

APPENDIX H
EAHCP STEWARD NEWSLETTERS, NEWS DROP MAGAZINES,
AND EAHCP CONSERVE NEWSLETTERS FOR 2019

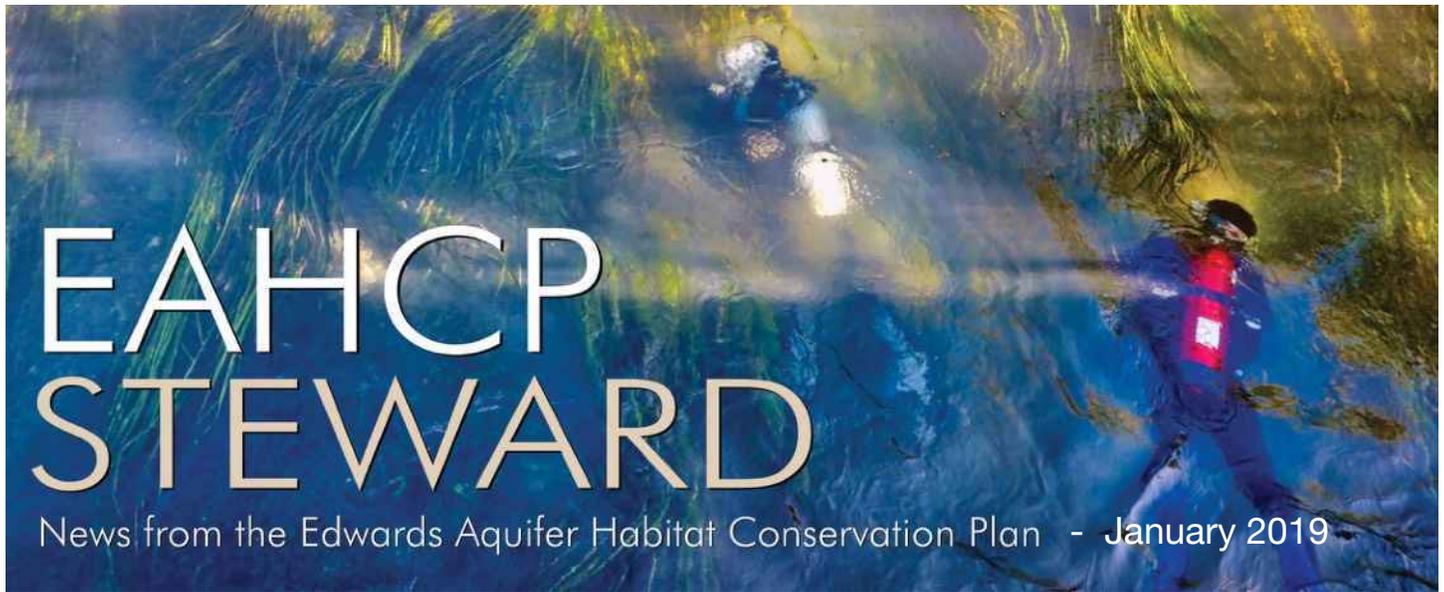
Appendix H1 – 2019 *EAHCP Steward* Newsletters

Appendix H2 – 2019 *News Drop* Magazines

Appendix H3 – 2019 *EAHCP Conserve* Newsletters

APPENDIX H1
2019 EAHCP Steward Newsletters
(Monthly Publication)

January 2019	<i>EAHCP Steward Newsletter</i>
February 2019	<i>EAHCP Steward Newsletter</i>
March 2019	<i>EAHCP Steward Newsletter</i>
April 2019	<i>EAHCP Steward Newsletter</i>
May 2019	<i>EAHCP Steward Newsletter</i>
June 2019	<i>EAHCP Steward Newsletter</i>
July 2019	<i>EAHCP Steward Newsletter</i>
August 2019	<i>EAHCP Steward Newsletter</i>
September 2019	<i>EAHCP Steward Newsletter</i>
October 2019	<i>EAHCP Steward Newsletter</i>
November 2019	<i>EAHCP Steward Newsletter</i>
December 2019	<i>EAHCP Steward Newsletter</i>



Rock Star

Distinguished Geologist John Sharp to Join EAHCP Science Committee



After spending more than four decades of teaching, research, consulting and service to his profession, Dr. John M. (Jack) Sharp, Jr. summed his thoughts about his new appointment to the Edwards Aquifer Habitat Conservation Plan (EAHCP) Science Committee by saying, “I’ll continue to learn, and hopefully contribute to the scientific understanding of the Edwards Aquifer.” That humble formula helped create a career of considerable success which takes 83 pages to detail in Dr. Sharp’s curriculum vitae (CV). It is also the same formula the

EAHCP has employed to make steady increases in knowledge about the Edwards Aquifer, endangered species living there and the habitats which support those unique creatures. So you might say that this match was probably chiseled out in geology heaven.

“When I came to Texas many years ago, I never thought I would be studying karst aquifers,” Sharp said. “But then I got involved with projects concerning the Edwards Aquifer and I was hooked. As a geologist, the Edwards presents so many interesting challenges for researchers, but it is also so uniquely important to the economic health of this part of the state. So, when you put those two together, how can a scientist not be completely drawn to helping people protect this resource and at the same time get as much benefit from it as possible.”

Sharp has a Ph.D. and M.S. in Geology from the University of Illinois and a B.S. in Geological Engineering from the University of Minnesota. He also served in the U.S. Air Force as a civil engineer. He is the recipient of the 1979 O. E. Meinzer Award of the Geological Society of America and the 2012 Presidents’ Award of the

International Association of Hydrogeologists , those organization's most prestigious hydrogeology award. He has been a Von Humboldt Fellow to West Germany.

Sharp's appetite for knowledge and learned insights in geology and hydrogeology brought him to making presentations to groups of scientists around the world. His prominence in his fields of study gave him the opportunity to serve the Geological Society of America as President, treasurer of the International Association of Hydrogeologists, and the U.S. chapter of the International Association of Hydrogeologists as its chair. He has also held other leadership positions with the American Institute of Hydrology and the Austin Geological Society. He served on the U.S. National Committee for Scientific Hydrology, Universities Council on Water Resources, Australian Research Council Panel of Assessors, and National Environmental Research Council (Great Britain) to list a few others.

In addition to his service to his profession, Sharp is credited for creating a mathematical model for determining physical changes that occur on the surface of fractured rocks. He traveled to Mexico to study the Earth's third-deepest sinkhole in partnership with NASA and other prominent agencies. He has written and co-authored hundreds of scientific journal pieces and done scores of book reviews. As a distinguished member of The University of Texas faculty, he is most proud of mentoring 100 graduate students through their studies and ultimate advanced degree theses.

Sharp also has a keen sense for how his profession is directly related to today's communities' water resources and pollution prevention needs. He says that hydrogeologists are particularly qualified and needed to help explain those types of resource challenges everyone faces. Upon his arrival in Austin, he focused much of his time to studying the impact of urbanization on Barton Springs. That work led to other types of community consulting such as his work in helping West Texas cities understand the potential impacts of hydraulic fracturing for oil on their natural springs.

In explaining his work with communities on their natural resource issues, Sharp elaborated, "With every water issue we must address in the present, we first have to try to understand the past, and then project into the future with the scientific knowledge we have learned. It's important to put out the current science as best as we understand it to foster wise decision making," Sharp noted. "Sometimes it's appreciated, sometimes it's not appreciated, but it's something every scientist should do."

Even though Sharp has recently retired from the University of Texas, he still has plenty on his plate that will add more pages to that already dense CV. One such project is a memoir about the Edwards Aquifer he is developing along with EAHCP Chief Science Officer Dr. Chad Furl and former EAHCP Program Manager Nathan Pence. And because of his career-long passion for learning more about the the Edwards Aquifer, he said he is especially looking forward to digging in on the EAHCP Science Committee work.

