



E-PARCC

COLLABORATIVE GOVERNANCE INITIATIVE

Program for the Advancement of Research on Conflict and Collaboration

THE EDWARDS AQUIFER (PART A)

Amidst of one of the worst Texas droughts in recent memory, attorney Robert Gulley wondered why he had left his position at an established law practice to take on the position of program director for the Edwards Aquifer Recovery Implementation Program (EARIP). As the program director, Robert now worked for 26 different organizations and his job was to assist them, using a consensus-based stakeholder process, through one of the most contentious and intractable national disputes involving scarce groundwater resources at the Edwards Aquifer, one of the most valuable water resources in the Central Texas area. This dispute had already spanned decades and, to make this task even more daunting, the competing interests on both sides had made numerous unsuccessful attempts over the years to resolve this conflict. Hot weather, droughts, and the resulting conflicts between stakeholders are frequent occurrences in Texas. Robert, who had returned to his home state specifically for this position, knew that this drought would only intensify the tensions amongst the stakeholders involved.

The Edwards Aquifer (“Aquifer”) provides approximately 90 percent of the water for over two million people living and working in the South-Central Texas area. The Aquifer supplies the water that services the city of San Antonio and other municipalities; a multi-million agricultural and ranching industry in the western part of the region that views water as a coveted property right; as well as the recreational activities that provide the backbone of the economies of rapidly-growing, nearby cities of San Marcos and New Braunfels (**Figure 1**). Through springs located in both San Marcos and New Braunfels, the Aquifer also contributes directly to the survival of eight species protected by the federal Endangered Species Act (ESA) and feeds water

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to the local Guadalupe River and numerous Gulf Coast bays and estuaries. Agricultural and chemical industries located along the Guadalupe River basin depend on the Guadalupe River, much of which originates from the Edwards Aquifer springs during periods of extreme drought.

As Robert reviewed the history of the dispute over the use of the Aquifer, he began to comprehend the magnitude of the task facing him and the EARIP stakeholders. Robert knew that water scarcity was a top global risk, but was a regional issue as what the South-Central Texas region was facing, and the problem had to be address regionally.¹ These stakeholders had a long history of conflict among one another and Robert grew increasingly worried that he would not be able to help them to work together and manage this scarce water resource.

Background

During the mid-1950s, Texas experienced a record-setting drought, known today as the “Drought of Record.” The drought hit the south and-central Texas regions particularly hard. Both areas depend heavily on the prolific artesian Edwards Aquifer for its water.^{2,3} The Aquifer’s water flow fell dramatically at Comal Springs and San Marcos Springs, the two largest springs in Texas and the southwestern United States. Comal Springs even stopped flowing for over four months, threatening the surface water supplies on the Guadalupe River and extirpating one of the two populations of fountain darters (a small fish found in Comal and San Marcos Springs that was later protected by the ESA). To many observers, it became clear that the region would have to begin managing groundwater to avoid “mining” the Aquifer as the region grew, *i.e.*, pumping more water from the Aquifer annually than is replaced each year by rainfall.⁴ Many also believed that the most logical solution was for San Antonio, the largest and fastest-growing city in the region and the single greatest user of the Aquifer, to develop alternate surface water supplies to accommodate new growth.

Restricting pumping from the Aquifer was not a politically-viable alternative in San Antonio or elsewhere in the state. At that time, “the rule of capture” almost exclusively governed groundwater use in Texas. Under this rule, a landowner is free to capture and use as much water as could be beneficially used without waste. Moreover, the rule of capture aligns with the heavy emphasis that Texas places on private property rights and, in so doing, was viewed as

¹ See Water crisis ranked as top global risk for the next 10 years. World Economic Forum, “The Global Risks Report 2016, 11th Edition,” 2016, at 13.

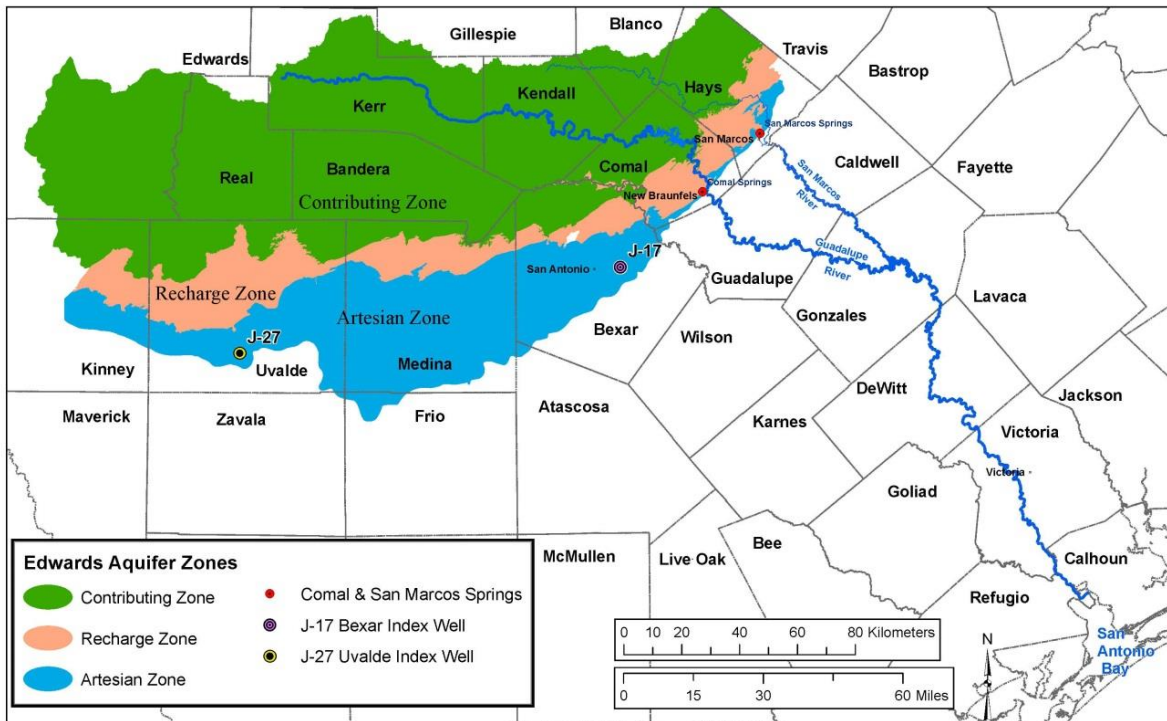
² See Appendix 1: Overview of Edwards Aquifer.

³ See Appendix 2: Historical Timeline of the Edwards Aquifer Conflict.

⁴ See Appendix 3: History of Water Management in Texas.

granting landowners a vested ownership interest in the use of water.⁵

Figure 1. Map of the Edwards Aquifer region showing the contributing zone, recharge zone, and artesian zone, as well as J-27 and J-17 wells and Comal Springs and San Marcos Springs.



As shown in **Table A**, San Antonio initially considered developing alternative water supplies to decrease its dependence on the Aquifer. These attempts were all unsuccessful. In many instances, the political will to invest in the future did not exist, given the lack of an immediate public demand and the readily available supply of inexpensive water from the Aquifer.

Table A. Alternate water supply projects considered but rejected by the City of San Antonio.

Water Project	Year	Potential Yield
Canyon Reservoir	1952-1965	100,000 acre-feet
Cuero I and II	1963	221,000 acre-feet
Cibolo Reservoir	1974	30,000 acre-feet
Lease of Canyon Lake Water	1976	Up to 50,000 acre-feet
Applewhite Reservoir	1991 and 1994	50,000 acre-feet

⁵ Illustrative of this point, the Texas Legislature created the Edwards Underground Water District (EUWD) in 1959 “to conserve, preserve, protect, and increase the recharge of and prevent pollution of the underground water” but did not authorize the EUWD to restrict the rights of landowners to pump underground water from their lands.

The history of San Antonio's efforts to find alternative water supplies is fraught with disputes between San Antonio, the agricultural communities of Medina and Uvalde counties that lie west of the city, and the surface water interests located downstream of Comal Springs and San Marcos Springs. These disputes contributed to the often acrimonious tone for most of the future debates between these interests.

Regional Water Resources Plan

In 1983, the City of San Antonio and the Edwards Underground Water District (EUWD), which consisted of three elected directors from the counties of Bexar, Medina, Uvalde, Comal, and Hays, established a Joint Committee on Water Resources to initiate a new, more comprehensive approach that focused the Aquifer's use on regional needs, rather than just the needs of San Antonio. This comprehensive approach began with a study of long-range water needs and water supply alternatives for the region. The results of that study were sent to the EUWD Board of Directors and the San Antonio City Council in March 1986. By October 1986, the City of San Antonio and EUWD expanded the composition of the Joint Committee to include the EUWD board chair, one board member from each of the District's five counties, as well as one representative from the San Antonio, Guadalupe-Blanco, and Nueces river authorities.

In early 1987, the city of San Antonio and EUWD convened the expanded Joint Committee on Water Resources to develop a plan for implementing the 1986 study's recommendations. Henry Cisneros, the mayor of San Antonio at the time, and the Robert Hasslocher, then chairman of the EUWD Board, served as co-chairs of the Joint Committee. Completed in 1988, the Joint Committee's *Regional Water Resources Plan* included strategies for both regulating the use of the Aquifer and for developing and paying for alternative water supplies for the region. The scope of this achievement was both extraordinary and courageous because it publicly stated, for the first time, the need to move away from the rule of capture. It was also one of the first instances in Texas where both groundwater and surface water would be managed as an interconnected system.

On July 7, 1988, the Joint Committee voted 9 to 0 with two abstentions to approve the *Regional Water Resource Plan*. Three river authorities also endorsed the plan. But foreshadowing things to come, the two abstentions on Joint Committee vote were directors on the EUWD board from Medina and Uvalde counties.

Despite an apparent unanimous vote by the committee membership the *Regional Water Resources Plan* had created tremendous controversy. The agricultural community in the western part of the region fiercely resisted any management of the Aquifer because of the

private property rights associated with groundwater and the protection of those rights afforded by the rule of capture. Perhaps to quell the growing opposition in Medina and Uvalde counties, Mayor Cisneros and Chairman Hasslocher told the citizens of the region in announcing the plan:

In developing this plan, special notice has been taken of the often competing viewpoints of the three principal segments of our regional economy: the San Antonio metropolitan center, the agricultural sector to the west and downstream/recreation interests to the east. In the past, these interests have often been pitted against each other, promoting a “winner take all” approach to the resolution of conflict. In contrast, this plan has been designed to protect and accommodate each of these concerns. As such it has inevitably, and properly, led to compromise. In arriving at these compromises, every possible consideration has been afforded to the public interest, individual property and business rights, the environment, and the projected needs of the region. Compromise obviously implies mutual concessions. It also suggests – and this plan has been developed in that spirit – mutual gains and benefits. It is the intent of this plan that its burdens and benefits be fairly and rationally distributed among all the parties involved.⁶

The San Antonio City Council voted 9 to 1 to approve the *Regional Water Resources Plan*. Subsequently, the EUWD Board also approved the plan by a 9 to 6 vote with the Board members from Medina and Uvalde counties voting against it this time. Mayor Cisneros described the vote as “decisive” but predicted that Uvalde County might withdraw from the EUWD. Rene Aelvoet, the Medina County representative on the Joint Committee, said he opposed the plan, but predicted Medina County would stay in the District because pulling out “would be a disaster.” The plan was now clearly in jeopardy.

The subsequent board member dispute over the plan became so intense that Medina and Uvalde counties eventually both left the EUWD. The loss of these counties from the board undercut the regional scope of both the water resources plan as well as the drought management plan adopted in 1988 and it eliminated the EUWD as a realistic regional body to manage the Aquifer.⁷

⁶ Transmittal letter from Henry G. Cisneros, Mayor of the City of San Antonio, and Robert C. Hasslocher, Chairman of the Edwards Underground Water District, July 1988.

⁷ In 1987, the joint committee had asked the Texas Legislature to authorize the EUWD to develop and enforce a regional drought management plan prior to September 1988. The Legislature enacted the requested change in House Bill 1942 (HB 1942). In what turned out to be quite important subsequently, as part of a compromise to allow the bill to be passed, Legislators allowed 10 percent of the residents of a county in the EUWD to petition for a referendum to be held to determine whether that county should remain within the District. A referendum would be held if the county directors voted unanimously to hold one.

Despite the plan's approval by the remaining board members, the lack of an agency with the authority to regulate the Aquifer remained a key structural impediment to its implementation. To obtain that authority, the remaining proponents went to the Texas Legislature in 1989. That year, a coalition comprised of the cities of San Antonio, San Marcos and New Braunfels, the EUWD, the San Antonio River Authority, the Guadalupe-Blanco River Authority (GBRA), the City Public Service of San Antonio, and the City of San Antonio Water Board sought state legislative authorization to implement the strategy contained within the plan, including the ability to regulate pumping. On the other side, the agricultural interests from the Uvalde and Medina counties who had seceded from the EUWD vehemently opposed the coalition's proposal. The conflicting efforts of these two factions in the Texas Legislature were so contentious that both sides completely resisted any compromise. Rodney Reagan, an Uvalde County irrigator said, "San Antonio isn't committed to anything but getting a handout. If San Antonio doesn't want us to have a water district out here, well that's unfortunate. We're willing to do our part, but we're not going to do it with San Antonio."

