

NEWS DROP

M A G A Z I N E

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EAHCP'S RIPARIAN RESTORATION IN NEW BRAUNFELS

Riparian restoration reestablishes native vegetation along the banks of a waterway to prevent streambank erosion, provide a healthy vegetative buffer, and improve water quality. The riparian restoration process involves the removal of non-native vegetation, the subsequent planting of native vegetation in removal areas, and continued maintenance to prevent reestablishment of non-native vegetation. **P.6**



EAHCP CONTRACTOR AARON HOOT, TREATING ELEPHANT EAR,
SAN MARCOS RIVER, TX



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COVER & BACK COVER

 **Guadalupe River,
New Braunfels, TX**

To Schedule a Tour of the Aquifer Storage
& Recovery Facility:
saws.org/education/community-programs/





Defining Our Future, Our Legacy

INCLUSION IMAGINATION INNOVATION



MESSAGE FROM THE GENERAL MANAGER

Defining Our Future, Our Legacy

WITH THE 25TH ANNIVERSARY OF THE EDWARDS AQUIFER AUTHORITY (EAA) JUST AROUND THE CORNER (IN 2021), WE HAVE BEGUN TO TAKE STOCK OF THE MORE-THAN-TWO DECADES OF WORK BEHIND US AND, I MUST SAY, THE PROGRESS THAT HAS BEEN MADE IS REMARKABLE.

From an extraordinary body of science to a proven regulatory program to a widespread water ethic driven by conservation education, the abundance of lessons learned over the past 20-plus years have moved us to the threshold of an exciting future full of promise.

Having set in place measures, processes and programs that ensure professional management and systematic protection of the Edwards Aquifer, our challenge before us is to redefine and reinvigorate our mission in ways that further ensure certainty in the sustainability of our most vital water resource for generations to come.

To this end, we propose a new model by which we regulate, educate, facilitate, communicate and collaborate with you our stakeholders; a way of doing business balanced around three key concepts – **inclusion, imagination, and innovation**. The EAA mission remains as clear as it has from the beginning -- manage, enhance, and protect the Edwards Aquifer system.

We've held true to this mission since 1996 and now we must commit ourselves to not rest on our laurels, but to use past success as a foundation to building a legacy; a legacy of certainty, sustainability, and credibility in the work of the EAA that will withstand the test of time, for the benefit of the Aquifer and the more than two million people who rely on it as their water resource.



ROLAND RUIZ, EAA'S GENERAL MANAGER

INCLUSION

We invite everyone to participate in our mission through collaborative approaches that create opportunities to share ideas, create partnerships, and identify solutions to challenges that undoubtedly await us.

IMAGINATION

We visualize the possibilities of what could be by freeing ourselves from divisions that fractured us in the past and instead embrace a future where what is possible is limited only by our capacity to imagine together.

INNOVATION

We reinvent ourselves through creativity and ingenuity that stretches our minds, our capabilities, and expands our thought processes toward a renewed sense of appreciation for our mission and those touched by it now, and in the future.





2 TURNING BACK THE TIDE

EAHCP's Riparian Restoration In New Braunfels, San Marcos, Taking Hold

happening here,” said EBR Enterprises CEO Eric Ruckstuhl. “The San Marcos and Comal Springs are unique ecosystems. But, over the years, people changed the natural beauty of these areas into a predominantly non-native riparian system that was literally choking out the native plants and wildlife that inhabited the areas for thousands of years. Most of it was unintentional, however, all of it had a detrimental effect on the native environment.”

EBR Enterprises has been working with the City of San Marcos for five years and New Braunfels for about two years to achieve the EAHCP's riparian restoration conservation measures. In that time, EBR has removed non-native vegetation from approximately five acres of riparian area along the Old Channel of the Comal River and Landa Lake in New Braunfels. And, it has completed an initial treatment of over 50 acres of invasive plants along the riparian edge of the San Marcos River. The non-native vegetation targeted by EBR primarily includes *Ligustrum*, Chinese Tallow, Chinaberry, Arundo Cane and Elephant Ear.

According to EBR's non-native removal statistics, approximately 900 *Ligustrum*, 450 Chinese Tallow and 175 Chinaberry have been treated and removed in New Braunfels. Countless Elephant Ear, which once enveloped large portions of Landa Lake and the Old Channel of the Comal River as well as Spring Lake and banks of the San Marcos River down to Cape's Road, have been removed.

