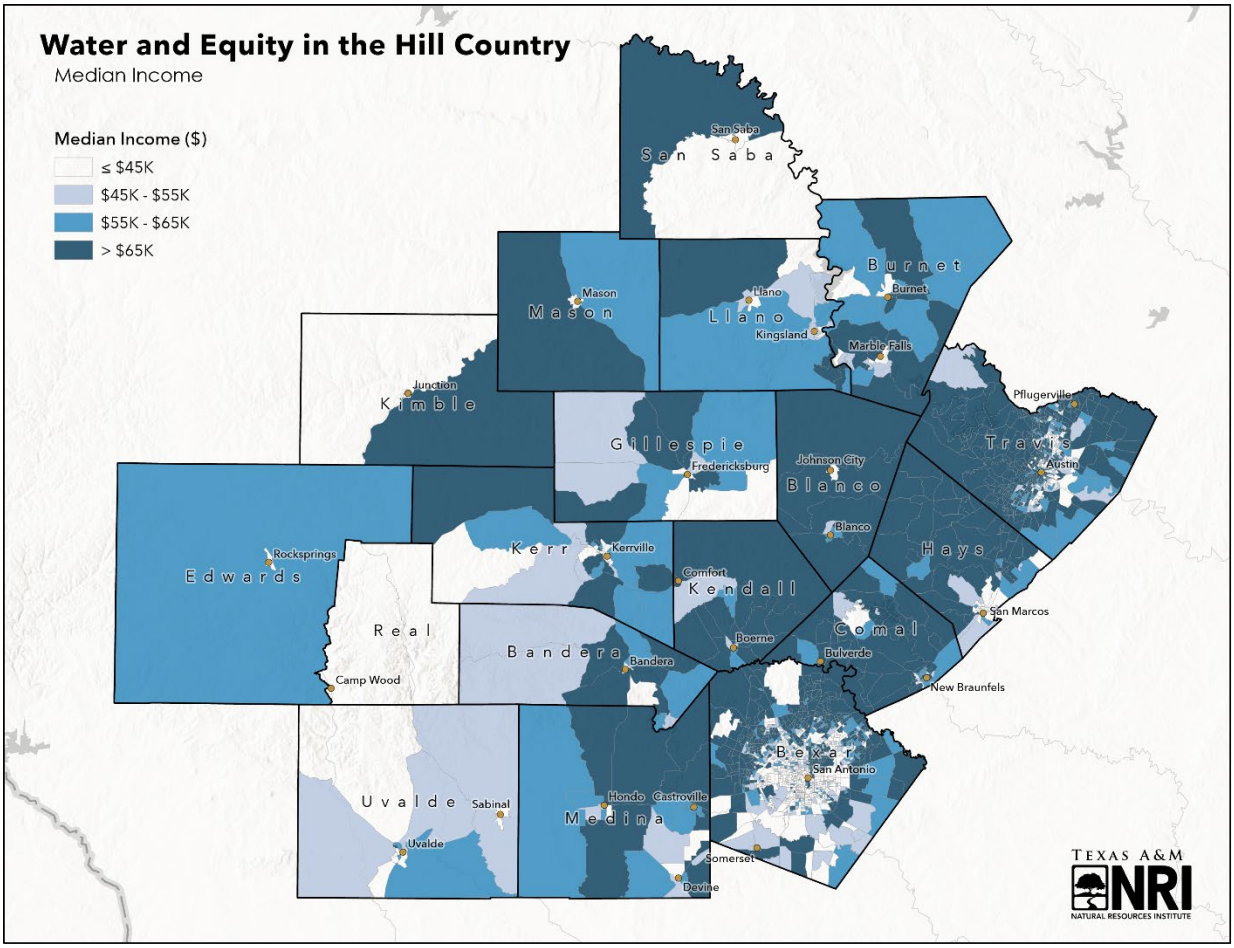



Figure 12. Median income ($) by census block in the Texas Hill Country. Source: US Census.

### *Unemployment Rates*

Unemployment in the Texas Hill Country is 4.6%, which is lower than the state and national unemployment rates of 5.1% and 5.3%, respectively. The unemployment rate is highest in Llano County, where 7.4% of the population is unemployed. The unemployment rate is lowest in Edwards, Real, and San Saba, where unemployment is less than 2% (Figure 13)**.** The unemployment rate measures the percent of people in the labor force (i.e., those that are employed or actively looking for work) that currently do not have a job. It is important to note that unemployment numbers do not include discouraged workers who are no longer in the labor force, or retirees.

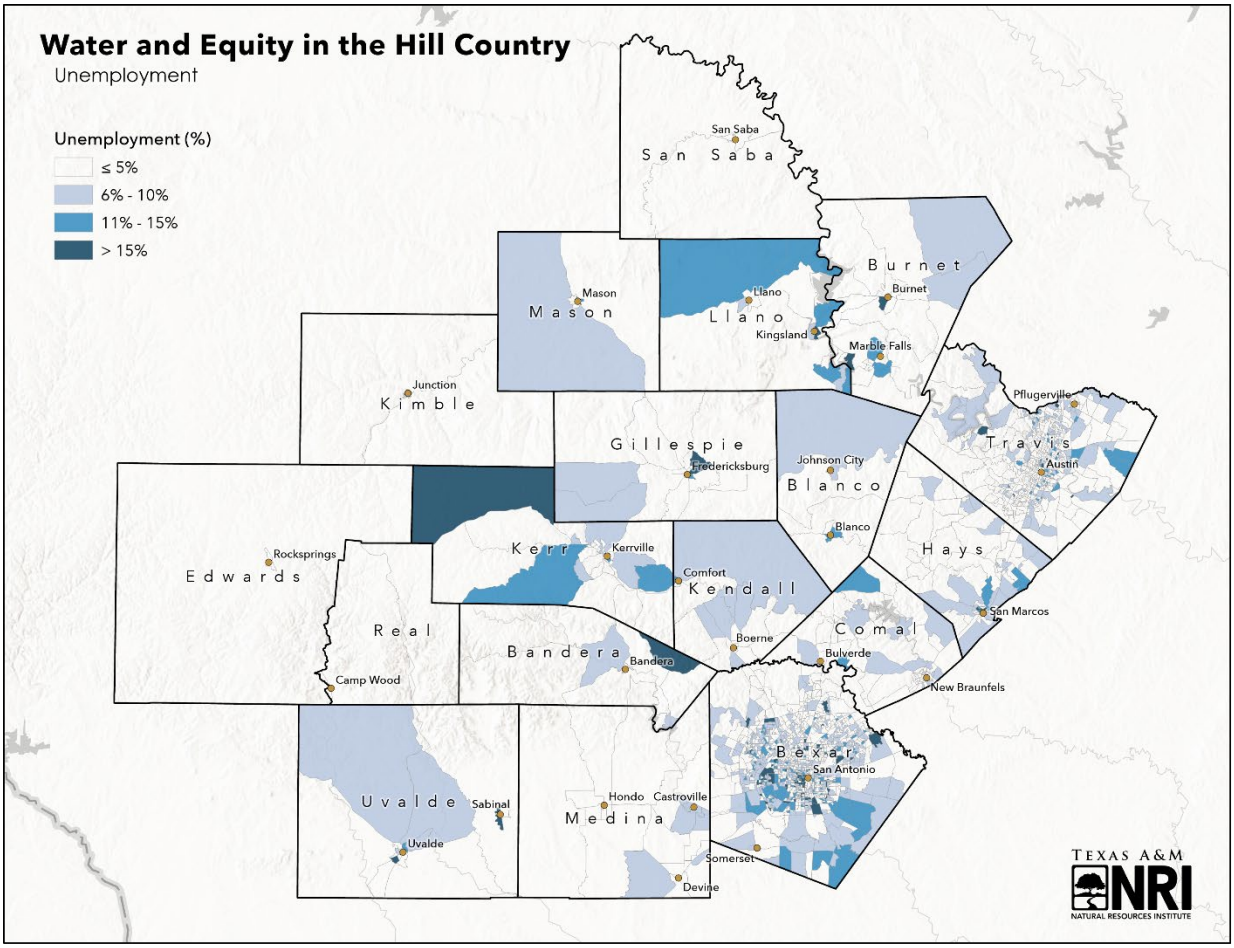



Figure 13. Percent unemployment by county in the Texas Hill Country. Source: US Census.

### *Labor Force*

The labor force participation rate is the proportion of people in the labor force (employed or actively looking) out of the total civilian noninstitutional population age 16 and over. In other words, the labor force participation rate tells you the percentage of people that are employed or actively looking out of the total people eligible to work. A low labor force participation rate could indicate high numbers of retirees, high numbers of students, or high numbers of discouraged workers. Unfortunately, current data on labor force participation is not available at the county level.

We calculated an approximation for this figure by dividing the population in the labor force over 16 by the population of people 15 years and older in each county. The results of this calculation show that in many Hill Country counties, the percentage of people in the labor force is low relative to the national average labor force participation rate of 63.6% (Census) (Table 3). For example, in Real, only 42.5% of people over 15 are in the labor force, which could indicate high numbers of retirees or discouraged workers.

Table 3. Adults in Labor Force by County in the Texas Hill Country.

| County Name | People 15 and over in the Labor Force (%) |
|---|---|
| Bandera | 51.8 |
| Bexar | 63.6 |
| Blanco | 59.0 |
| Burnet | 57.0 |
| Comal | 59.8 |
| Edwards | 52.3 |
| Gillespie | 57.1 |
| Hays | 67.0 |
| Kendall | 60.5 |
| Kerr | 53.9 |
| Kimble | 58.3 |
| Llano | 45.1 |
| Mason | 63.4 |
| Medina | 55.5 |
| Real | 42.5 |
| San Saba | 52.0 |
| Travis | 71.7 |
| Uvalde | 56.6 |

*ACS 2019 5-Year Estimates (Methodology)

### *Education*

On average, 64.2% of the Hill Country is college educated, which is higher than the state and national averages of 58.7% and 61.0%, respectively. The Hill Country also graduates more students from high school than the state average. On average, 13.3% of people in the Hill Country never graduated from high school, compared to 16.3% at the state level. However, these rates vary dramatically on a county-by-county level. For example, in San Saba, only 39.9% of the county is college-educated, and 25.2% of the county never graduated from high school (Figures 14-15).

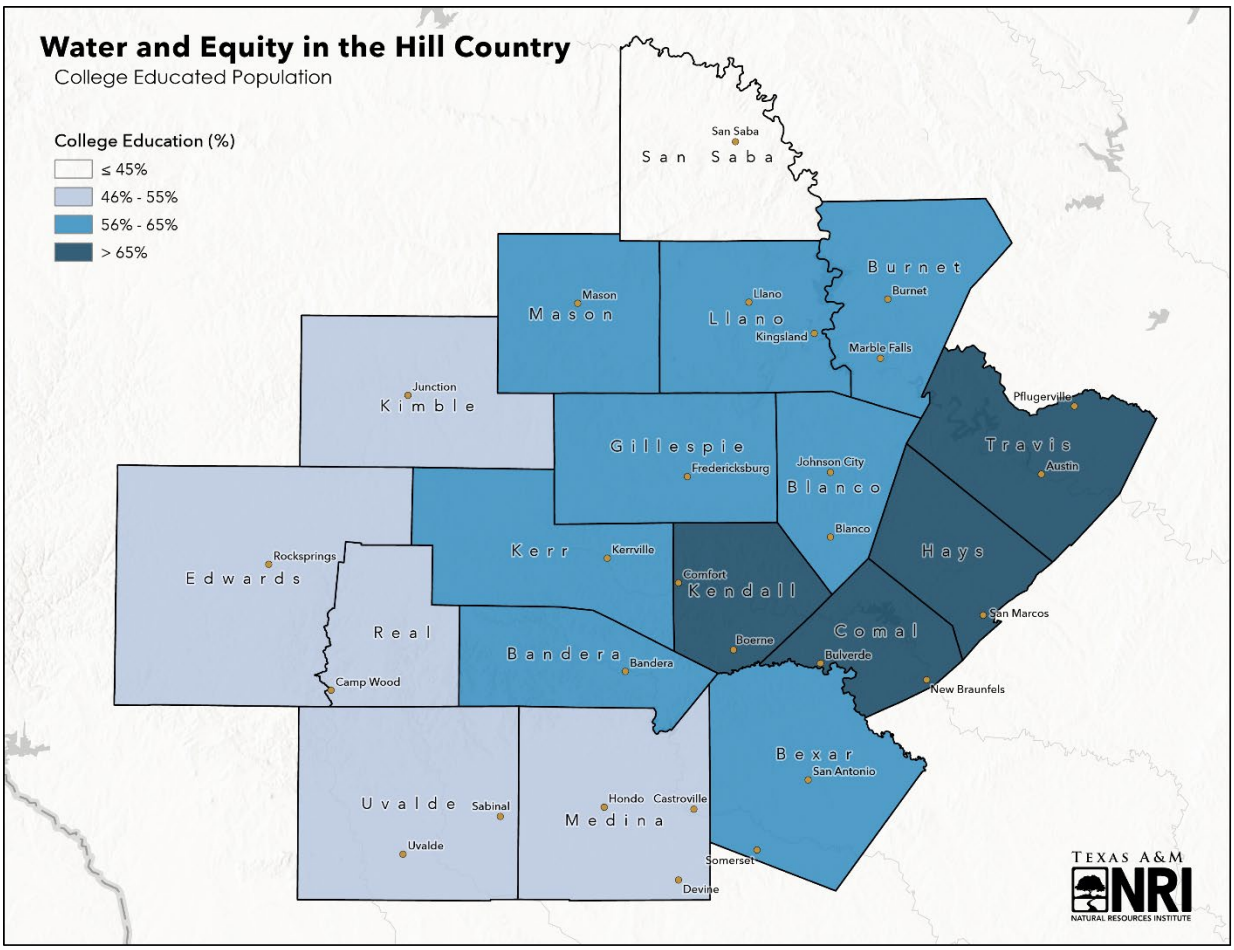



Figure 14. Percent population with college education by county in the Texas Hill Country. Source: US Census.

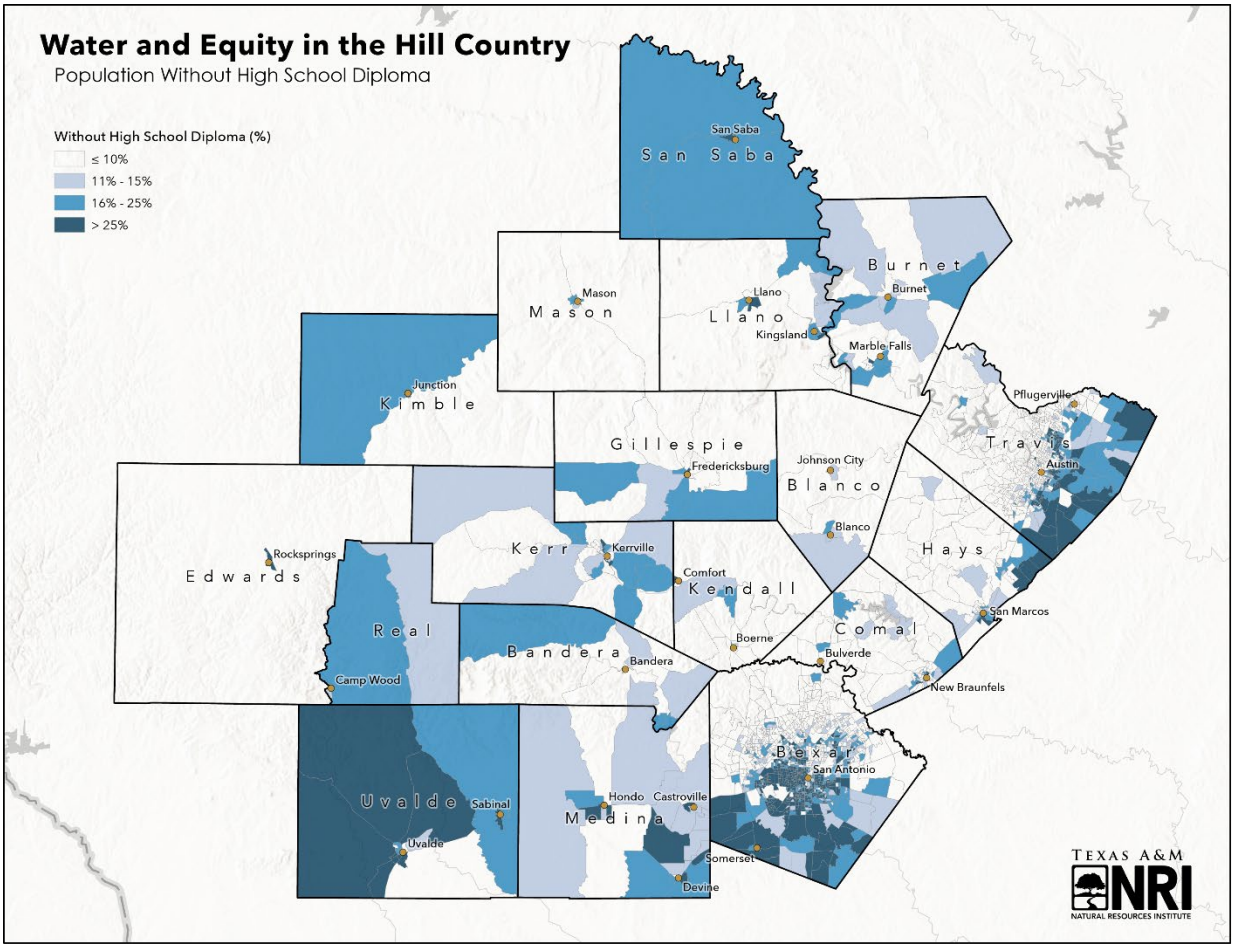



Figure 15. Percent population with less than a high school education level by census block group in the Texas Hill Country. Source: US Census.

### *Linguistic Isolation*

According to the EPA, households experiencing linguistic isolations are those that in which "all members age 14 years and over speak a non-English language and also speak English less than 'very well' (have difficulty with English)" (EPA). Despite having large Latino populations, based on Census data the Hill Country does not appear to have large issues with linguistic isolation, with few exceptions in parts of San Antonio, Austin, and Uvalde (Figure 16).

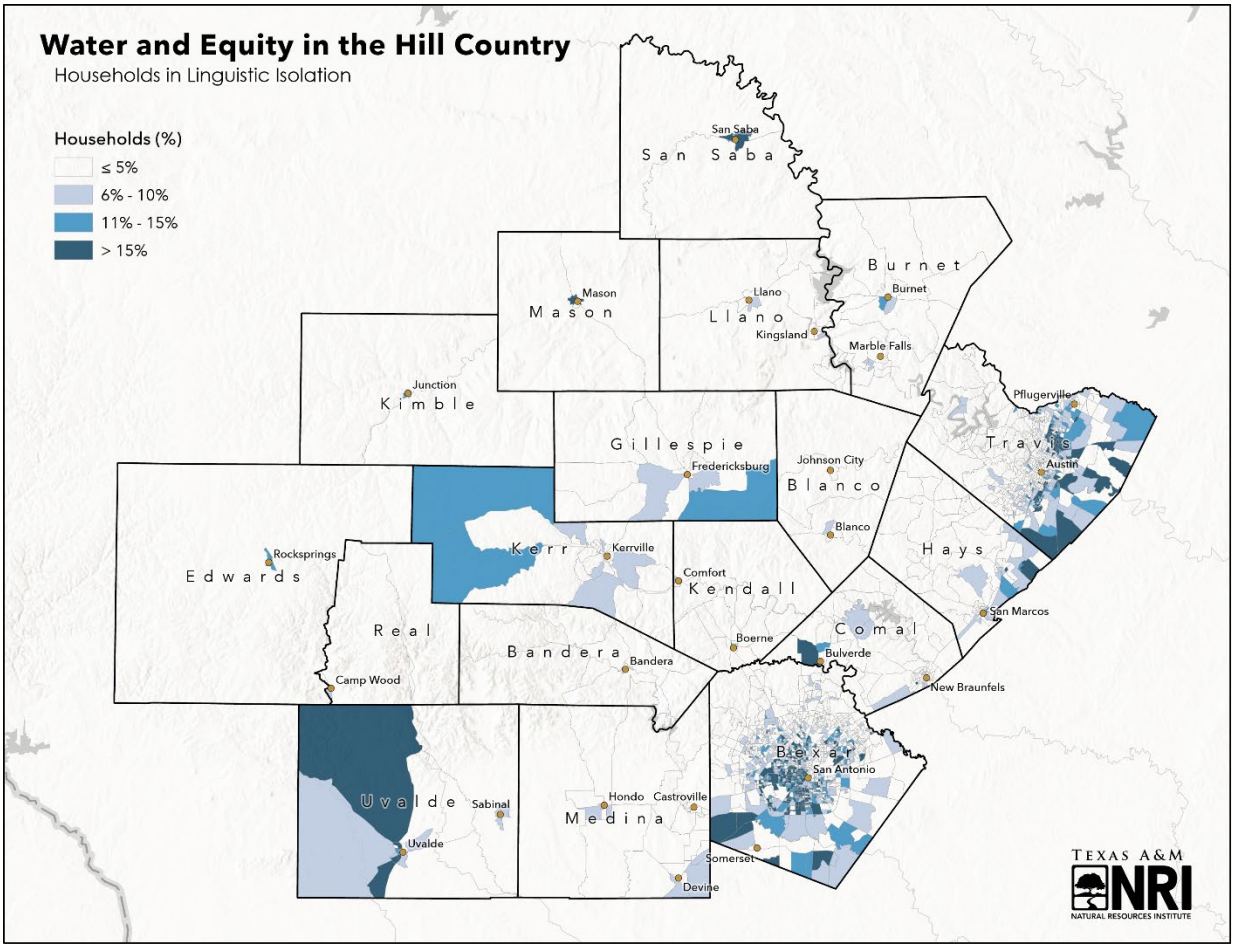



Figure 16. Percent households in linguistic isolation by census block group in the Texas Hill Country. Source: US Census.

## Landowner Demographics

Rural working lands provide many ecosystem benefits to surrounding communities, and land stewardship is key to imparting those benefits. The stewardship of rural land in the Hill Country has varied over the years. Historically, it is believed indigenous groups managed Texas lands for a variety of uses, in balance with natural cycles, and as European settlers arrived, land use transformed to present day production agriculture. Land ownership trends in Texas have changed little since land was transferred from indigenous and Mexican hands to European and European-American hands. Current landownership can be described within three metrics: operations, producers, and acres operated. The USDA defines an *operation* as "any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the year." They define a *producer* as the person designated to make management decisions regarding the land and/or operation. The *acres operated* involve the land base of the operation, in this case, the acres managed or owned.

Most farms across the United States are family businesses. Based on the 2017 Agricultural Census, we describe the demographics of Hill Country operations, producers and acres operated. In terms of Hill Country operations, 14% are owned or managed by Communities At-Risk (Latinos, Black or African Americans, American Indians or Indigenous groups, and Asian Americans) and 86% by non-Latino Whites. Considering only producers in the Hill Country, 11% of rural lands in the Hill Country are owned or managed by Communities At-Risk, meaning 89% of ecosystem service benefits for the Hill Country are controlled by Non-Hispanic Whites. With respect to acres operated in the Hill Country region, 6% were operated by Communities At-Risk and 94% by Non-Hispanic Whites. Most producers were male, but not overwhelmingly so, and over the age of 35, with only 9% below the age of 35 (Figure 18). Latinos represented the largest number of producers for Communities At-Risk (Figure 17).

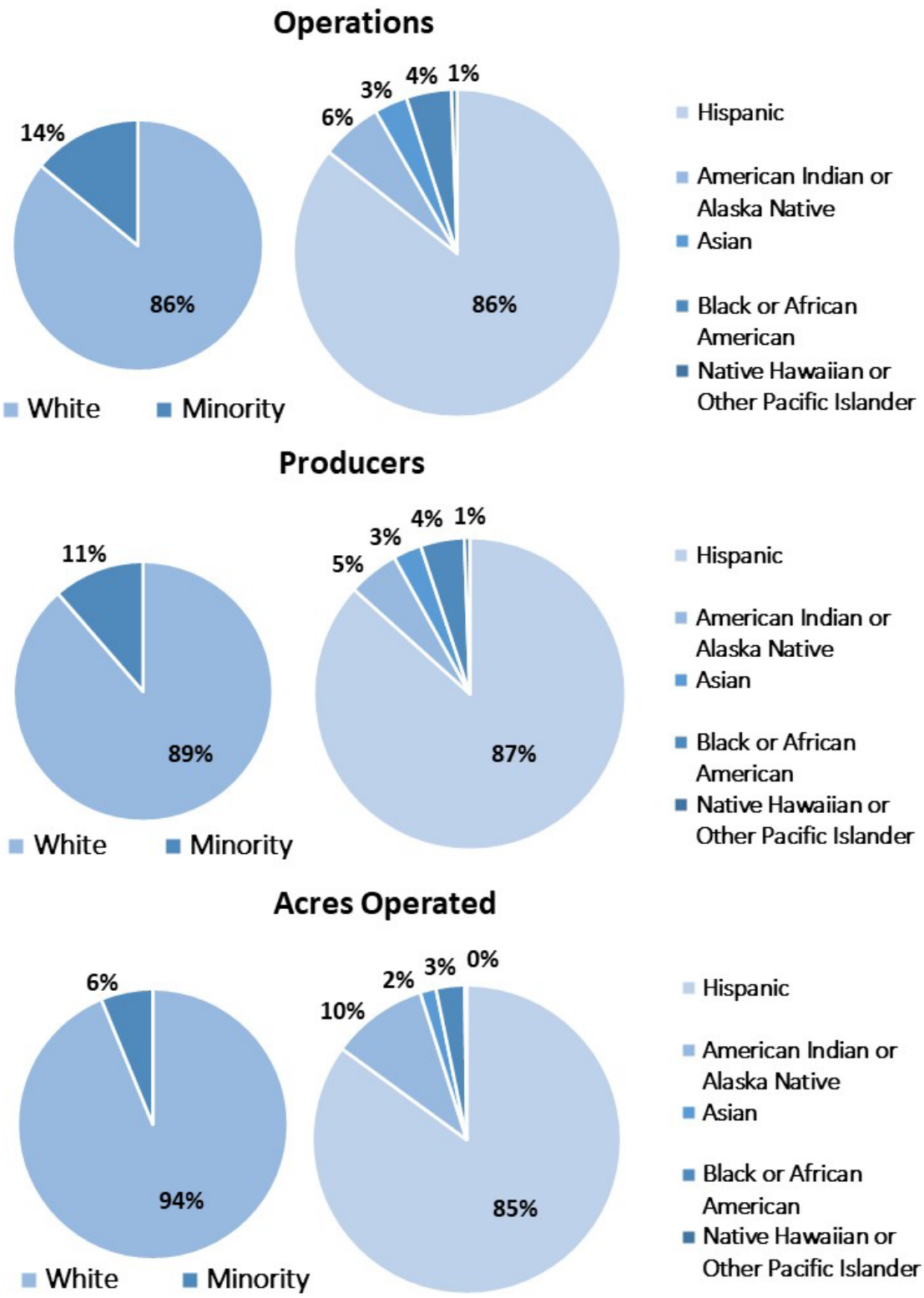



Figure 17. Race and ethnicity of rural working landowners by operations, producers, and acres operated in the Texas Hill Country. Source: USDA, NASS, COA.