Lacking any agreement by the stakeholders, the Texas Legislature did not enact any legislation to address the Edwards Aquifer management. Without legislative action, the remaining consensus for the *Regional Water Resource Plan* rapidly dissolved. Ultimately, the plan's failure was largely due to the differing beliefs between the City of San Antonio and irrigated agriculture on whether the Aquifer should be regulated.⁸

Endangered Species Become a Factor in the Aquifer Dispute

Frustrated by the lack of movement by the Texas Legislature on June 15, 1989, the GBRA, which had previously supported the *Regional Water Resource Plan*, issued a Notice of Intent to Sue for violations of Endangered Species Act.⁹ This notice brought the federally-listed species located at Comal and San Marcos Springs squarely into the debate over the use of the Aquifer (**Table B**). The strategy from GBRA's perspective was quite simple -- if it could convince a federal court to order management of the Aquifer to protect the federally-listed species, the downstream interests would be assured additional spring flow to contribute to surface water rights holders downstream, particularly during a drought. GBRA's strategy raised the specter of federal

⁸ In the *Regional Water Resources Plan*, the City had moved away from its support for the rule of capture. That movement was reinforced in 1991 when a catfish farm began operations in southern Bexar County. Because the "rule of capture" prevailed over the Edwards Aquifer, Ron Pucek, the owner of the catfish farm, was free to take as much water from the Aquifer as he could put to a beneficial use. He had drilled the world's largest water well and used nearly 45 million gallons per day - enough water to support 250,000 people, about one-fourth of San Antonio's population at the time. The catfish farm solidified the City of San Antonio's already growing appreciation for the need to regulate the Aquifer.

⁹ See Appendix 4: Overview of the Endangered Species Act.

intervention, already anathema in Texas, and sparked renewed efforts to resolve the matter within the region.

Table B. Federally-Listed Species at Comal and San Marcos Springs.

Common Name	Scientific Name	Status	Spring Location
Fountain Darter	<i>Etheostoma fonticola</i>	Endangered	Comal and San Marcos Springs
Comal Springs Riffle Beetle	<i>Heterelmis comalensis</i>	Endangered	Comal and San Marcos Springs
San Marcos Gambusia	<i>Gambusia georgei</i>	Endangered	San Marcos Springs
Comal Springs Dryopid Beetle	<i>Stygoparnus comalensis</i>	Endangered	Comal Springs
Peck's Cave Amphipod	<i>Stygobromus pecki</i>	Endangered	Comal Springs
Texas Wild-Rice	<i>Zizania texana</i>	Endangered	San Marcos Springs
Texas Blind Salamander	<i>Typhlomolge [=Eurycea] rathbuni</i>	Endangered	San Marcos Springs
San Marcos Salamander	<i>Eurycea nana</i>	Threatened	San Marcos Springs

The Special Committee on the Aquifer

Although the Texas Legislature did not address Aquifer management in the 1989 legislative session, they did establish a special committee on the Aquifer to investigate issues concerning underground and associated surface water management in the region. The intent of this special committee was to assist in resolving controversy surrounding a proposed management plan. Among other activities, the special committee convened key stakeholders and enlisted John Birdwell, a member of the Texas Water Commission, to mediate the dispute.¹⁰ Birdwell, met with the stakeholders individually and collectively between September 1990 and March 1991, but the parties failed to reach a regional consensus on how to use the Aquifer.

In 1991, the special committee submitted its final report to the state legislature. Absent any consensus, the committee voted unanimously not to include any recommendations regarding the use of the Aquifer.

¹⁰ The stakeholders included representatives from San Antonio/Bexar County, Uvalde County, Medina County, New Braunfels/Comal County, San Marcos/Hays County, Guadalupe Blanco River Authority and downstream interests, and as observers the FWS, Texas Parks and Wildlife Department, and the EUWD.

Texas Water Commission

In September 1991, John Hall, the incoming chairman of the Texas Water Commission (TWC), warned the region's stakeholders that if they failed to agree on a plan to manage the Aquifer by February 5, 1992, he would ask the TWC to do so. In October 1991, Bruce Todd, then the mayor of Austin, acted at the request of the cities of San Antonio and San Marcos, and attempted to mediate the negotiations among the stakeholders to develop such a plan. Months later, on February 4, 1992, the negotiators presented a five-point plan to the TWC. The new management plan for the Aquifer called for: (1) a voluntary program to pay farmers in Medina and Uvalde counties not to irrigate; (2) a public fund to help farmers switch to water-conserving irrigation systems; (3) emergency plans for cutting municipal water use in times of drought; (4) new rules to outlaw water waste; and (5) a provision that further negotiations toward a long-term water plan were to be mediated by the TWC. Todd, however, did not achieve consensus on the plan because of concerns from GBRA and the cities of New Braunfels and San Marcos that the plan did not prevent Comal Springs from going dry.

On February 5, 1992, lacking regional consensus, Chairman Hall announced that the TWC would take over the efforts to develop an Aquifer management plan. Hall said the TWC would publish its plan in early March 1992 if a settlement could not be reached and that the TWC would quickly produce a "very detailed" concept paper outlining the TWC plan. Weeks later, on February 18, 1992, the TWC issued its concept paper titled, "Avoiding Disaster: An Interim Plan to Manage the Edwards Aquifer." The paper consisted of an interim plan and a comprehensive long-term plan. Even with the concept paper, the parties refused to budge from their previous positions and the stakeholders could not reach agreement on a final plan.

Frustrated by the lack of progress, the TWC used its regulatory authority to assert jurisdiction over the Edwards Aquifer on the grounds that that the Aquifer itself was an underground river rather than a groundwater aquifer. As a designated underground river, the TWC would then have the same authority to regulate the use of the Aquifer as it did with other surface water bodies.

Initially, all of the stakeholders rejected the TWC's action. But as negotiations on the proposed regulations continued throughout the summer, the parties reached an agreement with Chairman Hall on regulations that they could support even if they did not agree with the Aquifer's designation as an underground river. As then-mayor of San Antonio, Nelson Wolff told a news conference, "We can live with these rules. We've come a long way. The Water Commission took into account concerns expressed by San Antonio after the first rules were proposed in April."

The compromise reached between TWC and San Antonio would require that when the Aquifer's elevation fell below 666 feet mean sea level at the J-17 index well, the total water pumped from the Aquifer would be capped at 75 percent of the average annual recharge into the Aquifer (450,000 acre-feet). Within 15 years, this water withdrawal cap would fall to 400,000 acre-feet. If the water levels at the J-17 index well fell below 625 feet, water use would be further reduced to 350,000 acre-feet. These measures would have provided significant protection to the federally-listed endangered species in normal years, but did not prevent Comal Springs from going dry during a repeat of the drought of record or provide adequate spring flows for extended periods during less severe droughts.

On September 9, 1992, the TWC approved a final rule designating the Aquifer as an underground river and adopting the compromise in final regulations. This designation had great significance in how the Aquifer was managed for the state as it was a move away from the rule of capture. At the hearing on the rule, the cities of San Antonio, New Braunfels, and San Marcos supported the rule. Vocal opposition, however, came from the agricultural interests located west of San Antonio that characterized the action as robbing "landowners of property rights," "clearly un-American and un-Texan" and labeled Chairman Hall himself as a "self-serving Bolshevik."

These opponents had also filed suit in the state district court in Austin seeking to enjoin the TWC's attempts to regulate the Aquifer as an underground river.¹¹ On September 11, 1992, the court invalidated TWC's designation as an underground river and blocked the implementation of the final rules.

The court's decision did not end the discussions of the TWC's plan. On September 23, 1992, the Dallas Morning News reported that Robert Puente, state representative from San Antonio, announced his intention to introduce a bill in the upcoming state legislative session that incorporated much of what was contained in the TWC plan.

Sierra Club v. Babbitt

While negotiations continued on legislation to implement the TWC plan in the 1993 state legislative session, a federal court was ruling on an earlier government action regarding the Aquifer. Back in 1991, after the lack of special committee consensus doomed state legislative action to regulate the Aquifer's use, the Sierra Club had filed a lawsuit in the United States District Court for the Western District of Texas against the United States Fish and Wildlife Service (FWS). Other plaintiffs included the GBRA, the cities of San Marcos and New Braunfels,

¹¹ *McFadden v. Texas Water Commission*, No. 92-052-14, 331st Dist. Ct., Travis County, Tex., September 11, 1992.

New Braunfels Utilities, and others. The lawsuit alleged that the FWS had violated the ESA by failing its duty to protect the federally-listed species in Comal Springs and San Marcos Springs as the federal agency charged with their protection. In November 1992, following a four-day, non-jury trial, U.S. District Judge Lucius Bunton ruled in favor of the plaintiffs, effectively overturning the “rule of capture” for the first time in Texas history.

The court’s decision repeatedly emphasized the importance of continuous minimum spring flows for the protection of federally-listed species. Judge Bunton found that the FWS had not identified the necessary minimum flows to be maintained and ordered the FWS to make determinations, within 45 days, on the spring flow levels at which “take” and “jeopardy” occurred at both the Comal and San Marcos Springs. The FWS made the determinations required by the court.¹²

The court also ordered the TWC to prepare, by March 1, 1993, a water management plan that, when fully implemented, would comply with the requirements of the ESA with respect to “take” and “jeopardy.” Not surprisingly, the TWC’s submittal was very similar to TWC Chairman Hall’s earlier plan except that it now called for creating a “strong local/regional management entity” and for obtaining an incidental “take” permit for the federally-listed species from FWS.

Most importantly, the court’s order stated that the court would allow the plaintiffs to seek appropriate relief immediately at the end of the 1993 state legislative session “*if the State of Texas does not have in effect at such time ... a regulatory system pursuant to which withdrawals from the Edwards Aquifer can and will be limited to whatever extent may be required to avoid unlawful takings of listed species, any appreciable reduction in the likelihood of survival and recovery of listed species in the wild, and any appreciable diminution of the value of critical habitat for the survival and recovery of the species, even in a repeat of the drought of record.*”¹³

Senate Bill 1477

During the 1993 state legislative session, State Representatives Robert Puente, Libby Linebarger, and Leo Alvarado authored House Bill (H.B.) 1792, which generally tracked Chairman Hall’s proposed regulations. Consistent with Hall’s regulations, pumping from the Aquifer would be limited to 75 percent of the average annual recharge into the Aquifer (450,000 acre-feet/year) until January 1, 2008 and would be set at 400,000 acre-feet after that

¹² *Sierra Club v. Babbitt*, “Springflow Determinations Regarding ‘Take’ of Endangered and Threatened Species,” April 15, 1993; *Sierra Club v. Babbitt*, “Springflow Determinations Regarding Survival and Recovery and Critical Habitat of Endangered and Threatened Species,” June 15, 1993.

¹³ Emphasis in the Court’s Order.

time. Also consistent with Chairman Hall's proposed plan, H.B. 1792 would trigger pumping reductions to 350,000 acre-feet when the water level at the J-17 index well fell to or below 625 feet mean sea level.

H.B. 1792 created the Edwards Aquifer Water Resource Management Authority, a new regional authority, to oversee the pumping limits. The new authority would replace the EUWD in favor of a nine-member board with two directors appointed by the City of San Antonio and one director each appointed by Bexar, Medina, Uvalde counties, and the cities of San Marcos and New Braunfels. One member would be appointed alternatively from Kinney and Atascosa counties and one director would be jointly appointed by Comal, Guadalupe, and Hays counties. Despite Representative Puente's efforts, David Counts, then-chairman of the House Natural Resources Committee and who also represented an agricultural county, did not allow the bill out of committee. Legislative attention subsequently turned to Senate Bill (S.B.) 1477, which was similar to H.B. 1792.

After much debate, the Texas Legislature enacted S.B. 1477 in May 1993. The law created the Edwards Aquifer Authority (EAA), with a nine-member appointed board. S.B. 1477 also directed the EAA to prohibit, with certain limited exceptions, pumping from the Aquifer without an EAA permit. The permits were to be based on historical water use period between June 1, 1972, and May 31, 1993, and specified how the permitted use would be calculated, including permits for irrigated agriculture that must allow pumping of two acre-feet of water annually for each acre used for crops in the historical period.

Further, the bill directed the EAA to limit permitted pumping to 450,000 acre-feet/year and required the EAA to prepare and implement a plan for reducing the maximum annual volume of water authorized to be pumped under regular permits to 400,000 acre-feet/year beginning on January 1, 2008. The bill also required the EAA to make proportional adjustments to the amount of water authorized for pumping through a permitting system to meet the amount of water available. Each existing user, however, would be guaranteed its statutory minimum withdrawal amount of water. Of critical importance to irrigated agriculture, the law guaranteed two acre feet of water for each acre of irrigated agricultural land. In 2001, the legislature set the fee that could be charged for agricultural water at two dollars per acre-foot of water.

Recognizing the possibility that the total permitted withdrawals probably would exceed the maximum withdrawal caps from the Aquifer, S.B. 1477 mandated that the financial cost of reducing pumping or permit retirement to achieve the 450,000 acre-foot cap be borne solely by the pumpers. The cost of retiring the water rights to get from 450,000 to 400,000 acre-feet, however, was to be borne equally by Aquifer users and downstream water rights holders. As a

measure of the importance of this provision, the legislature's expectation was that when the statutory minimum withdrawal from the Aquifer was included in the total withdrawals allowable, authorized pumping would exceed 500,000 acre-feet/year.

S.B. 1477 also directed that by June 1, 1994, the EAA would "implement and enforce water management practices, procedures, and methods to ensure that, by December 31, 2012, continuous minimum spring flows of the Comal Springs and the San Marcos Springs are maintained to protect the endangered and threatened species to the extent required by federal law." The bill then specifically required the EAA to "prepare and coordinate implementation" of a Critical Period Management (CPM) plan for periods of drought. The CPM plan's purpose was to limit pumping as the Aquifer levels declined.