AS YOU WALK ALONG THE TRAILS THAT LEAD TO THE WETLANDS BOARDWALK AT SPRING LAKE IN SAN MARCOS, YOU'LL RUN INTO A SMALL, RICKETY-LOOKING TIN SHED. AS YOU ENTER, YOU'RE MET WITH THE PRINTED WORDS “TURNING BACK THE TIDE.”

At the very bottom of the colorful poster, you connect that title to information about an amazing ecosystem restoration project in progress. It's not only collaborative among various state and regional agencies, but heartfelt by local volunteers who understand that help is needed to give these unique natural areas a chance to be renewed after decades of non-native plant incursion.

The EAHCP implements riparian restoration strategies in the San Marcos and Comal Rivers and along Landa Lake in a targeted effort to protect and enhance habitat for the endangered species like the fountain darter, Texas blind salamander and Texas wild-rice.

“When you talk to people about riparian restoration in San Marcos and New Braunfels, it's sometimes a little hard to get across the depth and importance of the work



 **SAN MARCOS RIVER BANK *AFTER* RIPARIAN RESTORATION**



SAN MARCOS RIVER BANK **BEFORE** RIPARIAN RESTORATION

Arundo Cane, which is a bamboo-like plant that came from the Northeastern parts of the country, have also been treated and removed from large portions of both systems. Additionally, EBR's riparian restoration work has included installation of erosion control berms and planting of native vegetation such as American Beauty Berry, Virginia Creeper and Elderberry.

"The Elephant Ear is probably the best example of how a non-native plant can overcome a significant part of a waterway and the native plants and animals there," Ruckstuhl explained. "Growing in the water, their roots grow together to create an almost impenetrable mesh. Plus, they soak up huge amounts of water. So, the root networks stifle habitat for native fish and the plants use water that the now-endangered fish species thrive in. In Landa Lake, we removed one Elephant Ear root that was about three-and-a-half feet long and weighed 30 pounds. Just astounding. And very damaging."

In addition to the riparian restoration work EBR is implementing, the EAHCP contracts with BIO-WEST, Inc. to improve riparian habitats for the benefit of the endangered Comal Springs riffle beetle. This riparian restoration is being done along the western shoreline of Landa Lake and the Spring Runs where many of the beetles can be found. Activities include the planting of native vegetation to increase bank stability, decrease erosion and sedimentation and increase the amount of usable habitat and food sources.

EAHCP also works with Cuda Conservation, LLC, the Conservation Crew and various volunteer organizations in San Marcos to remove non-natives and plant natives along the banks of the San Marcos River.

"Thanks to EAHCP contractors and dedicated volunteer efforts, riparian restoration along these spring systems has come a long way in reestablishing the native landscape. So, while the tide is turning, there is still a fairly steep hill to climb," Ruckstuhl explained. "But, the good news is that we're on the right road. And the EAHCP work in New Braunfels and San Marcos are perfect examples of how a native system can recover if you give it just a little bit of help, care, and vigilance."



**HIGH SERVICE PUMPS AT THE AQUIFER STORAGE & RECOVERY FACILITY [ASR]
IN SOUTH BEXAR COUNTY**

3 SAVING FOR A SUNNY DAY

THE ASR SPRINGFLOW PROTECTION PROGRAM IS A SIGNIFICANT MEASURE OF THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN (EAHCP).

But, how much do you know about the actual aquifer storage and recovery facility, which is operated by the San Antonio Water System (SAWS) in South Bexar County and an essential component in the EAHCP?

With water storage being a critical part of any water plan, SAWS began in 1996 investigating a relatively new technology known as aquifer storage and recovery, or ASR for short. Engineers in other parts of the country had discovered that water could be injected into an aquifer, and that water would form a type of “water bubble” which would remain in place for years. That allowed water companies to store excess water during rainy periods in the ground and then retrieve it when needed during dry periods. Storing water underground protects water from evaporation, which happens to water stored in lakes.

Being close in proximity to the sand-based Carrizo Aquifer in Southern Bexar County, SAWS conducted pilot projects there to determine whether it could take high-quality Edwards Aquifer water, store it and then recover it at the same water quality level months later. The pilot projects were a success, but the biggest surprise of all came years later as further studies showed that the ASR storage capacity would be much larger than anyone ever imagined.