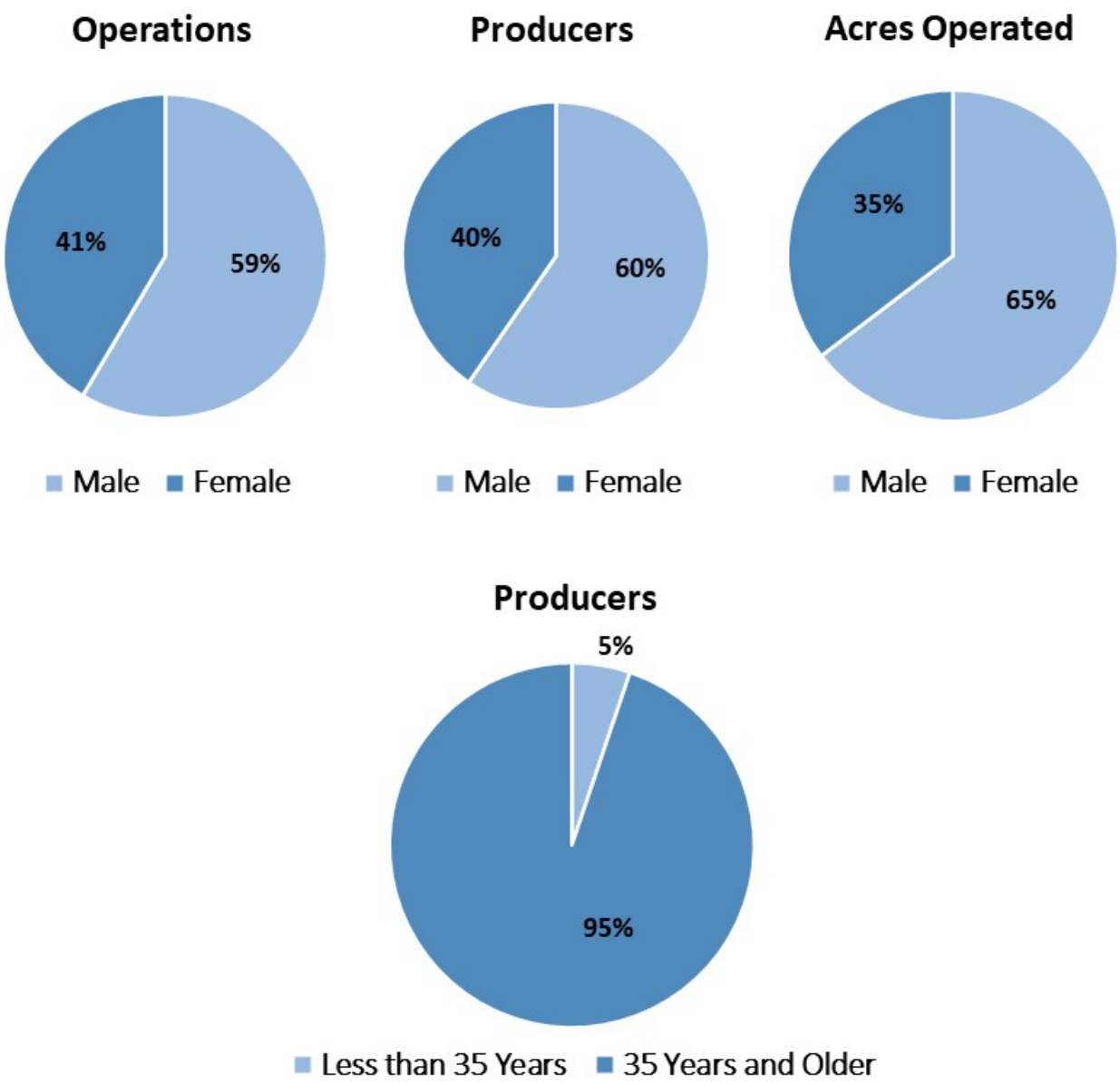



Figure 18. Sex and age of rural working landowners by operations, producers, and acres operated in the Texas Hill Country. Source: USDA, NASS, COA.

## Policymakers Demographics

The Hill Country consists of 18 counties with approximately 4 million residents, of which 8% are Black or African American, 1% American Indian or Indigenous, 4% Asian and approximately 87% White, divided among 40% Non-Hispanic White and 47% Latino (US Census 2021). The Hill Country is almost evenly divided between male and female. In an effort to compare sex and ethnicity collectively, pie charts were created for each county describing sex on the right half of the pie chart (male and female) and race and ethnicity on the left half of the pie chart (Non-Hispanic White, Black or African American, American Indian, Latino, and Asian). To make comparisons easier, similar charts also were created for county leaders and populations, side by side (Figures 19-20). The words community leaders and community representatives are used interchangeably throughout the report.

Most county populations are Non-Hispanic White (12 of 18 counties). Counties where half of the population consists of Latinos include Bexar, Edwards, Hays, Medina and Uvalde (5 of 18 counties), and counties where approximately a quarter of the population consists of Latinos include Bandera, Blanco, Burnet, Comal, Gillespie, Kendall, Kerr, Kimble, Mason, Real, San Saba and Travis (12 of 18 counties). With the exception of Bexar (9%), Travis (9%), Hays (5%), and San Saba, most counties had less than 3% African American populations, and 1% or less was the norm.

Elected county leaders and water leaders, to include groundwater conservation districts, river authorities, Texas Water Development Board and regional water planning groups, were assessed for each county. County leader positions averaged at 22, with a range of 13 to 28 positions per county. One position for each groundwater conservation district was evaluated (18 positions total). Thirty river authority positions were evaluated (2 per 15 authorities). Twelve Texas Water Development Board positions were evaluated, and 11 positions for regional water planning groups were evaluated (Regions J, K, and L). In assessing community and water leadership positions, a few positions could not be determined. This was factored into the assessment. County demographics were compared side by side with county leadership positions. Half of the county leaders in Burnett, Comal, Hays, Kendall, Real, San Saba and Travis counties were female and at least a third of the county leadership positions were held by females in the remaining counties, where males still held a slight majority. Bexar, Edwards, Gillespie, Hays, Travis and Uvalde counties held the most representative leadership cabinets in the Hill Country, in terms of race and ethnicity, when compared to respective county demographics. Very few Black or African American and Asian community leaders held positions in the Hill Country, and based on the available information, American Indian or indigenous groups did not hold any community leadership positions. These groups make a smaller percentage of the Hill Country population. Latinos held the most leadership positions among Communities At-Risk and slightly less, compared to respective county demographics.

In assessing water leadership, groundwater conservation district leadership was primarily Non-Hispanic White and male, as were river authorities. Regional planning groups were primarily Non-Hispanic White with some Latino representation and with more female representation (unfilled positions). The most representative water leadership group was the Texas Water Development Board, with the most representation by Communities At-Risk and females.

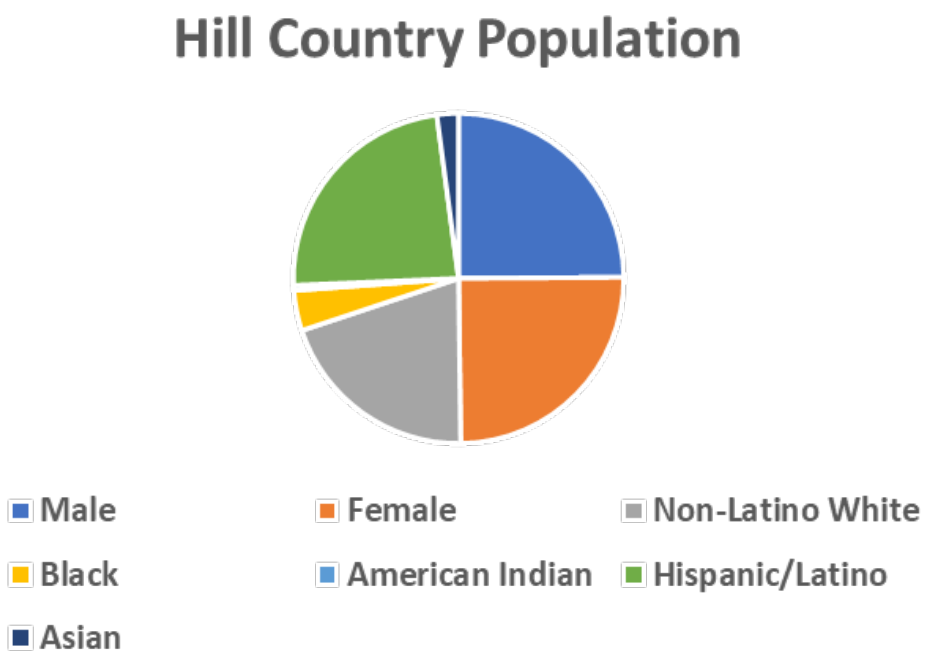


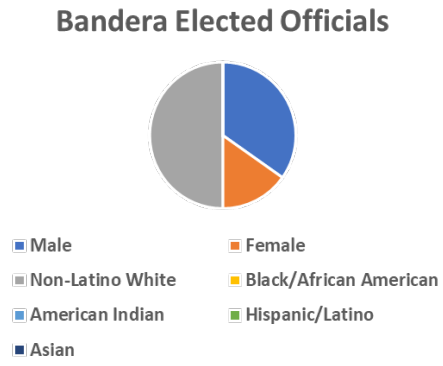

Figure 19. Collective Hill Country county general population demographics (race and ethnicity on left half of chart and gender on right half). Source: US Census.

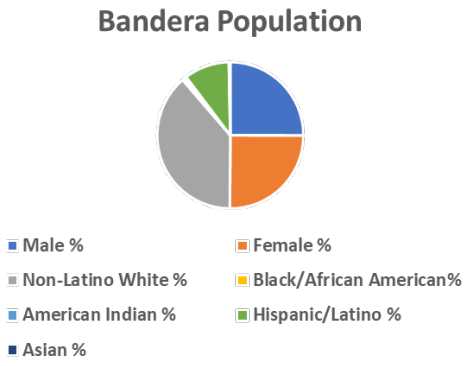
Preparing future leaders is key to sustainable communities. If the intent is to increase representation of Communities At-Risk in leadership positions, then care should be given to prepare individuals to succeed, to avoid setting back community efforts and representation. Suggestions for future leadership training programs tailored to Communities At-Risk include:

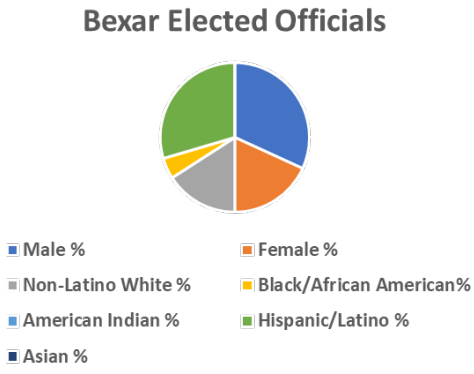
1. Strategic and meaningful, paid, long-term, targeted training, involving high contact hours, particularly for water leadership positions and for rural county leadership positions, as these involve complex systems, unique community cultures and specific processes and skills.
2. Caring, long-term mentorship and supportive personal networks within professional settings – assign several individuals that are a match for recruits to create a safe environment where there is freedom to ask questions, push boundaries and gain experience, to fall and learn without fear in a supportive work family, and to receive redirection and responsibilities with expectations for success, not a lowering of standards.

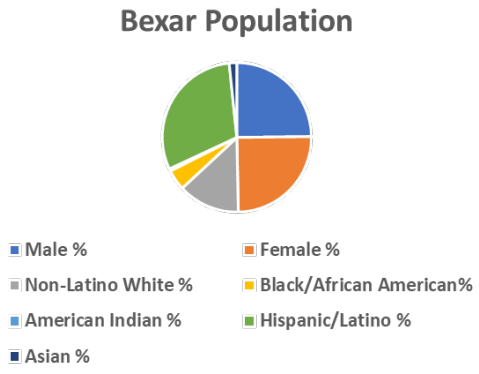
Leadership training has typically centered around internships, workshops, and hands-on training activities, which are important and valid preparation pathways. Often missing are long-term, meaningful touchpoints post training and post education for recruit retention, such as consistent and continual one-on-one mentoring and training, professional social network

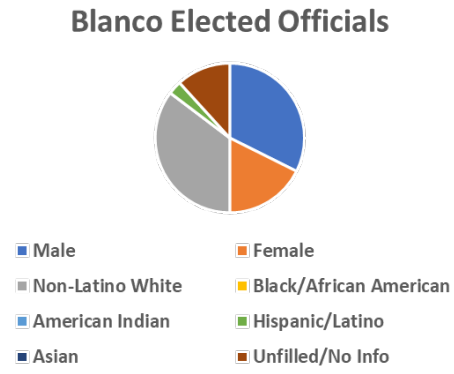
training, and the opening of social networks or at minimum increasing their accessibility to Communities At-Risk, in this case within the professional water arena and within professional county governments. Immersion in the social and cultural networks of water and county governments is necessary, in addition to the slow introduction of and full immersion into board room meeting basics and protocols so that these become second nature. Education programs offer many opportunities but strong, long-term leadership training partnerships with community organizations, non-traditional service organizations and government offices are key to building strong leaders.



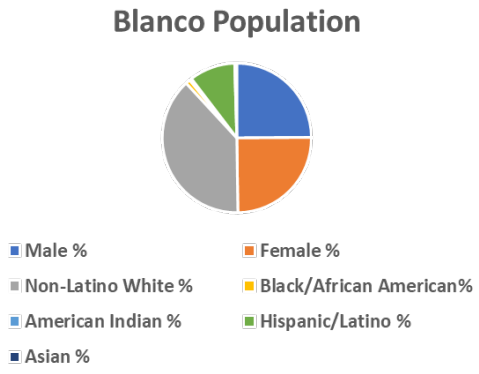
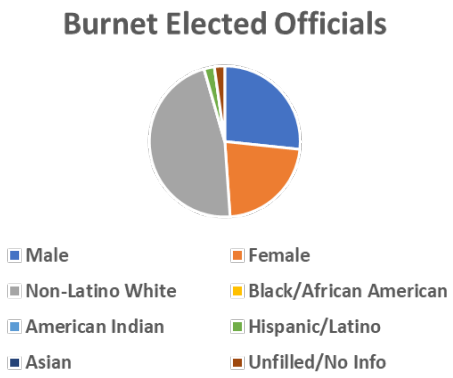
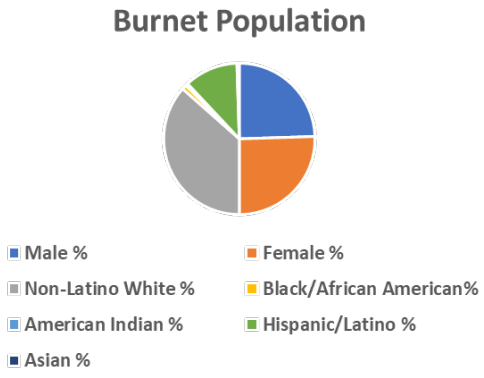
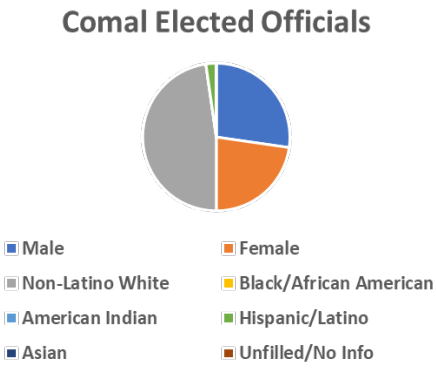
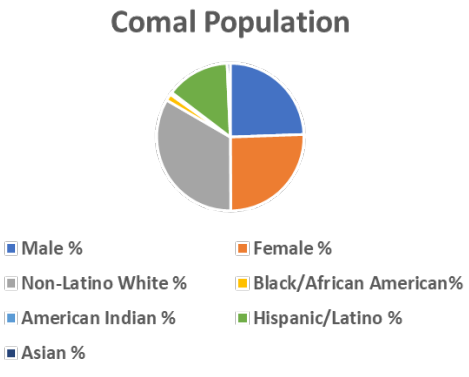



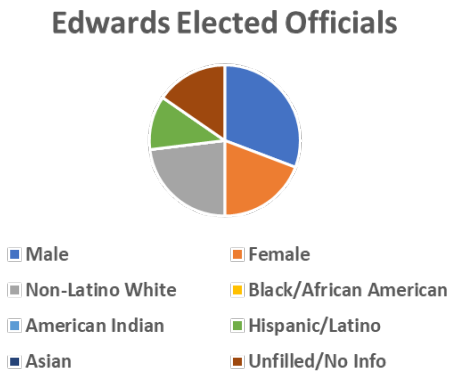

Figure 20. Elected county officials compared with general county demographics (race and ethnicity on left half of chart and gender on right half). Source: US Census.

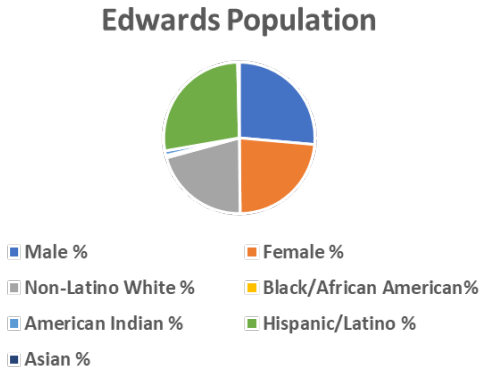
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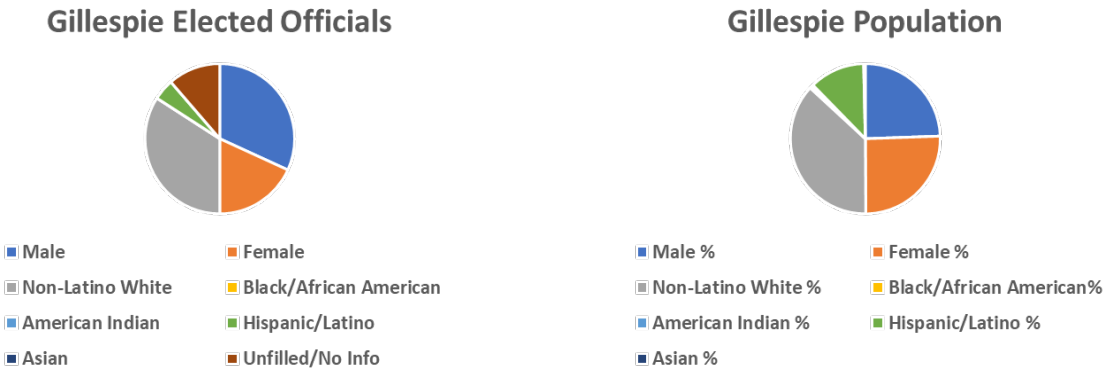


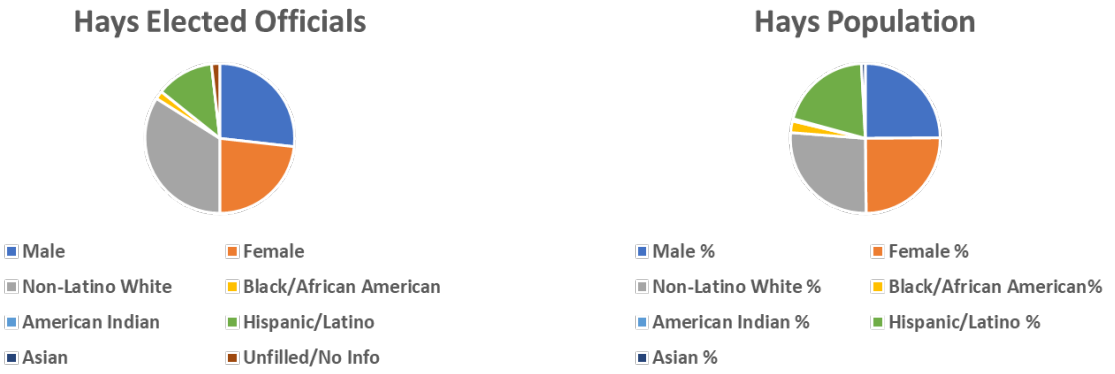


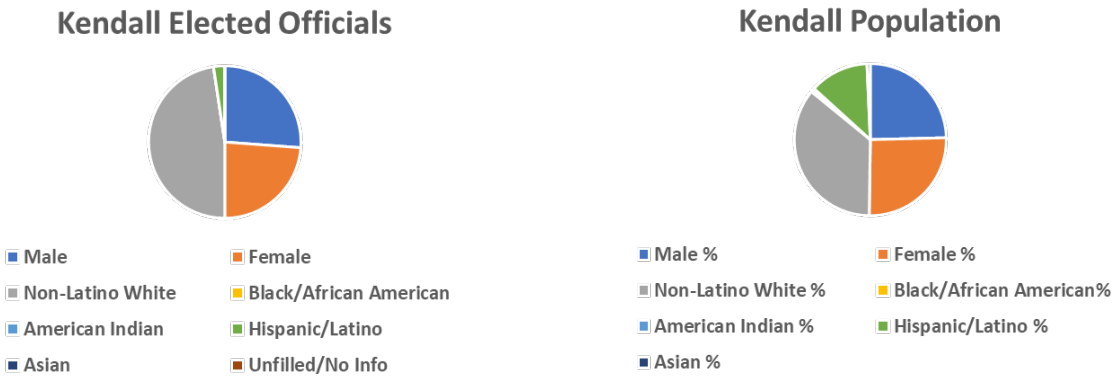


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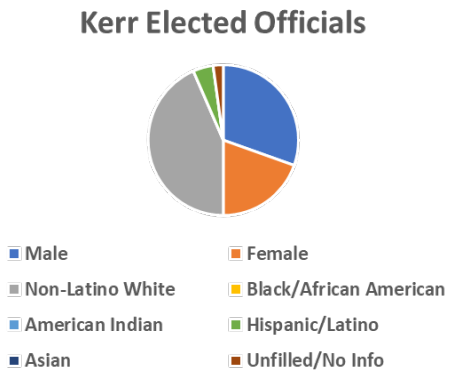


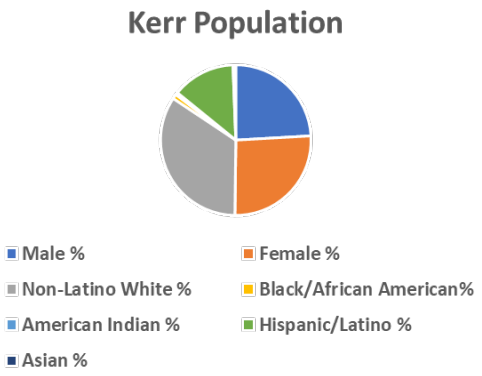


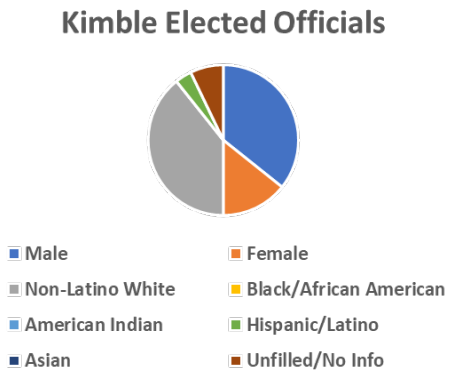


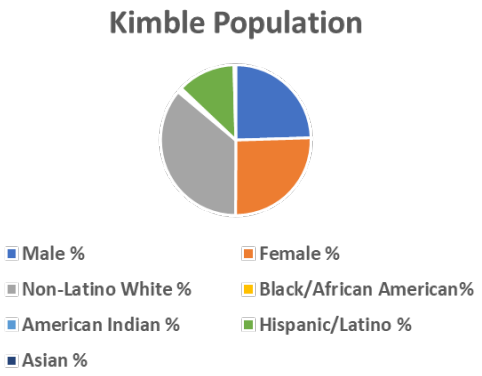


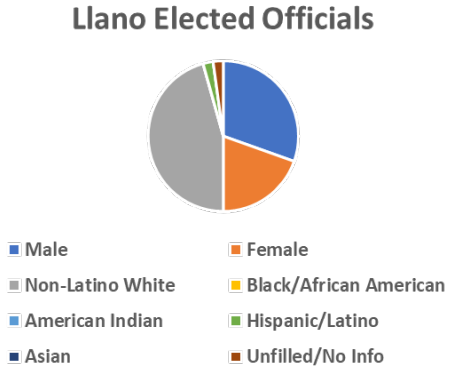


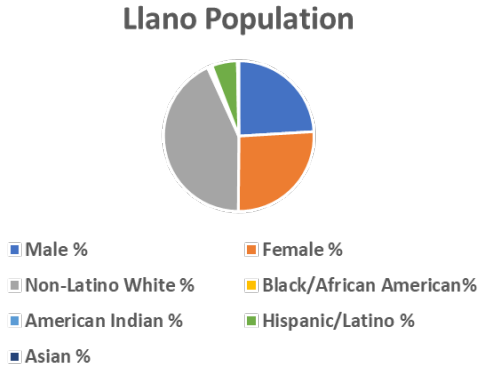


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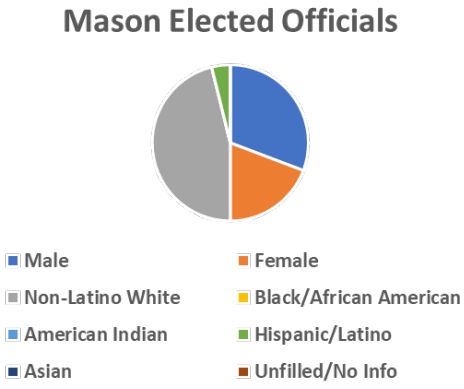