Implementation of S.B. 1477

Despite the passage of S.B. 1477, subsequent litigation surrounding the legality of the EAA and that having an appointed (versus an elected) board prevented the EAA from immediately implementing the law. The first EAA board was not seated and operating until 1996. Without the regulatory body in place to manage the Aquifer as required by the court's order, Judge Bunton was placed in a precarious position. Further complicating matters, a severe drought struck the region, prompting Judge Bunton to take over the management of the Aquifer to protect the threatened and endangered species, an attempt that was ultimately halted by the United States Court of Appeals for the Fifth Circuit.

In late 1996, the EAA began operating and processing pumping permits, but its efforts to protect the endangered species fell short of legislative requirements and the expectations of many regional stakeholders. By 2003, it was clear that by following the state legislature's requirements for issuing permits, the EAA would have to authorize withdrawals of between 549,000 and 572,000 acre-feet – far in excess of even the 450,000 acre-foot withdrawal cap in S.B. 1477. The financial cost of a permit buy-down approached \$1 billion.

As a result, the EAA developed an "interruptible/uninterruptible" permit rule to reduce the permitted pumping to 450,000 acre-feet. Under this rule, the EAA would reduce the total amount of every permitted withdrawal proportionally to bring the authorized amount to 450,000 acre-feet. The water rights remaining after the proportional reductions were designated "senior" or "uninterruptible" withdrawal amounts. The rule designated "junior rights" as the amount of each permit's reduction between the statutory minimum and the proportionally reduced amount. These junior rights could not be used if aquifer levels fell below

certain triggers. However, no plan was put in place to get from 450,000 to 400,000 acre-feet by January 1, 2008.

This strategy came under substantial fire from the downstream interests, including a recommendation by the Texas Commission on Environmental Quality (TCEQ) that the EAA reconsider its permitting strategy.¹⁴ While regulating the Aquifer to meet the maximum pumping amounts was important to prevent sustained depletion of the Aquifer and it lessened the region's dependence on the Aquifer, such regulation did not meet the requirements of Judge Bunton's decision to protect the species through a strategy that maintained minimum continuous spring flows. In 1998, the EAA received notices of intent to sue from the Sierra Club, the Environmental Defense Fund, and the National Wildlife Federation alleging violations of Section 9 of the Endangered Species Act for its failure to take action to protect the species.¹⁵ In 2000, the FWS also threatened to sue the EAA.

In December 1998, almost two-and-a-half years after creation, the EAA's board approved the preparation of the habitat conservation plan (HCP) intended to support an incidental take permit. The process of applying for an incidental take permit required that the EAA address the continuous spring flow requirement as part of its preparation of a HCP. The EAA was able to agree on measures for a CPM plan, although there was concern as to whether these measures would maintain continuous minimum spring flow during a drought of record. Ultimately, after spending five years and approximately \$3 million the EAA was unable to develop a HCP that its board would approve and that met minimum legal requirements for FWS to begin its review.

Edwards Aquifer Recovery Implementation Program

As the 2007 Texas legislative session approached, trust among the stakeholders had worsened, tensions increased, and negative discord prevailed due to the EAA's lack of success in fulfilling its most important mandates. It appeared that the Edwards Aquifer dispute was heading back to federal court once again.

Entering 2007, the lack of stability in Aquifer management continued to haunt San Antonio in its efforts to keep and attract new businesses that year. Dating as far back as July 1992, the San Antonio business community had been urging that a solution be found to the Aquifer issue. That year, Robert McDermott, then chairman of the board, of USAA, one of the city's largest

¹⁴ TWC was consolidated in 1993 into the Texas Natural Resource Conservation Commission, which became the Texas Commission on Environmental Quality in 2001.

¹⁵ See, e.g., Letter from Sierra Club to Edwards Aquifer Authority and Department of Interior, "Notice of Violation of Federal Endangered Species Act and Notice of Intent to Sue, August 14, 1998 (alleging, among other things, failure to impose meaningful limits on pumping).

employers, threatened to move a \$35 million financial center planned for San Antonio out of Texas unless USAA had “certainty of a water supply.”¹⁶ The city’s water supply problem is summed up well in an editorial cartoon satirizing San Antonio Mayor Bill Thornton’s attempt in 1996 to attract Japanese businesses to relocate to San Antonio (**Figure 2**).¹⁷

On January 9, 2007, as the Texas Legislature convened, Texas Attorney General Greg Abbott responded to a legislative request by issuing a legal opinion concluding that the EAA lacked the statutory authority to reduce pumping rights of permit holders or issue interruptible “junior” pumping rights below the permit holders’ statutory minimum amount of water. Furthermore, no strategy was in place to get the permits down to 400,000 acre-feet. As the legislative session began, the cost of an acre-foot of Aquifer water had risen to over \$5,000. The estimated cost to the pumpers of buying down permits to 450,000 acre-feet and retiring permits to get to 400,000 acre-feet totaled \$750 million. The estimated cost to downstream surface water users responsible for one-half of the cost of retiring permits to get from 450,000 to 400,000 acre-feet was \$125 million. As a consequence, most of the stakeholders had an interest in reaching some accommodation on the maximum pumping amount from the Aquifer prior to January 1, 2008.

Figure 2. San Antonio Express cartoon depicting Sony CEO meeting with City of San Antonio Mayor about constructing a Sony factory in San Antonio.



¹⁶ L.A. Lorek, San Antonio Light, “USAA warns water jeopardizing plant,” June 17, 1992. “San Antonio’s courtship of Intel Corp’s new proposed \$1 billion manufacturing plant, hinges in part on its ability to supply water.” L.A. Lorek, San Antonio Light, “Officials say water won’t slow growth,” June 18, 1992. “The business community has been saying that (there is a problem) for approximately 20 years. We need to do something about it.” Joe Fohn, San Antonio Express-News, “Business concerned about water future,” May 9, 1996, (quoting Joe Krier, Greater San Antonio Chamber of Commerce President).

¹⁷ Editorial Cartoon, San Antonio Express-News, October 18, 1996.

Furthermore, the EAA had not yet solved the continuous minimum flow requirement that was of essential importance to the environmental and downstream interests. The year before, in 2006, the FWS and regional stakeholders had begun discussing the prospects of using a “recovery implementation program” to develop a consensus-based plan to contribute to the recovery of the federally-listed species, while accommodating the region’s water needs. This program became known as the Edwards Aquifer Recovery Implementation Program (EARIP). In September 2006, at a joint meeting of the Texas Senate and House Natural Resources Committees, Bill West, general manager of GBRA, said that GBRA would not object to the cap being raised if the FWS, through its approval of an HCP, would determine the minimal flows that would protect the threatened and endangered species in the event of a severe drought.

This strategy ultimately formed the basis for a compromise that was later enacted in S.B. 3 in 2007. S.B. 3 amended S.B. 1477 by raising the total amount of permitted withdrawals from the Aquifer to 572,000 acre-feet per calendar year. Pumping under this maximum withdrawal cap would be subject to the CPM pumping reductions that were determined by the Texas Legislature with a minimum amount of water pumped close (floor) to 340,000 acre-feet. As a *quid pro quo*, the Texas Legislature directed the EAA and four state agencies to participate in a facilitated, consensus-based stakeholder process (*i.e.*, the EARIP).^{18,19} The legislature directed these groups to work with other stakeholders and reach a consensus on a HCP to ensure the protection of threatened and endangered species at all times, including throughout any future repeat of the drought of record. In addition, S.B. 3 required that the HCP had to be approved by the FWS and take effect by December 31, 2012.

The bill further called for the creation of a steering committee to oversee and assist in the development of the EARIP. The EARIP Steering Committee would initially include 21 members representing environmental, water authority and purveyor, industrial, municipal, public utility, state agency, and agricultural interests dependent on the Aquifer. S.B. 3 also required the steering committee to appoint an expert science subcommittee to make recommendations on specific issues identified in the bill.

The Challenge

The problem facing the EARIP was that for almost 70 years, the competing interests in this stakeholder group had tried to resolve their differences on a regional basis and ultimately failed each time. With each subsequent failure, those stakeholders lost confidence in each other and

¹⁸ Texas Department of Agriculture, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and Texas Water Development Board.

¹⁹ See Appendix 5: Government Structure of Texas

in their collective ability to solve the problem. Robert Gulley, the new program director for the EARIP, wondered whether the current effort was destined to suffer the same fate or whether he could help the EARIP stakeholders to regain their confidence and build on the past successes and learn from past failures to resolve the Aquifer dispute.

Robert recognized that there was a sense of urgency to this problem. Recent Aquifer modeling indicated that if the region were to experience a drought similar to that of the 1950s at current Aquifer pumping levels, Comal Springs would go dry for two to three years and San Marcos Springs might go dry for the first time in its history. This was especially troublesome as the region was poised to enter what appeared to be a severe drought and recent history showed that droughts only intensified the conflict amongst the stakeholders.

Could the EARIP possibly solve this nearly 70-year-old water dispute that had begun during the drought of the 1950s and has plagued the region ever since? Or was it a permanent part of life in South-Central Texas that would continue to create conflict and possibly deter economic growth? And could the EARIP accomplish this task in the five-year timeframe the Texas Legislature had given the stakeholders and satisfy the legislative mandate that the HCP must ensure continuous spring flow for the federally-listed species even during a potential repeat of the drought of record? In a state where federal intervention is not well-received, property rights are paramount, and the ESA is unpopular at best, would the stakeholders accept the guidance and assistance from the FWS essential to make the effort timely and successful?

One glimmer of hope was that the stakeholders developed and signed a memorandum of understanding that specifically outlined how they would resolve group conflicts and come to consensus.^{20,21} As he prepared for the EARIP meeting, Robert considered these issues and other information he had on the Aquifer and four possible alternatives that might resolve the dispute (Exhibits 1-6). As he walked out the door, he heard the weather forecast predicting no rain in sight and record high temperatures.

²⁰ See Appendix 6: EARIP Memorandum of Agreement

²¹ See Appendix 7: List of 39 Stakeholders of which 26 Steering Committee members that signed the EARIP Memorandum of Agreement

Definitions

Acre-foot of water: The amount covering one acre to a depth of one foot, equal to 43,560 cubic feet or 325,851 gallons of water.

Aquifer: A geologic formation that will yield water to a well in sufficient quantities to make pumping of water feasible for beneficial use; permeable layers of underground rock or sand that hold or transmit groundwater below the water table.

Artesian well: A well tapping confined groundwater. Water in the well rises above the level of the confined water-bearing strata under artesian pressure but does not necessarily reach the land surface.

Artesian zone: An area where the water from a confined aquifer stands above the top of the strata in which the aquifer is located.

Consumptive use: Water not available for reuse, due to reasons such as evapotranspiration, evaporation, incorporation into plant tissue, and infiltration into groundwater.

Evapotranspiration: The sum of evaporation and plant transpiration (release of water vapor) from the Earth's land surface to the atmosphere.

Domestic / stock: Use of water for drinking, washing, or culinary purposes; or irrigation of a family garden or orchard, the produce of which is for household consumption only, or watering animals.

Freshwater: Fresh water may be considered as water of sufficient quality to support its intended purpose—agriculture, electrical power generation, industrial processes, or human consumption.

Groundwater: Water within the earth that supplies wells and springs; water in the zone of saturation where all openings in rocks and soil are filled, the upper surface of which forms the water table.

J-17 well: A well located in the city of San Antonio that is used to gauge the level of the San Antonio Pool of the Edwards Aquifer since 1956. The well is located on a flow path that responds quickly to recharge and pumping. The well has ranged from 612 feet during the drought of record to 703 during historic rains that occurred during 1991 to 1992.

J-27 well: A well located in Uvalde County that is used to gauge the level of the Uvalde Pool of the Edwards Aquifer. Data has been collected on this well since 1940.

Karst aquifer: An aquifer formed by soluble rock formations such as limestone that have dissolved overtime to create caves, sink holes, springs, and underground caverns that allow for the storage and movement of water.

Recharge: A process by which water enters and replenishes an aquifer through infiltration from precipitation and surface water. In the case of the Edwards Aquifer, water is captured and flows over the surface on the contributing zone until it enters the aquifer through the recharge zone.

Surface water: Water that flows in streams, rivers, natural lakes, wetlands, and reservoirs.

Withdrawal cap: A limitation placed on the total amount of water that can be pumped by permit holders from the Aquifer in a calendar year. The cap originally intended to limit the growth of the city of San Antonio on water from the Edwards Aquifer and to prevent over drafting of the Aquifer. The original cap of 450,000 acre-feet was calculated using 75 percent of the average annual recharge across the Aquifer.

Withdrawal reduction floor: The total reductions of permitted withdrawals from the Aquifer in a calendar year.