“When SAWS opened its Aquifer Storage and Recovery (ASR) facility in South Bexar County in 2004, we were projecting we would store about 22,000 acre-feet of permitted Edwards Aquifer water during low-use periods and then use it during our hot summer months,” said SAWS Water Resources Director Darren Thompson. “After years of study and a better understanding of the formation, we now know that we can confidently inject close to 10 times that amount of water in the ground.

ASR Water Storage Will Help Protect Endangered Species From Future Severe Drought



 **CASCADE AERATOR, ASR FACILITY**

That was not only a game changer for SAWS, but it soon came to be the most efficient and effective component of the EAHCP’s program in meeting its federal permit requirements.”

Under the ASR Leasing Program, Edwards Aquifer permit holders are paid to lease their water to the ASR Program. SAWS then pumps Edwards water from their wells in San Antonio and injects it into the Carrizo Aquifer at the H2 Oaks ASR facility. That water is used to offset SAWS withdrawals from the Edwards during a drought of record. During a drought of record, SAWS will have the ability to withdraw stored water from the ASR facility to serve its customers, rather than pumping water from existing wells. That additional reduction in pumping, in combination with the other EAHCP springflow protection measures, will ensure that the Comal and San Marcos Springs continue to flow during drought conditions, thus protecting the endangered species living in the springs.

Currently, SAWS has stored 108,000 acre-feet (35 billion gallons) of water in its ASR facility on behalf of the EAHCP. It also has stored another 68,000 acre-feet injected from its own permits. Originally, the ASR project was constructed with one integration line of approximately 35-miles that transported water back and forth from its pump stations located near the AT&T Center. That meant water could either be pumped into ASR storage or out of storage, but not both at the same time. Over the past several years, SAWS has developed a second integration pipeline to service its customers on the southwest side of the city. That means SAWS can store and pump water out of the ASR facility simultaneously.

“Part of the beauty of the ASR Leasing Program is that everyone around the region benefits from this type of operation,” said Javier Hernandez, who manages the current ASR Springflow Protection Program for the Edwards Aquifer Authority (EAA). “Edwards permit holders can make some additional money on their water, SAWS doesn’t have to pump its Edwards wells as much, and that in turn relieves some pressure on Comal and San Marcos springflows. And, what we’ve learned from the extensive computer model runs and analysis conducted by the EAA is that the ASR Program will definitely be the key component in protecting the endangered species when we experience the next drought of record.”

So, how did the Edwards Aquifer Region find itself in a situation of protecting endangered species at the Comal and San Marcos Springs? In 1991, the Sierra Club brought a lawsuit in federal court against the U.S. Fish and Wildlife Service (USFWS). The suit alleged that USFWS had violated the Endangered Species Act by failing to protect the federally-listed species in the Comal and San Marcos Springs.

In 1993, the court ruled in favor of the Sierra Club and made it clear that the Texas Legislature, then in session, was expected to act immediately to protect the species. In response, the Legislature created the EAA to manage water withdrawals from the Edwards Aquifer.

Despite the mandates imposed by the Texas Legislature, by 2006, the EAA had not satisfied several of the requirements. Subsequently in 2007, the Legislature directed the EAA and four other state agencies to participate in the development of a plan to protect the federally-listed species as required by the Endangered Species Act.

In 2012, the EAHCP was submitted to the USFWS for approval. That plan contains numerous conservation measures, including the ASR Springflow Protection Program, and was specifically designed to protect endangered species by minimizing pumping from the Edwards Aquifer during a drought of record.

“It is extremely important for everyone across the Edwards Aquifer region to remember this piece of history. The Edwards Aquifer is a shared resource for about two million people and various types of water use,” Thompson said. “The creation of the Edwards Aquifer Authority, and later development of the EAHCP gave the region the means to manage our own water resource future. The authorization of the EAHCP means that there won’t be federal intervention as long as each piece of the EAHCP is successfully implemented. And, we have seen that all participants in the EAHCP are highly committed to making sure that happens.”





**JAVIER HERNANDEZ,
EAA'S SPECIAL
PROJECTS LIAISON**

“Part of the beauty of the ASR Leasing Program is that everyone around the region benefits from this type of operation...Edwards permit holders can make some additional money on their water, SAWS doesn't have to pump its Edwards wells as much, and that in turn relieves some pressure on Comal and San Marcos springflows.”