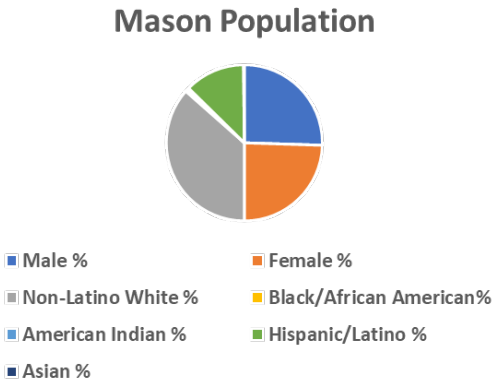


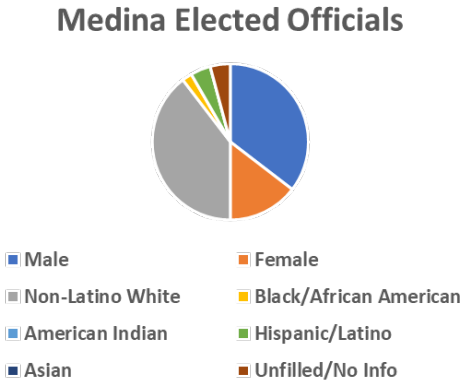


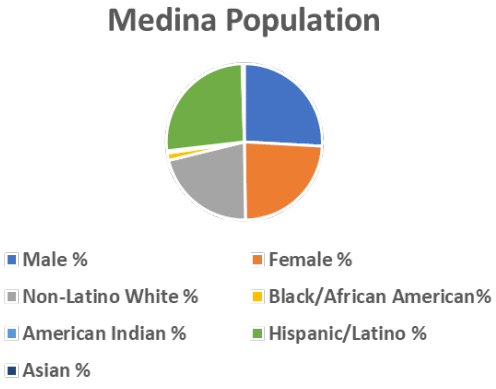


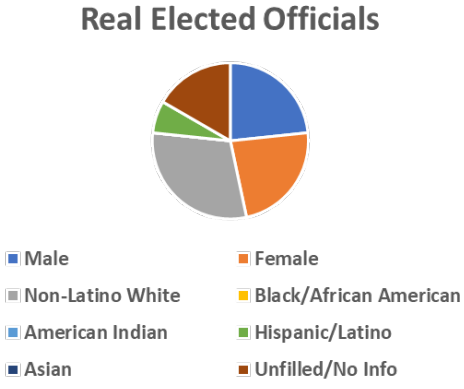


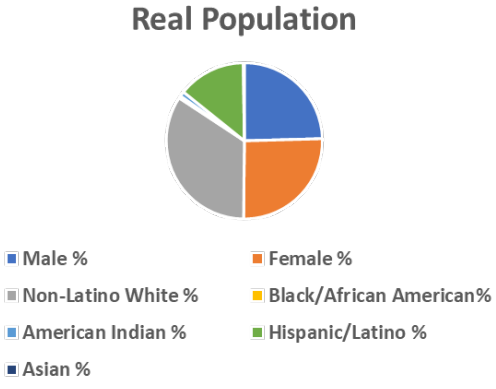


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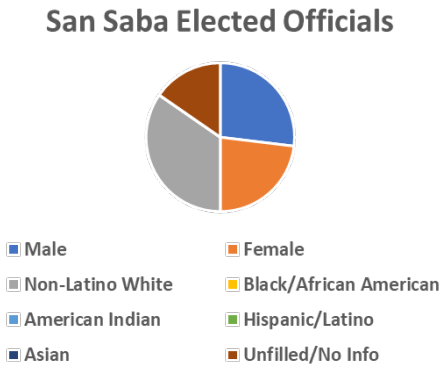


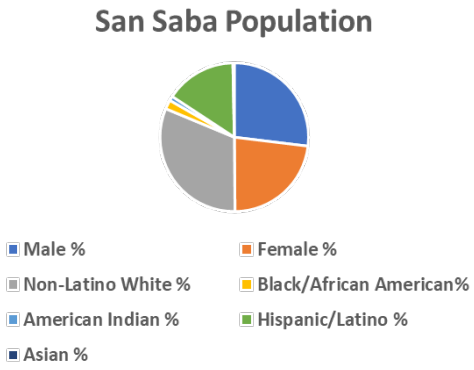


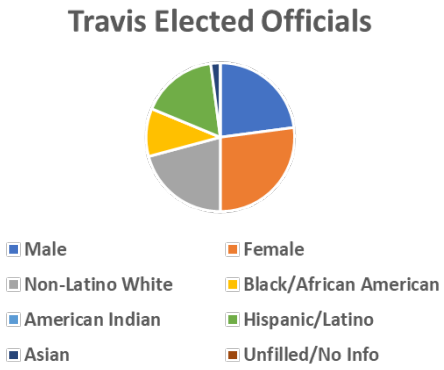


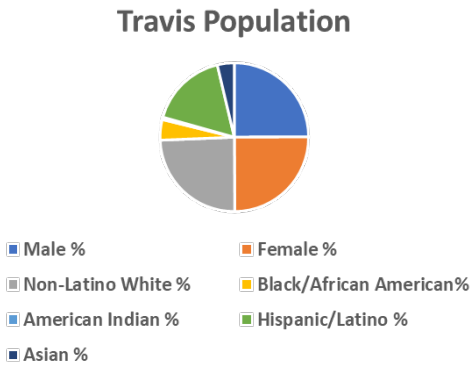


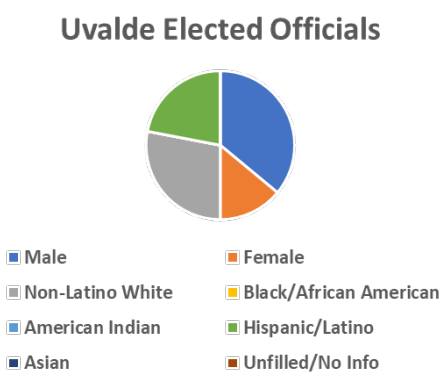


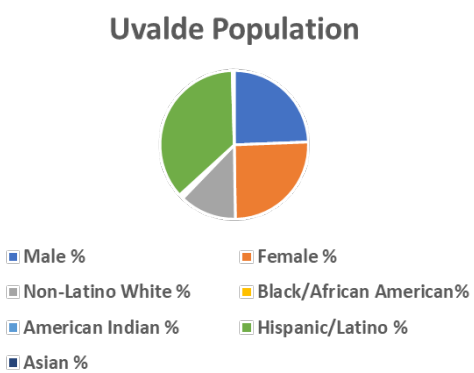


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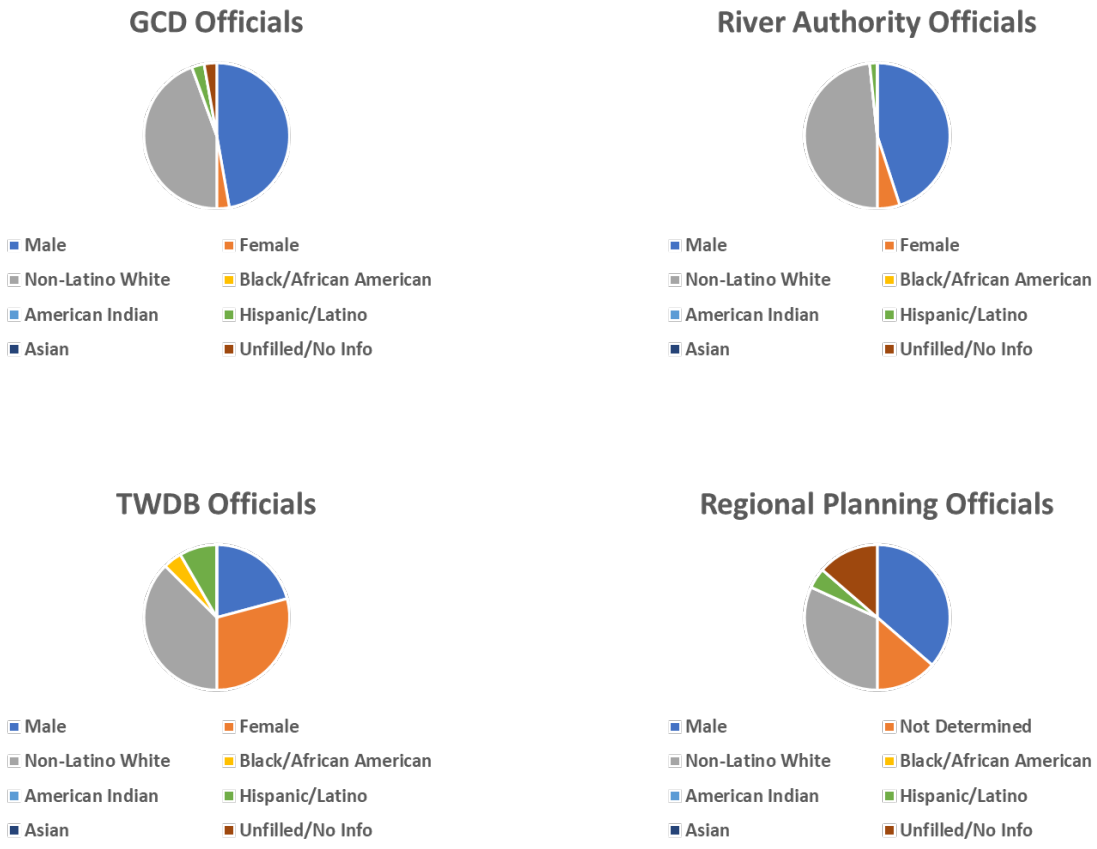


Figure 21. Demographics of Groundwater Conservation Districts, river authorities, Texas Water Development Board and regional planning groups officials (race and ethnicity on left half of chart and gender on right half).

## Communities At-Risk

In the U.S., certain populations tend to be more vulnerable to environmental harms. Vulnerability does not indicate the presence of an environmental issue (e.g., toxic waste site), but it does indicate the level to which that community is likely to be harmed by the presence of an environmental issue. Most methodologies used to identify Communities At-Risk look at percent people of color and percent low income as two factors because lower-income communities and Communities At-Risk are more susceptible to environmental risk factors. However, the range of variables depends on the goals of the organization carrying out the screening. This report looks at 3 vulnerability indices:

1. EPA's EJSCREEN Demographic Index
2. CDC's Social Vulnerability Index
3. Economic Innovation Group's Distressed Communities Index

Together, these indices allow for a high-level screening of areas in the Hill Country that might be more vulnerable to water equity issues. Because the Census data used in these indices may not be complete, they should not be interpreted as a decisive determination of all Communities At-Risk in the Hill Country.

### *EJSCREEN Susceptible Communities*

The EPA developed a tool called EJSCREEN that uses a combination of demographic and environmental factors to highlight potential environmental justice communities (EJSCREEN, p. a9). The tool can be separated into Environmental Indicators, like traffic proximity, and a Demographic Index, which estimates *susceptibility* to those indicators based on the percent of people within a Census block group who are people of color or low income. The EPA uses these two demographic factors because "minority, low-income, and indigenous populations… frequently bear a disproportionate burden of environmental harms and risks" (EJSCREEN Technical Documentation, p. 6). "Minority" in this case refers to people of color, which includes anyone who is non-Hispanic White. "Low Income" refers to individuals whose income is less than twice the poverty line.

The Environmental Indicators in EJScreen only include one water risk, related to wastewater discharge, so it cannot be used to identify communities that are likely facing water-related EJ issues. However, the Demographic Index can be used to identify communities that might be more susceptible to water issues if they occur. If we map the Demographic Index as a raw score, we see that census block groups in big cities and the southern part of the Hill Country appear to have a higher percentage of residents who are people of color or low income. We also see that, generally speaking, the town centers of each non-urban county tend to me more diverse or low income than their rural outskirts. When we map the Demographic Index scores as a percentile and look at the upper quartile of all census block groups, this pattern of more susceptible communities in southern counties, along the I-35 corridor, and in urban or town centers becomes even more clear (Figures 22-23).

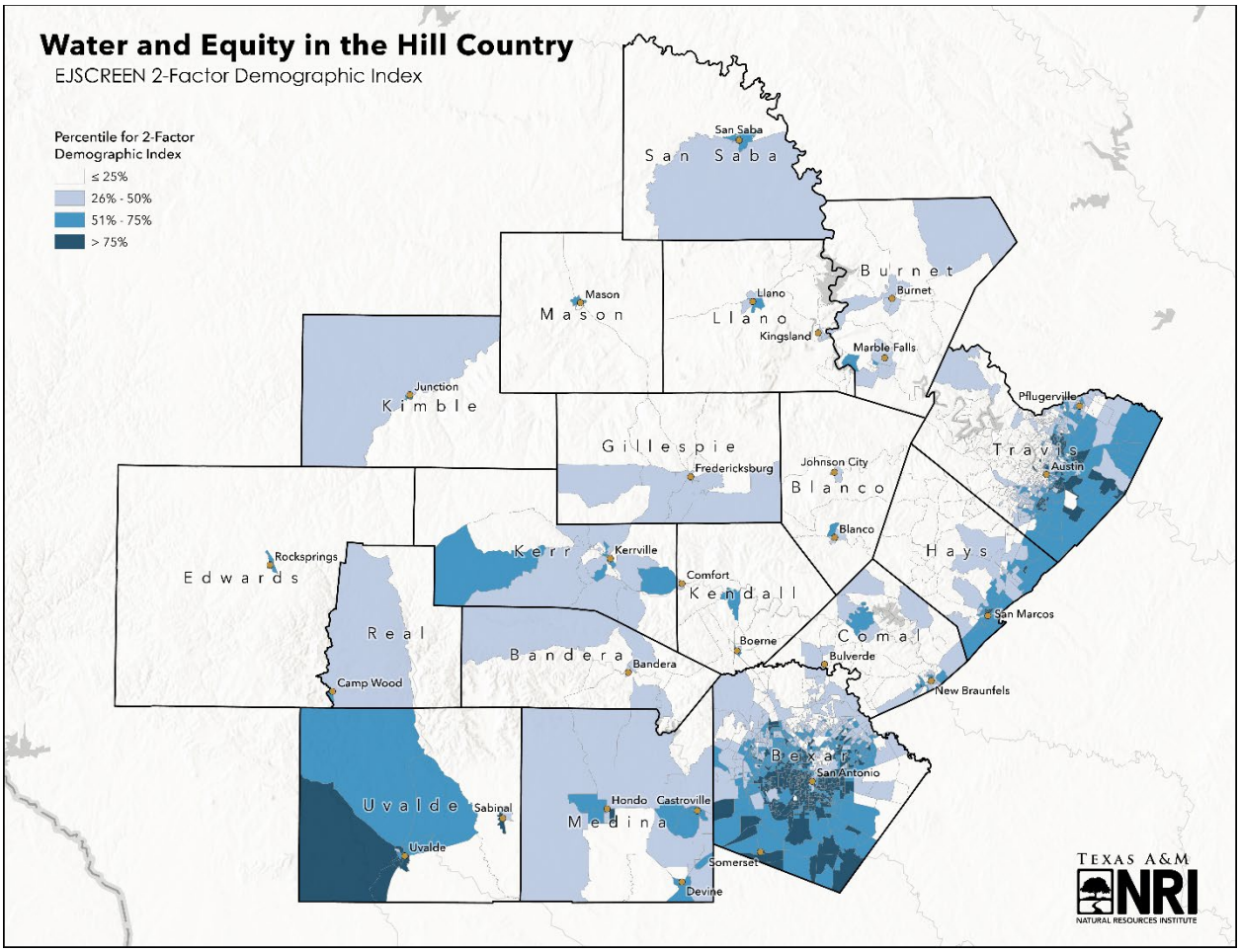


Figure 22. EPA's EJSCREEN 2-Factor Demographic Index (based on % low income and % people of color) by census block group in the Texas Hill Country. Source: EPA.

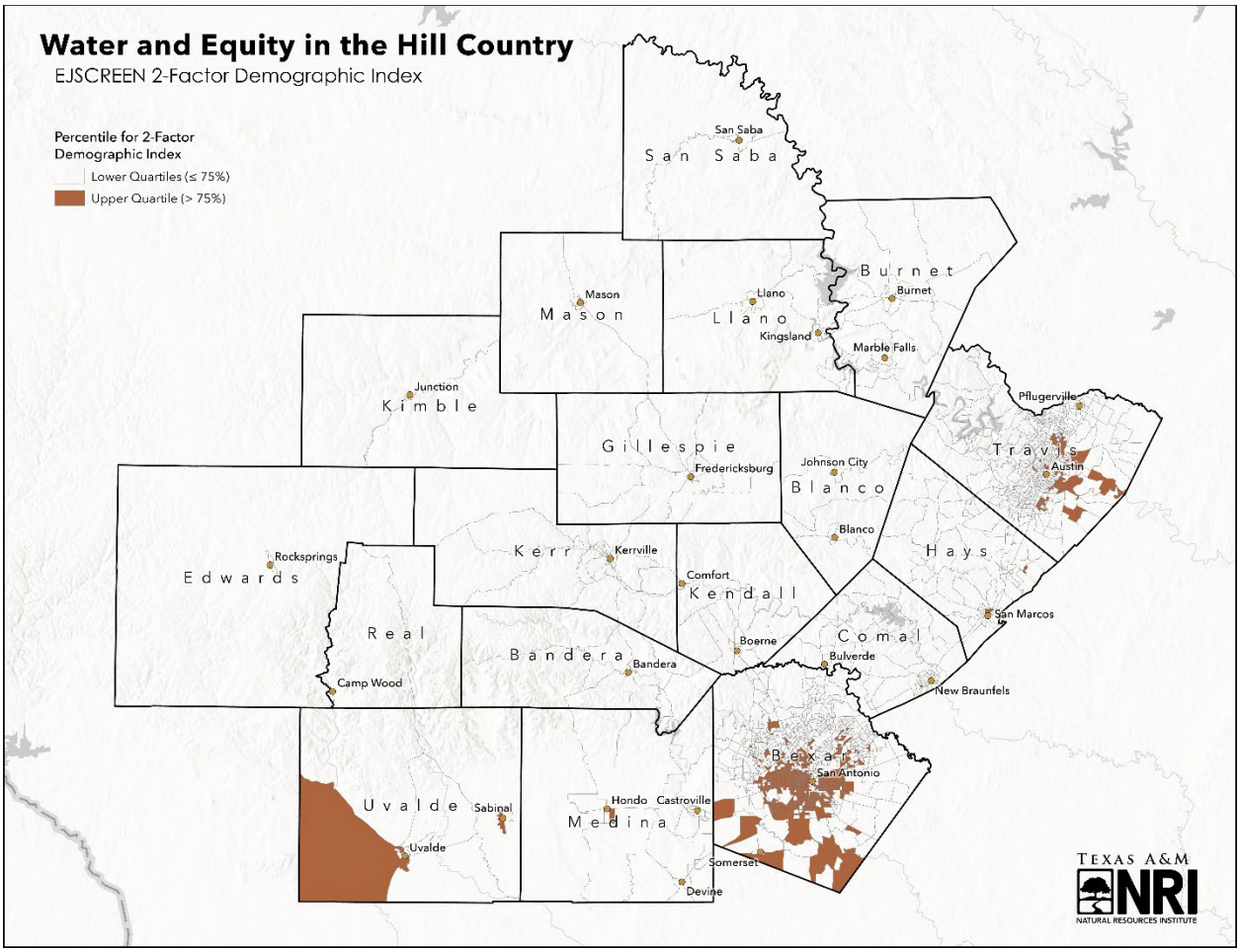


Figure 23. EPA's EJSCREEN 2-Factor Demographic Index upper quartile (based on % low income and % people of color) by census block group in the Texas Hill Country. Source: EPA.

The raw index does not consider the size of the census block group, so it may be useful to look at the number of susceptible individuals within each Census block group as an added data point. EJScreen's method for doing this is as follows:

*(Demographic Index for Block Group –Demographic Index for US) X (Population count for Block Group)*

The result can be interpreted as "the additional number of susceptible individuals in the block group, beyond what you would expect for a block group with this size total population" (EJSCREEN Technical Documentation, p. 22). A more basic version of this formula simply multiplies the Demographic Index by the Population Count for each block group to get an approximation for the number of susceptible individuals. Based on the results of this formula, the southern half of the Hill Country appears to be an area with a higher number of susceptible individuals (Figure 24). The areas along the I-35 Corridor (e.g., Austin, San Antonio, and San

Marcos) also have more susceptible individuals, which is expected given that they have more populous Census block groups.

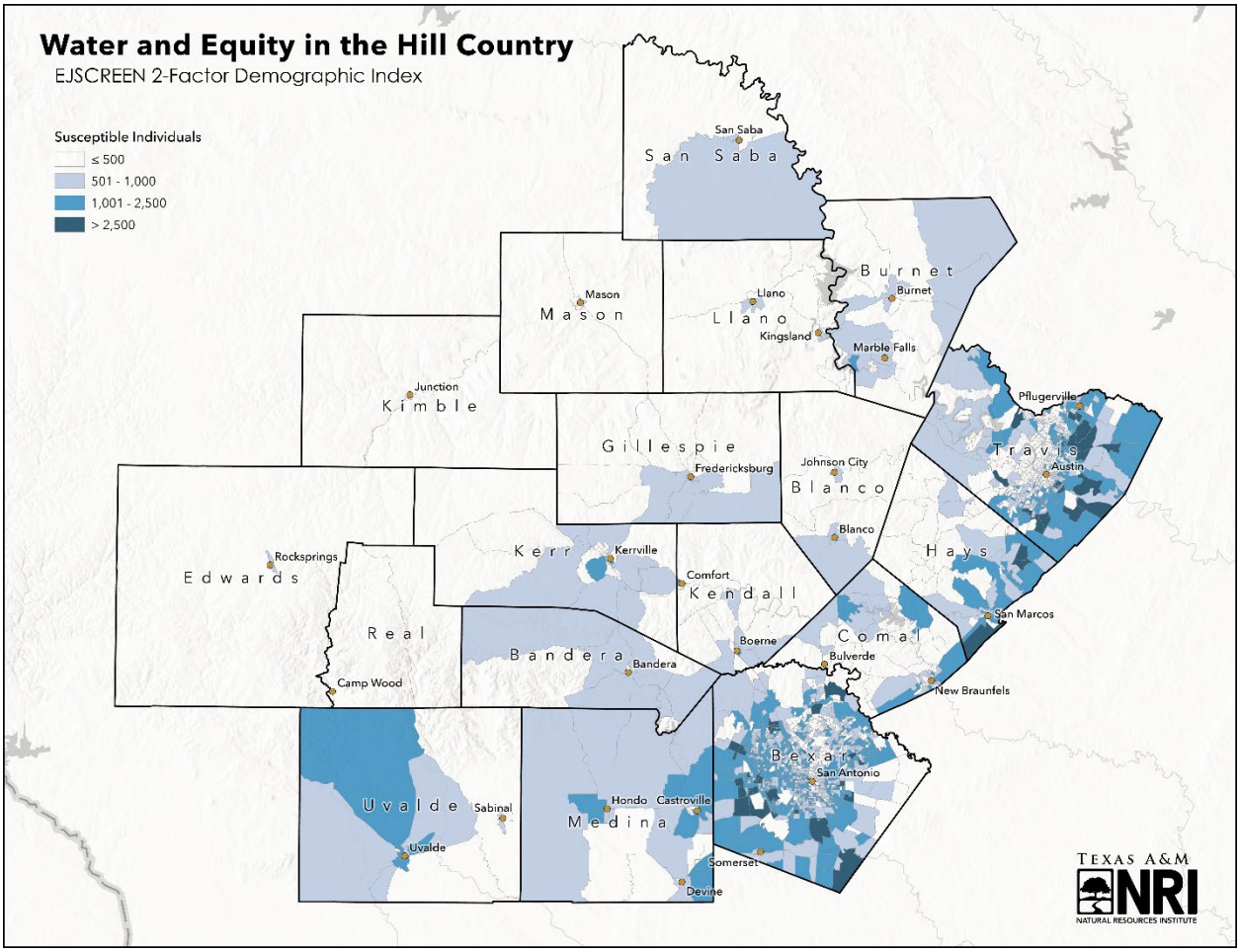


Figure 24. EPA's EJSCREEN 2-Factor Demographic Index susceptible individuals (based on % low income and % people of color) by census block group in the Texas Hill Country. Source: EPA.

### *Communities At-Risk*

Social Vulnerability refers to a community's ability to prepare for and respond to a hazardous event, whether a natural disaster like a hurricane, or a man-made disaster like a chemical spill. The CDC created a Social Vulnerability Index (SVI) to "help public health officials and emergency response planners identify and map the communities that will most likely need support before, during, and after a hazardous event" (Source: SVI Documentation).

The SVI includes composite ranking of vulnerability for each Census tract that takes into account Socioeconomic Status, Household Composition & Disability, Minority Status and Language, and Housing Type and Transportation. Rankings are based on percentiles, with values ranging from 0 to 1. The higher the percentile ranking, the greater the vulnerability. The SVI, like EJScreen, allows for an analysis of relative vulnerability (SVI Documentation). However,

the SVI is calculated from a total of 15 variables, and the focus is on hazardous events (Figure 25).