"Some people know where they want to go in their careers, but mine has been a complete adventure," Sharp acknowledged with a laugh. "I got into the study of geology upon the recommendation of a family friend who just happened to be the Minnesota Geological Survey director. And before I ever got started on my advanced degrees, I served as a civil engineer in the Air Force. It was during that time that I decided to pursue higher education and teaching. After I obtained my doctorate in hydrogeology, my work ultimately led to Texas and this wonderful university in Austin in 1982. Since then, I've worked in places close to home and some a bit far from here. But I can say each stop along the way has been a formative learning experience."

The EAHCP is proud to welcome Dr. Sharp to his next adventure.

You can read more about Dr. Jack Sharp at this link.

https://www.jsg.utexas.edu/researcher/john_sharp/

EAHCP Steward Short Takes

EAHCP Steward Moving to Monthly Publication

Editors Note: In 2019, the EAHCP Steward will be published monthly. We will continue to include feature stories along with the popular audio interviews, plus we'll be adding some short news takes. As always, feel free to send us your comments and please be sure to share with your colleagues.

EAHCP Implementing Committee Meetings to be Held at EAA

In 2019, all Stakeholder and Implementing Committee meetings will now be held in the EAA Board Room in San Antonio. This move has been made to take advantage of the EAA's larger meeting space and ability to live stream meetings. Those capabilities will help increase program transparency and accessibility. Additionally, packets and presentations will now be distributed using the Granicus system. During this transition, documents will also be made available on the EAHCP website as committee members get adjusted to the new system. These public meetings can be viewed at this link.

More information on this update will be shared at the January 24 Joint Stakeholders and Implementing Committee Meeting.

EAHCP Welcomes New Executive Committee Members

With the start of the year, the EAHCP Implementing Committee will be led by a new executive committee. Here are the appointments.

Chair - Mark Enders (CONB)

Vice Chair - Roland Ruiz (EAA)

Secretary - Robert Mace (TXST)

EAHCP Calendar for 2019

January 24 - Stakeholders Committee/Implementing Committee at EAA

February 21 - Implementing Committee at EAA

March 21 - Implementing Committee at EAA

May 23 - Stakeholders Committee/Implementing Committee at CONB

October 3 - Stakeholders Committee/Implementing Committee at EAA

December 19 - Stakeholders Committee/Implementing Committee at EAA

Science Committee Meetings

March 27 - Wednesday - Location TBD

June 27 - Thursday - Location TBD

September 11 - Wednesday - Location TBD

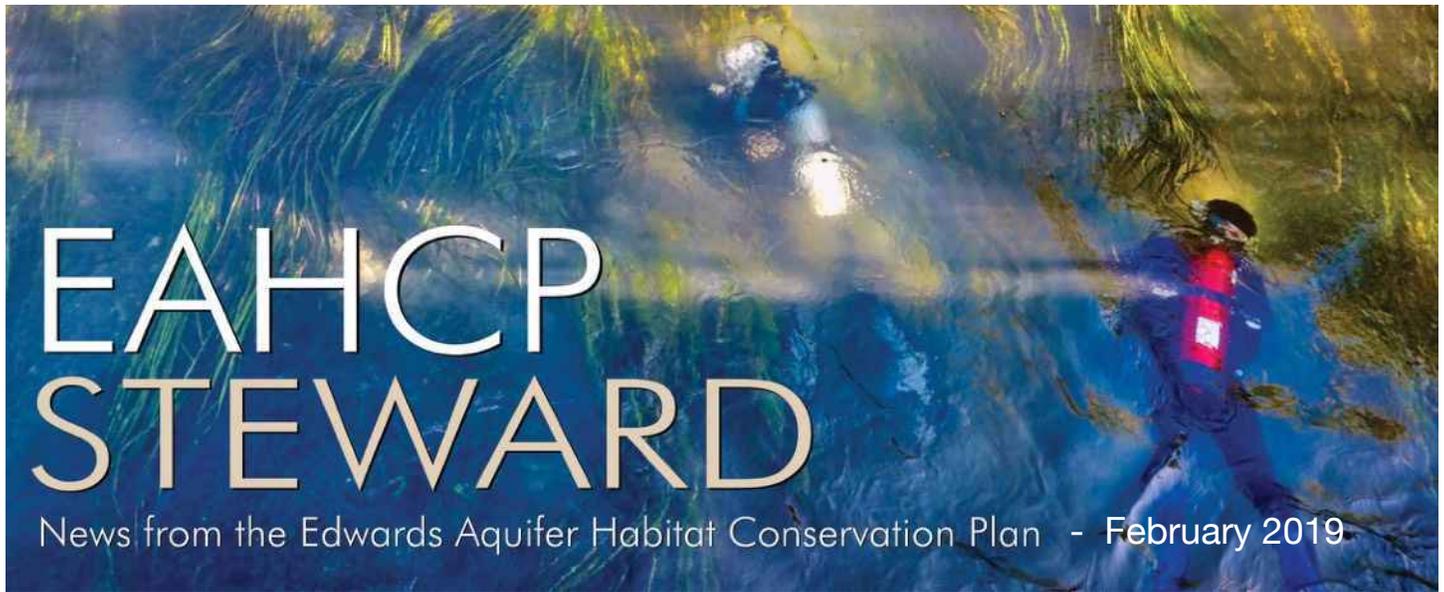
December 19 - Thursday - Meeting to be held at EAA

Sessom Natural Area Workday Scheduled for Feb. 9

The City of San Marcos has scheduled its next Sessom Natural Area Workday for Feb. 9, from 10 a.m. - 12 p.m.

Tasks include removing invasive ligustrum, constructing contour terracing, dragging small brush to be chipped, pulling invasive seedlings, broadcasting native seed and removing trash and other clean up items as needed. Tools will be provided. Please wear closed toed shoes.

The group will meet at Ella Lofts parking lot (817 Chestnut St). Pizza will be provided afterwards by our sponsor Pie Society. Please RSVP to Eric Weeks at eweeks@sanmarcostx.gov.



Reproduce to Reintroduce

New Research on San Marcos Salamanders and Texas Blind Salamanders Underway



One critical aspect of the Edwards Aquifer Habitat Conservation Plan (EAHCP) research program entails learning how to best capture endangered species from the wild and reproducing them in a refugia lab. That effort is meant to ensure there are plenty of Edwards Aquifer Region endangered animals held in captivity to reintroduce into the wild if a severe drought or other unforeseen disaster happened to wipe out the species now living in the protected habitats.

“We have some experience with

reintroducing the endangered fountain darters and Texas wild rice back into the wild, but we are really at the beginning of generating that body of knowledge about the San Marcos Salamander and Texas Blind Salamander,” said Dr. Lindsay Campbell, a U.S. Fish and Wildlife Service supervisory biologist and point person on the EAHCP refugia program. “This presents interesting challenges in collecting endangered salamanders from the wild and figuring out how best to maintain and reproduce them in the lab.”

Collecting the Texas blind salamanders involves catching them with traps or drift nets over springs. The research team members set traps in two different 30-foot Edwards Aquifer wells about a mile from the San Marcos refugia. After testing various types of traps, they settled on two heavy plastic minnow traps tied together with thread that will not degrade. The team typically works over a two-week period going out three days a week to lower and retrieve traps. They use small bits potato peels and pistachio nuts as bait to draw in the salamanders. San Marcos salamanders are collected by hand using divers at Spring Lake and snorkeling just below Spring Lake dam. Drift nets are employed at the diversion spring in Spring Lake.