Exhibit 1. Annual precipitation totals and mean precipitation (inches) for San Antonio from 1934 to 2008.²²

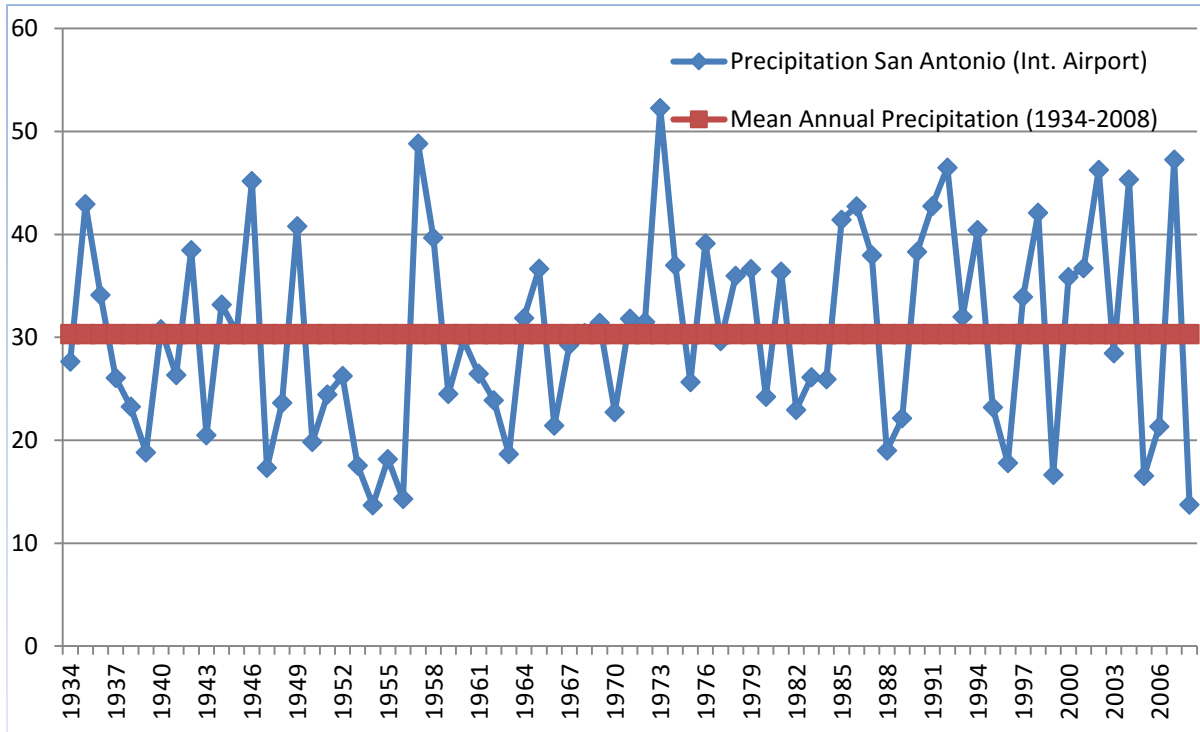
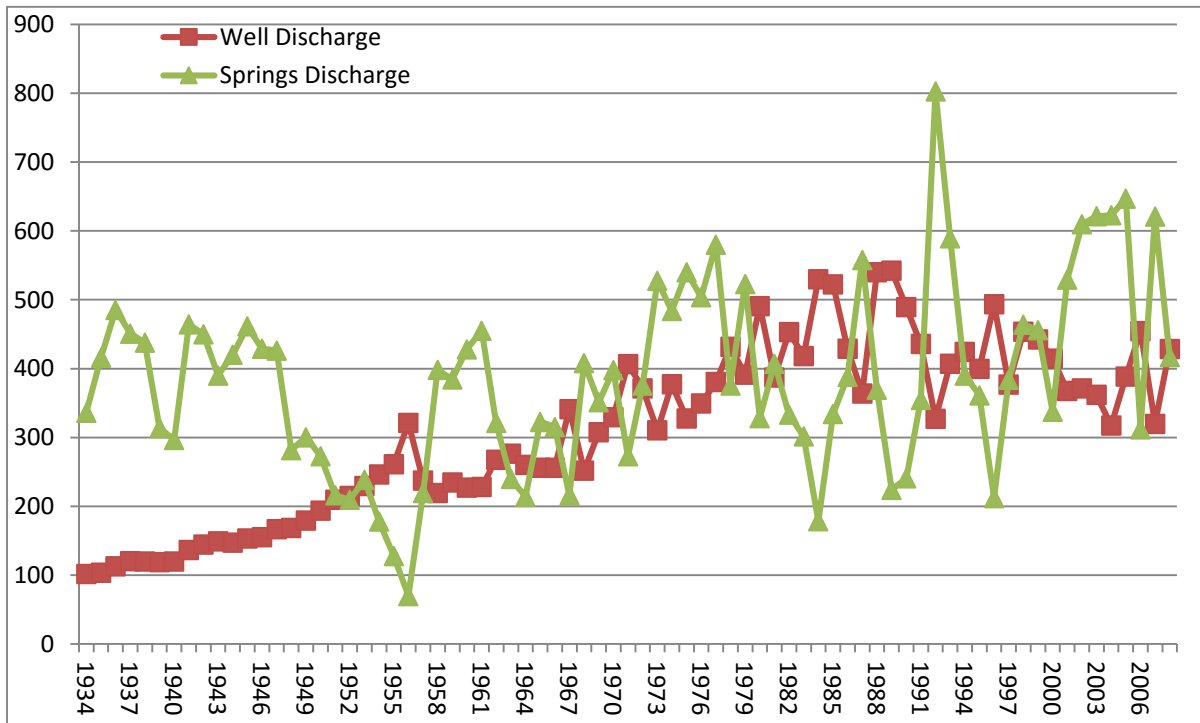


Exhibit 2. Ground water pumping verses springs discharge (ac/ft/yr) from 1934 to 2008.²²



²² See Edwards Aquifer Authority, "Edwards Aquifer Authority Hydrological Data Report for 2008," July 2009, at 16, 30, and 31.

Exhibit 3. Annual estimated Edwards Aquifer groundwater discharge and recharge by use from 1990 to 2008 (measured in thousands of acre-feet).²²

Year	Irrigation	Municipal	Domestic / Stock	Industrial / Commercial	Springs	Total Discharge	Estimated Groundwater Recharge
1990	172.9	254.9	37.9	23.7	240.6	730	1123.2
1991	88.5	240.5	39.5	67.5	354.6	790.6	1508.4
1992	27.1	236.5	34.8	29.0	802.8	1130.2	2485.7
1993	69.3	252.0	49.9	36.1	589.4	996.7	447.6
1994	104.5	247.0	33.9	39.3	390.2	814.9	538.1
1995	95.6	255.0	11.6	37.3	361.3	760.8	531.3
1996	181.3	261.3	12.3	38.8	212.0	705.7	324.3
1997	77.4	253.0	12.3	34.4	383.9	761	1134.6
1998	131.9	266.5	13.4	41.7	464.1	917.6	1142.3
1999	113.6	273.3	13.4	42.4	456.1	898.8	473.5
2000	106.3	261.3	13.4	33.8	337.5	752.3	614.5
2001	79.0	245.9	13.4	29.4	529.4	897.1	1069.4
2002	97.1	228.4	13.6	32.3	609.9	981.3	1573.7
2003	79.6	237.2	13.7	31.7	621.5	983.7	669
2004	55.4	220.3	13.8	28.1	622.9	940.5	2176.1
2005	85.3	255.1	13.8	34.3	647.1	1035.6	764
2006	149.1	259.1	13.8	34.5	312.0	768.5	201.6
2007	42.5	236.0	13.8	27.6	620.6	940.5	2162.3
2008	112.7	273.6	13.5	28.8	417.1	845.7	212.9
Mean	98.4	250.4	20.1	35.3	472.3	876.4	1008.0
Median	95.6	253	13.7	34.3	456.1	897.1	764

Exhibit 4. Aquifer Pumping Authorized by Regular Permits in 2008.²³ Water authorized for pumping may not have been used in its entirety due to CPM restrictions and precipitation in a given year.

Category of Use	Number of Permits	2008 Authorized Pumping (ac-ft/yr)
Municipal	417	277,218.9
Industrial	330	50,431.5
Irrigation	851	243,899.4
Total	1,598	571,549.8

²³ See U.S. Fish and Wildlife Service, "FEIS," December 2012, at 1-9.

Exhibit 5. San Antonio Water System residential water class rates inside city limits from 2004 to 2008.²⁴

	2008	2007	2006	2005	2004
Service availability Charge by meter size					
5/8"	\$6.56	\$6.56	\$6.56	\$6.11	\$5.61
3/4"	8.32	8.32	8.32	7.73	7.12
1"	12.10	12.10	12.10	11.28	10.36
1-1/2"	21.56	21.56	21.56	20.09	18.46
2"	32.90	32.90	32.90	30.66	28.18
3"	59.37	59.37	59.37	55.33	30.85
4"	97.19	97.19	97.19	90.38	83.25
6"	191.75	191.75	191.75	178.70	164.24
8"	305.19	305.19	305.19	284.43	261.42
10"	437.37	437.37	437.37	407.80	374.81
12"	815.76	815.76	815.76	760.26	698.76
Usage (per 100 gallons)					
Standard:					
First 7,481 gallons	0.0878	0.0878	0.0878	0.0818	0.0751
Next 5,236 gallons	0.1268	0.1268	0.1268	0.1182	0.1086
Next 4,488 gallons	0.1994	0.1994	0.1994	0.1858	0.1707
Over 17,205 gallons	0.3186	0.3186	0.3186	0.2969	0.2728
Seasonal:					
First 7,481 gallons	0.0878	0.0878	0.0878	0.0818	0.0751
Next 5,236 gallons	0.1379	0.1379	0.1379	0.1182	0.1086
Next 4,488 gallons	0.2148	0.2148	0.2148	0.1858	0.1707
Over 17,205 gallons	0.4114	0.4114	0.4114	0.2969	0.2728

²⁴ See San Antonio Water System, "Comprehensive Annual Financial Report for the Years Ended December 31, 2008 and 2007," March 2009, at 80.

Exhibit 6. Summary of four alternatives financial costs, pumping levels and critical period management percent reductions (CPM), and the effects of the alternative on Comal and San Marcos Springs flow during a repeat of the drought of record. A detailed description of the alternatives follows this summary table.

	Alternative 1: No Change	Alternative 2: CPM Pumping Restrictions	Alternative 3: VISPO, ASR, Conservation, and Stage V	Alternative 4: Expanded ASR with Associated Infrastructure
Summary of Alternative	No change from status quo. Individual pumpers subject to possible violation of the ESA; pumpers could seek individual ESA permits; no mitigation measures to improve the likelihood for species survival in the event of reduced or no spring flows.	Pumping would be reduced during single stage CPM by 85% to assure minimum spring flows. Due to pumping measures pursuing a HCP is believed to not be needed.	A number of EARIP stakeholders would pursue operations and activities under coverage under a HCP incidental take permit that includes use of VISPO, ASR, water conservation, and a Stage 5 pumping reduction. Habitat restoration measures for species are also included.	The EAA would issue individual pumping permits under a regional HCP incidental take permit; fewer mitigation measures needed than Alternative 2 due to higher CPM reduction and greater reliance on an expanded ASR.
Financial Cost	No additional funding beyond what is currently spent.	Funding would be limited to operational and administrative costs to regulate and enforce pumping restrictions as a part of the operational budget of the EAA.	\$261.2 million over the 15 year life of a HCP incidental take permit.	\$439 million to \$1.16 billion over the 15-year life of a HCP incidental take permit based on variables in leasing vs. purchasing water rights for the large ASR. \$914.6 million to \$1.09 billion if what is purchased and \$439 million to \$697 million if the water is leased for the ASR.
Pumping Levels and CPM Percent Reductions	Aquifer pumping up to 572,000 ac-ft/yr allowed under regular permits with four stage CPM (20%, 30%, 35%, and 40%) pumping reductions implemented during each declared drought stage to a pumping limit of 320,000 ac-ft/yr at Stage IV by 2013.	Aquifer pumping up to 572,000 ac-ft/yr allowed under regular permits but with an 85% single stage CPM reduction implemented during Stage I of a declared drought resulting in a pumping limit of 85,800 ac-ft/yr.	Aquifer pumping up to 572,000 ac-ft/yr allowed under regular permits with five-stage CPM (20%, 30%, 35%, 40%, and 44-47%) pumping reductions implemented during each declared drought stage to a pumping limit of 320,000 ac-ft/yr at Stage IV.	Aquifer pumping up to 572,000 ac-ft/yr allowed under regular permits with four-stage CPM (20%, 30%, 35%, and 50%) pumping reductions implemented during each declared drought stage to a pumping limit of 286,000 ac-ft/yr.
Performance of Alternative	Comal Springs would go dry for 23 months and flows would approach zero at San Marcos Springs during a drought of record.	Spring flow targets would be met for all species at Comal Springs and San Marcos Springs.	Spring flows would be maintained and may approach levels during a drought of record requiring active management at the springs for species protection.	Spring flows would be maintained, but Comal Springs would require water to be injected into wells near Comal Springs to maintain spring flow during a Drought of Record.

Detailed Description of Alternatives

Alternative 1: No Change

In 2007, through S.B. 3, the Texas Legislature directed the EAA to authorize pumping up to 572,000 acre-feet per calendar year (ac-ft/yr), subject to adoption and enforcement of the CPM plan that required pumping reductions triggered by specified aquifer and springflow levels. The resulting CPM program consists of four stepwise pumping reductions (referred to as “Stages”) triggered by Comal and San Marcos springflows and Aquifer levels recorded at specified “index wells” located in Bexar and Uvalde Counties (**Table 1**). The CPM plan recognizes two interconnected but separate “pools” located at different elevations within the Aquifer, and established separate trigger levels and pumping restrictions in these distinct areas. These subdivisions within the Aquifer are generally referred to as the “San Antonio” and “Uvalde” pools. Under S.B. 3, the EAA cannot currently require permitted pumping to total less than 340,000 ac-ft/yr. This legislation also mandates that beginning January 1, 2013, CPM reductions cannot restrict pumping to less than 320,000 ac-ft/yr unless further reductions are needed to protect federally-listed threatened or endangered species.