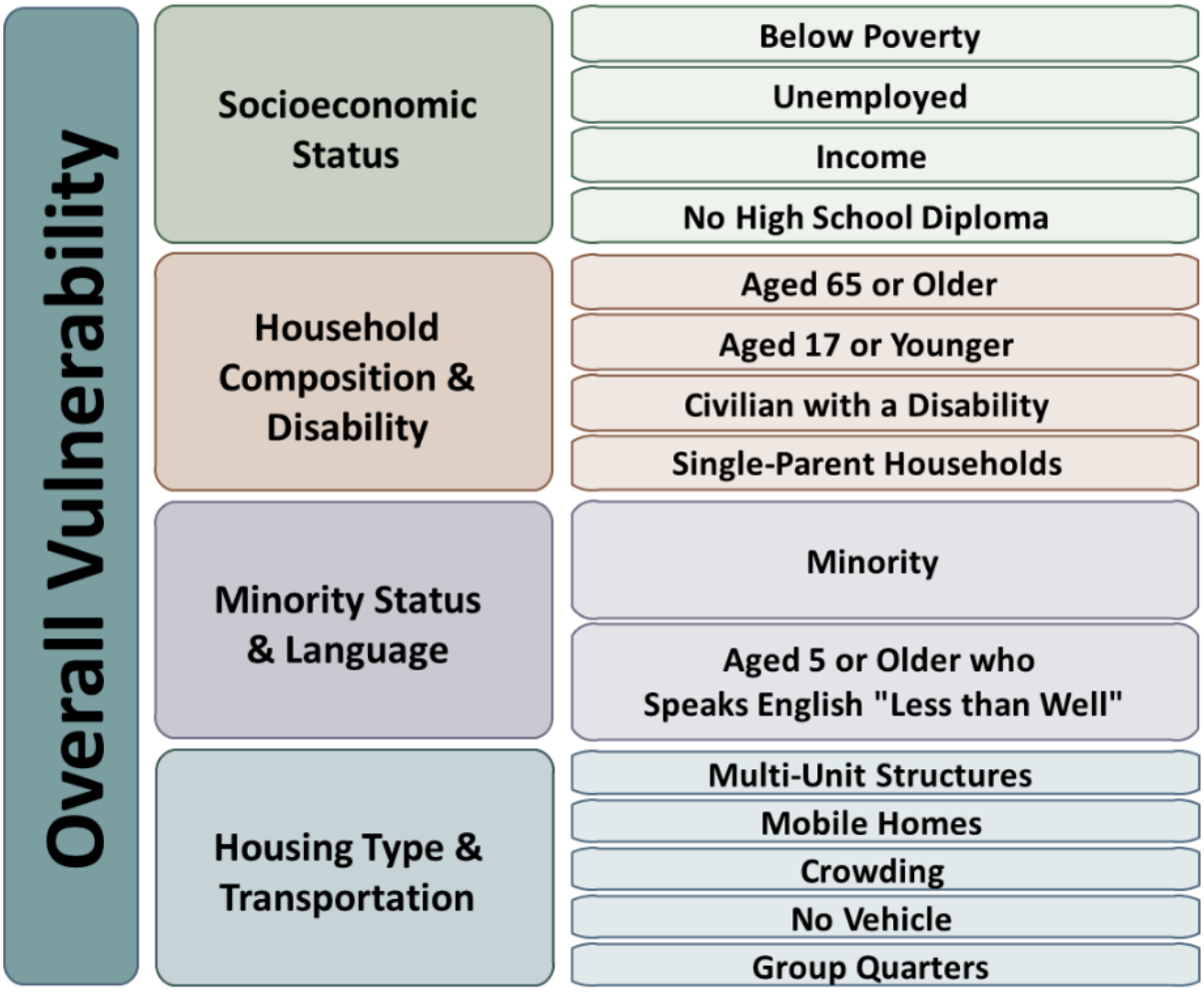


Figure 25. CDC's Social Vulnerability Index variables. Source: CDC.

Based on the overall tract summary ranking variable, the most “socially vulnerable” communities in the Hill Country live in East Austin, San Marcos, south San Antonio, Uvalde, Junction, Llano City, and San Saba City (Figure 26).

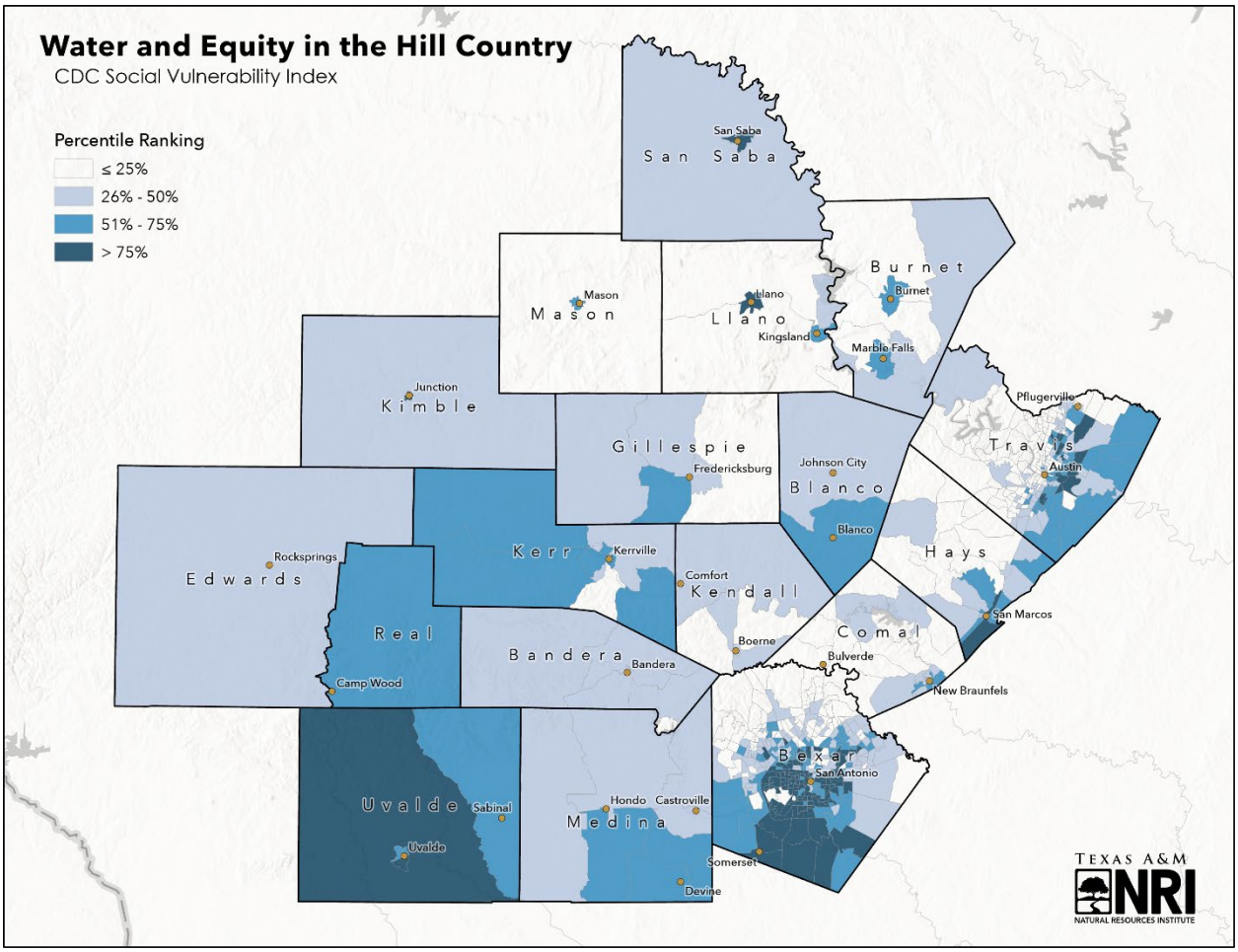


Figure 26. CDC’s Social Vulnerability Index percentile ranking by census block group in the Texas Hill Country. Source: CDC.

### *Economically Distressed Communities*

Areas of the Hill Country facing severe economic distress may be more vulnerable to displacement and water-related challenges, like declining well-levels, than economically stable communities. The Economic Innovation Group produces a Distressed Communities Index (DCI) that examines economic well-being at the zip code level (Economic Innovation Group DCI). The index is based on a variety of variables from the US Census’ Business Patterns and American Community Survey 5-Year Estimates for the 2014-2018 period, including Housing Vacancy Rate and Percent Change in Number of Jobs. Based on the DCI, most of the Hill Country’s rural outskirts are considered “Distressed” or “At Risk” of being distressed (Figure 27).

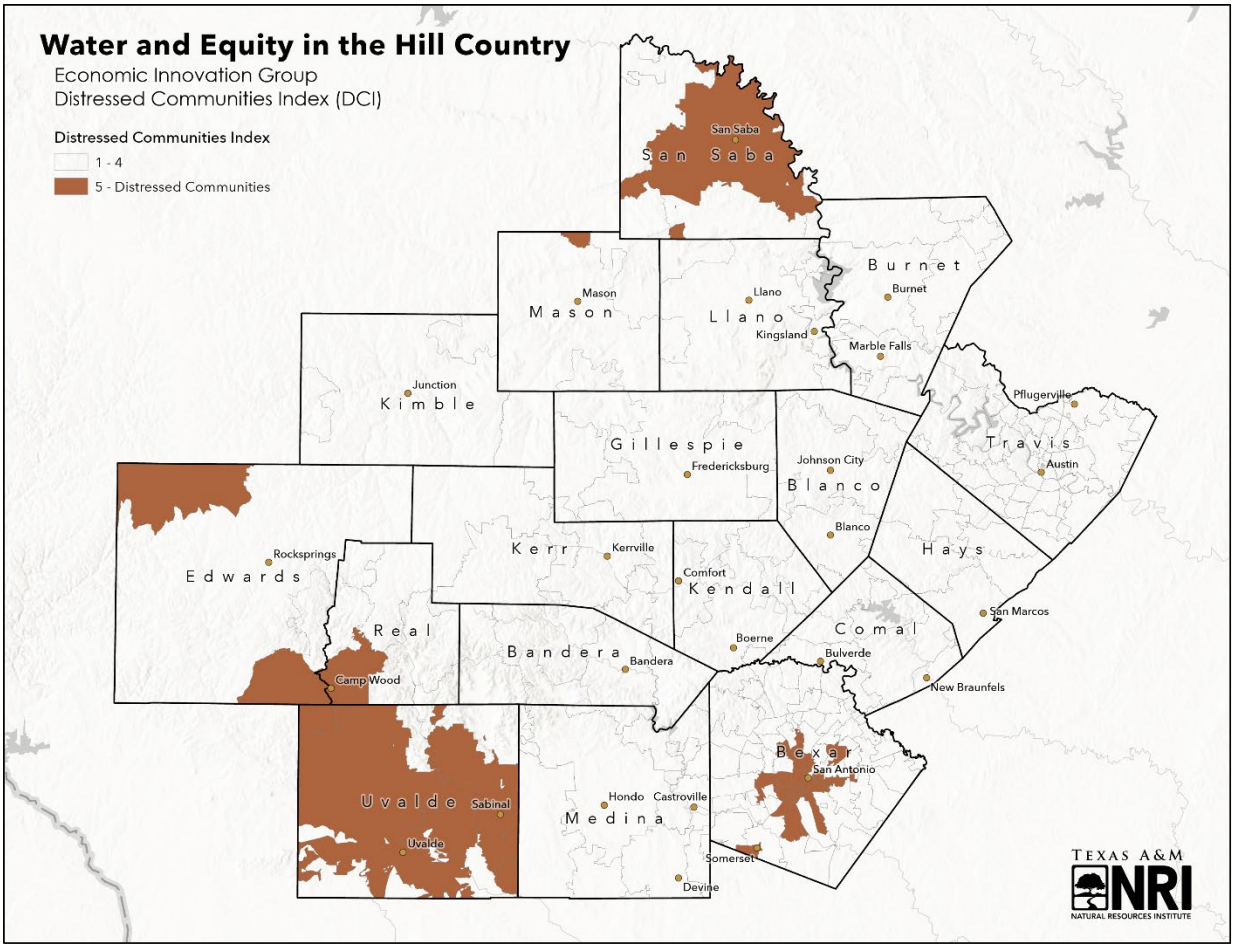


Figure 27. Distressed Communities Index (upper quintile) by census block group in the Texas Hill Country. Source: EIG.

In closing, together these vulnerability indices allow for a high-level screening of areas in the Hill Country that might be more vulnerable to water equity issues. Because the Census data used in these indices may not be complete, they should not be interpreted as a decisive determination of all Communities At-Risk in the Hill Country. It does however identify key regions within the project area for targeted programming and other water conservation related activities.

## Key Take-Aways

- A series of historical events played an important role in the current demographic makeup of the Hill Country. Development and displacement of Communities At-Risk were not random acts but instead were influenced by these historical drivers, such as key pieces of legislation and changing workforce opportunities.
- In review of Hill Country demographics, Communities At-Risk are primarily found in urban areas where greater employment opportunities also are located. In contrast, rural Texas Hill Country demographics are predominantly white and older populations. The predominant community of color in the Hill Country is Latino followed by African American.
- Action: Programming and engagement strategies of these Communities At-Risk should consider location, cultural relevancy, and the predominant communities being served. For the former (location), the nexus of data for Communities At-Risk and water challenges can serve to address water equity challenges and opportunities for meaningful community engagement.
- Action: With respect to history, we continue to shape the Hill Country with current collective decisions – strategic and purposeful planning may be beneficial, as history often repeats itself. THCCN programming and engagement strategies should identify complementary actions driven by network organization missions to facilitate opportunities of water equity engagement.
- Population density, age, and race and ethnicity are expressed primarily at a regional scale (urban and rural), where urban areas are characterized by diverse, younger and higher density population groups, and rural areas are characterized by less diverse (primarily white), older and lower density populations.
- In contrast, poverty, income, unemployment, labor, and education are expressed at a local scale, meaning zip codes or neighborhoods matter within a given area. In Bexar County, for example, these variables are expressed within a county locally compared to more regional differences. This is not surprising given drivers in vulnerability indices described in the report are framed by these factors, resulting in the demographic makeup of the Hill Country.
- Action: Communities At-Risk are locally distributed and not random within urban areas. Within rural areas, zones of Latino prevalence are small compared to land mass. Mapping of Communities At-Risk is helpful for THCCN programing and engagement strategies that is targeted and purposeful.
- Action: Linguistic isolation can be an important barrier to water resources for Communities At-Risk, particularly for safety (flooding and drought). Preference for Spanish materials manifested as low in rural areas compared to other parts of the state. This may be associated with preferences in receiving information or that pockets of Latino community respondents were too small in rural areas to influence overall survey results. Some bilingual programming efforts may be beneficial.

- Hill Country rural landowners are primarily Non-Hispanic White, male and older, reflective of rural communities. Policymaker structure is also reflective of their county population with respect to race, age, and ethnicity, similar to rural and urban counties, with some exceptions.
- Action: Because pockets of Communities At-Risk are small in number in rural areas, they may not be well represented in policy-maker structure. THCCN program and engagement strategies might include:
    - Strategic and meaningful, paid, long-term, targeted training, involving high contact hours, particularly for water leadership positions and for rural county leadership positions, as these involve complex systems, unique community cultures and specific processes and skills.
    - Caring, long-term mentorship and supportive personal networks within professional settings – assign several individuals that are a match for recruits to create a safe environment where there is freedom to ask questions, push boundaries and gain experience, to fall and learn without fear in a supportive work family, and to receive redirection and responsibilities with expectations for success, not a lowering of standards.
- Action: There was congruence between models of Communities At-Risk where each of the three approaches validated one another. A shortcoming of many of these modelling approaches is that they may not specifically include water challenges in a more comprehensive fashion, thus, integrating location of Communities At-Risk and explicit water challenges as was conducted in this study would aid THCCN programming and engagement efforts. Further mapping at higher or more local resolutions may be beneficial in future efforts.

Note: Publicly available data was accessed for this report. This data is produced by different agencies whose terminology for various population groups differ. The term *Communities At-Risk* is used in this report as an all-encompassing term to describe the same populations covered by the datasets. By nature of the data, "low income" and "people of color" (both EPA definitions) encompass many Communities At-Risk. A list of some definitions of key terms by data source would be helpful to understanding descriptions in this report:

1. White or Non-Hispanic White: "Individuals who responded 'No, not Spanish/Hispanic/Latino' and who reported 'White' as their only entry in the race question (Census Bureau 2021)"
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Note: Common data source acronyms used in this report include,

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Texas Natural Resources Information system, TNRIS
Texas Water Development Board, TWDB
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# Section 2: Water Characteristics in the Hill Country

## Overview

Water intersects the lives of Hill Country residents in countless ways. The aquifers and rivers of the region provide water for drinking and irrigation and are a source for recreation. On the other hand, polluted waters can negatively impact health, floods can cause severe physical and economic damage, and high-water prices can burden families financially. While there are many ways to approach a landscape analysis of water in the Hill Country, this report analyzes water as it relates to the categories of water supply, water quality, flooding, affordability, and access to recreation.

## Water Supply

According to the 2022 Texas State Water Plan, 14 out of 18 counties in the Hill Country are expected to see an increase in demand for water between 2020 and 2050 (Figure 28). A sizable portion of that growth is driven by population growth in the Hill Country. For example, Hays County is expected to see a population increase of 98%, and an increase in water demand of 78% between 2020 and 2050 (State Water Plan 2022).

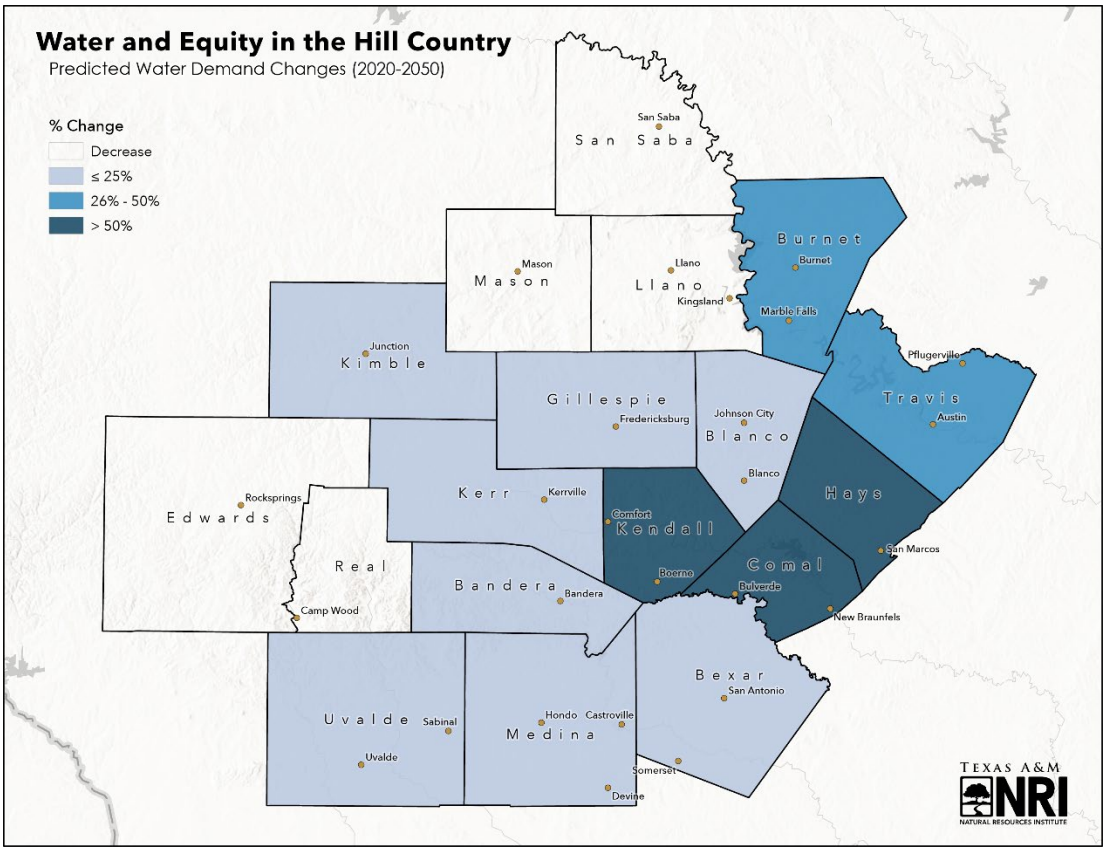


Figure 28. Change in water demand from 2020 to 2050 by county in the Texas Hill Country. Source: 2022 SWP, TWDB.

As a result of this increased demand, the SWP predicts that 16 out of 18 counties will experience unmet water needs (i.e., shortages) by 2050 unless new water supplies are developed (State Water Plan 2022, Figure 29).

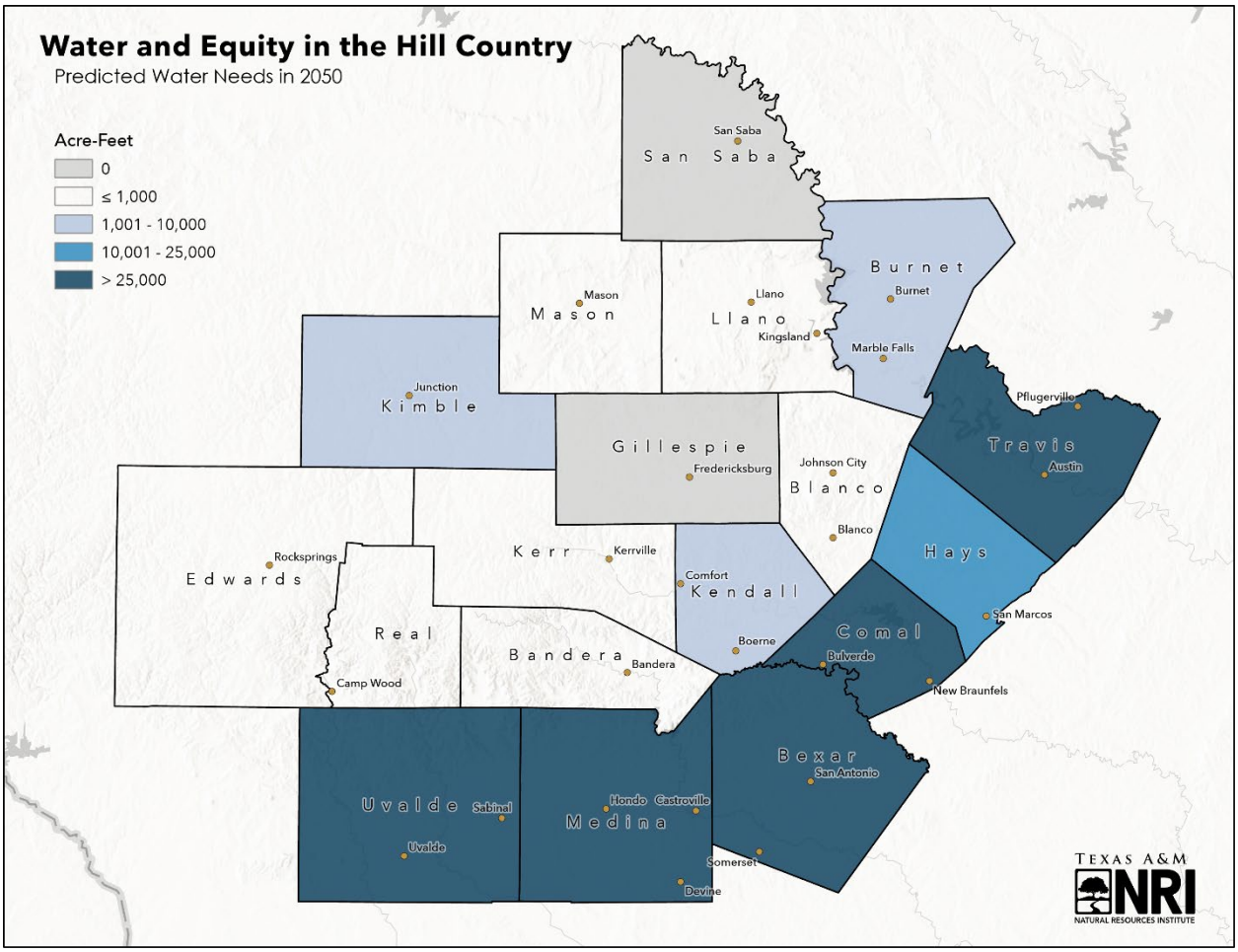


Figure 29. Predicted water needs in 2050 by county in the Texas Hill Country. Source: 2022 SWP, TWDB.

Regional Water Planning Groups are tasked with recommending water management strategies to address these shortages. In many counties, these strategies include the development of new groundwater wells (Figure 30). The SWP's reliance on groundwater development as a strategic supply could raise equity concerns because well levels have experienced declines in many parts of the region (Meadows Report 2021).