“The food we use in the Texas blind salamander traps grows biofilm while it’s in the Edwards well, which then attracts the invertebrates the salamanders feed on,” said Kelsey Anderson, a Fish and Wildlife Service biological science technician working at the San Marcos refugia center. “We only keep one out of three blind salamanders we catch in traps. That is a limit we placed on ourselves in order to be conservative with our preservation efforts. We just don’t know enough about these salamander population numbers to be too aggressive in taking them out of the wild at this point. However, when we collect Texas blinds in a drift net that are shot out an aquifer spring, we take 100 percent of those thinking that they will not survive in the lake or river environment.”

Once the salamanders have been captured and quarantined to ensure their health and the health of other salamanders in the lab, the fun and interesting work begins. The lab is now tagging the salamanders to set a baseline of information from the date they were placed in their new homes. The tagging system is based on colors and helps team members quickly identify males from females and then monitor their growth and habits over time.

Campbell explained that the long-term goal is to have 500 San Marcos Salamanders and 500 Texas Blind Salamanders on hand for reintroduction if that is ever needed. The current reintroduction strategy would be to release 50 individuals per stocking site with the goal of 500 total individuals released and monitored during the first stage of reintroductions.

“One of the things you quickly learn about this research is that there are many details you have to know before you ever get to that point of reintroduction. For example, if we needed those salamanders to be 30 centimeters in length for reintroduction, we need to learn how long it takes for them to grow into that length. Then you take another step back and figure out what the survival rate is of salamanders to that life stage to calculate how many salamanders you would need to hatch to get to the target number of individuals at 30 cm. Then you calculate how many clutches of eggs it would take to get your target number to hatch and how long it would take to produce that many clutches. Another step back informs you about the whole husbandry process. So, really, we’re just beginning to refine this knowledge of our salamanders and put more solid parameters on the estimates from the past.”

The first part of the team’s husbandry research on San Marcos salamanders showed that the males can be very persistent in the pursuit of a female who is ready for the “courtship dance.” Given that new knowledge, they will be placing the males and females together in groups, but will be removing the males after 48 hours to reduce the potential stress on females. The females typically oviposit eggs about a month after mating has occurred, and the team has observed clutches of eggs numbering anywhere from seven to 73 eggs.

“Our team of young scientists are extremely engaged and enthusiastic. We learn new things each day and then have to assemble those bits of information into sound science we can pass on to other researchers and the EAHCP team,” Campbell concluded. “We feel positive that this research will lead us to knowing as much about these endangered species as we do now know about others protected by the EAHCP.”

Short Takes

EAHCP Implementing Committee February Meeting Canceled

The February 21 Implementing Committee Meeting has been cancelled. The IC will reconvene at their regularly scheduled meeting on March 21st at 10 a.m. at the EAA.

And just a reminder, all Stakeholder and Implementing Committee meetings will now begin at 10 a.m. rather than the previous 9 a.m. start time.

Great Texas River Clean Up in San Marcos Scheduled for March 2

The 2019 Great Texas River Clean Up in San Marcos is Saturday, March 2nd. Registration will begin at 8:30am at your clean up location's headquarters and the clean up will begin at 9 am. Lunch and a free T-shirt will be provided.

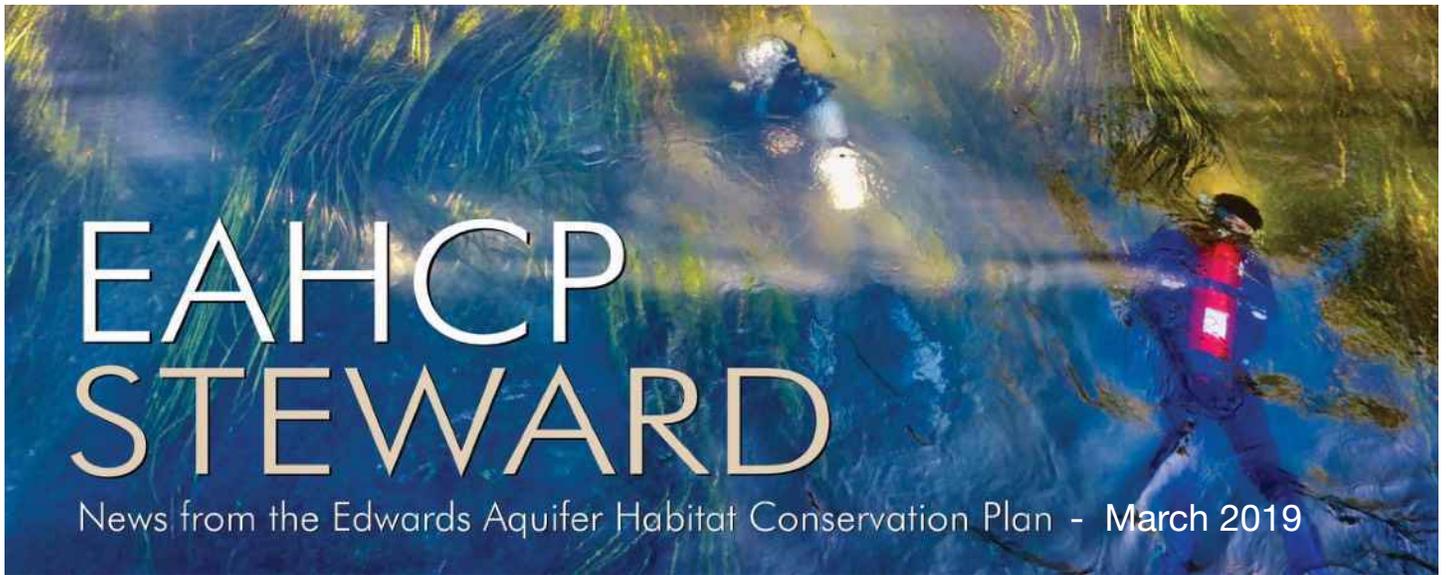
T-shirts are available on a first come, first serve basis. If you want your size, make sure to show up early. Please carpool if you can and if you would like to, bring a filled water bottle.

Refugia Sneak Peek

You can get a sneak peak at some of the new tanks in the San Marcos Refugia which will be home to many of the endangered species the EAHCP is designed to protect. [Click here for more info.](#)

EAHCP Implementing Committee Meetings to be Held at EAA

In 2019, all Stakeholder and Implementing Committee meetings will now be held in the EAA Board Room in San Antonio. This move has been made to take advantage of the EAA's larger meeting space and ability to live stream meetings. Those capabilities will help increase program transparency and accessibility. Additionally, packets and presentations will now be distributed using the Granicus system. During this transition, documents will also be made available on the EAHCP website as committee members get adjusted to the new system.



Keep it Clean

Meet the New EAHCP Habitat Conservation Manager Jamie Childers



Many people spend their first years in college listed as an “undecided major.” Not Jamie Childers. She knew from an early age that she somehow wanted to be involved in protecting the water resources so critical to communities all over the world. She credits her grandmother for that particular inspiration.

At a young age, Childers, the Edwards Aquifer Habitat Conservation Plans’ (EAHCP) new habitat conservation manager, heard many stories about waterways in Belgium where her grandmother grew up which were polluted and

caused sickness in towns nearby. As a young adult, her first stop in addressing that passion for clean water was Colorado State University where she earned a bachelor of science degree in Watershed Science. After graduation, she began her professional work in environmental science. Currently, she is pursuing a master of science degree in Natural Resource Policy and Administration from the University of Florida.

“Although I’ve been involved in water resources planning and environmental protection efforts over the past 18 years, I am truly excited to join the EAHCP team,” Childers said. “This opportunity, I believe, will bring me back to my original goals of working in water quality protection. I’ve been learning a great deal about the Edwards Aquifer, the endangered species and habitats in my first month with the EAHCP. I have already gained a deep appreciation for the amazing work that has been done to protect this unique aquifer. It offers exciting professional challenges that I’m anxious to dig deeper into.”