Table 1. Senate Bill 3’s four stage CPM plan for the San Antonio and Uvalde Pools triggered by Comal and San Marcos Springs flow measured in cubic feet per second (cfs) and J-17 Index Well (San Antonio Pool) and J-27 Pool (Uvalde Pool) measured in mean sea level (msl).

COMAL SPRINGS FLOW (cfs)	SAN MARCOS SPRINGS FLOW (cfs)	INDEX WELL LEVEL (feet msl)	CRITICAL PERIOD STAGE	WITHDRAWAL REDUCTION
San Antonio Pool				
<225	<96	<660	I	20%
<200	<80	<650	II	30%
<150	N/A	<640	III	35%
<100	N/A	<630	IV	40%
Uvalde Pool				
N/A	N/A	N/A	I	N/A
N/A	N/A	<850	II	5%
N/A	N/A	<845	III	20%
N/A	N/A	<842	IV	35%

Alternative 2: CPM Pumping Restrictions

Under Alternative 2, an ESA incidental take permit (ITP) would not be necessary because spring flows at Comal and San Marcos Springs during a repeat of drought of record conditions would

avoid 'take' of federally-listed species. This alternative would limit the amount of water pumped from the Aquifer to assure the long-term survival of the species. Under this alternative a single CPM stage requiring 85 percent reduction in pumping to a maximum 85,800 ac-ft/yr would be implemented during drought conditions.

Substantially less groundwater would be available for human use as pumping reductions during CPM would be driven by the requirement to maintain spring flow levels at Comal and San Marcos Springs under this alternative. The single stage CPM reduction of 85 percent would occur as a result of the following: flows at Comal Springs fall below 225 cfs; flows at San Marcos Springs fall below 96 cfs; J-17 Index well drops below 665 feet msl; or J-27 Index Well drops below 865 feet msl.

Alternative 3: VISPO, ASR, Conservation, Stage V, and Adaptive Management

Alternative 3 would occur in two phases. Phase I includes actions to restore and protect spring ecosystem habitats and actions to be implemented during periods of severe drought. Phase II measures would be dependent on the outcomes of an adaptive management program.

Adaptive management will evaluate the performance of minimization and mitigation actions and modify the measures as needed to achieve federally-listed species protection. EARIP stakeholders identified uncertainty regarding the capacity of current models to determine the need for additional spring flow protection measures at extremely low flow conditions for extended periods. Phase I adaptive management measures would include development and testing of additional hydrologic modeling to further refine the understanding of the potential need for additional flow protections during severe drought conditions.

To ensure species protection while recognizing the uncertainty associated with implementing additional measures, a "presumptive Phase II" action would be developed. The "presumptive Phase II" measure would consist of incorporating operations and management of the SAWS Water Resources Integrated Pipeline (WRIP) in conjunction with the ASR and additional CPM pumping reductions to achieve the identified flow objectives. The necessity of and any adjustments to the presumptive Phase II measure will be identified and implemented through the adaptive management plan.

Voluntary Irrigation Suspension Program Option

The Voluntary Irrigation Suspension Program Option (VISPO) would reduce Aquifer withdrawals by limiting pumping during drought conditions. Enrolled VISPO participants would agree to suspend Aquifer pumping when identified flow and Aquifer index well thresholds are triggered

in exchange for annual payments. When activated during drought conditions, the VISPO program would reduce Aquifer demand by 40,000 ac-ft/yr.

Regional Water Conservation Program

A Regional Water Conservation Program (RWCP) would focus on improving municipal water system efficiencies throughout the region to reduce demand on the Aquifer. The RWCP would consist of measures including but not limited to new build or retrofit of efficient plumbing fixtures, landscape irrigation improvement and retrofit options employing gray water, rain water harvest, and condensate collection and re-use technologies. The RWCP would reduce the need for 20,000 ac-ft/yr of water through conservation and one half would go un-pumped during the life of the HCP.

SAWS ASR

A total of 50,000 acre-feet of Aquifer water, secured through irrigation permit leases and/or by exercising water management practices authorized under S.B. 1477, would be used to fill and maintain a portion of the capacity of the SAWS ASR facility. During drought periods SAWS would stop pumping Aquifer water from wells closest to the spring ecosystems and offset these reduced volumes with water stored in the ASR. This measure has the effect of maintaining consistent public water supplies, while eliminating the draw-down effect of wells most proximate to federally-listed species.

Emergency Stage V Critical Period

The EAA would require additional CPM pumping restrictions (“Stage V”) during drought conditions. For wells within the San Antonio Pool, Stage V would be triggered by a J-17 index well monthly average below 625 feet msl and spring flows of 45/40 cfs at Comal Springs. Areas within the Uvalde Pool will enter Stage V when the J-27 Uvalde County Index Well water level declines to 840 feet msl. Stage V would require a reduction of 44 percent of permitted pumping in both the San Antonio and Uvalde pools.

Alternative 4: Expanded ASR with Associated Infrastructure

This alternative would expand SAWS ASR capacity in combination with additional CPM reductions to maintain springflow during drought conditions. The distinguishing components of alternative 3 include CPM pumping reductions of 50 percent to no more than 286,000 ac-ft/yr and development and operation of an ASR facility and associated infrastructure for maintenance of springflows.

The large ASR would provide up to 66,700 ac-ft/yr of Aquifer water from the lease or purchase of Aquifer irrigation rights in Uvalde, Medina, and Bexar Counties. Water would be pumped from existing Aquifer wells in northeastern Bexar County. Pumping for the ASR would be subject to CPM rules allowing the water supply to range from 40,000 (if pumped during Stage IV CPM) to 66,700 ac-ft/yr (if pumped without CPM reductions). The pumped water would be conveyed by a newly constructed water transmission pipeline stored in an ASR facility in the vicinity of Cibolo Creek in northwest Wilson County. When needed for spring flow maintenance, the stored water would be conveyed through the constructed water transmission pipeline to recharge facilities located between Cibolo Creek and Comal Springs. Modeling simulations indicate injection wells located southwest of New Braunfels in Comal County would be required to maintain springflow at Comal Springs.

APPENDIX

Appendix 1. Overview of Edwards Aquifer

The Edwards Aquifer is a limestone (karst) aquifer in central Texas and is one of the most prolific aquifers in the world. The southern segment of the Aquifer extends through six Texas counties: Kinney, Uvalde, Medina, Bexar, Comal, and Hays, and the Aquifer holds water that serves a larger 12 county area. The southern segment of the Aquifer is the primary water source for the City of San Antonio and supplies water to the Guadalupe, Nueces, and San Antonio River basins providing water to users in these downstream basins. The Aquifer is one of the primary water sources used for irrigated agriculture, municipal, industrial, and recreational needs in South-Central Texas.

The Edwards Aquifer displays many complex patterns typical of a karst aquifer (**Figure 1**). Water flows from the contributing zone where it may then enter the Aquifer in the recharge zone through caves, sinkholes, and other permeable karst areas. The contributing zone and recharge zones encompass 4,400 and 1,500 square miles, respectively. The artesian zone is the confined area of the Aquifer that is fed by the recharge zone and sealed by impermeable rock and salt water. As a result of water flowing into this confined area, tremendous pressure is created which forms flowing artesian wells and springs. Comal Springs and San Marcos Springs are the two largest springs in Texas and the southwestern United States.

In total, the Aquifer is estimated to hold between 25 and 55 million acre-feet; however, most of this water is not available for pumping because of the need to protect spring flow. Spring flow depends on the upper five to ten percent of the formation, so the Aquifer is still 90-95 percent full when all the springs run dry. For this reason, the Aquifer has been described as a “bucket of water with leaks (springs) near the surface of the bucket.” As water levels decline due to lack of recharge or pumping, Aquifer levels may fall below the leaks (springs) causing water to stop flowing.

A constriction known as the "Knippa Gap" separates a pool of water under central Uvalde County from the San Antonio pool under Medina, Bexar, and Comal counties. Large amounts of water cannot pass quickly through the gap, so water piles up behind it in the Uvalde Pool, causing water levels in wells west of the Knippa Gap to be higher and less variable. The J-17 index well in northeast Bexar County near Fort Sam Houston, a U.S. Army post, is used to monitor the water levels in the artesian zone of the San Antonio pool. The J-27 index well in Uvalde County is used to monitor the water levels in the artesian zone of the Uvalde pool.

Between 1947 and 1957, the most severe, prolonged drought in the historical record occurred in the Aquifer region. This drought is appropriately referred to as the “drought of record.” Recharge into the Aquifer primarily from rainfall during this period averaged 229,000 acre-feet per year - -far less than the historic average recharge of 728,300 acre-feet.²⁵ The lowest recharge for this region was 43,700 acre-feet in 1956. Pumping from the Aquifer averaged 219,000 acre-feet/year. The highest pumping during the drought of record also occurred in 1956 when 321,100 acre-feet of water was pumped from the Aquifer. This sustained overdraft was in effect “mining” the Aquifer.

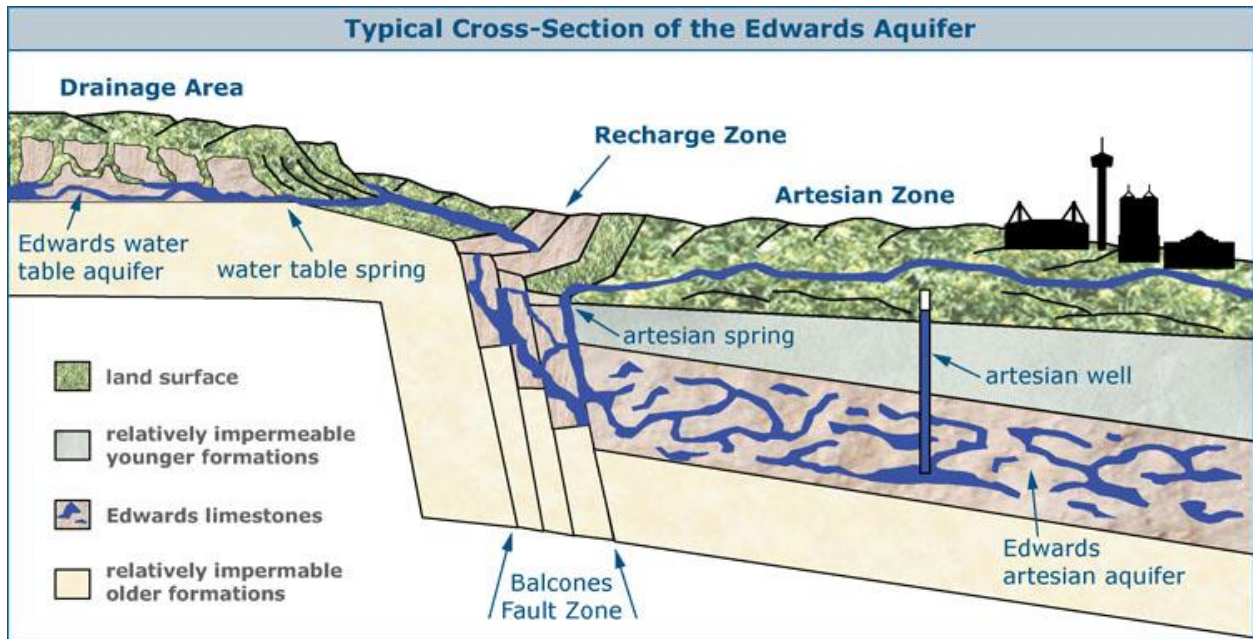
Beginning on June 13, 1956, measured spring discharge at Comal Springs ceased for 144 consecutive days. Due largely to this cessation of flows, the population of fountain darters, a small fish, in the Comal Springs system was lost. The San Marcos Springs never completely stopped flowing, allowing for fountain darters to be successfully reintroduced into the Comal Springs from the San Marcos Springs in the mid-1970s.

While the drought of record had a profound effect causing the Comal Springs to go dry, lesser droughts also diminished the spring flows and the contribution of water from the springs to the Guadalupe River. For example, in 1984, recharge during the three preceding years had been well below average and pumping that year was very high, 530,000 acre-feet.²⁶ As a result, Comal Springs almost ceased flowing (28 cubic feet per second). In addition, recharge in 1988 and 1989 also was well below average and pumping was high (540,000 acre-feet) in 1988 and 542,000 acre-feet in 1989. Comal Springs dropped to 62 cubic feet per second, in 1989 and to 46 cubic feet per second in 1990. In 1996, spring flows at Comal Springs dropped to 86 cubic feet per second. The recharge for the three preceding years were also well below average.

²⁵ The average annual recharge for the period 1934 through 2008 was approximately 724,300 acre-feet. See Edwards Aquifer Authority, “Edwards Aquifer Authority Hydrological Data Report for 2008,” July 2009, at 22

²⁶ See Edwards Aquifer Authority, “Edwards Aquifer Authority Hydrological Data Report for 2008,” July 2009 at 28-29.

Figure 1. Cross-sectional view of the Edwards Aquifer.²⁷



²⁷ <http://www.edwardsaquifer.net/intro.html>

Appendix 2. Historical Timeline of the Edwards Aquifer Conflict²⁸

Prior to Pumping – Comal and San Marcos Springs, possibly the largest in the United States, have strong, continuous spring discharge at all times even during major droughts. A unique assemblage of species dependent on the spring discharge flourishes.