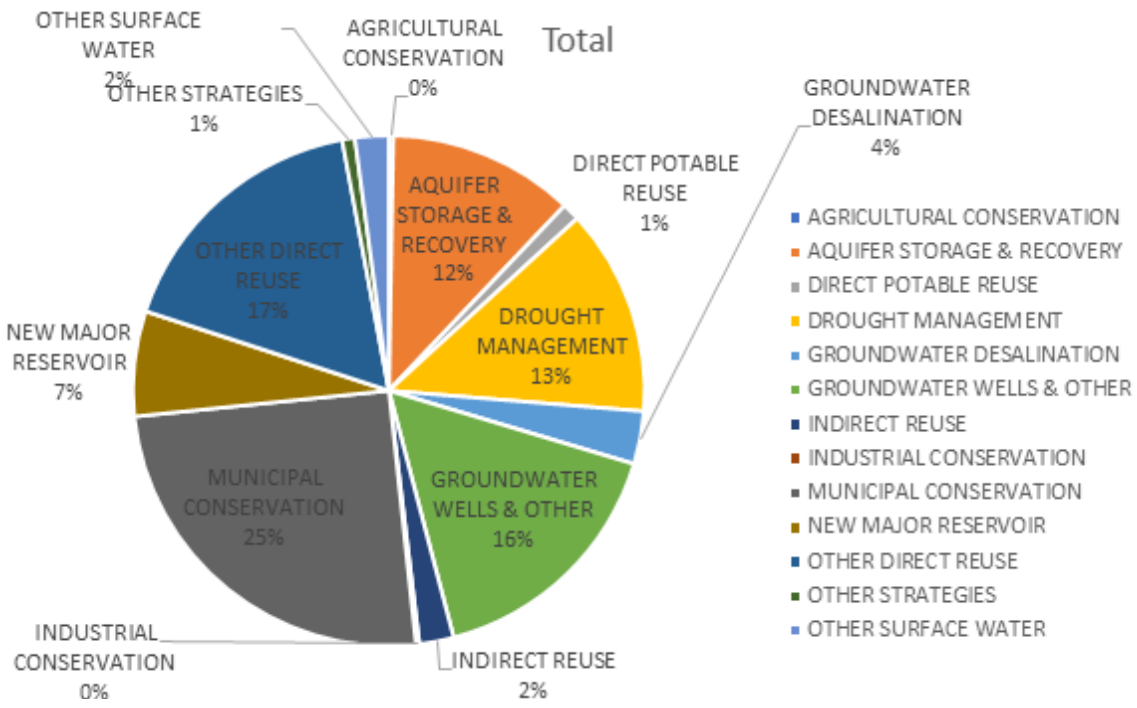


Figure 30. Water supply strategies for 2050 in the Texas Hill Country. Source: 2022 SWP, TWDB.

The Nature Conservancy's Water Explorer tool, which compiled data from TWDB monitoring wells, shows that in the southern portion of the Hill Country, many wells had decreased water levels when compared to levels in 2000 (Figure 31). Of high concerns are those counties that have experienced well declines and rely on the Trinity Aquifer, namely Bandera, Kerr, and Kendall. The Trinity Aquifer has large areas showing multidecadal downward trends. Please note this differs from counties like Medina and Uvalde that rely on the Edwards Aquifer, which is more responsive to rainfall and has limits on groundwater pumping. In these counties, short-term data on well declines may not be reflective of the long-term viability of the aquifer. Kerr and Bandera counties have relatively low coverage from Public Water Systems and some of the highest estimated well water declines in the region (Meadows Report 2021). They also have many low-income households. These trends raise concerns about the impact of aquifer level decline on poorer communities that rely on well water (Figures 32-33).

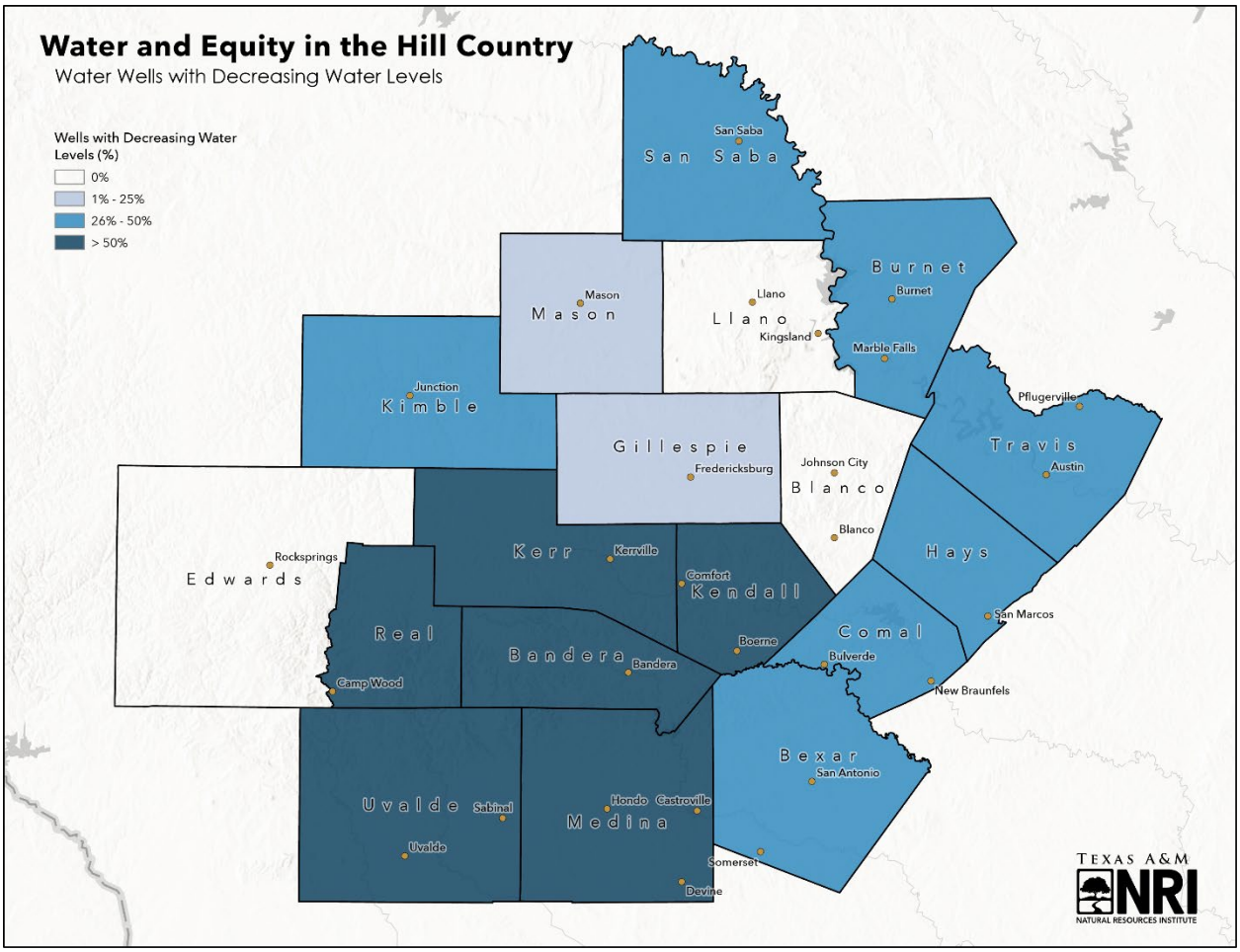


Figure 31. Percentage of wells with decreasing water levels sampled from 2000–2014 by county in the Texas Hill Country. Source: 2022 SWP, TWDB.

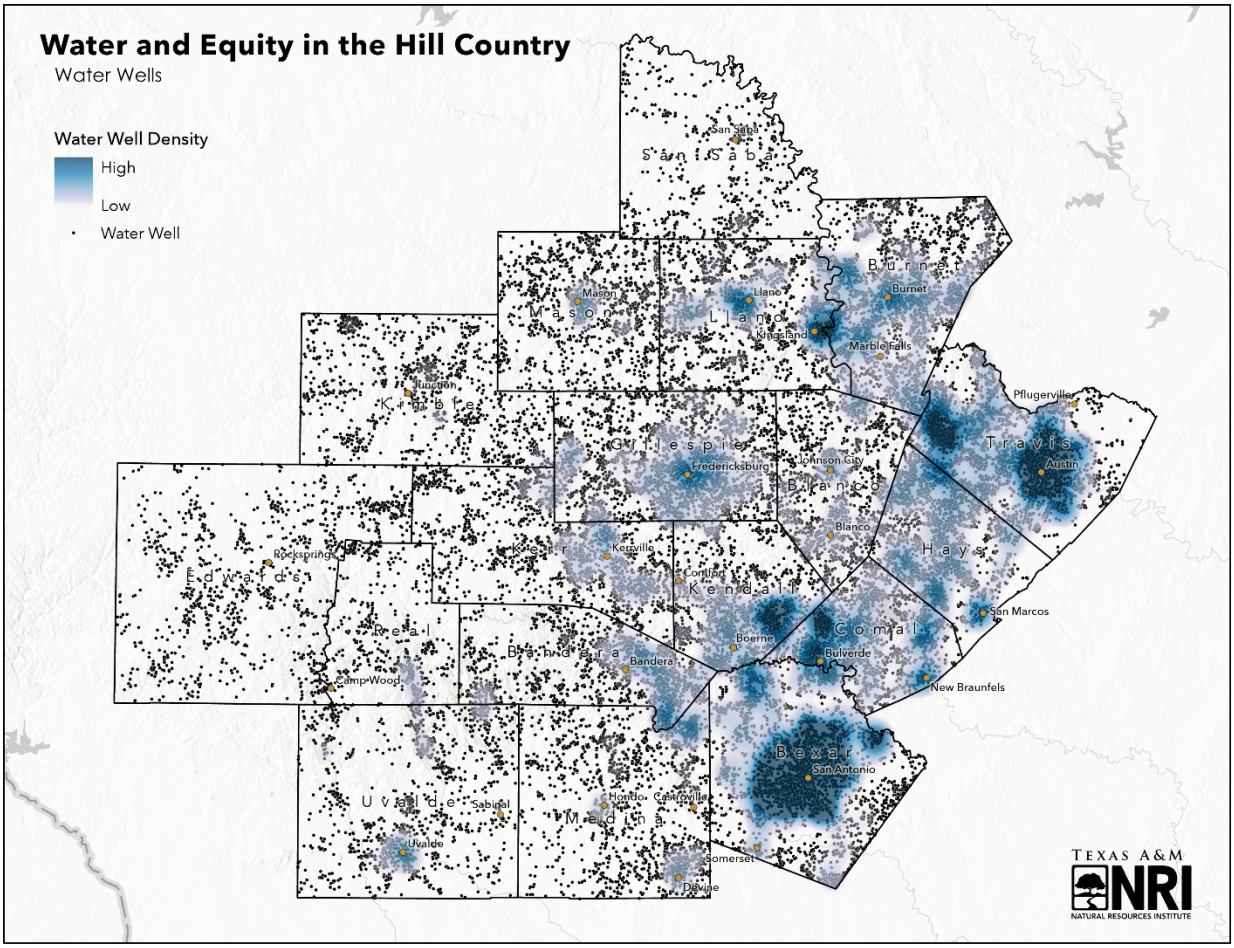


Figure 32. General density of water wells in the Texas Hill Country. Source: SDRGD, TWDB.

## Water Quality

Water quality in this report refers to both drinking water quality, and the quality of water in local rivers and streams since both can impact public health. For public drinking water supplies, it is possible to look at reports of drinking water violations to assess general issues with water quality (Figure 33). Based on these violations, the size of the drinking water system has a significant impact on water quality, with smaller systems appearing to have the highest number of violations. There does not appear to be a spatial pattern to these violations.

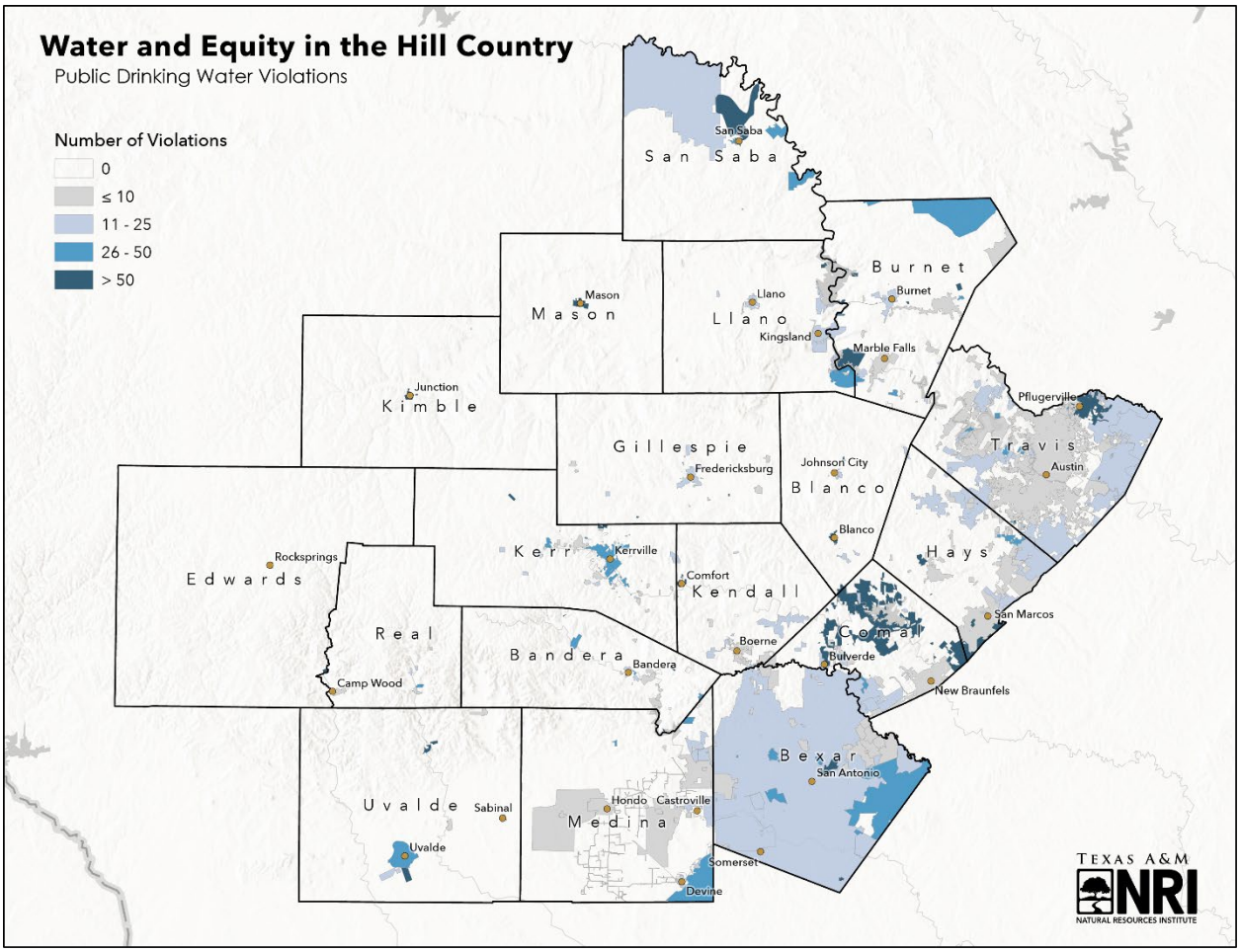


Figure 33. Drinking water violations of public water suppliers in the Texas Hill Country. Source: EPA, SDWIS.

For groundwater, we can look at TCEQ's list of Groundwater Contamination sites as an indicator of potential groundwater contamination in nearby areas (Figure 34). Oil and gas byproducts were the most common contaminants. These include diesel, gasoline, benzene, and petroleum. The TCEQ list only includes reported Groundwater Contamination sites, which ignores contaminated in private wells that has not yet been reported. Locations of sites that might pose water quality problems, such as injection wells and superfund sites are mapped below (Figure 35).

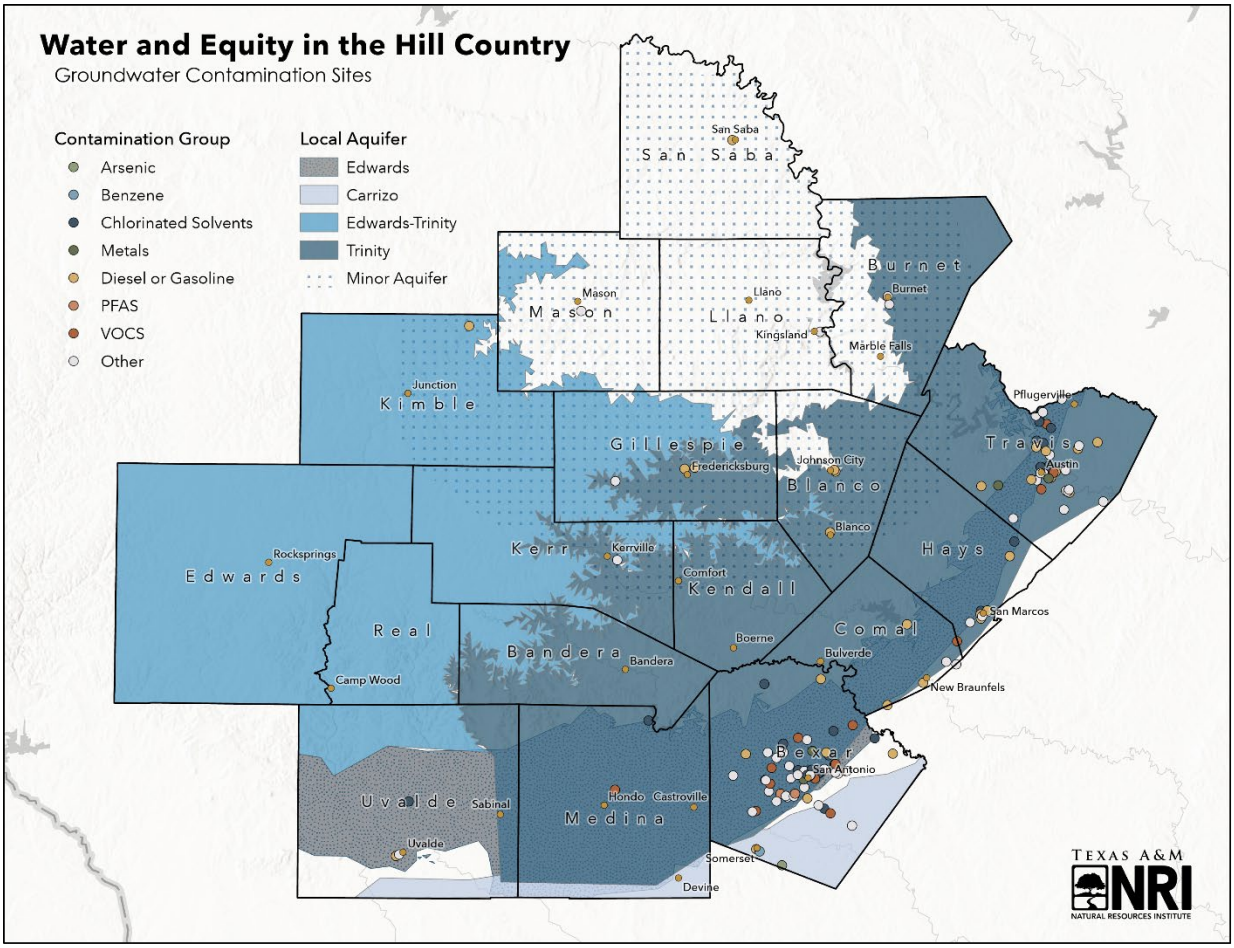


Figure 34. Groundwater contamination sites and local aquifers in the Texas Hill Country. Source: TCEQ.

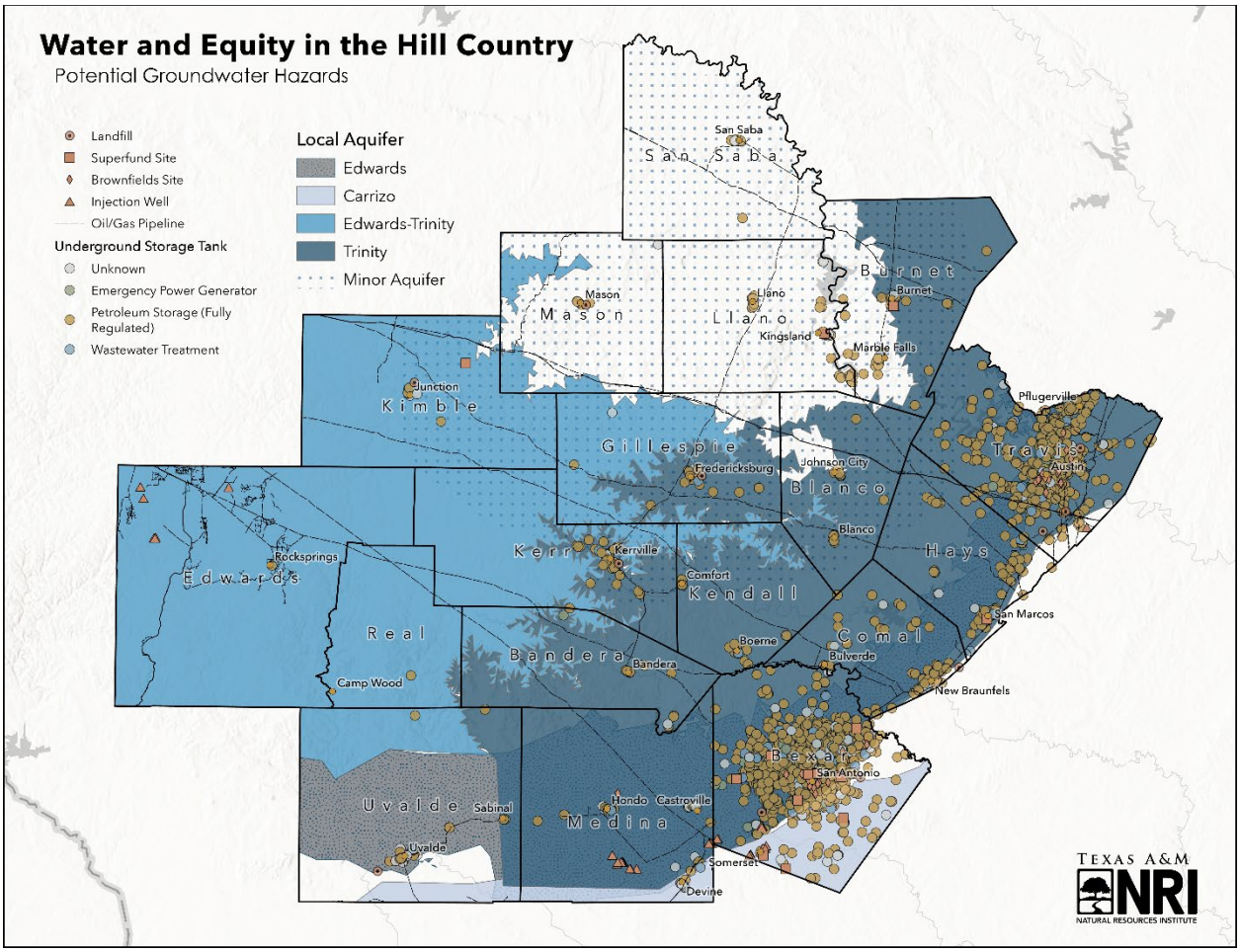


Figure 35. Potential groundwater quality hazards and local aquifers in the Texas Hill Country. Source: TCEQ.

Water pollution can also impact the waterways where people recreate. TCEQ records of Impaired Streams offer some indication of where waterways are polluted (Figure 36). However, the current map of Impaired Streams ignores some streams and rivers that are impacted by excessive effluent exceedances, as is the case in the Llano River outside of Junction (Figure 37).

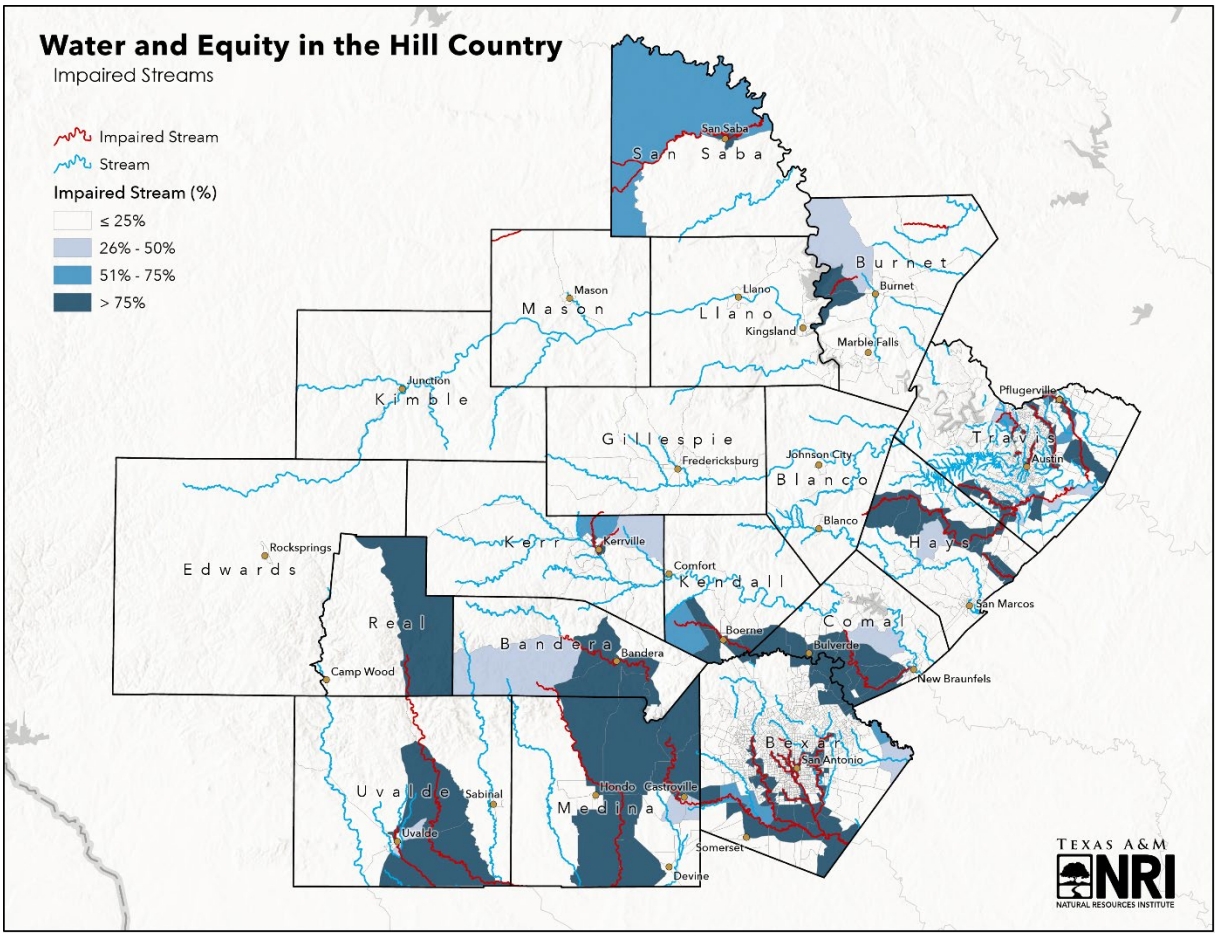


Figure 36. Impaired streams in the Texas Hill Country. Source: TCEQ.