Before coming to San Antonio a year ago, Childers worked with Tetra Tech, a global environmental engineering company, and was involved in an environmental project regarding the Florida Everglades Agricultural Area.

She was a member of a large project management and technical team charged with studying the impacts of a potential 240,000 acre-foot storage reservoir that collects water from Lake Okeechobee.

“Most people know something about the special nature of Florida’s Everglades,” Childers noted. “Our team was brought in to ensure the project work was done consistently with US Army Corps of Engineers’ policies and guidelines. The twist on this project, though, was the timeline. A typical project like this would take three years to finish. We were asked to get it done in six months. Consequently, we had a huge team and worked nonstop. In addition to my project management contributions, I worked closely with the South Florida Water Management District’s modelers and biologists to quantify the environmental and cost benefits of alternatives being considered.”

Prior to her work in Florida, Childers worked on and managed several National Environmental Policy Act programs including two large water resources environmental impact studies for the Southeastern “water wars.” Additionally, she managed technical staff in the development of watershed, hydrodynamic and water quality models for various rivers, lakes and estuaries in the Southeast.

“The watershed studies I worked on ranged in size from 18 square miles to more than 43,000 square miles,” Childers explained. “We were responsible for developing and managing the databases required to store and organize biological, water quality and water quantity data. I know that technical experience will be very helpful in my work on the EAHCP as there is some excellent research occurring here.”

In addition to the technical aspects of her profession, she is an advocate for engineers and scientists understanding they have roles as educators too. Her current studies include a focus on the means for conveying complex water resources issues to nontechnical stakeholders.

“I know this has been said before, but I truly believe that water is life,” Childers said. “And that means everyone should know how important protecting our water resources is to the future of all communities. Historically, technical folks share their work within their own community of professionals. Today, there are so many new and exciting ways to tell the world about what we’re finding, studying and concluding. It’s important that we make time to communicate our work in ways that engage all the users of the Edwards Aquifer. The Edwards Aquifer Authority and the EAHCP are rare gems in the world of aquatic habitat conservation. It’s not that often that a group of scientists and technicians have the resources and commitment to implement a habitat conservation program of this scale. That’s a big story for not only the Edwards Aquifer Region but for those in other parts of our country who might be working on HCPs of their own. I’m looking forward to sharing this unique work with both technical and nontechnical people.”

No one can be sure if Jamie Childer’s grandmother thought her stories about water in her homeland would make such an impact on her granddaughter. But, we do know she would be quite proud of how those memories shared helped shape Jamie’s life into one now passionately engaged in producing a healthy planet.

Short Takes

Make Plans to Attend San Marcos Sustainability Fair

On April 6, 2019 City of San Marcos Sustainability Fair and Live Plant Sell. This event is intended to bring local environmentally-minded organizations together and showcase skills to live a more sustainable lifestyle. You can find out more information by going to: www.SanMarcosTx.gov/DiscoveryCenter.

Refugia Sneak Peek

You can get a sneak peak at some of the new tanks in the San Marcos Refugia which will be home to many of the endangered species the EAHCP is designed to protect. [Click here for more info.](#)

EAHCP Implementing Committee Meeting Set for March 21

A meeting of the Edwards Aquifer Habitat Conservation Plan (EAHCP) Implementing Committee will be held Thursday, March 21, 2019 at 10 AM in the Edwards Aquifer Authority Board Room, 900 E. Quincy St., San Antonio, TX, 78215.

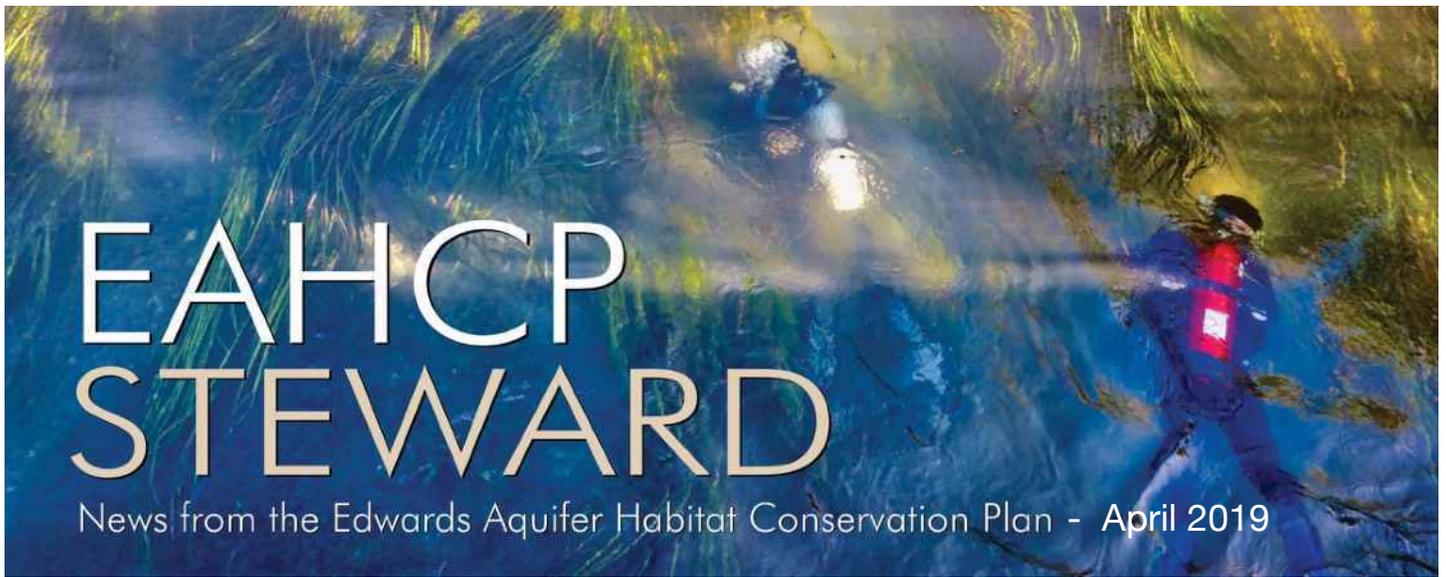
EAHCP Science Committee to Meet on March 27 in San Marcos

The EAHCP Science Committee will meet on March 27 at the San Marcos Recreation Hall. The meeting will begin at 9 AM.

You can find out more information about the San Marcos Recreation Center at this link.