1884 – The first irrigation well is completed in Bexar County.

1900 – Aquifer pumping reaches approximately 30,000 acre feet per year.

1904 – The rule of capture is adopted as the law of groundwater control in Texas by the Texas Supreme Court in *Houston & T.C. Ry. Co. v. East*.

1949 – Texas authorizes voluntary creation of underground water conservation districts.

1950 to 1957 – This is when the drought of record occurred in Texas. Comal Springs dries up for 144 days in 1956 and San Marcos Springs drops to a low of 46 cfs.

1959 – 56th Texas Legislature creates the Edwards Underground Water District (EUWD) to protect and preserve the Edwards Aquifer.

1973 – The Endangered Species Act (ESA) becomes law.

1980 to 1990 – Pumping has increased significantly after the drought of record and now averages nearly 500,000 acre-feet in some years.

1983 – San Antonio and the EUWD established a Joint Committee on Water Resources to initiate a comprehensive approach to Aquifer management beyond San Antonio's needs.

1984 – Flow at Comal and San Marcos Springs nearly ceases during a brief drought.

October, 1986 – The composition of the Joint Committee is expanded to be more inclusive of the Aquifer region.

1987 – San Antonio and EUWD convened the Joint Committee on Water Resources to develop a plan to implement the strategy developed by Joint Committee completed in 1986.

1987 – San Antonio and EUWD endorse legislation, H.B. 1942. The 70th Legislature authorizes the EUWD to develop and enforce a regional drought management plan, prior to September 1988, "to minimize drawdown of the water table or the reduction of artesian pressure and spring discharge..." H.B. 1942 also provided for an elective board and allows counties in the district to de-annex themselves.

July, 1988 – The Joint Committee on Water Resources completes the *Regional Water Resources Plan*.

August, 1988 – EUWD approves a drought management plan in accordance with H.B. 1942.

January, 1989 – Uvalde and Median Counties vote to secede from the EUWD over disagreement about pumping limits and attempts to establish single-county underground water districts.

May, 1989 – Legislative attempt at groundwater allocation fails. A committee of legislative members, the Special Committee on the Edwards Aquifer, is established to study the Aquifer.

June 15, 1989 – The GBRA issues a Notice of Intent to sue for violation of the ESA.

1989 – A long-range regional water plan, adopted by the EUWD and San Antonio after prolonged negotiation fail enactment by the 71st Legislature.

April 12, 1990 – The Sierra Club issues a Notice of Intent to sue for violation of the ESA.

²⁸ See Todd H. Votteler, "Raiders of the Lost Aquifer? Or, the Beginning of the End to Fifty Years of Conflict over the Texas Edwards Aquifer," *Tulane Environmental Law Journal*, vol. 15 at 322-334 (2004).

1991 – The Living Waters Artesian Springs catfish farm opens 15 miles southwest of San Antonio, using as much as 40 million gallons a day. The EUWD and San Antonio file suit in State court claiming the catfish farm is wasting water and polluting the Medina River.

May 16, 1991 – The Sierra Club files a lawsuit in U.S. District Court for the Western District of Texas, Midland (*Sierra Club v. Babbitt*). The GBRA and San Antonio, along with numerous other parties quickly intervene on both sides. The suit alleges that the Secretary of Interior and the FWS failed to protect federally-listed species dependent on the Aquifer in violation of the ESA.

October, 1991 to January, 1992 – Austin Mayor Bruce Todd attempts to resolve the dispute over Aquifer regulation. No resolution is reached.

February, 1992 – John Hall, Chairman of the Texas Water Commission, circulates a 1992 proposed management plan (based on previous discussions with all interested parties) describing a voluntary regional management plan for the Aquifer as an alternative to state regulations.

April, 1992 – The TWC releases its interim plan for management of the Aquifer.

May 16, 1992 – The TWC declares the Aquifer to be an underground stream and, therefore, state water. It adopts emergency rules and initiates rulemaking proceedings.

September 9, 1992 – Rules designating the Aquifer as an underground river are approved by the TWC.

September 11, 1992 – A Travis County District Court grants irrigators' motion and voids TWC declaration that the Aquifer is an underground river on grounds that the TWC did not have statutory authority to assert jurisdiction.

November 16-19, 1992 – Trial in *Sierra Club v. Babbitt* is held before Judge Bunton in Midland, Texas.

February 1, 1993 – Judge Bunton enters Judgment and separate Findings of Fact and Conclusions of Law in favor of the Sierra Club, GBRA, and other plaintiffs. The TWC is directed to devise a plan to limit pumping and preserve spring discharge by May 1, 1993. If the legislature does not enact a regulatory plan by May 31, 1993, the Judge will allow the plaintiffs to seek additional relief, and the Aquifer may become subject to federal judicial control. The FWS is ordered to determine threatened and endangered species 'take' and 'jeopardy' spring discharge levels for Comal and San Marcos Springs within 45 days.

May 30, 1993 – 73rd Legislature enacts S.B. 1477, creating the Edwards Aquifer Authority (EAA) to regulate groundwater use, abolishing the EUWD. S.B. 1477 directed the EAA to "implement and enforce water management practices, procedures, and methods to ensure that, by December 31, 2012, continuous minimum spring flows of the Comal Springs and the San Marcos Springs are maintained to protect the endangered and threatened species to the extent required by federal law." It also capped the amount of water that the EAA could permit to 450,000 acre-feet. That amount had to be reduced to 400,000 acre-feet by January 1, 2008.

1993 to 1998 – A series of lawsuits occur and are filed both in state and federal court challenging the status of the EAA and against the EAA for failure to develop a plan for the threatened and endangered species.

July, 1996 – EAA convenes its first organizational meeting.

Late 1996 – EAA began operating and processing pumping permits.

December, 1998 – The EAA's board approved the preparation of a habitat conservation plan.

1999 – The EAA holds public meetings and begins the process of developing a habitat conservation plan to obtain an ESA Section 10(a) incidental take permit from FWS.

1999 to 2005 – The EAA spends more than 5 years and \$3 million dollars to develop a habitat conservation plan. Ultimately the draft plan did not meet the legal requirements for FWS to begin a review and the plan likely did not maintain minimum continuous spring flows during a repeat drought of record.

2003 – The EAA realizes it would have to issue more permits than was allowed by S.B. 1477. The EAA attempted to resolve this issue through an interruptible “junior/senior” water rights permitting program.

2006 – FWS begins discussions with regional stakeholders on using a “recovery implementation program” to develop a consensus-based plan that would balance the needs of the threatened and endangered species with the region’s water needs.

September, 2006 – Bill West, General Manager of GBRA, said at a joint meeting of the Texas Senate and House Natural Resources Committees, that GBRA would not object pumping cap being raised if FWS approved a plan with minimal flows for the threatened and endangered species.

January 9, 2007 – Texas Attorney General Greg Abbott responded to a legislative request by issuing a legal opinion concluding that the EAA lacked the statutory authority to reduce the pumping rights of permit holders or issue interruptible “junior” pumping rights below the permit holders’ statutory minimum amount of water.

2007 – Senate Bill 3 is passed by the legislature and amends S.B. 1477 by raising the total amount of permitted pumping from the Aquifer to 572,000 acre-feet per year. Pumping under this maximum pumping cap would be subject to the critical period management pumping reductions with a pumping floor of 340,000 acre-feet. S.B. 3 also directs the EAA and a number of regional stakeholders to develop a consensus-based stakeholder plan to ensure the protection of the threatened and endangered species even during a repeat of the drought of record. S.B. 3 also requires the plan to be approved by FWS and take effect by December 31, 2012.

Appendix 3. History of Ground Water Management in Texas

The root cause of the dispute over the use of the Edwards Aquifer is an outgrowth of the difference in the way Texas managed groundwater and surface water resources. A fundamental tenet of hydrology is that groundwater and surface water are interconnected resources. This tenet is embodied in the concept of the hydrological cycle. Many, if not most, western states recognize and manage these interconnected resources together – a regulatory process known as conjunctive management.²⁹

Texas, however, is different. In Texas, prior to 1993, groundwater use was governed almost exclusively by the “rule of capture.” Under this doctrine, established by Texas courts, a landowner is free to capture and use as much water as could be beneficially used without waste.³⁰ Moreover, this common law privilege generally could be exercised without regard for any negative impacts to adjacent landowners or spring flows.³¹ The rule of capture was known as the rule of the biggest pump, that is the one with the biggest pump could take all the water. Befitting of Texas, it is really the wild, wild west of water law.

Until 2012,³² it was not clear who owned the groundwater, but it was clear that the state had the authority to regulate the resource – at least when it was brought to the surface.³³ In 1949, the Texas Legislature created underground water conservation districts, which generally had the authority to promulgate rules for conserving, protecting, recharging, and preventing waste of groundwater.³⁴ Few such districts were created, and those that were largely tended to issues such as subsidence.

Surface water is broadly defined to include the ordinary flow, underflow, and the tides of every flowing natural watercourse in the state. Storm water and floodwater found within natural lakes rivers, and streams are also state waters.³⁵ As is common in most western states, in Texas

²⁹ See Ronald Kaiser, “Conjunctive Management and Use of Surface and Groundwater Resources,” in *Essentials of Texas Water Resources*, Second Ed. Mary K. Sahs (ed.) 2012 at 5-1.

³⁰ Russell S. Johnson, “Groundwater Law and Regulation,” in *Essentials of Texas Water Resources*, Second Ed. Mary K. Sahs (ed.) (2012) at 4-3.

³¹ *Texas Co. v. Burkett*, 296 S.W. 273, 278 (Tex. 1927); *Pecos County Water Control & Improvement District No. 1 v. Williams*, 271 S.W.2d 503 (Tex. Civ. App. - El Paso 1954, writ ref’d n.r.e.).

³² See, *Edwards Aquifer Authority v. Day and McDaniel*, 55 Tex. Sup. Ct. J. 343, 369 S.W.3d 814 (Tex. 2012) (Landowner has an interest in groundwater in place that cannot be taken for public use without compensation.).

³³ Texas Const. art. III, § 59(a).

³⁴ Act of June 2, 1949, 51st Leg., R.S., ch. 306 (codified at Tex. Rev. Civ. Stat. art. 7880-3c), *repealed by* Act of April 12, 1971, 62^d Leg., R.S., ch. 58, § 2.

³⁵ Texas Water Code § 11.021(a).

after 1967, surface waters are governed by the “prior appropriation doctrine.”³⁶ Under this doctrine, the State of Texas owns all surface water in trust for the benefit of its people, subject to a state-granted right to use.³⁷ The state grants permission through an administrative process to beneficially use the water on a seniority basis.³⁸

The Guadalupe River is the principal river in the Guadalupe River Basin. The Comal River, located in New Braunfels and the San Marcos River are tributaries of the Guadalupe River. The normal flows of the Guadalupe River and its tributaries are fully appropriated. As water from the Edwards Aquifer is discharged at the Comal and San Marcos springs, the water loses its character as groundwater and becomes surface water. As such, surface water permits issued to users of the Guadalupe River are based in part on the flows from the Aquifer.

Prior to 1993, the State of Texas did not regulate the amount of groundwater that could be pumped from the Aquifer. Further, under the rule of capture, the users of the Aquifer had no duty or obligation to limit the use of the Aquifer to protect the surface water interests downstream of the San Marcos and Comal springs. This was a matter of concern to the downstream interests who realized that increased pumping of the Aquifer would reduce the discharge of water from the spring systems and potentially interfere with their established surface water rights in the Guadalupe River. Because of its large role in distributing water to the Guadalupe Basin, addressing this concern was the focus of the Guadalupe-Blanco River Authority.

The concerns of the Guadalupe-Blanco River Authority and the downstream water users boiled over after a ten-year period of severe drought from 1947 through 1956 that is recognized as the drought of record for the region.

³⁶ See Water Rights Adjudication Act, Tex. Water Code §§ 11.301-11.341.

³⁷ See Ronald Kaiser, “Texas Water Law and Organizations, in Water Policy in Texas: Responding to the Rise of Scarcity, Ronald C. Griffin, ed. 2011 at 24-27.

³⁸ *Id.* at 25.

Appendix 4. Overview of the Endangered Species Act

The Endangered Species Act provides the federal government authority to protect threatened and endangered species from both federal and non-federal actions. Endangered Species Act, Pub. L. No. 93-205, 87 Stat. 884 (1973), codified at 16 U.S.C. §§ 1531-1544. The U.S. Secretary of the Interior, through the FWS or the Secretary of Commerce, through the National Marine Fisheries Service (NMFS), administers and enforces the ESA. 16 U.S.C. § 1533; 50 C.F.R. § 222.101 and 50 C.F.R. § 17.01.³⁹ For purposes of this case, the pertinent provisions are found and described in the following sections of the ESA.

Section 9 of the ESA

Section 9 of the ESA prohibits the “take” of listed endangered fish and wildlife. 16 U.S.C. § 1538(a)(1). “Take” is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct.” 16 U.S.C. § 1532(19). “Harm” includes significant habitat modification that actually kills or injures a listed species through impairing essential behavior such as breeding, feeding, or sheltering. 50 C.F.R. § 17.3; *Babbitt v. Sweet Home Chapter of Communities for a Greater Or*, 515 U.S. 687 (1995). Listed plants are not subject to the “take” prohibition in Section 9. However, under Section 9, plants listed as endangered may not be imported into or exported from the United States, removed from, or damaged on federal property, used in commercial activities, or removed or damaged from any area in knowing violation of any state law or regulation. 16 U.S.C. § 1538(a)(2).