**FOR MORE
INFORMATION**

Please visit
edwardsaquifer.org
or call 210-222-2204



CASCADE AERATOR, ASR FACILITY



 EAHCP CONTRACTOR NICK MENCHACA CAPTURES TILAPIA IN LANDA LAKE, NEW BRAUNFELS, TX



4 TIP OF THE SPEAR

Atlas Environmental Leads the Way On Non-Native Fish Removal

YOU’VE PROBABLY HAD A FRIEND OR FAMILY MEMBER TELL YOU A GREAT FISHING STORY ABOUT THE GIANT FISH THEY ALMOST LANDED. WELL, WHEN NICK MENCHACA CATCHES FISH, THEY DON’T GET AWAY.

“We are working under contract with the City of San Marcos and City of New Braunfels to remove the non-native fish found there in order to protect the endangered species that are native to those waters,” Menchaca explained. “Our program is just one of many that are part of the Edwards Aquifer Habitat Conservation Plan (EAHCP) which is designed to restore the native habitats of the Comal and San Marcos spring and river systems.”

When the EAHCP formally began in 2013, Menchaca’s company, Atlas Environmental, was hired by the City of San Marcos to remove invasive fish species from Spring Lake and the upper San Marcos River. This year, the City of New Braunfels brought the company on to continue removal efforts within the Comal Springs and river, including Landa Lake.

“We’ve been very successful so far. Since 2013, we’ve removed nearly 8,000 non-native armored catfish from the San Marcos River. We recently reached a total of 10,000 pounds of invasive biomass removed from Spring Lake and the upper San Marcos River. In just three months of working in New Braunfels, we’ve speared over 1,000 tilapia for removal,” Menchaca explained. “We have used nets before, but freediving with spear guns has proved to be most efficient. Nets capture other types of fish, debris and vegetation. Spearfishing is the most selective type of fishing and allows for minimal disturbance to all native species and habitats.”



INVASIVE SPECIES, SUCKERMOUTH CATFISH

The targeted non-native species include the suckermouth catfish, sailfin catfish, tilapia, red rimmed melania snails, ramshorn snails, and nutria. These animals compete for food and habitat with the native and endangered species that the EAHCP is designed to protect. Nutria are aquatic rodents that can grow larger than 20 pounds and can severely damage a river environment because they chomp on riverine plants and roots. They also burrow into river banks making the waterway susceptible to significant erosion during flooding. It is thought that nutria were originally from South America and were not found in the U.S. until about 200 years ago. Today, they are disrupting river environments across the Southwest and in California.

“We trap the nutria. In addition to the harm these non-native animals bring to the endangered species and habitat, they can make a mess of a river bank. Nutria excessively gnaw on bark and end up killing



CAPTURING TILAPIA, AN INVASIVE SPECIES, IN LANDA LAKE

cypress trees and other native trees.” Menchaca said. “The armored catfish, like the nutria, will also burrow into the sides of river and lake banks when they nest. As for the tilapia, we have best results in colder months, early in the mornings and even at night, especially with a full moon. We pick the ramshorn snails by hand from the river bottom. Over the last few years, we’ve been able to identify the hotspots and have become familiar with the best times to maximize removal efforts.”

Menchaca stated that there are some definite differences between the Comal and San Marcos ecosystems, such as depth, current, vegetation, native species and public recreation. Most importantly, Landa Lake offers year-round successful spearfishing conditions. For the majority of the year in Spring Lake, the tilapia reside in a tributary known as Sink Creek with zero visibility. The tilapia only seek thermal refuge near the clearer, spring fed water on the coldest days and nights.

Throughout the entire year, spearfishing is dependent on the weather, fish activity, visibility and fluctuating numbers of people recreating in the river. During the summer months, they plan spear outings early in the mornings to avoid the busy afternoons of river recreation.

While spear fishing is off-limits to the public within city limits, Atlas Environmental puts on two polespear fishing tournaments a year. Each tournament happens over the course of three weeks and entrants can win prizes in any of the 14 tournament categories. The competition has drawn some very proficient fishermen from around the region and has continued to grow each year.