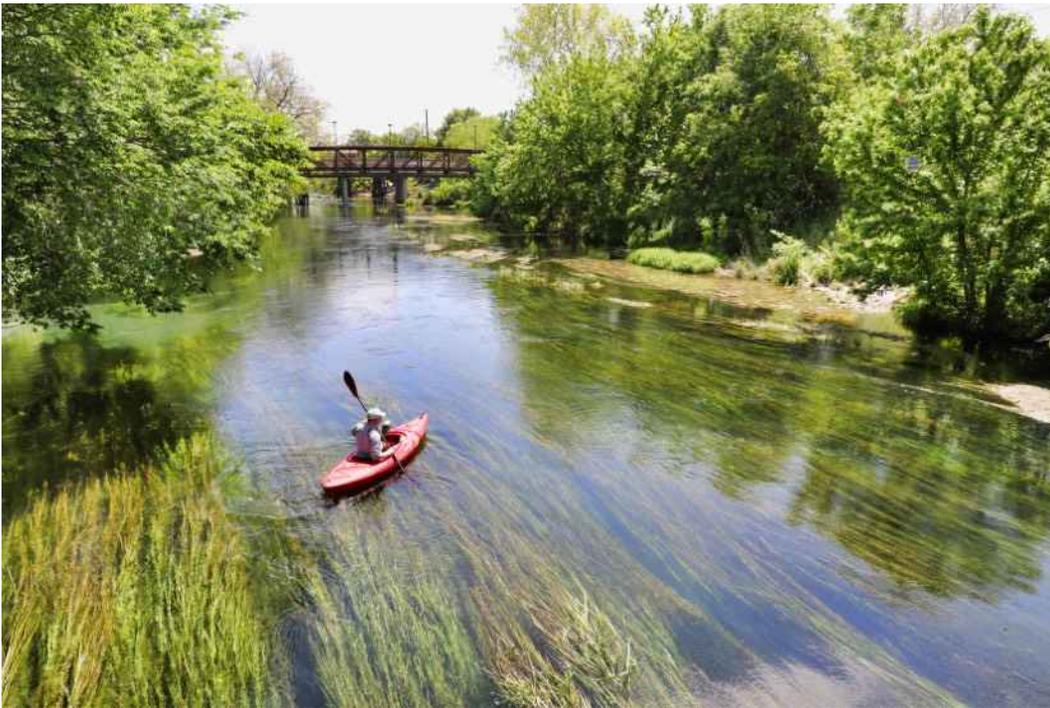
Quick Reminder

In 2019, all Stakeholder and Implementing Committee meetings will now be held in the EAA Board Room in San Antonio and begin at 10 AM. This move has been made to take advantage of the EAA's larger meeting space and ability to live stream meetings. Those capabilities will help increase program transparency and accessibility. Additionally, packets and presentations will now be distributed using the Granicus system. During this transition, documents will also be made available on the EAHCP website as committee members get adjusted to the new system. These public meetings can be viewed at this link: . These public meetings can be viewed at this link.



Putting Native Vegetation on the Map

EAHCP Completes Five Year Cycle for Monitoring Vegetation



“It was a sizable task, and maybe a bit of a brain tease at the start.”

Those few words from Casey Williams, a BIO-WEST biologist, gives you an idea of the thoughts running through his mind as he launched his kayak into the San Marcos River to begin mapping the submerged aquatic vegetation (SAV) of the entire San Marcos and Comal River systems.

“I had been doing some spot [SAV] mapping in the river systems before the Edwards Aquifer Habitat Conservation Plan (EAHCP) five-year program began in 2013,

but thinking about getting through the entire San Marcos and Comal Rivers was a new hill to climb,” Williams said. “It wasn’t just the magnitude of the effort, but I also wanted to make sure that the final product was beneficial to the EAHCP team members.”

The 2013 SAV mapping effort set the baseline for future years so the EAHCP could monitor progress in removing non-native plants in the system and replacing them with native species. The planting of native vegetation was expected to have a reciprocal positive impact on the endangered species living in the river systems, as well as the general health of the overall ecosystem.

To create the map, Williams would head out in a kayak with his portable GPS system, paddle around a patch of plants and record the GPS coordinates into his device. In addition to the plant location information, he would make notes of the plant mix there and the total area of the patch. Knowing the size of each patch also helped program managers know how much natural habitat could be restored.

“When we started in the Comal River, the entire riverine area was covered with the non-native *Hygrophila*,” Williams explained. “It was very dense and looked like huge swaths of muck in the river. In some places, it controlled the river from bank to bank. In San Marcos, we found huge areas of elephant ear plants and *Hygrophila* as well. So, after five years of mapping this area and observing EAHCP programs to reinstate native plants, the two river systems look very different from the first day I put my kayak in the water back in 2013. The elephant ears are gone and the endangered native Texas wild-rice has really grown beyond what I anticipated.”

Kristy Kollaus, EAHCP Environmental Scientist, has also witnessed the native vegetation improvements and stated that this whole process has helped the EAHCP team members adapt to new findings.

“One of the things we learned from reestablishing native plants in the river systems is that some native species fare better in certain locations than others,” Kollaus noted. “That could be attributed to species habitat preferences and changes in available habitat from year to year as well as other factors, but when we do observe these outcomes, we change strategies in an effort to maximize native vegetation expansion to improve habitats for the endangered species. We have even learned new planting techniques that help certain species of plants thrive. For example, we’ve planted *Sagittaria* in front of *Ludwigia* in order to slow the flow of water which the *Ludwigia* prefers.”

Both Williams and Kollaus commented on the positive improvements of Texas wild-rice in the San Marcos River. From 2013 to 2018, Texas wild-rice has expanded an estimated 5,914 square meters, a 240 percent increase, through planting and natural expansion. Overall, nearly 70 percent, 35,000 square meters, of the San Marcos habitat was covered with non-native plants in 2013. However, by 2018, that invasive plant covering had been reduced to 22,000 square meters.

“One very important aspect of this five-year mapping program is that we use the data to update the biological goal reporting we must provide to the U.S. Fish and Wildlife Service as part of our Incidental Take Permit, which is what governs the whole EAHCP program,” Kollaus stated. “We have to provide data on how our habitat restoration programs are effecting the endangered plant and animal species within both river systems. So, the detailed mapping program plays a key role in helping us document those stories.”

Looking forward, both Williams and Kollaus expect more progress in improving the San Marcos and Comal River systems. And while another drought or large flood scouring events could occur, both scientists are confident that the data mapping and field research from the past five years has them well prepared for either of those natural occurrences.

So, with this new knowledge and positive trend toward more and more native plants thriving in the San Marcos and Comal Rivers, could there one day be only native plants found in that ecosystem?

“It is improbable to think that we might someday have 100 percent coverage of native plants in this Edwards Aquifer fed ecosystem. We are really shooting to reverse the ratio of natives to non-natives,” Kollaus concluded. “As mentioned, non-natives dominated parts of both systems just five years ago and now that balance has been shifted and our progress should only accelerate over the coming years based on what we’ve learned in the last few years. We just want to give our native vegetation a fighting chance to flourish and it looks like we’re starting to win that battle.”

Short Takes on the Next Page

Short Takes

EAHCP 2018 Annual Report Available

The 2018 EAHCP Annual Report is ready for download. [Click here for more info.](#)

EAHCP Implementing Committee Meeting Set for May 23 at City of New Braunfels City Hall

A meeting of the Edwards Aquifer Habitat Conservation Plan (EAHCP) Implementing Committee will be held Thursday, May 23, 2019, 10 AM, at the City of New Braunfels City Hall. [Click here for more info.](#)

EAHCP at San Marcos Sustainability Fair

The EAHCP team volunteered (Olivia Ybarra, left, and Kristina Tolman) at the City of San Marcos Sustainability Fair and Native Plant Sale on Saturday, April 6. Proceeds from the plant sale helped fund the



native plant demonstration beds and plant propagating program at the Discovery Center. EAHCP staff informed visitors of the habitat restoration and conservation activities occurring in the San Marcos River and Comal River systems as well as the goals, initiatives and accomplishments achieved by the program.

A huge thank you to Melani Howard, Eric Weeks, Conrad Chappell and the Discovery Center staff for hosting such a successful event.

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - May 2019

Tip of the Spear

Atlas Environmental Leads the Way on Nonnative 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 nonnative 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 nonnative 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."

The targeted nonnative 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 harm these nonnative 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 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 in 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 nonnative 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."

Editor's Note: See Short Takes below for organizations you can get volunteer with to help EAHCP.

Short Takes

EAHCP Implementing/Stakeholder Committees Meeting Set for May 23-New Braunfels

A joint meeting of the Edwards Aquifer Habitat Conservation Plan (EAHCP) Implementing Committee and Stakeholder Committee will be held Thursday, May 23, 2019, 10 AM, at the City of New Braunfels City Hall.

Many Thanks to the EAHCP Science Committee Chairs

Science Committee Chairs Jacquelyn Duke and Chad Norris agreed to pose for an *EAHCP Steward* photo at the last Science Committee meeting in San Marcos. Thanks guys for your support and leadership.