Enforcement of fish and wildlife violations under Section 9 may come in the form of civil penalties. U.S.C. § 1540. Knowing violations may trigger criminal fines and imprisonment of less than 1 year, and injunctions. 16 U.S.C. § 1540(b). Citizen suits are also allowed to enjoin any violation of the ESA or to compel action by U.S. Secretary of the Interior 16 U.S.C. § 1540(g).

Courts have found that a regulatory agency’s actions or failures to act may violate the ESA. For example, the United States Court of Appeals for the First Circuit found that the State of Massachusetts’ fishing regulations caused a “take” of the endangered Northern Right whales.⁴⁰

³⁹ The species at the Comal and San Marcos springs are regulated by FWS, which is within the Department of the Interior. Thus, the use of the term “Secretary” herein refers to the Secretary of the Interior.

⁴⁰ See *Palila v. Hawaii Department of Land and Natural Resources*, 639 F.2d 495 (9th Cir. 1981) (Hawaii Department of Land and Natural Resources liable for “take” of Palila bird by failing to manage herds of feral sheep and goats); *Loggerhead Turtle v. County Council of Volusia County*, 148 F.3d 123, 1251 (11th Cir. 1998) (Volusia County may be liable for take resulting from its regulatory actions); see also *Sierra Club v. Yeutter*, 926 F.2d 429 (5th Cir. 1991) (U.S. Forest Service’s even-aged management practices violated section 9 of the ESA); *Defenders of Wildlife v. Administrator, EPA*, 882 F.2d 1294 (8th Cir. 1989) (Environmental Protection Agency liable for take of the endangered black-footed ferret due to its pesticide registration program).

Strahan v. Coxe, 127 F.3d 155, 166 (1st Cir. 1997). The state had authorized gillnet and lobster pot fishing in the whales' critical habitat, but the NMFS had issued a final interim rule proposing to modify those fishing practices as entanglement with fishing gear was a leading cause of depletion of the whales. *Id.* at 159. The court found that the ESA not only prohibits the acts of the person causing a take, but also bans the acts of a third party that bring about the taking, *i.e.*, vicarious liability. *Id.* at 163 citing 16 U.S.C. § 1538(a)(1)(B). The court concluded "a governmental third party pursuant to whose authority an actor directly exacts a taking of an endangered species may be deemed to have violated the provisions of the ESA." *Id.*

Section 7 of the ESA

Section 7(a)(2) requires all federal agencies, in consultation with the FWS, to ensure that any action "authorized, funded, or carried out" by an agency is "not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification" of designated critical habitat. The issuance of an ITP is a federal action subject to Section 7 of the ESA.

While the ESA does not define "jeopardy," federal regulations define it as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery⁴¹ of a listed species in the wild by reducing the reproduction, numbers or distribution of that species." 50 C.F.R. § 402.02. To determine whether the effects of the incidental take will appreciably reduce the likelihood of the survival and recovery of the listed species, the direct and indirect effects of the action and the cumulative effects are aggregated with the environmental baseline. *Id.* It is important to note that, unlike the prohibition in Section 9 of the ESA that applies to individual members of a listed species, the Section 7 analysis looks at the effects of the action on the species as a whole.

The ESA describes critical habitat as those areas that contain the "physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection." 16 U.S.C. § 1532(5)(A)(i). FWS regulations identify the "constituent elements" of critical habitat to include "those that are essential to the conservation of the species," such as "roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types." 50 C.F.R. § 424.12.

The results of the Section 7 consultation are documented in biological opinions developed by the FWS. A biological opinion is generally produced near the end of the ESA permitting process

⁴¹ The term "recovery" means "improvement in the status of a listed species to the point at which listing is no longer appropriate." 50 C.F.R. § 402.02.

to document conclusions regarding the likelihood of jeopardizing the continued existence of, destroying, or adversely modifying designated critical habitat for, any listed species.

Section 10(a) of the ESA

Section 10(a) of the ESA provides relief under certain circumstances from federal or citizen suits alleging violations of Section 9. For example, permits may be issued that allow a taking if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. 16 U.S.C. § 1539(a)(1)(B). These permits are referred to as incidental take permits (ITPs).

An ITP must have an approved conservation plan, commonly known as a habitat conservation plan (HCP). *Id.* The HCP must specify the likely impact of the taking; the steps the applicant will take to minimize and mitigate such impacts and the funding available for the steps; the alternative actions considered and the reason why such alternatives are not being used; and such other measures the Interior Secretary may require as necessary or appropriate. 16 U.S.C. § 1539(a)(2)(A)(i)-(iv); 50 C.F.R. § 17.22(b)(iii). An ITP will be issued if the Interior Secretary finds that the taking will be incidental; the applicant, to the maximum extent practicable, will minimize and mitigate the impacts of the taking; the applicant ensures funding for the HCP; the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and the applicant assures the HCP will be implemented. 16 U.S.C. § 10(a)(2)(B); 50 C.F.R. §§ 17.22(b)(2) and 17.32(b)(2).

While the ESA does not prohibit the taking of listed plants on non-federal land, a HCP may need to include conservation measures to protect listed plant species as the ESA requires that the FWS consider, in its Section 7 biological opinion regarding its issuance of the permit, impacts to any listed species, including plants. 16 U.S.C. § 1536(c). Once an incidental take permit has been issued, for so long as the permittee complies with the terms of the permit, the FWS may not require the commitment of additional funding or resources from the permit holder for changed or unforeseen circumstances. 50 C.F.R. §§ 17.32(b)(5)(iii)(B). This is often referred to as the “no surprises” rule.

The use of the ESA to protect surface water rights from groundwater pumping was put to the test when the Sierra Club sued the FWS for failing to protect the threatened and endangered species located in the San Marcos and Comal springs. *See infra* at n. 5.

Photographs of the federally-listed Comal Springs riffle beetle, Fountain darter, Texas wild rice, and Texas blind salamander are included below. These species are found at the Comal and San Marcos Springs.



Comal Springs riffle beetle (courtesy Randy Gibson, USFWS)



Fountain darter (courtesy Texas A&M University)

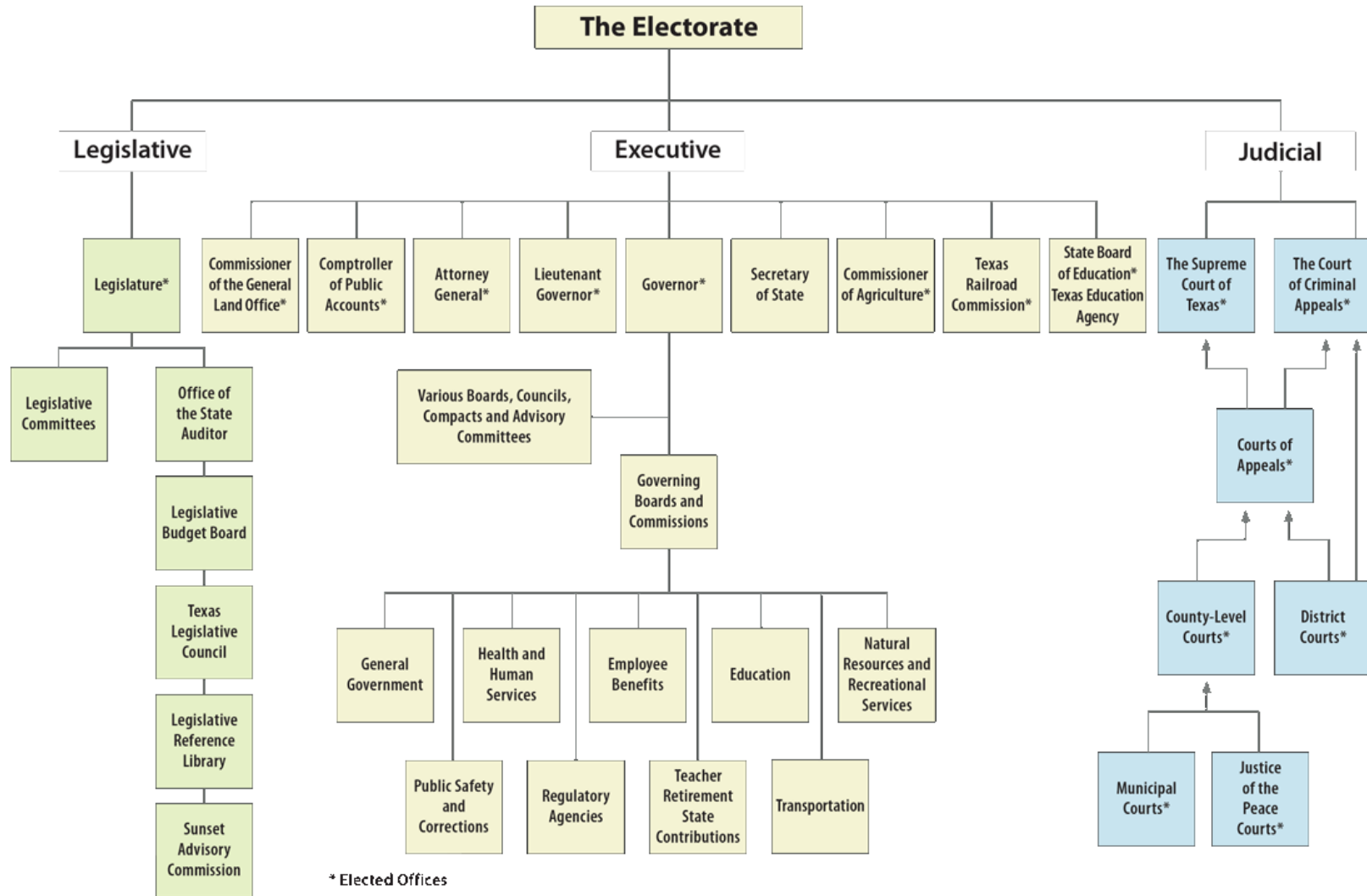


Texas wild rice (courtesy Jackie Pool)



Texas blind salamander (courtesy USFWS)

Government Structure of Texas



Appendix 6. Excerpts from the Memorandum of Agreement for the Edwards Aquifer Recovery Implementation Program

This Memorandum of Agreement (“MOA”) is intended to serve as the Memorandum of Agreement for the Edwards Aquifer Recovery Implementation Program (the “Program”) under the Endangered Species Act and as the Memorandum of Agreement required by Senate Bill 3. It is made and agreed to by the Parties signing below and is effective on the Effective Date. The Parties will work together in good faith and cooperation to achieve the purposes and goals provided in the following provisions of this MOA.

Purpose

The purpose of this MOA is to formally initiate the development and implementation of the Edwards Aquifer Recovery Implementation Program. The Program is a collaborative initiative among stakeholders to participate in efforts to contribute to the recovery of the Edwards Species, develop aquifer management measures, and develop conservation measures for the Edwards Aquifer.

Participation

The Parties pledge to participate in good faith in an open, voluntary, and cooperative process that will strive to reach consensus on issues that further the purposes and goals of the Program. To achieve these purposes and goals, the Program will be overseen by a Steering Committee designed to ensure opportunities for participation and adequate representation of stakeholders. The Steering Committee will adopt procedures consistent with the MOA to ensure the Program includes, but is not limited to, the following procedural elements: an open process, advance public notice of meetings and proposed actions, opportunity for stakeholder participation, open communication, and consensus-based decision-making.

Governance

The goal of the Steering Committee is to achieve consensus-based decision making. Consensus is reached when no Member of the Steering Committee is opposed to a proposal. It is understood and accepted that in order to achieve a consensus on the Steering Committee, each Member will be open to pursuing “win-win” alternatives and to considering variations on the

⁴² http://www.texasparency.org/State_Finance/Texas_Government.php

proposal that he or she might initially prefer. In its deliberations, the Steering Committee shall seek to exhaust every reasonable and practicable effort to reach consensus.

In furtherance of consensus-based decision-making, when a proposal to the Steering Committee involving a Tier 1 decision (as set out below) does not achieve consensus, the Steering Committee will adopt a process which requires further deliberation and development of the proposal by an Issue Team. The Issue Team will be a smaller team of stakeholders as appointed by the Steering Committee and will include, to the extent practicable, participants representing all different viewpoints on the proposal, which may include participants who are not members of the Steering Committee. The Issue Team process will provide an opportunity for input from other stakeholders. The goal of the Issue Team is to achieve consensus on the proposal, or to develop a restatement of the proposal that may better achieve consensus of the Steering Committee. If after resubmission to the Steering Committee, or restatement of the proposal and resubmission to the Steering Committee, consensus has not been achieved, the Steering Committee will then vote on the proposal. A resubmitted or restated proposal will be deemed to have been approved by the Steering Committee when at least 75 percent of the entire Steering Committee has voted in favor of the proposal in accordance with voting procedures to be adopted by the Steering Committee.

The Steering Committee will adopt procedures for appointment of Issue Teams, time requirements for resubmission and restatement of proposals, flexibility to continue to pursue consensus, an allowance for a minority report to be included with Tier 1 decisions, and voting procedures. These procedures to be adopted by the Steering Committee will apply to all Tier 1 decisions.

The following types of decisions are considered to be Tier 1 decisions:

- (a) Hiring or terminating of Program Manager;
- (b) Approval of annual budget;
- (c) Formal Recommendations to the EAA;
- (d) Recommendations or Reports to the Legislature;
- (e) Membership, responsibilities, and procedures of subcommittees;
- (f) Changes to the membership of the Steering Committee;
- (g) Adoption and amendment of the decision process of the Steering Committee;

(h) Decisions related to adoption or amendment of any Program agreements including, but not limited to the Memorandum of Agreement, the Implementing Agreement, the Cooperative Agreement, and the Program Document;

(i) Adoption or amendment of Program Operational Rules; and

(j) Any significant action determined by the Steering Committee to require Tier 1 decision-making in accordance with procedures to be developed.