“While we want the tournaments to be fun, they are actually part of the overall non-native species removal program. This is also a way that our company can recruit volunteers to help us throughout the year,” Menchaca said. “One of the winners of a couple of the tournaments has agreed to work with us from time to time, and so he gets to fulfill his spearfishing passion and we get some excellent help. That’s definitely a win-win for our program, the EAHCP and our overall community awareness efforts.”



EAHCP CONTRACTOR CAPTURES TILAPIA IN LANDA LAKE, NEW BRAUNFELS, TX



 JACOB'S WELL, HAYS COUNTY, TX



5 DROUGHT MANAGEMENT

EAA's Collaborative Efforts & Scientific Research at Play

JACOB'S WELL IS A KARST SPRING, WHICH ORIGINATES FROM THE MIDDLE TRINITY AQUIFER. IT IS LOCATED IN THE CYPRESS CREEK WATERSHED NEAR WIMBERLY, TEXAS.

In a recent report published by the Meadows Center for Water and the Environment at Texas State titled, "Evaluation for the Development of a Jacob's Well Groundwater Management Zone in Hays County, Texas," Marcus Gary, EAA Field Operations Manager and Hydrogeologist, chaired the report's technical team. The team was comprised of representatives from the Barton Springs Edwards Aquifer Conservation District, Hays Trinity Groundwater Conservation District, and The Meadows Center for Water and the Environment. Jacob's Well is a karst spring, which originates from the Middle Trinity Aquifer.

It is located in the Cypress Creek watershed near Wimberly, Texas. In the past, the spring has stopped flowing due to pumping influences in the areas that surround it. The published report provides a scientific framework to potentially aid the Hays Trinity Groundwater Conservation District in developing policy

changes to maintain the spring flow at Jacob's Well by recommending the establishment of groundwater management zones. One of these areas has been defined as the Jacob's Well Groundwater Management Zone (see Figure 1, next page), in which a reduction of pumping in this zone during periods of drought could help maintain the spring flow. The second defined area, Regional Recharge Area Groundwater Management Zone, contains the largest documented spring in the Hill Country Trinity Aquifer, known as the Pleasant Valley Spring (PVS).

The spring has a measured range from 12 to 60 cubic feet per second. At its highest, that amounts to about 27,000 gallons per minute! The spring flow supplies water to the Blanco River, which directly feeds into the Edwards Aquifer.

Through collaboration, efforts such as these effect policy changes that can be instituted to maintain the integrity of naturally occurring springs and aquifers. The scientific technical committee of this report has provided science-based research to be considered, and continued research will be conducted to further develop the understanding of the Regional Recharge Area Groundwater Management Zone.