The next Science Committee meeting is scheduled for Thursday, June 27, 10 am, at the San Marcos Aquatic Resources Center.



Volunteer Opportunities

We hope you enjoyed the article on Atlas Environmental above. As Nick Menchaca mentioned, there will be a spear fishing tournament coming up in November, which are like volunteer opportunities to help remove nonnative fish from Landa Lake.

Here are some other groups you might consider contacting to volunteer to help the EAHCP keep the Comal and San Marcos Springs and Rivers clean.

New Braunfels

Headwaters at the Comal Springs - www.headwatersatthecomal.com

Comal County Master Gardeners - www.txmg.org/comal

Comal County Master Naturalists - www.comal.agrilife.org/master-naturalists

Comal Trails Alliance - www.comaltrails.org

Native Plant Society of Texas-New Braunfels Chapter - www.npsot.org/wp/newbraunfels

Native Plant Society of Texas - Lindheimer Chapter - www.npsot.org/wp/lindheimer/

Comal County Conservation Association - www.comalconservation.org

San Marcos

San Marcos River Foundation - www.sanmarcosriver.org

San Marcos Greenbelt Alliance - www.smgreenbelt.org

Hays County Master Naturalists - www.haysmn.org

Hays County Master Gardeners - www.txmg.org/hays

Discovery Center - www.sanmarcostx.gov/873/Discovery-Center

Conservation Crew - Email Eric Weeks at EWeeks@sanmarcostx.gov

EAHCP Steward YouTube Channel

Last month, we posted an underwater video pointing out some nonnative vegetation in the Comal and San Marcos Rivers. Here is the link to the EAHCP Steward YouTube Channel if you want to view that video again or download it. www.youtube.com/channel/UCeTnpcj35ZIC8JNF8I_7NgQ

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - June 2019

The “Eyes” Have It

Eyes of the San Marcos River Clean Up Group Growing a Following



Zach Halfin

If you read reviews from tubers on the San Marcos River, you'll be inundated with descriptions such as, "This beautiful river never ceases to impress me," and "Love the San Marcos River, the water is crystal clear and beautiful." After the City of New Braunfels implemented a can ban in 2013, a lot of the river recreation traffic shifted to the lower reaches of the San Marcos River near the City of Martindale. The increase in tubers also brought about a spike in trash. That problem caught the eye of Zach Halfin, Derek Lee and Nathan Lawrence, and so they took some bold steps to keep cans and other trash out of that stretch of river.

"After the can ban became effective in the City of New Braunfels, the lower portion of the San Marcos River got very busy," Halfin said. "A group of friends and I decided to start an organization that would focus on telling people to be responsible for carrying out any trash they brought to the river. At first, we were going to occupy a gravel bar, known as Shotgun Island, just above

Martindale, call ourselves the San Marcos Peaceful River Militia and patrol that area. But, we opted for naming our group the "Eyes of the San Marcos River" and sought to educate tubers about the importance of keeping the San Marcos River clean. Essentially we went with the carrot instead of the stick and that has worked out for us."

To illustrate that philosophy in action, Halfin explained that at the group's first official event, they grilled hot dogs and exchanged them for empty cans from tubers. But the group soon realized that people would give

them their trash when asked for it, and that the cookouts weren't necessary. Those trash collecting efforts have been so popular, that they now have a highly visited Facebook page, which gives them a means to solicit volunteers.

Halfin has lived in San Marcos for about 15 years. He is a graduate of Texas State University and now owns a landscaping business and is the Garden Manager of an 18-acre demonstration garden called "Thigh High Gardens." That acreage sits on the Edwards Aquifer recharge zone, not too far from the university.

"I have been an avid gardener since I was 18 years old, and it is what I studied in college," Halfin explained. "Our goal with this property is to create a sustainable homestead and also an educational center. For example, we have about 10 kilowatts of solar power installed and we are making steady progress each year in achieving goals that make the property a more sustainable model."

Halfin and the other founders of the Eyes of the San Marcos River are also moving toward making their group an official nonprofit organization. He described it as currently under-organized, but still effective in garnering volunteer support. However, they think that creating the nonprofit will give them better direction and the ability to bring some other resources to their own clean up events and others they take part in.

"Our focus now is to be on the river for major holidays, like the 4th of July during the summer heavy recreational months. We will talk to people about not littering and also do some clean up while we're out there. We let people know that most parts of the river are also people's back yards and that they should care about keeping the river clean. We also participate in two river-wide clean up events each year, sponsored by other groups, that are held in the spring and fall."

Halfin characterized their clean up events as hard work. Because they mainly work in the river and not along the banks, people are in the flowing water, navigating river bottom rocks and grabbing cans and other plastic from the river bed. Sometimes a volunteer will have to swim out to where the trash is. So, by the end of the event, people can be very tired and typically a bit sunburned. But, Halfin says they are clear about what type of work they're doing and still can get up to 50 people to attend.

In looking at trends over the last few years, Halfin says there has been some real progress in certain areas. "Overall, we've seen some improvements with tube outfitters providing mesh trash bags for people to use. In fact, over the past Memorial Day holiday, we saw more people with the mesh bags than those who didn't have them. We were there to hand out bags, but many people already had them."

"Our feeling is that most people don't want to litter, but they also don't come prepared to handle their trash," Halfin noted. "We often see people floating with their coolers, but no mesh bags for empty cans. They put the cans in the coolers or next to them in their tubes. Then, as a group of tubers go over some rapids, the cans, other trash, and personal items go everywhere. So over time, we want people to know how to manage their trash while still having a great time on the river."

If you are interested in finding out more about the Eyes of the San Marcos River group, Halfin says that their Facebook page is where the action is.

"The Facebook page continues to grow every year, and it is a great way for the public to keep up with activity on the San Marcos River. It has proved to be a great forum for ideas and conversations as well. We keep spam off of the page, but we let people air their opinions about whatever the issues affecting the San Marcos River are. We just ask that it happens in a constructive manner."

Short Takes

Volunteer Opportunities

We hope you enjoyed the article on the Eyes of the San Marcos River above. You can become a member of this group for only \$10 and you can connect with them on their [Facebook group](#).

Here are some other groups you might consider contacting to volunteer to help the EAHCP keep the Comal and San Marcos Springs and Rivers clean.

New Braunfels

Headwaters at the Comal Springs - www.headwatersatthecomal.com

Comal County Master Gardeners - www.txmg.org/comal

Comal County Master Naturalists - www.comal.agrilife.org/master-naturalists

Comal Trails Alliance - www.comaltrails.org

Native Plant Society of Texas-New Braunfels Chapter - www.npsot.org/wp/newbraunfels

Native Plant Society of Texas - Lindheimer Chapter - www.npsot.org/wp/lindheimer/

Comal County Conservation Association - www.comalconservation.org

San Marcos

San Marcos River Foundation - www.sanmarcosriver.org

San Marcos Greenbelt Alliance - www.smgreenbelt.org

Hays County Master Naturalists - www.haysmn.org

Hays County Master Gardeners - www.txmg.org/hays

Discovery Center - www.sanmarcostx.gov/873/Discovery-Center

Conservation Crew - Email Eric Weeks at EWeeks@sanmarcostx.gov

EAHCP Science Committees Meeting Set for Thursday, June 27 - San Marcos

A meeting of the Edwards Aquifer Habitat Conservation Plan (EAHCP) Science Committee will be held Thursday, June 27, 10 AM, at the San Marcos Aquatic Resource Center.



Resolution Signing

Pictured (left to right): Robert Mace (Stakeholder Committee Secretary), Mark Enders (Implementing Committee Chair), Scott Storment (Program Manager), Darcy Frownfelter (Implementing Committee Parliamentarian and General Counsel).

