



The Edwards Aquifer Authority Working Towards Sustainable Water Management

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Flowing artesian well in the Edwards Aquifer used for monitoring by the Authority.

Water in the West can be a contentious issue, and that's certainly the case in Texas. The population of the state is expected to increase from 21 million in 2000 to 40 million in 2050; demand on water resources likewise will nearly double. In no place has water been a greater issue than in south-central Texas, where since 1996, the Edwards Aquifer Authority (Authority) has worked to adjudicate withdrawal permits for the Edwards Aquifer.

Edwards Aquifer Hydrology

The Balcones Fault Zone portion of the Edwards Aquifer is one of the most permeable and productive aquifers in the United States. It is the primary source of water for approximately 1.7 million people, including the city of San Antonio, and provides most of the water for agriculture and industry across its 180-mile wide extent.

The karstic Edwards Aquifer is noted for its sinkholes, sinking streams, caves, springs, and high-yielding water wells. The interconnected fractures and caves in the aquifer have created areas of incredibly high permeability and are home to more than 40 endemic species, including various catfish, shrimp, and salamanders. This high permeability also causes the aquifer system to respond rapidly to recharge and discharge events. Water levels can fall more than two feet per day in response to heavy agricultural and municipal pumping in the region. Alternately, heavy rainfall can cause the water level in some wells to rise more than 150 feet in less than a week.

Artesian wells in some parts of the aquifer have historically yielded more than 30,000 gallons per minute.

Withdrawal of water from wells in the Edwards Aquifer impacts the volume of water discharging at Comal and San Marcos springs, the two largest springs in the southwestern United States. These springs form the habitat for seven endangered species and are important sources of water for downstream users on the Guadalupe River. In addition, a highly developed water recreation industry uses both springs. Discharge from the springs is variable, however. During the 1956 drought of record, Comal Springs went dry and San Marcos Springs had greatly reduced flow. At that time, the annual water withdrawal from the Edwards Aquifer was about 320,000 acre-feet; today, the 10-year median volume is 409,000 acre-feet per year.

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The Edwards Aquifer Authority

In 1991, the U.S. Fish and Wildlife Service (FWS) was sued under the Endangered Species Act by the Sierra Club, which alleged that the agency inadequately protected the endangered and protected species in the Comal and San Marcos springs ecosystems. The Sierra Club won the lawsuit and a federal judge gave

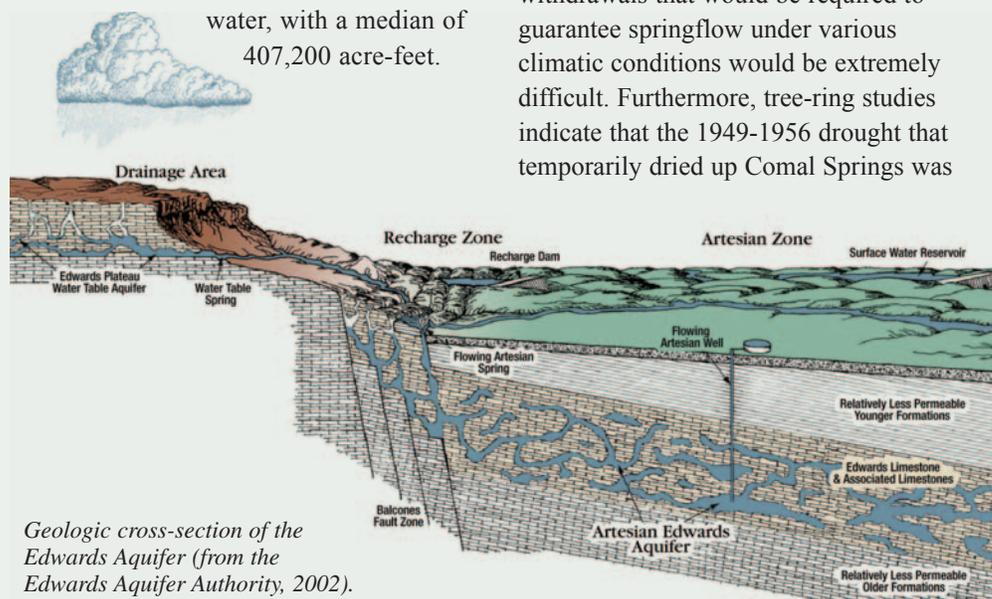
the state of Texas a deadline to regulate water withdrawals from the Edwards Aquifer. In 1993, the Texas Legislature passed the Edwards Aquifer Authority Act (the Act), creating an entity to regulate aquifer withdrawals. Its formation was immediately challenged in court, and not until 1996 were all the issues settled.