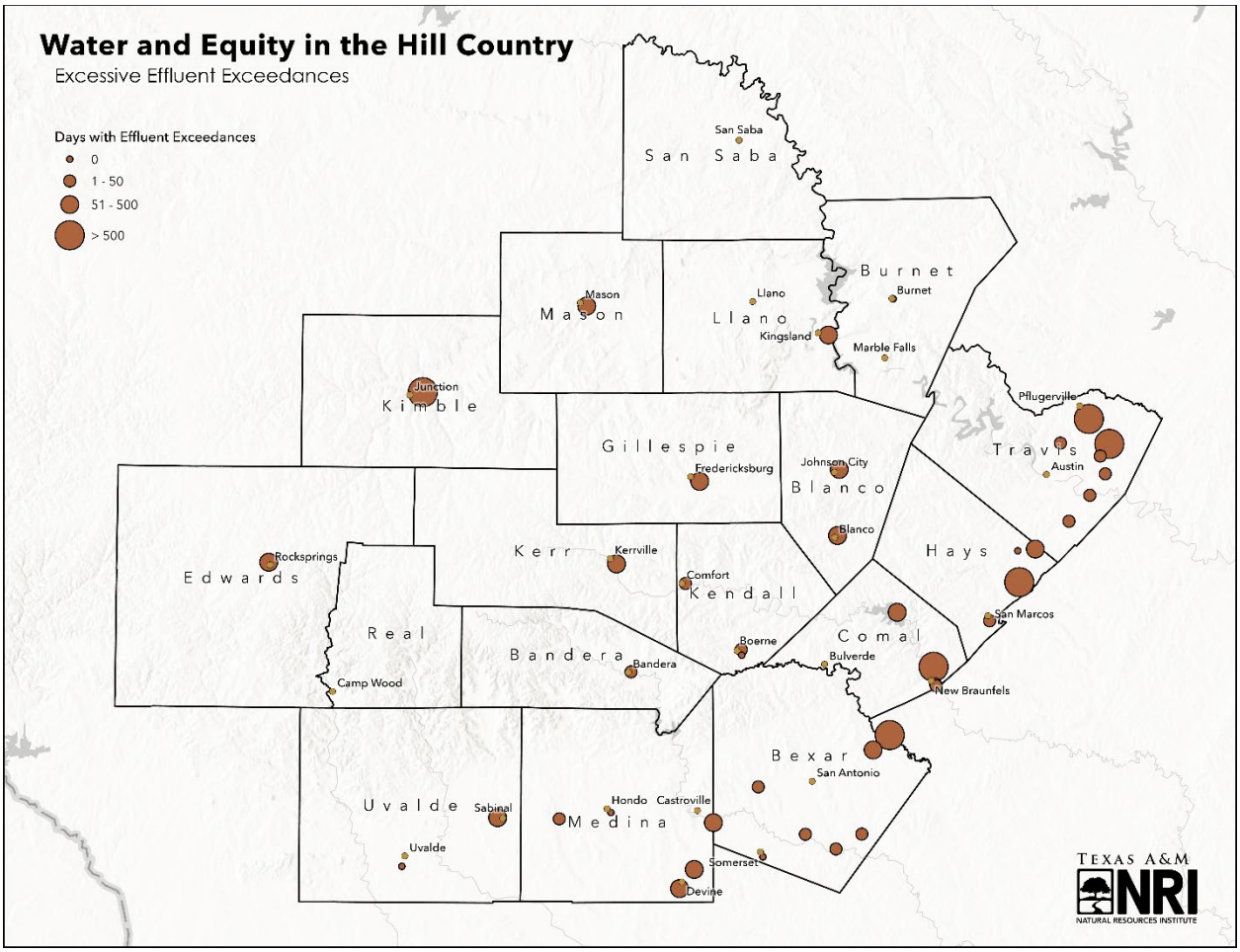


Figure 37. Facilities with excessive effluent exceedances in the Texas Hill Country. Source: TCEQ.

Austin, San Antonio, San Marcos, and New Braunfels—the major Hill Country cities along the I-35 corridor—show the clearest pattern of groundwater contamination. This part of the region also has a large number of impaired streams and with many days with effluent exceedances.

Additionally, many rural towns like Junction, Mason, Kingsland, Devine, and Rocksprings have both high numbers of drinking water violations and many days with effluent exceedances. This likely signals a need for infrastructure upgrades to drinking water treatment plants and wastewater treatment facilities.

## Water Affordability

Water Affordability appears to be an issue in most small Hill Country towns with public water systems, such as Uvalde, Devine, Castroville, Kerrville, Mason, and Llano. In these areas, the household burden of the water bill is considered "High." In San Marcos (Hays County) and Concan (Uvalde County), the water burden is considered "Very High" (Figure 38).

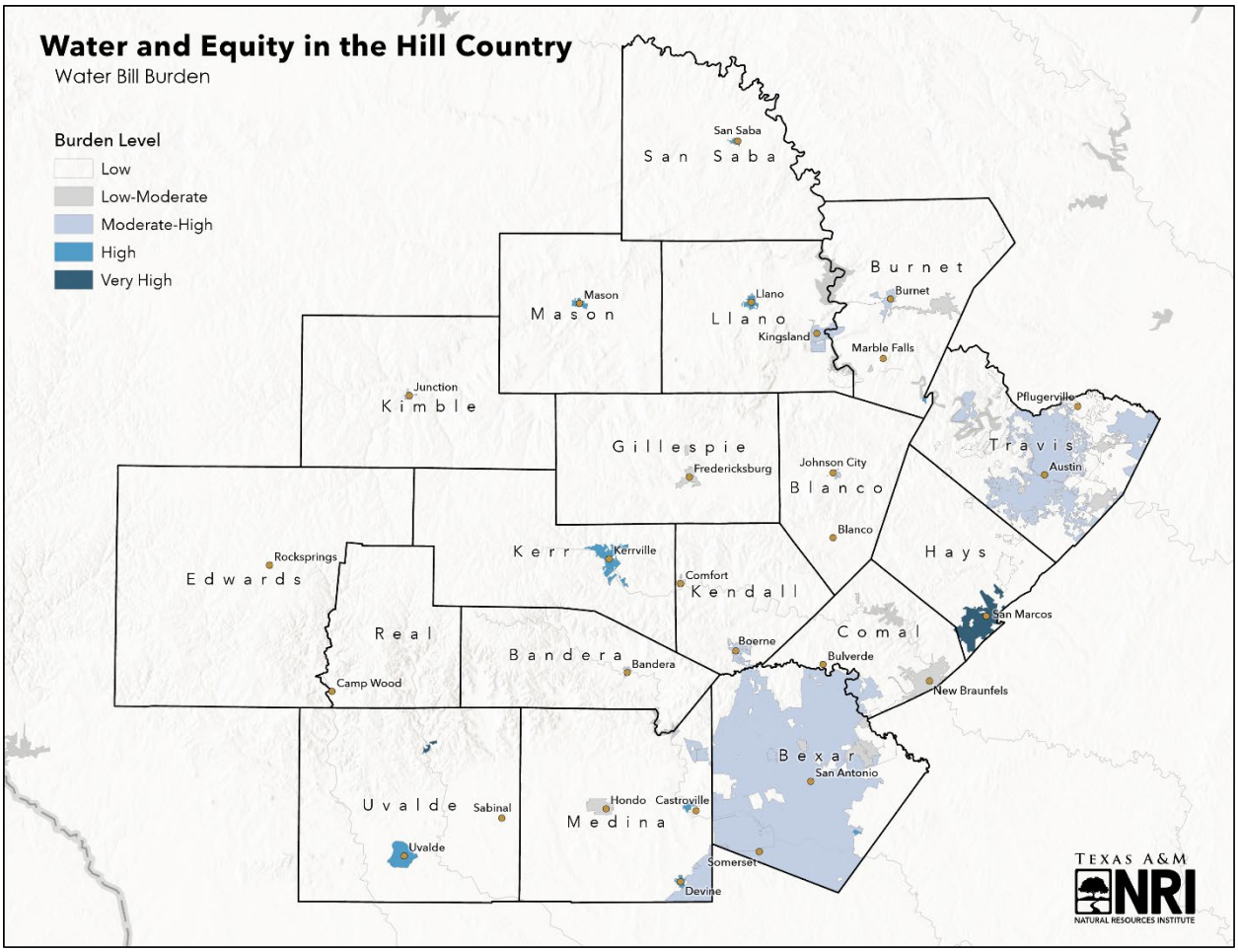


Figure 38. Water bill burden levels for public water systems in the Texas Hill Country. Source: NIEPS.

Water affordability burden levels are derived from the Nicholas Institute's Water Affordability Dashboard, which calculates an affordability burden from a combination of utility rate data and resident characteristics, such as percent low income, for most public water systems in Texas.

For example, within the San Marcos water utility service area, it would take 21.8 minimum wage working hours to pay for a monthly water bill of 8,000 gallons. Because 44% of people living in that service area are considered low income, the burden level of that water bill is "Very

High". In Kerrville, an area where the water affordability burden is "High", it would take 16.2 hours to pay for a monthly water bill for 8,000 gallons, and 37.6% of residents in the service area are considered low income. This assessment assumed an average household water usage of 8,000 gallons per month because according to TWDB, the average monthly household water use is between 7,380 and 7,626 gallons. However, it is important to note that at much lower water usage, such as 4,000 gallons per month, San Marcos, Concan, Llano, Uvalde, and Devine still are considered to have "High" water burdens.

## Flood Risk

The region that includes Central Texas and the Hill Country is commonly referred to as Flash Flood Alley because they have a greater risk of flash flooding than most of the United States (LCRA 2022). The index map below shows flood risk based on soil properties and reported flash floods by county from 1986-2018. Flood risk is greatest is highest along the Balcones Escarpment (Figures 39-40).

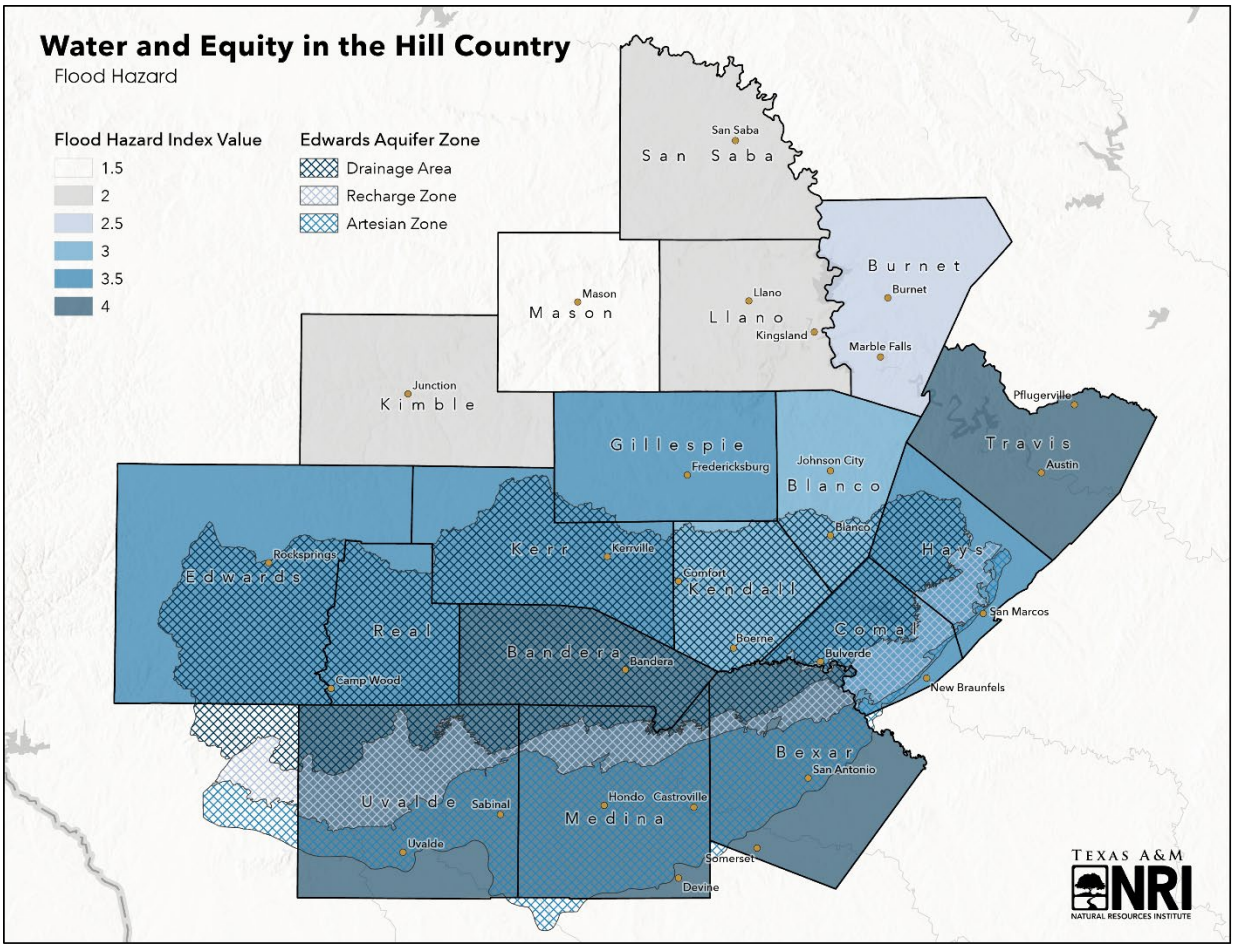


Figure 39. Flood hazard index by county and Edwards Aquifer zones in the Texas Hill Country. Sources: NRCS, NOAA.

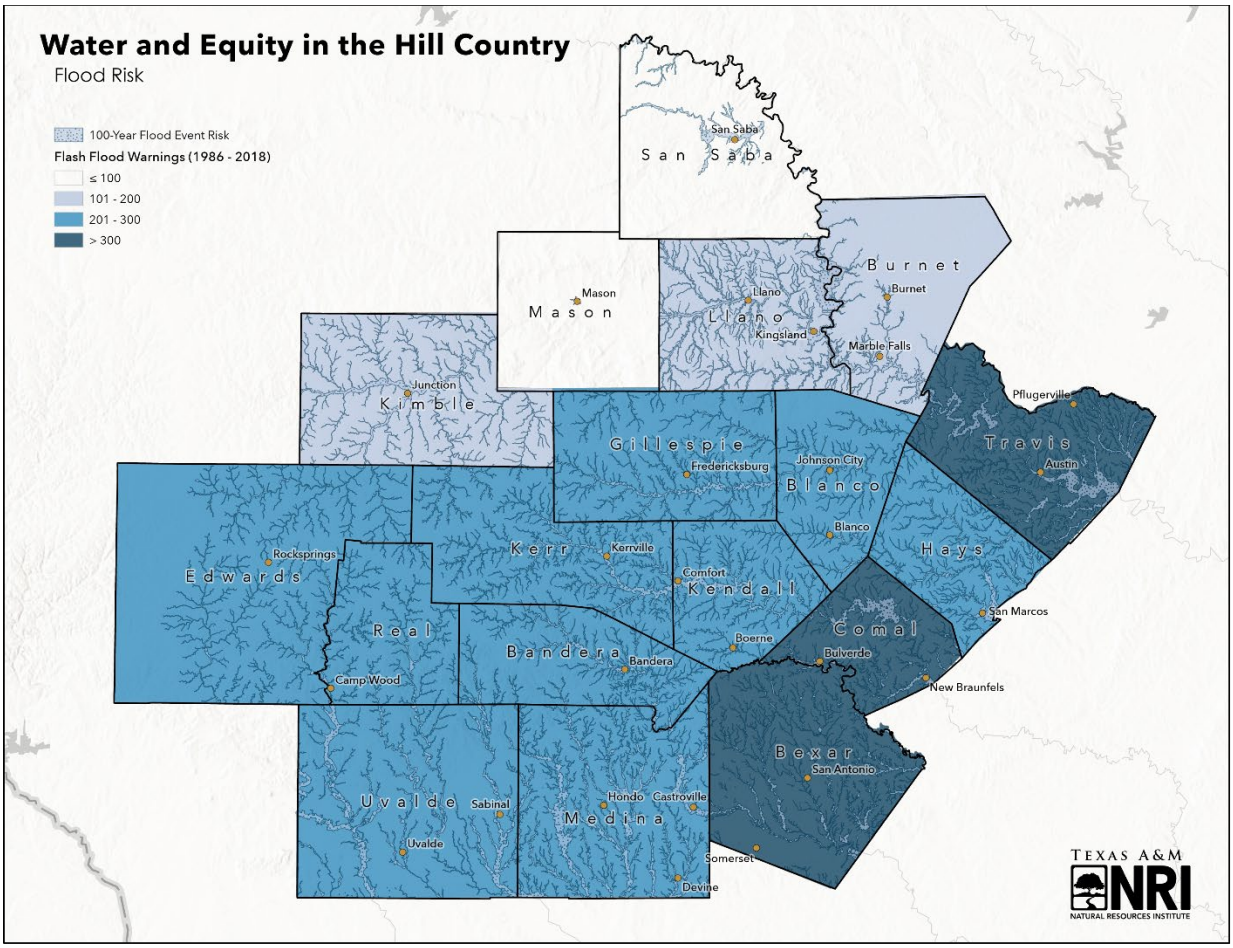


Figure 40. Relative flood risk in the Texas Hill Country using flash flood warnings from 1986-2018 by county and 100-year flood event risk zones. Source: TWDB.

## Water Recreation

Public lands make up a small part of all land in the Hill Country. Most land is privately owned, providing limited opportunities to recreate in the lands adjacent to waterways. The exception to this is Travis County, which has a higher volume and acreage of public land (Figure 41).

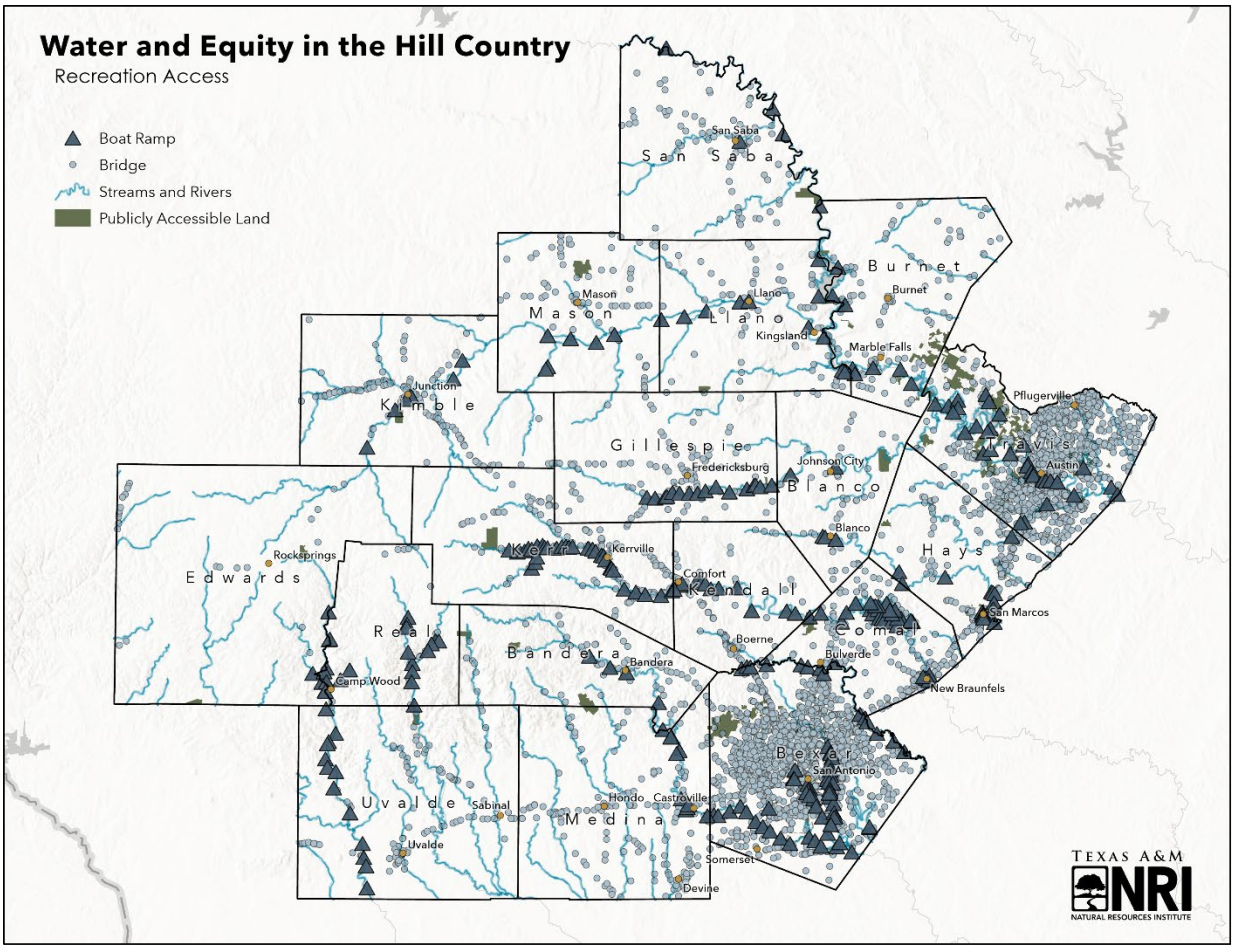


Figure 41. Recreational water access in the Texas Hill Country, including publicly accessible land, boat ramps, and bridges. Sources: TPWD, TXDOT.

Bridge crossings can provide access to waterways in areas without many public lands. However, the quality of the waterway at the bridge crossing and access to the bridge itself is difficult to ascertain from a map of bridges in the region. Boat ramps also provide access to waterways. Rivers with a high number of boat ramps include the Guadalupe, Medina, and Pedernales Rivers. As a general observation, more rural and less populous counties appear to have less access to waterways for recreation.

## Water Equityscape

We identified Communities At-Risk (see note for definition at end of section) potentially subject to environmental challenges in section 1 of this report through the review of three commonly used vulnerability indices. That effort resulted in the identification of key focus areas where Communities At-Risk may be subject to a disproportionate level of water challenges (Figure 42). In general, there was congruence between the indices and identified areas around some of the larger urban centers such as Austin and San Antonio. Other more rural communities such as Uvalde also were identified as Communities At-Risk. One shortcoming of these vulnerability indices previously mentioned is they do not include a significant number of water-related factors in their calculations. Further, census data used to create these indices may be lacking in some parts of the Hill Country.

Following that review, in section 2 of this report we attempted to remediate the lack of water-related factors in vulnerable community mapping. This resulted in the collection of several important water-related concerns or factors likely to impact Communities At-Risk. Such water challenges included drinking water violations, water affordability, projected aquifer water level declines, flood zone risks, and impaired water bodies (Figure 43). In combining these geospatial layers to Communities At-Risk, we created a “water equityscape” as a planning tool for THCCN partners. The Equityscape will be compiled on a web-based viewer in the future. Mapping the nexus of Communities At-Risk with water challenges can aid in targeted programming and water improvement projects to benefit these disadvantaged communities (Figure 44). Due to limitations of data resolution previously mentioned, this mapping approach may miss some communities, however, it can be beneficial to THCCN partners in understanding these issues.

Housing affordability can also be a factor for Communities At-Risk. Recent trends in real estate market value and direction of land development appears to avoid these areas where Communities At-Risk are located (Figure 45). This may accentuate the issue for Communities At-Risk where choices to live in more desirable areas may be prohibitive.

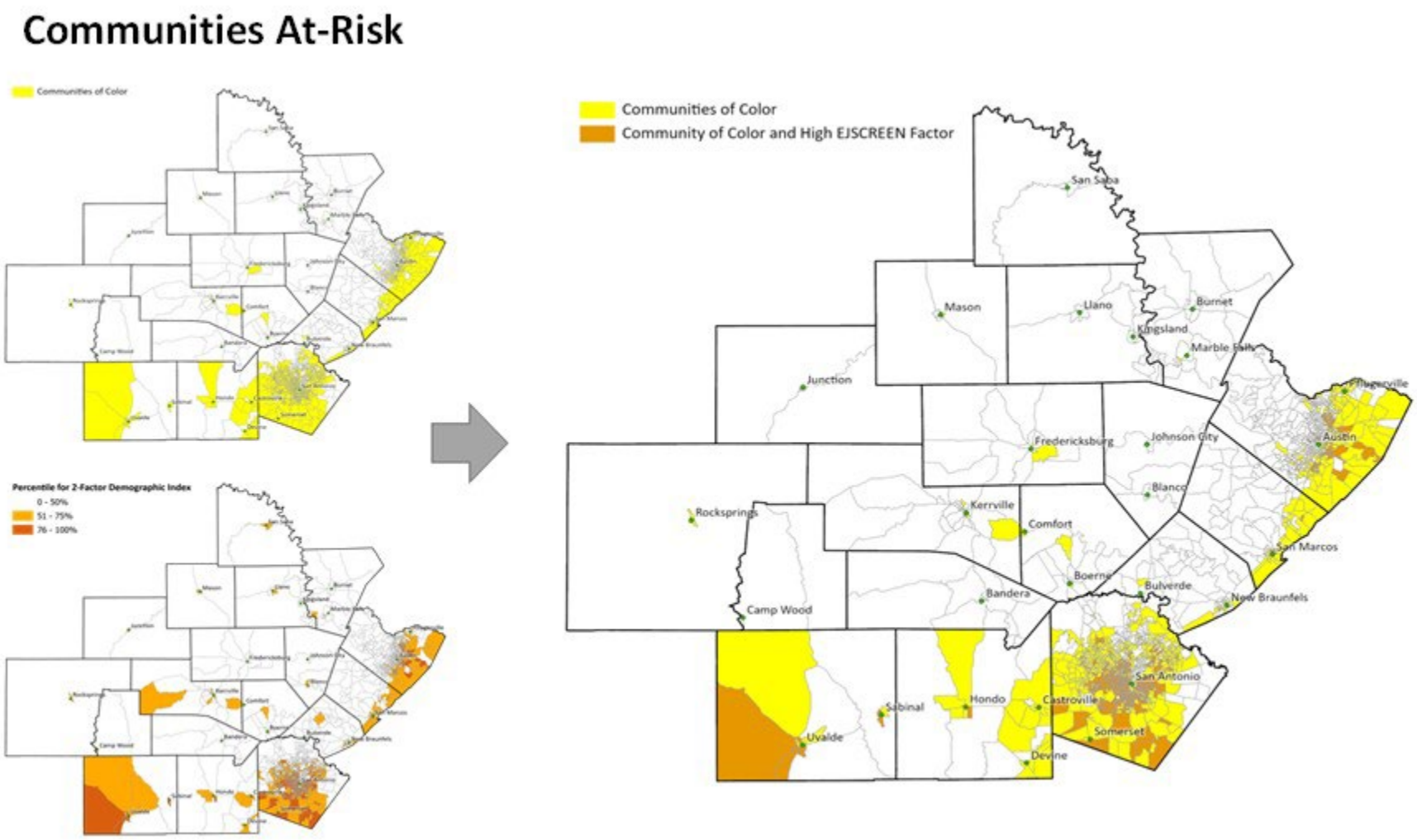


Figure 42. Communities At-Risk in the Texas Hill Country. Source: US Census, EPA EJScreen.