At the May 23, 2019 joint EAHCP Stakeholder and Implementing Committee meeting, Resolution No. 05-19-001 was signed effectively validating the transition to the second phase of the EAHCP program and confirming the Conservation Measures that will be implemented through 2028.

To view the Comprehensive Phase II Work Plan and Resolution visit: www.eaahcp.org/administration/adaptive-management/



San Marcos River Education and Awareness Event

The EAHCP Team volunteered at San Marcos River Education and Awareness Event to inform the public, locals, and river tourists the habitat conservation and restoration activities occurring in the San Marcos River.

Eight local organizations participated including the Blanco River Regional Recovery Team, Mermaid Society SMTX, The Meadows Center for Water and the Environment, TreeFolks, San Marcos River Foundation, the Eyes of the San Marcos River, San Marcos Greenbelt Alliance and Ecosystem Regeneration Artisans.

A special thank you to the San Marcos Lions Club for hosting such an important event!

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - July 2019

The “Grande Dam(e)” of San Marcos

Texas State University Begins Stabilization of the Aging Spring Lake Dam



The Texas State team, left to right, Barbara Delgado, Doug Bynum, Joel Trevino

Iconic. Historic. Beautiful.

Those are the words you hear most when talking about the area around Spring Lake Dam in San Marcos, Texas. Given the gravity of those descriptors, you clearly understand why Texas State University, which owns the structure, is focused on preserving the dam and all that it has created.

“Texas State purchased the land which encompasses Spring Lake back in 1994,” said Doug Bynum, Texas State University’s director of

facility operations. “The dam which creates Spring Lake was included in the acquisition and so we are responsible for maintaining it. We have been actively monitoring its structural integrity for years, but after the flooding in 2015, we knew we had to initiate actions to stabilize the dam. There was way too much seepage coming from the bottom of the structure and that was a very red flag for us.”

The dam was initially constructed in 1849 but researchers believe it was reconstructed at least once since that time. Historical records show that the current configuration and general appearance of the dam date back to 1909. The dam is composed primarily of rock fill and cedar post stabilizers with a clay liner on the upstream slope. Several large trees growing along the crest of the dam are thought to have been originally planted as reinforcement for the structure.

Spring Lake Dam - Continued

Spring Lake Dam creates unique social and biological resources, including providing habitat for eight federally-listed threatened and endangered species. Spring Lake and the area downstream of the dam contain high densities of fountain darter, San Marcos salamander and Texas wild-rice populations. Since 1945, glass-bottom boats tours have provided the public an opportunity to see the San Marcos River origin bubbling from the Edwards Aquifer and showcased the importance of water conservation, habitat preservation, and native species diversity.

Because of its historical significance, ecological importance, and educational value to the community and visitors alike, Texas State sought input from many stakeholders and regulatory authorities as it began the long road to dealing with problems with an eroding Spring Lake Dam. Bynum said they gathered as many of the regulatory agencies and stakeholders together after the 2015 flood to begin some sort of corrective construction project on Spring Lake Dam. The Federal Emergency Management Agency (FEMA) was already on the Texas State campus due to the flood damage there, so they were the first group Bynum's team approached. Then came the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Texas Department of Energy Management, Texas Commission on Environmental Quality and other local and regional stakeholders. The first meeting of the minds didn't make much progress until the roomful of representatives walked out to actually see the site in question. After a few minutes of observing what was physically happening to the dam, FEMA agreed to take the lead and to bring some financial resources to the table. The others sorted out their roles and the long process of preparation for construction began.

Bynum noted that this round of construction is only an interim solution to an immediate potential safety problem created by the dam's age and the significant flooding from 2015. He said Spring Lake Dam is not designed to meet modern standards. And given that fact, anytime the San Marcos River gets high stream flows from storm events, water overtops the dam and causes gradual deterioration. Plus, high flows have scoured the associated embankments and spillways.

"We know that a comprehensive solution must be undertaken in the future, but that will occur after this emergency stabilization project is completed," Bynum acknowledged. "Just getting to this construction was a long process because this location is biologically sensitive and historically significant. So, we were all very happy the day construction began. And it will be an even bigger cause for celebration when this project wraps up later this summer."

As Bynum mentioned, this project has had a detailed and focused approach to preserving endangered species and their habitats. Liza Colucci, with Zara Environmental, is the lead biologist on the project and concurs that the biological assessment and preservation efforts have truly been collaborative and meaningful.

"Because there is a [U.S.] Fish and Wildlife Service incidental take permit associated with this area, we have been working hand in hand with the Fish and Wildlife biologists in San Marcos to ensure we are protecting the endangered species before any heavy machines or workers enter the areas around Spring Lake Dam," Colucci explained. "In fact, this has been a great opportunity for Fish and Wildlife to collect some fountain darters and salamanders for the refugia located in San Marcos, which they are required to do each year as part of the Edwards Aquifer Habitat Conservation Plan. We have also been in regular contact with the Meadows Center [for Water and the Environment] at Texas State on protection of Texas wild-rice. Any time contractors are working in the water, we have a biologist there to inspect the area prior to work beginning. Everyone involved with the project understands our role and has been thoroughly supportive."

The biological team's responsibility is to ensure that the species are found and moved to other locations before work on the dam for the day is undertaken. They also monitor the turbidity and overall water quality in

Spring Lake Dam - Continued

the river near the dam as construction has progressed to make sure the species aren't inadvertently harmed by excess dirt or other debris running off from the construction site.

"Overall, I think things have progressed nicely so far," Bynum concluded. "We still have a few months to go, but with everyone pulling together, communicating well and headed in the same direction, we're confident that we can solve our near-term issues with Spring Lake Dam and then be ready to look at that long-term fix."

EAHCP STEWARD SHORT TAKES



Thank You Dianne Wassenich

At the Science Committee Meeting, Scott Stormont, EAHCP Program Manager, presented Dianne Wassenich the 2019 EAHCP Distinguished Service Award in recognition of her years of dedicated river stewardship, advocacy, and leadership. Congratulations, Dianne!



Science Committee Meeting

The next EAHCP Science Committee Meeting will be held September 11, 2019, at San Marcos Recreation Hall.

At the previous meeting, Science Committee members took some time to tour the EAHCP Refugia at the San Marcos Aquatic Resources Center. The group is watching how salamanders are tagged for identification purposes.

Volunteer Opportunities

Volunteer Restoration Diver – Texas

Volunteer Opening - Volunteer Restoration Diver - San Marcos, New Braunfels, Texas

Start Date - 07/01/2019

Last Date to Apply - 07/25/2019

Description - Volunteer divers will assist in aquatic restoration activities including removing non-native aquatic plants and planting native aquatic plants to improve habitat for the endangered fountain darter in the Comal River in New Braunfels, Texas. Volunteers will snorkel or dive along with aquatic technicians to carry out multiple tasks including planting, vegetation removal, aquatic gardening.

Qualifications - Please be SCUBA certified or other qualifications include life guard experience or strong swimming skills. -Volunteer should be comfortable working in and around water for long periods of time and able to lift 50 lbs -Please be located near San Marcos or New Braunfels Texas -Provide own equipment including snorkel,mask, dive booties, wet suit. -Volunteers should be interested in aquatic biology, restoration ecology and endangered species ecology. Please send short letter of interest to the below email.

Contact Person - Casey Williams - cwilliams@bio-west.com

More Information - <https://wfsciobs.tamu.edu/iobs/volunteer-restoration-diver-texas-2/>

Saturday July 20- Sessom Natural Area Workday

Where: Sessom Natural Area

Meet at Ella Lofts parking lot- 817 Chestnut - 6 spaces are designated for park users.

Time: 8-10am

Activity: removing invasive ligustrum, constructing contour terracing, dragging small brush to be chipped; pulling invasive seedlings, broadcasting native seed and removing trash.