The Steering Committee will adopt simplified procedures for all other decisions of the Steering Committee. For those decisions other than Tier 1 decisions, a decision will be deemed to have been approved by the Steering Committee when a majority of the entire Steering Committee has voted in favor of the proposal in accordance with voting procedures adopted by the Steering Committee. Non-Tier 1 decisions are not subject to the Issue Team process described in Section 5.3.

Appendix 7.

The following thirty-nine stakeholders executed the 2007 Memorandum of Agreement with the F regarding participation in the Edwards Aquifer Recovery Implementation Program. An asterisk indicates that the stakeholder was a member of the Steering Committee.

Aquifer Guardians in Urban Areas

Aquifer Guardians in Urban Areas is San Antonio's most effective environmental action organization. We use law, science, and the support of volunteers and online activists to protect our city's source of drinking water, the Edwards Aquifer. You can help keep the Hill Country beautiful and our water clean. Look around, learn, and take action.

Alamo Cement Company*

Alamo Cement Company produces and distributes cement in United States. It also offers ready-mix concrete and concrete products. Alamo Cement Company was formerly known as San Antonio Portland Cement Co. and changed its name to Alamo Cement Company in July 1979. The company was founded in 1880 and is based in San Antonio, Texas. Alamo Cement Company operates as a subsidiary of Buzzi Unicem SpA.

Bexar County*

As the fourth largest County in Texas and the 19th largest County nationally, Bexar County is steeped in rich history and tradition, while at the same time rapidly growing with a population approaching two million. Home of the first ever digital library, BiblioTech, Bexar County is also the home of such treasures as the San Antonio Riverwalk, the Alamo, and our historic Missions.

Bexar Metropolitan Water District*

The Bexar Metropolitan Water District (BexarMet) was established by the Texas Legislature in 1945 and currently serves approximately 86,000 connections in Atascosa, Bexar, Comal and Medina counties. BexarMet is unique among water utilities in that the District is comprised of several (21) smaller water systems not interconnected with each other. While approximately 60 percent of BexarMet customers reside within the San Antonio city limits, BexarMet also serves customers in Somerset, Castle Hills, Hill Country Village, Hollywood Park, Bulverde, and portions of Converse.

Carol Patterson

Carol Patterson is a resident of San Antonio and represents District 1, Edwards Aquifer Authority, reaches from central Bexar County north to the county line. Carol Patterson serves

on the board's Aquifer Management Planning and Finance/Administration Committees. She has also served on the Executive Committee, Research & Technology and Permits Committees.

City of Garden Ridge*

The City of Garden Ridge is a small municipality of just over 3,000 people located in Comal County, Texas.

City of New Braunfels*

The City of New Braunfels is a home-rule city under Texas State Law. The City was founded in 1845 under German charter. The City is governed by a seven-member council and has over 500 employees under the City Manager. The City of New Braunfels is the County seat for Comal County and has approximately 60,000 residents. Comal Springs originates and flows through the City.

City of San Marcos*

The San Marcos River is a spring-fed waterway from San Marcos Springs that flows through the heart of San Marcos--both literally and figuratively. People can kayak, snorkel, swim, and float on inner tubes in the 72-degree water. Or they can relax in the parks that straddle the river, watching the tubers float by. San Marcos is prime shopping country. Our historic downtown offers unique local shops for people who want to walk and shop, and the outlet malls on Interstate Highway-35 attract bargain hunters from all over North America. The City of San Marcos is the County seat for Hays County, is home to Texas State University, and has over 40,000 residents.

City of Victoria*

The City of Victoria is located approximately 30 miles from the Gulf of Mexico located on the Guadalupe River. The City is home to approximately 60,000 residents and is the County seat of Victoria County, Texas. The City of Victoria is a regional retail hub for a seven county area known as the "golden crescent" and the City is located in the cross roads of San Antonio, Austin, Corpus Christi, and Houston. The City is home to industries such as Formosa Plastics Corp, Inteplast Group, Dow Chemical, Invista, and Alcoa.

Comal County

Comal County is located just north of the City of San Antonio along the I-35 Highway Corridor. The County has over 100,000 residents and its County seat is the City of New Braunfels.

CPS Energy*

CPS Energy is the nation's largest municipally-owned energy utility providing both natural gas and electric service. CPS Energy serves more than 765,000 electric customers and 335,000 natural gas customers in and around San Antonio, the nation's seventh largest city.

Dan Laroe

Dan Laroe represented Preserve Lake Dunlap Association.

Dow Chemical*

Dow combines the power of science and technology to passionately innovate what is essential to human progress. The Company connects chemistry and innovation with the principles of sustainability to help address many of the world's most challenging problems such as the need for clean water, renewable energy generation and conservation, and increasing agricultural productivity. Dow Chemical has plants on the Gulf Coast including a plant located downstream of the City of Victoria on the Guadalupe River.

East Medina County Special Utility District*

East Medina County Special Utility District is a political subdivision of the State of Texas for the purpose of furnishing potable water service to the Southeast area of Medina County. The District's service area is located approximately 25 miles west of the City of San Antonio. The East Medina County Special Utility District's water source is the Edwards Aquifer.

Edwards Aquifer Authority*

The Edwards Aquifer Authority is a regulatory agency established by the 73rd Legislature in May 1993 with the passage of the Edwards Aquifer Authority Act to preserve and protect the Edwards Aquifer. However, legal challenges prevented the EAA from operating until June 28, 1996. Today, a 17-member board of directors representing Atascosa, Bexar, Caldwell, Comal, Guadalupe, Hays, Medina, and Uvalde counties continues its mission.

Gilleland Farms

Gilleland Farms is a privately held cotton farm established in 1975 located in Uvalde County, Texas.

Greater Edwards Aquifer Alliance

The Greater Edwards Aquifer Alliance is a 501(c)(3) nonprofit organization that promotes effective broad-based advocacy for protection and preservation of the Edwards Aquifer, its springs, watersheds, and the Texas Hill Country that sustains it.

Greater San Antonio Chamber of Commerce

The Greater San Antonio Chamber of Commerce has been serving businesses in San Antonio since 1894. The Chamber's goal is to continuously improve the business climate and build opportunities for growth for San Antonio and our region. The Chamber accomplishes this through programs focused on advocacy, economic development, events and direct services to our members.

Guadalupe Basin Coalition*

The Guadalupe Basin Coalition is a voluntary association of businesses, chambers of commerce, lake associations and governmental entities in counties along the Guadalupe River Basin (including all of its tributaries and springs) that are bonded by a common concern for the economic and environmental sustainability of the Guadalupe River Basin and San Antonio Bay.

Guadalupe-Blanco River Authority*

Established by the Texas Legislature, the Guadalupe-Blanco River Authority (GBRA) was first created in 1933 under Section 59, Article 16 of the Constitution of Texas as a water conservation and reclamation district and a public corporation called the Guadalupe River Authority. In 1935, it was reauthorized by an act of the Texas Legislature as the Guadalupe-Blanco River Authority. GBRA provides stewardship for the water resources in its ten-county statutory district, which begins near the headwaters of the Guadalupe and Blanco Rivers, ends at San Antonio Bay, and includes Kendall, Comal, Hays, Caldwell, Guadalupe, Gonzales, DeWitt, Victoria, Calhoun and Refugio counties.

Guadalupe County Farm Bureau*

The Guadalupe County Farm Bureau is a non-profit organization that is a member organization of the Texas Farm Bureau. The Texas Farm Bureau's mission is to be the Voice of Texas Agriculture. The vision of Texas Farm Bureau is to benefit all Texans through promotion of a prosperous agriculture for a viable, long-term domestic source of food, fiber and fuel. The Guadalupe County Farm Bureau is located in Seguin, Texas, along the Guadalupe River.

John M. Donahue, Ph.D.

John M. Donahue was a Professor of Anthropology at Trinity University in San Antonio, Texas. His interest in water issues stems from his work in public health and to the fact that San Antonio is located over the Edwards Aquifer whose management is the focus of continuing debate among local, county, state and federal actors. He and Barbara Rose Johnston are co-editors of *Water, Culture and Power: Local Struggles in a Global Context*, published by Island Press in 1998.

Larry Hoffman

Larry Hoffman is a retired civil engineer from the U.S. Air Force, resident of the City of San Antonio, and member of the Regional Clean Air and Water.

Mary Q. Kelly

Mary Q. Kelly was Of Counsel to Gardner Law, and practices in the area of water and public law. She assists water districts, utilities, and other public and private clients in all phases of regulation, use, and development of water rights, water projects, and water regulation.

Nueces River Authority*

The Nueces River Authority (NRA) was created in 1935 by special act of the 44th Texas Legislature. Under supervision of the Texas Commission on Environmental Quality, NRA has broad authority to preserve, protect, and develop surface water resources including flood control, irrigation, navigation, water supply, wastewater treatment, and water quality control. NRA serves all or parts of 22 counties in South Texas, covering over 17,000 square miles, generally constituting the drainage area of the Nueces River and its tributaries and the adjoining coastal basins.

New Braunfels Utilities*

New Braunfels Utilities' (NBU) mission is to improve the quality of life for our customers and community through excellence in service. NBU is one of 2,000 community-owned, not-for-profit, public power electric utilities in the nation. NBU is governed by a Board of Trustees made up of local residents appointed by the New Braunfels City Council.

Preserve Lake Dunlap Association

The Preserve Lake Dunlap Association is a non-profit 501(c) corporation. Some of the purposes of the corporation are: preserve the natural scenic beauty and intrinsic character of Lake Dunlap; protect the flow of water from the Comal springs; provide recommendations to the City of New Braunfels on watershed drainage program; and promote a sense of common interest among members and encourage greater community interest and involvement.

Regional Clean Air and Water Association*

Non-profit organization in the City of San Antonio dedicated to Clean and Water and the efficient use of the Edwards Aquifer. Members include Carol Paterson, Kirk Paterson, and Larry Hoffman.

San Antonio River Authority*

In 1917, the voters of Texas, recognizing the necessity of developing and conserving the state's water resources and inspired by devastating floods of 1913 and 1914, passed a Constitutional amendment allowing the legislature to create special purpose political subdivisions of the state to serve regional areas, generally coincidental with river basins and to be generally known as river authorities. San Antonio River Authority, created in 1937, is one of many such active river authorities in the State of Texas. Its jurisdiction covers 3,658 square miles—all of Bexar, Wilson, Karnes and Goliad Counties.

San Antonio Water System*

San Antonio Water System (SAWS) is a public utility owned by the City of San Antonio. It was created in May 1992 through the consolidation of its three predecessor agencies: City Water Board – the previous city-owned water supply utility. City Wastewater Department – the city government department responsible for sewage collection and treatment. Alamo Water Conservation and Reuse District – an independent city agency created to develop a system for reuse of treated wastewater. Since the formation of SAWS, San Antonio has been recognized nationally for its novel conservation efforts and proactive water management planning, making San Antonio water's most resourceful city.

San Marcos River Foundation*

The San Marcos River Foundation is a nonprofit founded in 1985 during the Sesquicentennial celebration for the community by a small group of San Marcos citizens with a mission to preserve and protect the flow, natural beauty and purity of the San Marcos River.
South Central Texas Water Advisory Committee

South Central Texas Water Advisory Committee*

The South Central Texas Water Advisory Committee is a 20-member organization created by S.B. 1477 to interact with the Edwards Aquifer Authority when issues of downstream water rights need to be addressed.

South Texas Farm and Ranch Club

The purpose of the South Texas Area Farm and Ranch Club is to provide a forum to discuss issues affecting agriculture and the Agrifood industry, to support effective leadership in agriculture, to keep members informed of pending legislation which might affect them and/or their businesses and to maintain a working relationship with various agricultural organizations, with particular emphasis on supporting the Texas AgriFood Master program.

Texas Bass Federation*

Texas B.A.S.S. Nation is a non-profit corporation organized and operated exclusively for enjoying, promoting, preserving and furthering the sport of bass angling.

Texas Commission on Environmental Quality*

The Texas Commission on Environmental Quality (TCEQ) strives to protect our state's public health and natural resources consistent with sustainable economic development. The goal of TCEQ is clean air, clean water, and the safe management of waste.

Texas Department of Agriculture*

Texas Department of Agriculture's mission is to partner with all Texans to make Texas the nation's leader in agriculture, fortify our economy, empower rural communities, promote healthy lifestyles, and cultivate winning strategies for rural, suburban and urban Texas through exceptional service and the common threads of agriculture in our daily lives.

Texas Living Waters Project*

The Texas Living Waters Project is a joint effort of the Lone Star Chapter of the Sierra Club and National Wildlife Federation as well as our regional partner, Galveston Bay Foundation. Together, we work to transform the way Texas manages water to better protect our springs, rivers and estuaries to meet the water needs of Texas and future generations of Texans.

Texas Parks and Wildlife Department*

The mission of Texas Parks and Wildlife Department is to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

Texas Water Development Board*

The Texas Water Development Board's mission is to provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas.

Texas Wildlife Association

The Texas Wildlife Association is a state-wide membership organization that serves Texas wildlife and its habitat, while protecting property rights, hunting heritage, and the conservation efforts of those who value and steward wildlife resources.