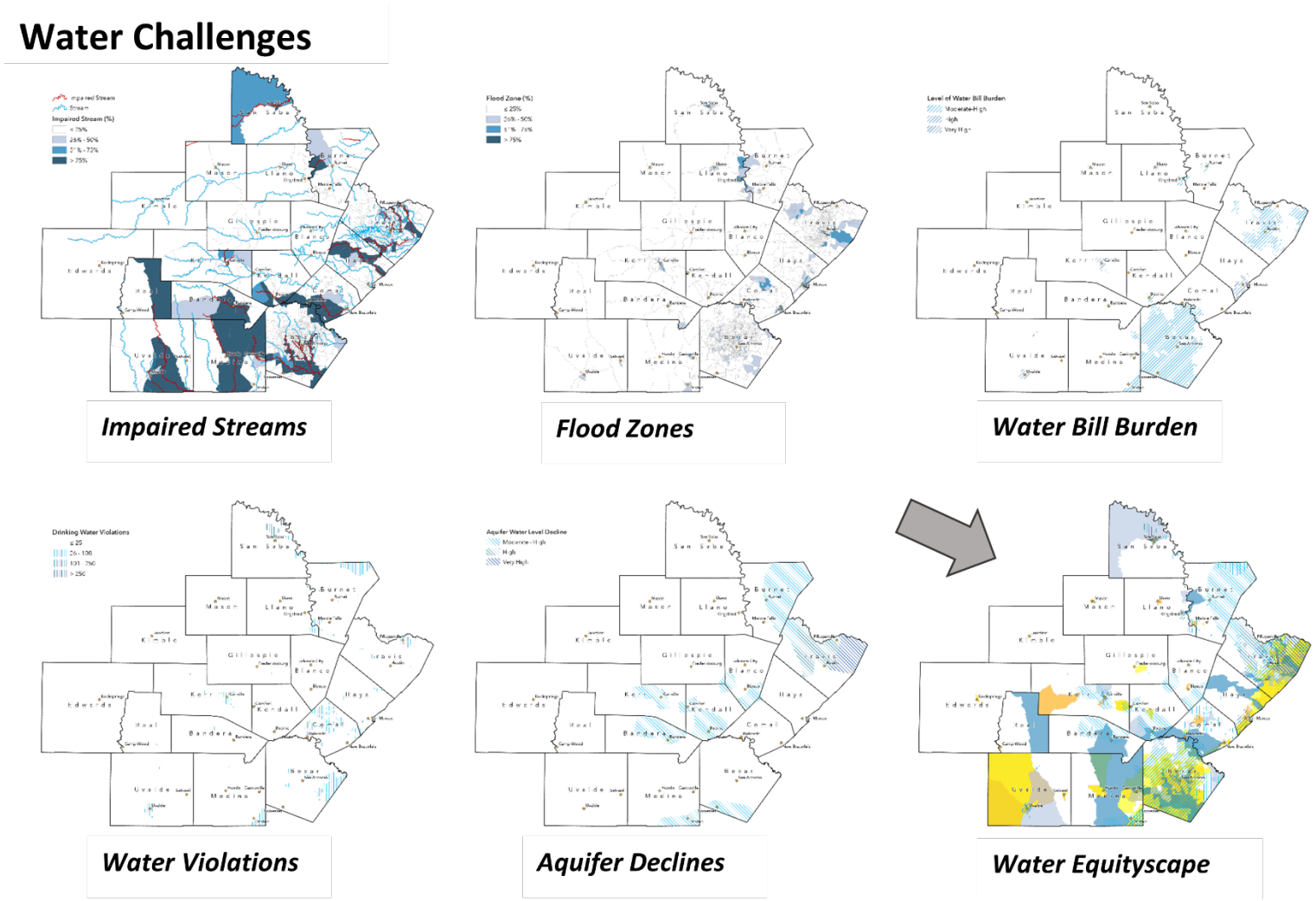


Figure 43. Select water challenges or concerns impacting Communities At-Risk. Source: Compiled by NRI from TCEQ, TWDB, NIEPS, EPA, US Census.

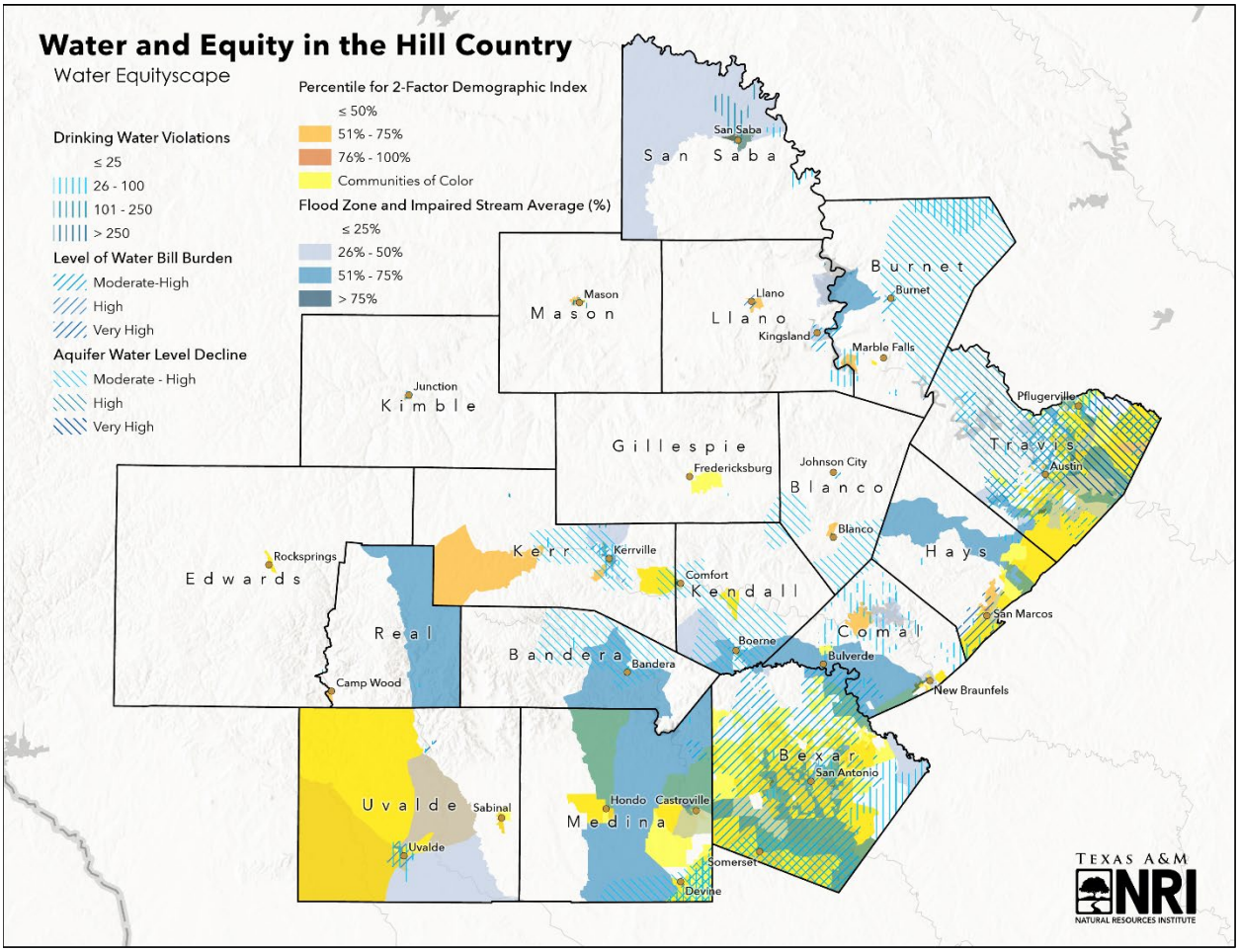


Figure 44. Water Equityscape combining Communities At-Risk and water challenges in the Texas Hill Country. Source: Compiled by NRI from TCEQ, TWDB, NIEPS, EPA, US Census.

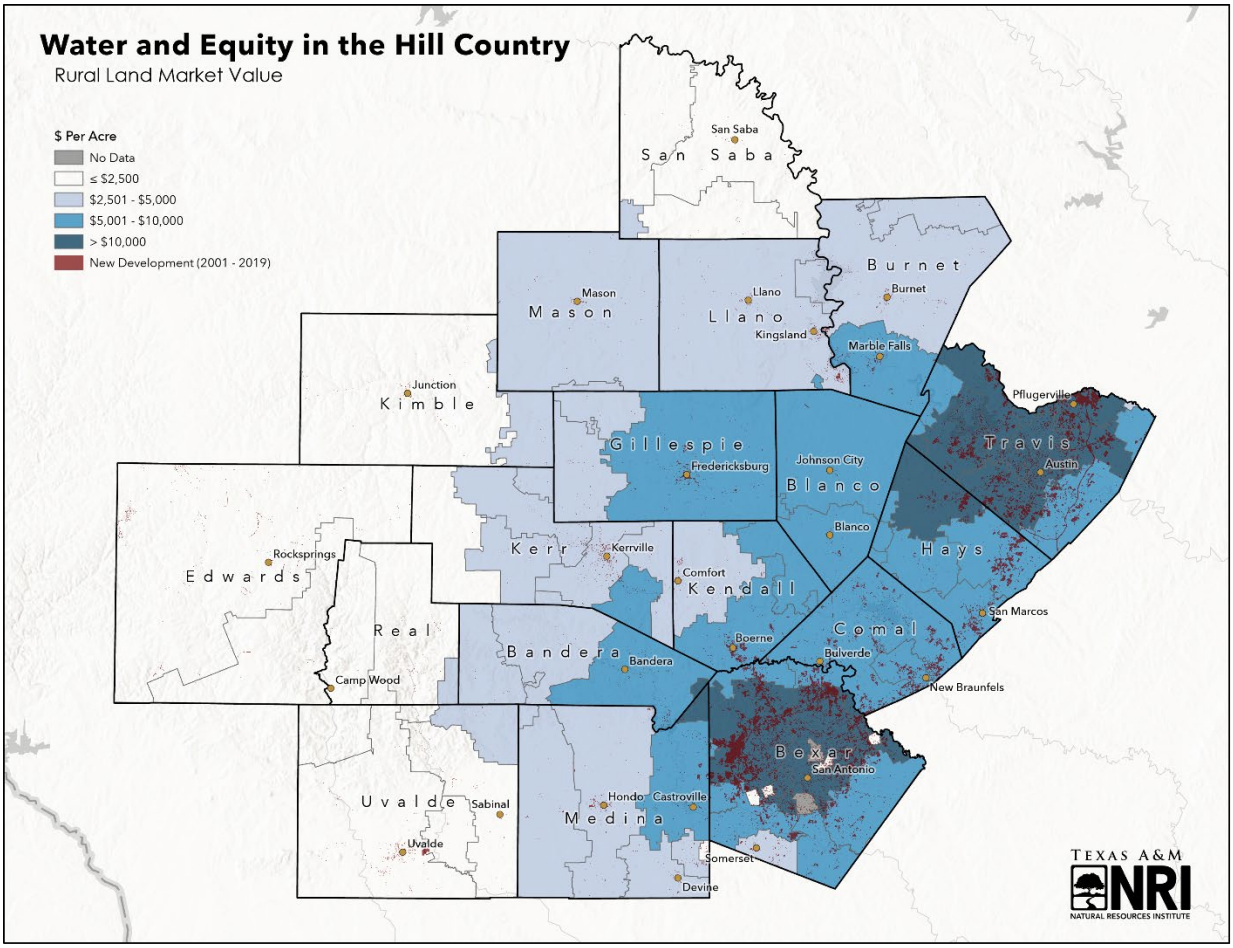


Figure 45. Urban development from 2001 - 2019 and rural land market values ($ per acre) in 2017 in the Texas Hill Country. Source: MRLC, NLCD, TCPA.

## Key Take-Aways

- Pressure and demand for water resources will only continue to increase in the coming years for the state in both urban and rural areas. It will be a significant social, economic and demographic issue, defined by specific parameters such as water supply, water quality, flood risk, affordability and accessibility.
- Placement of the majority of water challenges is not surprisingly in and around urban centers and based on the nexus or overlap of water challenges and Communities At-Risk identified in key areas within the Hill Country (south San Antonio, south Austin, and Uvalde, among other cities.).
- Action: Development of a water equityscape map demonstrates the overlap with Communities At-Risk indices and water challenges. Data suggest that Communities At-Risk are exposed to these challenges in some cases at a disproportionate rate. THCCN can use this approach to identifying high-priority areas in programming and engagement efforts. Further mapping at higher or more local resolutions may be beneficial in future efforts.

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Texas Natural Resources Information system, TNRIS
Texas Water Development Board, TWDB
The Nichols Institute for Environmental Policy Solutions, NIEPS
United States Census Bureau, US Census
United States Department of Agriculture, USDA
United States Department of Agriculture Census of Agriculture, USDA COA

# Section 3: Water Survey in the Hill Country

## Overview

### *Survey Description*

The *Texas Water Survey* was developed to determine daily use and management of water resources state-wide and as a complementary effort to *Texas Landowner Survey* described below; results from the survey were used to assess water use and management within the 18-county project study area. Survey respondents consisted of 4 groups: (1) water users (anyone who lives in Texas who uses any water source, such as public or private utility water, groundwater – well water, surface water – river, stream, lake), (2) water providers (someone who works for private or public water utilities, water distributors, groundwater conservation districts, or other types of water providers), (3) community leaders (e.g., elected or non-elected officials, community advocates, county commissioners, mayors, social workers, health professionals, educators, water planners, TWDB regional water planning groups, river authorities), and (4) water professionals (e.g., water utility workers, TCEQ professionals, plumbers, groundwater well drillers). The voluntary survey was anonymous, confidential, and disseminated through an online survey platform (i.e., Survey Monkey). Results were presented in aggregate form (averages and totals), and the mostly multiple-choice survey covered a variety of topics (i.e., general water questions, water dependability, accessibility of information, cost of water, future water needs, water quality, water recreation, private wells, flooding and drought, and water users).

The *Texas Landowner Survey*, which is released every 5 years by NRI's Texas Land Trends program, is an anonymous and confidential survey seeking to understand private landowner needs and concerns in operating and managing their land. The survey covers a variety of topics ranging from land management, land loss and fragmentation, and landowner challenges and preferences, all of which serve to build on efforts in private land conservation and management. Based on responses from 5 years ago, the Texas Landowner Survey was expanded to include several additional topics, among them water. The survey was disseminated via an online survey platform (i.e., Survey Monkey) and results were presented in aggregate form (averages and totals). Results from the survey were used to assess water use and management on working lands within the 18-county project study area.

From a water equity perspective, information, dependability and accessibility were considered drivers of change and assessed. Equity, for this project, is actively defined as individuals meeting their water and water associated needs, since water, although common, is a basic resource needed by all Texas residents. The survey was reviewed and approved by the funder and funding committee consisting of various water experts and reviewed by the Texas A&M Institutional Review Board. Areas with limited water resources and uses were also interviewed.

### *Response results*

For the Texas Hill country, we collected 406 responses from both surveys. Representation from the 18 County region was obtained in our survey effort. Respondent demographics include 65

years as average age, majority male (68%) and Non-Hispanic White (93%). As expected, responses from underrepresented groups in the online survey were low (7%) and more targeted in-person surveys were conducted to further expand information collected. Target audience make-up included water user (65%), water professional (19%), community representative (9%), and water provider (6%). Within these target audience groups, mayors/elected officials, groundwater district managers, TWDB regional planning group members, public water utility providers, and rural homeowners/landowners were the majority within their respective user groups. Water user respondents consisted of rural and non-rural households. The majority of responses (68%) indicated a water provider was present in their community. Question responses (42) were summarized via word clouds (also known as text clouds or tag clouds) with frequent responses appearing in bigger and bolder font colors and sizes to indicate more prevalent or important concerns or needs. Survey data were summarized by category, to include water uses, groundwater management, water concerns, dependability, and access.

Engaging with underrepresented groups was challenging using web-based survey tools. For this reason, in addition to the above surveys, 28 in-person interviews were conducted as a supplemental measure to validate and/or further clarify water responses for Communities At-Risk (see note for definition at end of section). In-person interviews with individuals and those familiar with community water-related needs assisted our assessment of community water needs, concerns, and challenges (20 people of color and 8 non-Hispanic Whites).

# Responses

## *Water Uses*

### *Online Survey*

Understanding primary water uses can serve in guiding programs for network partners in the future. A series of questions were asked to better describe common water uses by the various survey groups. From survey responses, the primary water source reported was private wells followed by public water utility. This dependency on groundwater will continue to be a future challenge within the Texas Hill Country, requiring increased efforts to improve overall water use efficiency, as well as conservation related measures. Other sources of water reported in the survey included the recapture of rainwater and surface water, where accessible. Personal and household uses were the most common among water users, and water on their properties or land was used for recreation, livestock, ranching and other agricultural purposes. In terms of oversight capacity, community and water leaders/professionals reported the use of water resources as primarily for domestic uses followed by agriculture uses. Within this context, across all survey groups, the primary water uses for all water sources included domestic use followed by drinking. Specific to water utility as a water source, key priority areas included household, commercial and drinking or personal use. With respect to surface water as a water source, household followed by landscaping were the primary uses by respondents. Use of rainwater also was reported, and its use was driven primarily for household, livestock and agriculture. Finally, other sources of water, to include graywater and private wells, were

primarily alternatives for landscaping or agricultural uses. Community and water leaders/professionals reported the protection of private property rights followed by water affordability as key priorities for their communities (see questions and responses below).

### *In-person Interviews*

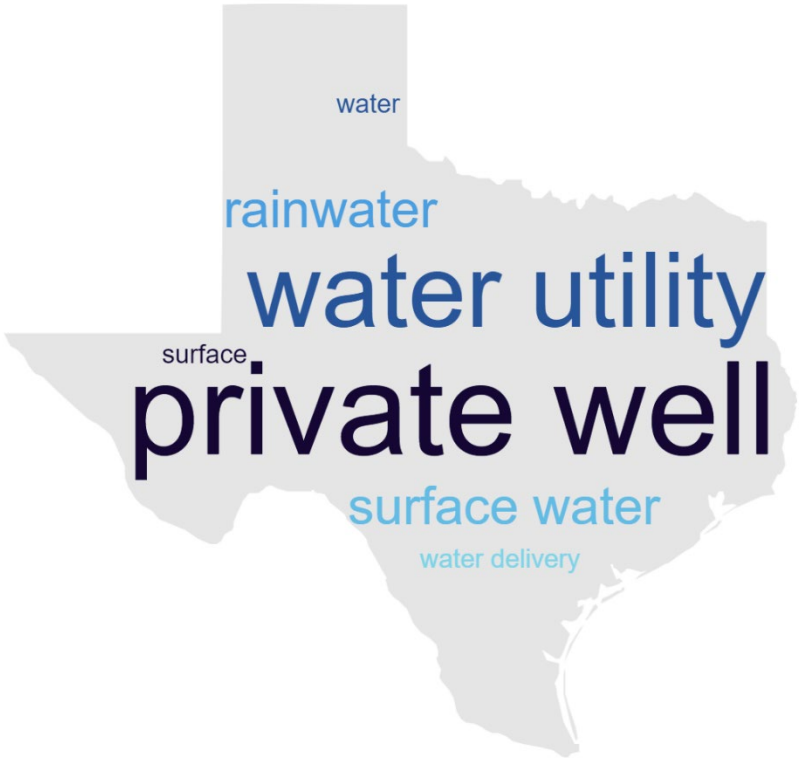
Various sources of water are used across the Hill Country. Some key messages obtained through in-person interviews emphasized the notion that water uses varied by water source: one-time use water bottles and refillable water bottles, private wells, ponds, recycled water, surface water/river water for irrigation and industry, recycled water for apartment complexes, public and private water utility companies, water dispensers/vendors, bottled water, and captured rainwater for landscaping and gardening are examples. Water was used to meet household, lawn and garden, pet, and agricultural needs. A common theme regarding water use was a general appreciation for water and the importance of its stewardship. There was a desire for all users to conserve water (residential, agricultural, and commercial), for an increase in meaningful water conservation education programming, and for consideration of populations who lack water access for basic uses, such as the elderly, disabled, and those with special needs (i.e., water delivery service and transportation services, meals on wheels, etc.). It was mentioned that water conservation incentives should also apply to businesses and fines imposed should they negligently use water. Some respondents perceived that most of the population did have access to water, even if it was bottled water, and that it was equally important for the general public to drink “enough” water for its health benefits. Rainwater capture was growing in popularity and local incentives were helping increase interest and expand its use. A requested action involved making conservation behaviors more tangible for the public so the benefits of a particular water use or behavior are more evident, hoping this in turn would increase knowledge, understanding, and intrinsic value, leading to the adoption of conservation practices.

Regarding water use, a specific concern was rapid population growth impacting water needs across the Hill Country. Respondents noticed that as populations increased, medical facilities and schools were built to accommodate the growth, which in turn facilitated future growth, new residential developments, and increased water use. Suggested conservation measures included sliding scale fees based on use, enforcement of drought restrictions and water conservation education efforts, as well embedding conservation efforts in future development. Finally, water safety fears by way of boil notices are fears that persist, along with fears of inadequate infrastructure. These concerns translated to increased use of bottled water for drinking and household activities, thus are an increased cost to some communities, particularly those that can least afford to purchase outside drinking water.

### *Summary*

The dependency on groundwater via private wells will continue to be a challenge for the Texas Hill Country. Increasing conservation efforts with water users can serve to improve the long-term sustainability of this finite resource. In comparing attitudes and behaviors between the in-

person interviews versus online survey respondents, other program recommendations may include an increased emphasis on programs targeting private water wells and conservation behaviors and incentives. Interviews suggest an interest in conservation education programs, assistance programs, and rainwater capture. There was also an interest in families that depend solely on bottled water for survival year-round, that programs be developed to ensure they have access to water during weather emergencies or pandemic times (when the general public overbuys) and for neighborhood type programs that would ensure access to water for the elderly, disabled, and individuals with special needs.

| What are your top three water sources? What are your communities top three water sources? | As a public servant, over which water uses do you provide input for your community? |
|---|---|
|  |  |

| What are your top three water uses?<br>What are your communities top three water uses? | If you were planning for the future water needs of your community, how would you prioritize the various water uses below? |
|---|---|
|  |  |

| What are your top three uses for water utility? | What are your top three uses for surface water? What are your communities top three uses for surface water? |
|---|---|
|  |  |

| What are your top three uses for private wells? What are your communities top three uses for private wells? | What are your top three uses for rainwater? What are your communities top three uses for rainwater? |
|---|---|
|  |  |

**What are your top three uses for graywater?**
**What are your communities top three uses for graywater?**

## *Ground Water Management*

### *Online Survey*

A key aspect of the Hill Country Network study was to better understand the use and impacts to groundwater resources. A series of questions focused on this aspect of water management to include the question of what percent of residents have active private wells. In general, many residents (>53%) reported having an active private well for household or agricultural use. Survey respondents also reported private well water quality was primarily the responsibility of their local Groundwater Conservation Districts as well as the well owner. To a lesser degree, survey respondents believed that everyone who lived above the aquifer recharge zone had some level of responsibility in maintaining the water quality of private wells. Approximately 60% of private well owners check their well at least one to two times annually, primarily for maintenance of well equipment. When well challenges arise, such as maintenance or other water quality issues, these were typically addressed through engagement with private well maintenance providers or in correspondence with their local Groundwater Conservation District representative.

### *In-person Interviews*

Respondents indicated groundwater resources were important and were vulnerable due to rapid growth across the Hill Country region. There was concern regarding competition for resources between rural and urban areas and support for limits to the amount of water rural landowners can share with urban communities. A few respondents felt that providing basic water education to the public describing *where water comes from*, and the *costs (along the way) associated with getting water to the community* might help improve water conservation. The importance of well water safety and maintenance information was also mentioned.