The Authority's Challenge

Under the Act, the Authority is charged with limiting the amount of water that can be withdrawn to 450,000 acre-feet per year until 2008, when the aquifer "cap" drops to 400,000 acre-feet per year. However, the Act also requires the Authority to issue permits to users who can prove beneficial use of groundwater between 1972 and 1993 (the "historical period"). In addition, the statute allocates two acre-feet of water per acre of land irrigated during the historical period. Municipal and industrial users were issued an amount equal to the average amount used during this period. To date, permits have been issued or will be issued for more than 560,000 acre-feet of historical rights – considerably more than the 450,000 acre-feet goal.

The Authority's Board of Directors must determine how best to reduce the amount of permitted water in order to reach the target withdrawal volume. The board has three options: invoke a junior/senior program that splits each permit and limits the withdrawals by junior users during low aquifer conditions; purchase water permits and retire those withdrawal rights; or invoke a proportional adjustment wherein all users

share the reductions in proportion to the size of their right regardless of aquifer levels. The estimated cost to purchase and retire the excess 110,000 acre-feet per year is approximately \$200 million. For now, the board has chosen a temporary junior/senior permit program based on a proportional reduction of all permit holders until 2007. In addition, the Authority has promulgated regulations to implement a demand management/critical period management program in the event that aquifer levels decline below specified levels in aquifer index wells. If a drought of record were to recur, permitted water withdrawals across the aquifer could be limited to 350,000 acre-feet of water annualized. Over the last five years, the region annually has used from 353,200 to 442,700 acre-feet of water, with a median of 407,200 acre-feet.

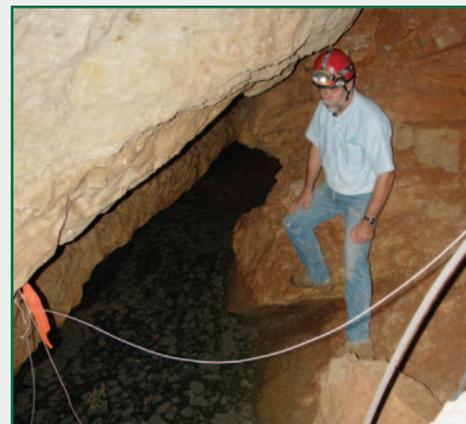


Geologic cross-section of the Edwards Aquifer (from the Edwards Aquifer Authority, 2002).

Regional Water Planning

One of the primary reasons the Authority was established was to protect endangered species in the Comal and San Marcos springs ecosystems. The Authority initiated development of a Habitat Conservation Plan (HCP) in 1999; a second draft was completed in July 2004 and released for public comment prior to submission to the FWS. The draft HCP contains several elements, including aquifer withdrawal limits under normal and drought conditions, monitoring and mitigation measures, and funding estimates. However, it does not guarantee springflow under all conditions.

Determining the current usage of the aquifer and the exact reductions of withdrawals that would be required to guarantee springflow under various climatic conditions would be extremely difficult. Furthermore, tree-ring studies indicate that the 1949-1956 drought that temporarily dried up Comal Springs was



Jon Cradit in Ezell's Cave in San Marcos, Texas. The cave provides access to one of the places you can actually view the Edwards Aquifer.

the most severe drought in the past 300 years, and illustrate that springflow is not predictable. Therefore, under the most severe drought conditions, the draft HCP calls for the establishment of refugia, habitats protected from environmental changes experienced by the region.

In summary, the Authority is moving forward with a new plan for groundwater management: issuing permits, limiting and monitoring groundwater withdrawals, and managing the cornerstone of water supplies for south-central Texas. However, many difficult issues remain to be addressed in the quest for water sustainability for Texas' citizens and the environment.

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