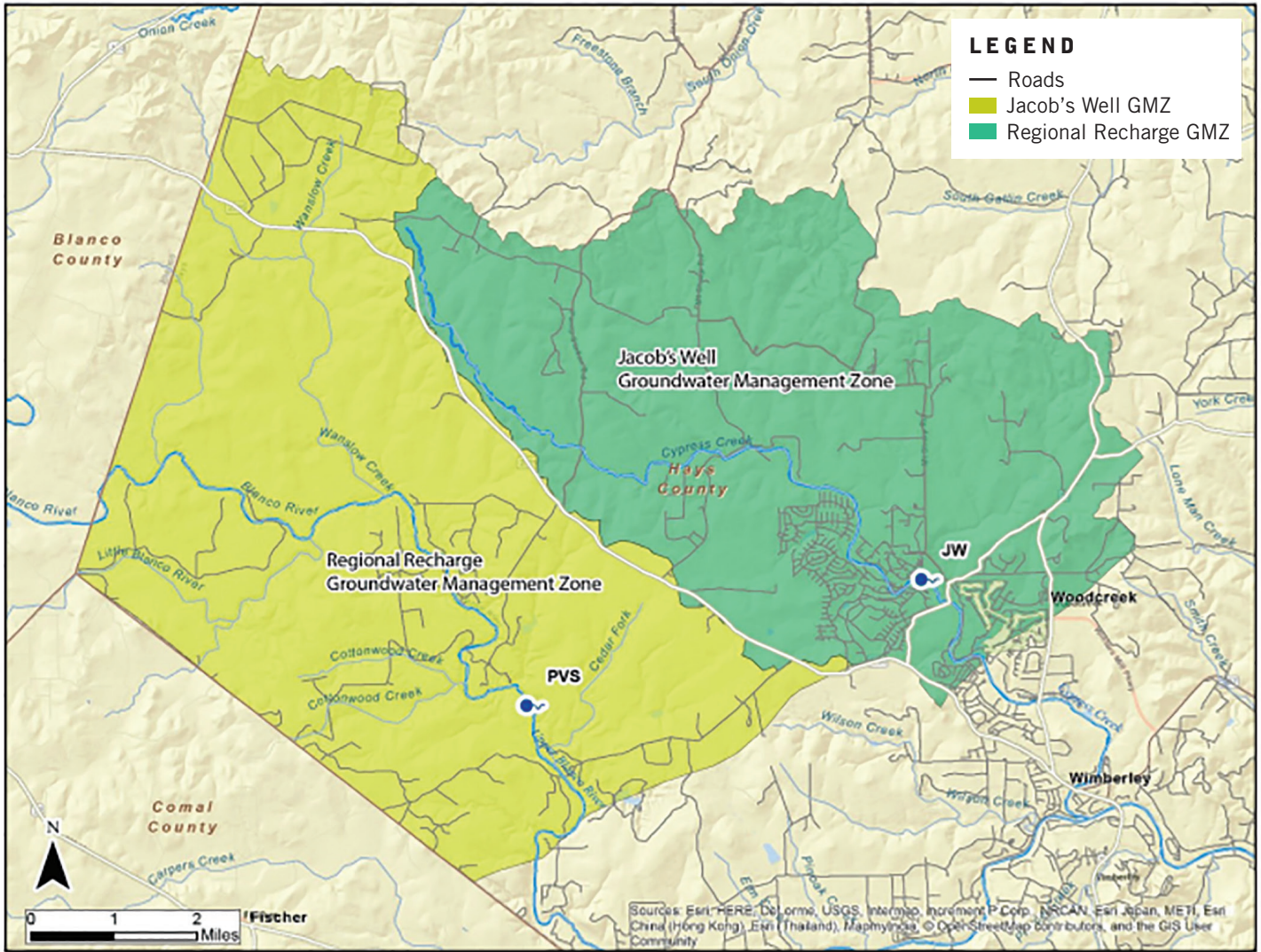
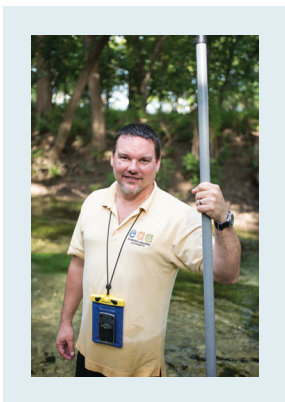


Figure 1. Areas of hydrologic influence to Jacob’s Well shown in hatched areas. Potential groundwater management zones are shaded green and yellow. The area of the Jacob’s Well Groundwater Management Zone is 34 square miles and the area of the Regional Recharge Groundwater Management Zone is 56 square miles.



MARCUS GARY, EAA FIELD OPERATIONS PROJECT MANAGER

“Pleasant Valley Spring was unknown until 2013, and since then we have documented its critical importance to the Blanco River base flow. The EAA has recently funded USGS stream gages that now provide a continuous record of this spring flow, which is key to monitoring the long-term sustainability of groundwater resources in Hays County.”



**TO ACCESS
THE FULL REPORT:**

<http://bit.ly/JWGMZReport>



 JACOB'S WELL



THE EDWARDS AQUIFER THEN

5-30-26

 JACOB'S WELL

The final version of the Geological Society of America Memoir, Volume 215, “**The Edwards Aquifer: The Past, Present, and Future of a Vital Water Resource**” was made available on the web this summer (Sharp et al. 2019). This peer-reviewed publication contains a compilation of knowledge regarding the Edwards Aquifer system, and features chapters authored and co-authored by Edwards Aquifer Authority staff. The EAA and co-author’s organizations have ensured most content is open access with PDF versions of articles available for download.



**TO ACCESS
FREE SECTIONS
OF THE MEMOIR:**

<http://bit.ly/eaaresearch>





& NOW

 **JACOB'S WELL**

This extensive summary of technical information currently available on the Edwards Aquifer highlights a significant amount of work by various EAA technical staff and former staff: Chad Furl, Chief Science Officer; Geary M. Schindel, Chief Technical Officer; Jim Winterle, Director of Modeling, and Paul Bertetti, Director of Aquifer Science.



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