### *Summary*

Water users in the Texas Hill Country have a high reliance on groundwater resources and as previously mentioned, increasing conservation efforts can improve the long-term sustainability of water supplies. The importance of Groundwater Conservation Districts and private well owners in managing groundwater supplies was recognized by both water leaders and users. In comparing attitudes and behaviors between the in-person interviews versus online survey respondents, other program recommendations include programs focused on education, well maintenance and water conservation.

| Who is responsible for water quality of wells? | When you or your community's residents need assistance with your well, who do you contact? |
| --- | --- |
|  |  |

## *Water Concerns*

### *Online Survey*

Water concerns reported in the survey included drought, water availability, and groundwater resources. These were identified as the three most pressing challenges by all survey groups. Within this context, more specific water concerns reported included drought, water conservation efforts, and groundwater and surface water health. A few survey questions focused on wastewater management on landowner property or by the community. Community and water leaders/professionals reported no significant wastewater challenges in their communities. The primary approach to managing wastewater was the use of septic systems followed by community sewer systems and gray water reuse. The perceived ownership rights of both groundwater and surface water varied. Most landowners (>75%) reported owning both surface and groundwater rights. From a groundwater perspective, this difference, from the anticipated response, may be associated with a need for greater information regarding right ownership and water capture rules. The cost of water can also be a limiting factor for communities. Overall, community leaders and water providers perceived water costs as low and they were very satisfied to satisfied with current water prices. Similarly, water users and water professionals perceived water as affordable, although some were neutral when asked if they were satisfied with their overall cost of water. The average annual household income spent on water for drinking and household uses was less than 10% across all groups, with similar numbers reported for business expenditures spent on water resources. Trust in Texas Hill Country community drinking water quality was extremely high (>85%) across all groups. Finally, when asked about experiences with flood and drought damages, greater than 70% of respondents indicated associated impacts.

### *In-person Interviews*

Based on in-person interviews, there were no major overarching, specific concerns regarding water providers, community leaders, or water professionals. Generally, respondents believed their communities were efficiently operated from a water utility supply perspective. Water is such a basic need and there is not much competition for providing water resources – there is usually only one water provider in each community.

During extreme weather conditions and during the covid pandemic, water shortages were/are created due to consumer over-purchasing of bottled water. Community members that depend on local supermarkets for water are put at heightened risk of going without water for prolonged periods of time, even after the majority of a community's water has been restored, in the case of infrastructure damage or faulty infrastructure. Increasing awareness among Texas communities and vendors that some individuals rely solely on bottled water for their daily use and needs might be helpful. Also, this community group pays more for water under these conditions. For example, when stores run out of water, what is left behind are the expensive bottled water choices, creating an added cost to these consumers, who may already have difficulty affording the regularly priced water, in addition to transportation costs associated with traveling to the supermarket to purchase water. It was requested that programs be created for individuals that depend on these vendors and water sources for survival, to lessen their overall cost of water or at the very least, to set aside water so that this community group

may have access to water during emergency periods, water shortages, and for daily use. Publicizing information regarding common tap water dispensing areas would be helpful to these community members.

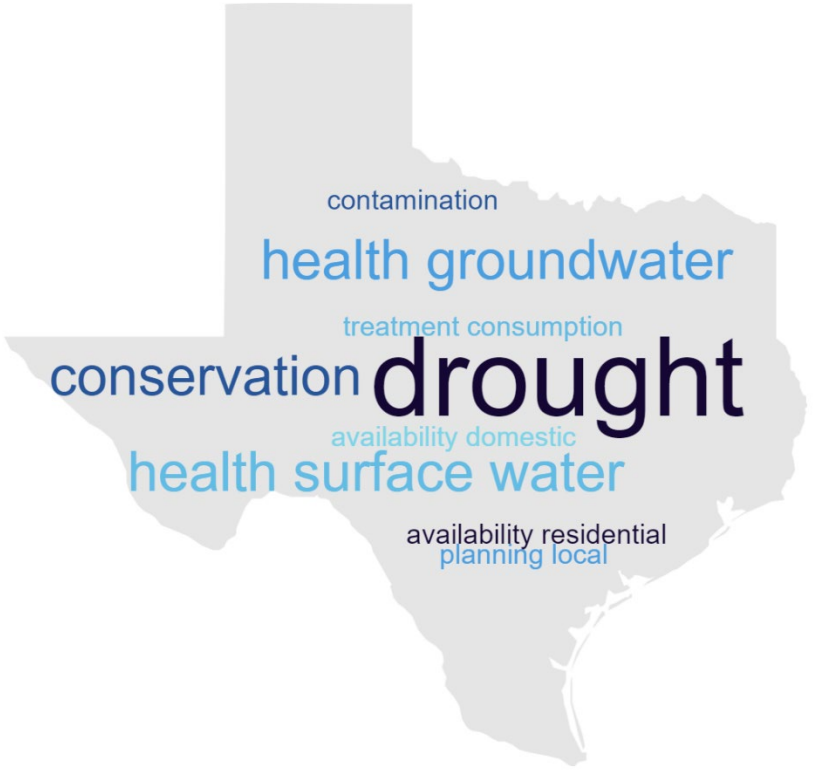
Texas communities near rivers alternate between floods and drought and have programs in place for each: floods are associated with building restrictions near water and droughts restrict watering. Landowners perceive a bias in favor of urban areas as watering restrictions impact their ability to make a living and provide food products. Similarly, a respondent shared that community members feel that local communities might perceive farmers and ranchers have unlimited use of water during restriction periods. Both groups suggested water conservation measures as a means of ensuring a future water supply. Using recycled water was suggested.

In terms of clean rivers, a respondent felt that water leaders should allocate money to this end, to prevent water pollution and prevent harming wildlife, birds, and people. Clean rivers will help people value rivers more. Other suggestions included adopting parts or legs of rivers for cleaning by water leaders and school programs. Also mentioned were offering incentives or water bill savings to households who conserve water and older populations.

There was a concern that we are in a long-term drought period, coupled with population growth. Historically, to supplement pumping restrictions, outside water was purchased. Currently, shallow water wells are going dry. Corporations and businesses were also viewed as having put a strain on water resources. Watering restrictions were encouraged along with xeriscaping, minimal flush toilets, and rainwater capture systems for all new developments. There was a request that newer, large-scale developments be encouraged to develop a new water source prior to construction and include in their plans the installation of rainwater capture systems to promote water conservation.

### *Summary*

Drought, water availability and water conservation are significant concerns across survey groups for the Texas Hill Country. Water quality is less of a concern compared to water quantity, which is reinforced in the trust of water quality by all survey groups. The affordability of water does not appear to be a significant limiting factor or issue of accessibility for online survey respondents, however, in person interviews suggest that water affordability is a concern for some communities. In comparing attitudes and behaviors between the in-person interviews versus online survey respondents, other program recommendations include programs focused on water conservation, drought, and future water availability.

| Thinking only about your property, please select your 3 most pressing (general) water concerns. | Thinking only about your property, please select your 3 most pressing (specific) water concerns |
| --- | --- |
|  |  |

**How do you manage wastewater on your property or in your community?**

## *Dependability and Access*

### *Online Survey*

The dependability and access to water resources are potentially at the crux of water equity challenges. In the final section of the water and landowner surveys, we asked a series of questions to determine the perspective of survey respondents to dependable water supplies as well as access to water supplies and recreational opportunities. In this section, we also determined access to water resources information provided by various water-oriented entities, such as public water utilities or Groundwater Conservation Districts.

Water Dependability.—As noted in the previous section, water availability is viewed as a high priority issue for the Texas Hill Country. In asking the question *what makes water dependability a challenge*, water availability, followed by infrastructure damage were noted as key contributors. In general, survey respondents were satisfied with the overall dependability of their service providers. Satisfaction levels varied from very satisfied to satisfied across all survey groups. Views on the reliability of access to drinking water were similar. The majority of water providers (>80%) reported their communities had reliable and safe drinking water supplies. Their responses were validated by water users.

Information Access.—Preference for access to water information included written media as well as direct conversations with the local water provider. Preference for sharing water information was in person, followed by information exchange through community meetings. Access in providing water information through digital/wireless communication networks, such as the internet and telephone (both cell and landline) was high, with the majority of respondents having one or more of these services (i.e., Internet, telephone landline, cell phone). The perceived access of water users to telephone landlines, by community and water leaders/professionals, was actually higher than reported (nearly 2X). This is an important consideration in disseminating water information, particularly with underrepresented groups. In asking for the overall satisfaction level when receiving water information, it varied from very satisfied to satisfied for public servants, in contrast, for water users, satisfaction levels were lower or neutral. Language barriers can be a challenge associated with access to water information, particularly safety-related information. In our survey, the preferred language for information was English and approximately 25% of such information was readily available in Spanish. For water users surveyed, their preference for informational materials was in English, however, this may be associated with a greater number of responses from online respondents.

Recreation.—Access to water recreational opportunities was another area measured in our project. Respondents were initially asked about key recreational activities available in their communities: hiking, wildlife watching, and photography. Reported barriers to recreating in a local body of water were primarily attributed to not enough time for that activity, followed by places are always full. Both community representatives and water users cited a lack of time as a primary reason for not participating. Water providers and water professionals offered other factors that did not align with water users, such as crowded parks or boat ramps. Another question where community and water leaders/professionals did not align with water user responses is the frequency in which residents recreate in a lake or river. The former group

attributed water recreation to be greater than five times a month whereas water users reported less than once a month. Distance to a water access point for recreational purposes for all groups surveyed was less than 10 miles. Distance did not seem to be a limiting factor to water access for online survey respondents. Finally, survey respondents were asked to rate the overall quality of the water body in which they preferred to recreate. Responses varied from very good to average across all survey groups.

### *In-person Interviews*

Water recreation participation varied among in-person interview respondents. Not all respondents were open to participating, while others participated from a handful of times a year to almost daily in the Hill Country and along the Texas coast. Activities ranged from walking along a river, lake or creek via trails (nature or concrete) to tubing, fishing, and swimming, and simply enjoying a moment by the water. Regardless of participation level, each had an appreciation for water.

Water trash collection, in a group, pair or alone, was also a respondent activity, often on a voluntary basis. This was done to improve the experience of those enjoying the water, a benefit for the community. Water safety education programs were also beneficial to communities. Kerr County has a water safety educational program provided to both children and parents at schools where information is provided to younger students by grade level and safety vests are distributed to families who might not be able to afford them. Information sharing with families creates exponential benefits to communities. In Bexar County, fee waivers for city swimming pools increased participation and indirectly helped families redirect their earnings, especially larger families. These are examples of activities that increase access to water recreation. Educational programs that reach children and families are essential for sharing vital information with a greater return on investment. Access to river areas for pay are available. Designated public access points to Hill Country rivers are limited, and residents resort to public non-designated areas, such as public bridges and roads. These areas may provide limited parking opportunities which adhere to official rules enforced by local sheriffs. Publishing general safety and parking guidelines along with other how to's, area safety information (river flow), area use etiquette, do's and don'ts, and basic flora and fauna educational information, to include promoting conservation and preservation behaviors, are helpful to improving equitable access and conscientious use. Information is key to increasing access.

### *Summary*

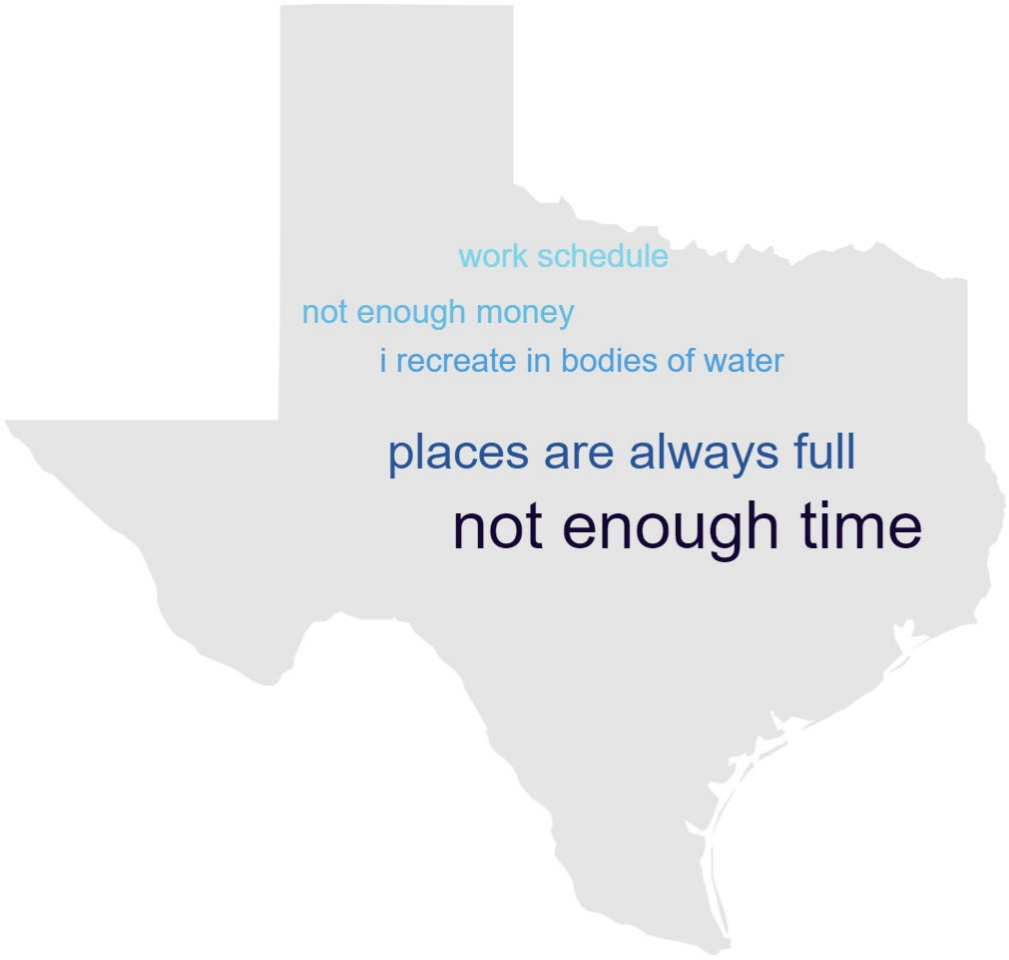
Water availability in the future appears to be a significant concern across survey groups and a key factor in dependability for water users in the Texas Hill Country. The current dependability and quality of water resources, however, remains high across all user groups. Differences in perceived access to water information in terms of format and communication networks can serve to improve programming and outreach. Online survey respondents likely do not adequately represent underrepresented communities, illustrating the need for alternative approaches in community engagement. Physical access to water recreational opportunities does not appear to be a limiting factor but instead time to dedicate to such activities and availability. In comparing attitudes and behaviors between the in-person interviews versus online survey respondents, other program recommendations include programs focused on

increasing access to recreational areas, from parking to fee waivers or decreasing prices, and increasing safe access points for water recreation. Although the data do not reflect a general lack of access to water (personal use, drinking, etc.), our findings do not suggest that a lack of water access is not occurring on the ground or that there are no cost-prohibitions to accessing water.

| Over the last 5 years, what are some things that have made water dependability a challenge in your community? | How does your community prefer to receive water information? |
| --- | --- |
|  |  |

| How do you prefer to share water information? | Which recreational activities are available in your community? |
| --- | --- |
|  |  |

**What are some things that keep community residents from recreating more often in a local body of water ?**



## *Survey Summary by Respondent Group*

This section provides a summary of survey responses by respondent group. This allows for a general comparison among respondents. These are generalities and may differ slightly from the top 3 descriptions in the previous section.

### *Water User*

Water user respondents consisted primarily of rural and non-rural households. Their primary water use involved personal and household uses. Water on their properties was used for recreation, livestock, ranching and other agricultural purposes. They were satisfied with their water dependability but listed water availability as their primary water challenge, followed by infrastructure damage. They were mostly satisfied with their water provider and favored Groundwater Conservation Districts, their providers and printed media and community meetings as information sources. They were somewhat satisfied with the flow of information from their water provider, preferred information in English and had access to the internet. They preferred sharing information with their providers via in person meetings and were satisfied with the cost of water, spending 10% or less on water. Ensuring access to affordable drinking water was their main priority, as they trusted their water source. Tubing, photography and swimming were their main recreational activities, although they participated in the activity less than once a month, and some preferred not to recreate in water. Lack of designated access points, time and travel/transportation constraints limited participation. Many respondents had a water well and sought the assistance of water well companies for well maintenance. Their communities had experienced floods and droughts.

### *Water Leaders*

From the survey results it is clear that water leaders in the Hill Country are most concerned about the impact of drought on their communities. They are also very concerned about water quantity challenges stemming from the rapid pace of development and increased groundwater use, leading to decreasing aquifer levels and streamflow. Leaders felt that current groundwater laws (e.g., Rule of Capture) are a huge barrier to sustainable groundwater management. Many expressed frustration that groundwater and surface water are managed separately. On the water quality side, sewage waste, both from failing septic systems and wastewater water treatment plants, was the most common water quality concern. Leaders are concerned about the impact of wastewater effluent on stream quality and missing controls on Nitrogen (N) and Phosphorus (P) pollution. There are also concerns that TCEQ is not sufficiently regulating water quality (i.e., their standards are too lax).

It is also worth noting the disparity in the responses. Half of respondents felt that protecting the private property rights of well owners was one of their main priorities, while the other half shared that it was a low priority. A similar disparity could be seen with regard to the importance of sustaining springs and rivers for recreation and wildlife (though in this case, more people felt it was a high priority goal than those who did not). Another potentially polarizing area was water affordability: some leaders feel water is too affordable, and that the cost for water should be higher to incentivize conservation whereas some felt water was not affordable.

### *Community Representatives*

Apart from domestic, landscaping and drinking purposes, community representatives responded that community members also used water for swimming, kayaking and recreational activities. They reported their communities had no wastewater challenges and that water was dependable. They listed water availability as their community's primary concern, followed by infrastructure damage. They indicated communities had access to drinking water. Community representatives believed water providers were their community's primary source of water information, followed by written media (community preference for written information in English and had access to the internet) and elected officials. They felt their community was satisfied with their water's dependability, trusted elected officials, and preferred community meetings and in-person communication for sharing information about water with community representatives. Community leaders believed the community was satisfied with the cost of water (10% or less of a household's income), trusted their water source, and indicated ensuring access to affordable drinking water followed by sustaining springs and rivers for recreation and wildlife as the most important community priorities. Recreational activities included boating, birdwatching and photography, and community leaders believed participation in water-related activities occurred greater than 5 times a month. Participation constraints were associated with lack of time and work schedules, limited water access points and recreational spaces (full), and expensive entrance fees. There was a preference for nearby bodies of water and well-maintained recreational areas. Leaders indicated communities had more active than inactive wells, and that these were maintained 1-3 times a year by a private well maintenance company. They believed groundwater conservation districts and private landowners were both responsible for well maintenance. They also shared their communities had experienced floods and droughts.

### *Water Providers*

Water providers who responded to the survey were primarily public entities. They viewed pets, household uses, landscaping, gardening, cooking, bathing, general hygiene, drinking water, and domestic uses as the primary uses of water in their communities. All responded there were no wastewater challenges and that their water dependability was good. Challenges for the community involved water availability, infrastructure damage and high cost of water. Access to water and the internet were viewed as reliable, and water providers felt communities were satisfied with the information provided to them by groundwater conservation districts and written media. Water providers viewed themselves as the preferred information source for their communities (English language). Communities preferred to receive information via community meetings, phone messages, and community postings. Water providers were a top 3 information resource. There was general satisfaction with the cost of water and that less than 10% of a household's and business' income was spent on water. Providers reported communities prioritized ensuring access to affordable drinking water and water uses associated with local jobs, and that communities trusted the providers' drinking water. Community recreation activities involved hiking, wildlife watching, stargazing, photography, experiencing nature, birdwatching, and biking. Water activities communities preferred were canoeing or kayaking, and other water recreational activities, ranching, group sports, camping, and boating. Providers indicated their communities recreated less than once a month and that participation

constraints were associated with time, work, full spaces, and not enough money. Water recreation was limited by don't know how to swim, fish, etc., lack of transportation and companionship. They understood communities preferred to travel less than 10 miles to a water body and indicated that communities felt the water quality where they recreated was good. Communities had equally active and inactive wells, which were serviced 1-3 times per year, or they were not maintained because doing so was cost restrictive. Communities also had experienced floods and droughts, and providers felt private landowners were responsible for their wells.

### *Water Professionals*

Most water professional respondents were male. Water professionals indicated that water availability, drought and groundwater were the greatest water concerns. They viewed drinking and personal water uses, along with gardening, household, and landscaping as the primary water uses. Topics of concern included drought, health of groundwater, surface water and water availability for residential areas. The agencies most contacted for assistance were Groundwater Conservation Districts, other organizations and river authorities. Groundwater well assistance was received from private well maintenance companies, and water professionals reported private landowners were responsible for well water quality. They also indicated sewer was the most common wastewater system utilized and that over 75% of water users owned both surface and groundwater rights on their properties. Water professionals provided input towards many water uses. They indicated communities preferred water delivery services as sources of water for drinking and personal use, and they selected other sources of water for livestock, ranching, irrigation, and gardening. They believed there were no wastewater challenges in their community and that communities were satisfied with their water dependability. Their communities did have prior experience with flooding and drought. Water availability and infrastructure damage outside of properties were somewhat concerning, while drinking water access was not a concern for their community. They also shared their community had access to information sources and were fairly satisfied with the method in which they received information. When it came to receiving water information, they felt communities were very satisfied with the water information provided to them and that communities preferred receiving information in English, directly from Groundwater Conservation Districts, followed by written media and local traditional media. They gauged communities preferred to share water information directly with Groundwater Conservation Districts, in water meetings, in person and with elected officials. They were not sure how satisfied communities were with their current cost of water but felt that paying 10% or less of one's household income was the norm (community and commercial). They believed a community's top priority would be ensuring access to drinking water followed by sustaining springs and rivers for recreation and wildlife. They felt communities trusted their drinking water source, and in terms of recreation, hiking, wildlife watching, and photography were the primary activities. Recreating in a body of water was believed to occur at least 3-4 times a month. Reasons for community non-participation in recreational activities included *places are always full, not enough time, places are too far away,* and *not enough money* with a distance of at least 10 miles travelled to reach a body of water, whose condition was listed as average to good.

## Key Take-Aways

- Drought and overall water availability weighed heavily on Hill Country survey respondents' minds, yet they also felt current water dependability and affordability were good or satisfactory, suggesting future water may be more of the driver for concern. Most communities and respondents had personal experiences with either flood and/or drought.
- Dependency on groundwater is high (50-60%), placing great pressure on Hill Country water sources and posing significant challenges moving forward, which were validated by expressed respondent concerns. Regarding groundwater wells, well management, and the role of managers, there was a heavy emphasis on groundwater conservation districts, and also on well owners for responsibility of wells.
- With respect to dependability and access, people felt they have dependable water sources and quality, yet there is a real concern that these may not be a reality in the future. Also, once safety has been breached, it might take some community members a long time to trust their water source again, thereby increasing their cost of water.
- Respondents felt opportunities to recreate existed in the Hill Country, although policymakers felt water users had more time to recreate than was their reality. Improving recreation access, making it easier for people to recreate may be beneficial but not without addressing other barriers, such as time to recreate.
- There was a preference for in-person and community meetings with respect to information sharing and access. Written media also was a preferred source but not to the same degree as the former items.
- There appears to be communication among water professionals, water providers, and water leaders; however, increasing and/or maintaining communication with water users would be helpful.

Note: Publicly available data was accessed for this report. This data is produced by different agencies whose terminology for various population groups differ. The term *Communities At-Risk* is used in this report as an all-encompassing term to describe the same populations covered by the datasets. By nature of the data, "low income" and "people of color" (both EPA definitions) encompass many Communities At-Risk. A list of some definitions of key terms by data source would be helpful to understanding descriptions in this report:

1. White or Non-Hispanic White: "Individuals who responded 'No, not Spanish/Hispanic/Latino' and who reported 'White' as their only entry in the race question (Census Bureau 2021)"
2. African American or Black: A person having origins in any of the Black racial groups of Africa (Census Bureau 2021).
3. Asian: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam (Census Bureau 2021).
4. Hispanic or Latino: refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race (Census Bureau 2021)
5. Indigenous Groups or Native Americans: A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment (Census Bureau 2021).
6. Low-Income: The EPA uses the term "low-income" to describe households whose household income is less than or equal to twice the federal "poverty level" (Source: EPA EJScreen).
7. Minority: In some reports by the EPA, the term "minority" is used to describe people of color (see definition above). The term Minority Communities is used to describe communities primarily made up of people of color, as described here.
8. People of Color: Individuals who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino. That is, all people other than non-Hispanic white-alone individuals. The word "alone" in this case indicates that the person is of a single race, not multiracial (Source: EPA EJScreen). Communities At-Risk, At-Risk Communities, and Communities of Color are defined and described in this context.
9. Poverty Threshold: The Census Bureau sets income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's poverty threshold, then that family is considered in poverty (Source: Census Bureau).
10. Distressed Communities, Susceptible Communities, and Socially Vulnerable Communities: These are additional terms used by various organizations to describe people of color and indices associated with people of color.

Note: Common data source acronyms used in this report include,

2022 State Water Plan, SWP
Center for Disease Control, CDC
Distressed Communities Index, DCI
Economic Innovation Group, EIG
Environmental Protection Agency, EPA
Environmental Protection Agency EJ SCREEN, EPA EJScreen
Groundwater Conservation Districts, GCD
Multi-Resolution Land Characteristics Consortium, MRLC
National Agricultural Statistics Service, NASS
National Land Cover Database, NLCD
National Oceanic and Atmospheric Administration, NOAA
Safe Drinking Water Information System, SDWIS
Social Vulnerability Index, SVI
Texas Commission on Environmental Quality, TCEQ
Texas Comptroller of Public Accounts, TCPA
Texas Department of Transportation, TXDOT
Texas Natural Resources Information system, TNRIS
Texas Water Development Board, TWDB
The Nichols Institute for Environmental Policy Solutions, NIEPS
United States Census Bureau, US Census
United States Department of Agriculture, USDA
United States Department of Agriculture Census of Agriculture, USDA COA

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