Special Instructions: wear closed toed shoes; tools will be provided.

Contact: Eric Weeks (eweeks@sanmarcostx.gov) to volunteer

Here are some other groups you might consider contacting to volunteer to help the EAHCP keep the Comal and San Marcos Springs and Rivers clean.

New Braunfels

Headwaters at the Comal Springs - www.headwatersatthecomal.com

Comal County Master Gardeners - www.txmg.org/comal

Comal County Master Naturalists - www.comal.agrilife.org/master-naturalists

Comal Trails Alliance - www.comaltrails.org

Native Plant Society of Texas-New Braunfels Chapter - www.npsot.org/wp/newbraunfels

Native Plant Society of Texas - Lindheimer Chapter - www.npsot.org/wp/lindheimer/

Comal County Conservation Association - www.comalconservation.org

San Marcos

San Marcos River Foundation - www.sanmarcosriver.org

San Marcos Greenbelt Alliance - www.smgreenbelt.org

Hays County Master Naturalists - www.haysmn.org

Hays County Master Gardeners - www.txmg.org/hays

Discovery Center - www.sanmarcostx.gov/873/Discovery-Center

Conservation Crew - Email Eric Weeks at EWeeks@sanmarcostx.gov

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - August 2019

Turning Back the Tide

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



Aaron Hoot with EBR

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.

Essentially, riparian restoration reestablishes native vegetation along the banks of a waterway to prevent stream bank 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. 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.

Riparian Restoration - Continued

“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 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* sp., Chinese Tallow, Chinaberry, Arundo Cane and Elephant Ear.

According to EBR’s non-native removal statistics, approximately 900 *Ligustrum* sp., 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. 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.”

“Because there is a [U.S.] Fish and Wildlife Service incidental take permit associated with this area, we have been working hand in hand with the Fish and Wildlife biologists in San Marcos to ensure we are protecting the endangered species before any heavy machines or workers enter the areas around Spring Lake Dam,” Colucci explained. “In fact, this has been a great opportunity for Fish and Wildlife to collect some fountain darters and salamanders for the refugia located in San Marcos, which they are required to do each year as

Riparian Restoration - Continued

part of the Edwards Aquifer Habitat Conservation Plan. We have also been in regular contact with the Meadows Center [for Water and the Environment] at Texas State on protection of Texas wild-rice. Any time contractors are working in the water, we have a biologist there to inspect the area prior to work beginning. Everyone involved with the project understands our role and has been thoroughly supportive.”

The biological team’s responsibility is to ensure that the species are found and moved to other locations before work on the dam for the day is undertaken. They also monitor the turbidity and overall water quality in the river near the dam as construction has progressed to make sure the species aren’t inadvertently harmed by excess dirt or other debris running off from the construction site.

“Overall, I think things have progressed nicely so far,” Bynum concluded. “We still have a few months to go, but with everyone pulling together, communicating well and headed in the same direction, we’re confident that we can solve our near-term issues with Spring Lake Dam and then be ready to look at that long-term fix.”



Dos Rios Watershed Clean-Up Set for Sept. 21

The City of New Braunfels, with the help of local partners and sponsors, is hosting the 3rd Annual Dos Rios Watershed Clean-Up on Saturday, September 21st from 9 AM until noon. In case of inclement weather on September 21st, October 5th has been selected as a rain date for the event. This year the City of New Braunfels is partnering with Headwaters at the Comal. The Headwaters at the Comal grounds will be our morning meeting location, a clean-up location, and where everyone will meet for lunch once the clean-up has wrapped up. [You can read more about the event and sign up for activities at this link.](#)



San Marcos Dam Update

Last month, EAHCP Steward did a feature story on the construction work happening at the San Marcos Dam near the San Marcos Springs. The photo above shows that the work has been completed. Congrats to Texas State University for diligently pursuing shoring up of that historic structure in San Marcos.



SPLASH Festival in San Marcos Starts Sept. 11

The Mermaid Society of San Marcos serves as a catalyst for community engagement for the protection and preservation of the San Marcos River. Their goal is to help broaden awareness and to increase participation with various river protection efforts organized by city and community groups.

Since 2016, the Mermaid Society of San Marcos has staged the SPLASH Festival. It includes festivities, symposiums and events throughout two weeks in

September. It culminates with the Mermaid Art Ball, the Downtown Mermaid Promenade - a parade through the city - and the Mermaid AquaFaire, a Riverside celebration for all.

[You can read about all of the SPLASH Festival events here.](#)

Volunteer Opportunities

Here are some groups you might consider contacting to volunteer to help the EAHCP keep the Comal and San Marcos Springs and Rivers clean.

New Braunfels

Headwaters at the Comal Springs - www.headwatersatthecomal.com

Comal County Master Gardeners - www.txmg.org/comal

Comal County Master Naturalists - www.comal.agrilife.org/master-naturalists

Comal Trails Alliance - www.comaltrails.org

Native Plant Society of Texas-New Braunfels Chapter - www.npsot.org/wp/newbraunfels

Native Plant Society of Texas - Lindheimer Chapter - www.npsot.org/wp/lindheimer/

Comal County Conservation Association - www.comalconservation.org

San Marcos

San Marcos River Foundation - www.sanmarcosriver.org

San Marcos Greenbelt Alliance - www.smgreenbelt.org

Hays County Master Naturalists - www.haysmn.org

Hays County Master Gardeners - www.txmg.org/hays

Discovery Center - www.sanmarcostx.gov/873/Discovery-Center

Conservation Crew - Email Eric Weeks at EWeeks@sanmarcostx.gov

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - September 2019

Profiling a Parasite

EAHCP continues to monitor Haplorchis parasite to protect endangered fountain darters

While it might be handy to have a biology degree to understand the life cycle of the *Haplorchis pumilio* parasite, you don't have to look very hard to see the type of damage it can do to a small fish like the endangered fountain darter. The question is, what are the chances that this parasite can impact the fountain darter population at the Comal and San Marcos Springs?

"We have known about the *Haplorchis* parasite being in Landa Lake for about 10 years now," said BIO-WEST, Inc. aquatic ecologist Brad Littrell. "However, we were focused on another parasite called

Centrocestus formosanus, thinking that it was a greater problem for the fountain darter. As we studied *Centrocestus*, we came upon *Haplorchis* and have continued to carefully document the concentrations of the free-swimming parasites in the water as well as concurrently monitor the fountain darter populations."

The Edwards Aquifer Habitat Conservation Plan (EAHCP) is currently in its sixth year of implementation and its numerous programs are designed to protect, enhance, and conserve the Comal and San Marcos Springs systems where endangered species, like the fountain darter, inhabit. BIO-WEST, Inc. is the biological consulting group working with EAHCP partners to implement riparian and aquatic restoration efforts in these systems. In addition to spring and habitat protection programs, there is a robust biological monitoring program that not only assesses the effectiveness of the conservation activities but can quickly adapt to assess emerging issues like parasite problems.



Brad Littrell in lab measuring concentration of parasites in a water sample.

***Haplorchis* parasite - Continued**

It is thought that the *Haplorchis* parasite was introduced to the Comal River, San Marcos River and other aquatic environments in the region by people dumping aquariums with exotic snails in rivers. The red-rimmed melania snail, *Melanooides tuberculata*, is a favorite for home aquariums due to their bright colors. However, that snail, which comes from Asia, is the perfect host for exotic trematode parasites. The adult

parasites, or flukes, live in the intestine of a fish-eating bird. Parasite eggs can be contained in bird droppings.

The parasitic cycle has host and intermediary stages. Infestation begins when the host snail eats the eggs and the parasites transform in the snail. Eventually, the infected snail will release a microscopic, free-swimming form of the parasite called a “cercaria.” The cercaria will then find fish to infect, and that is where the trouble begins for the fish.

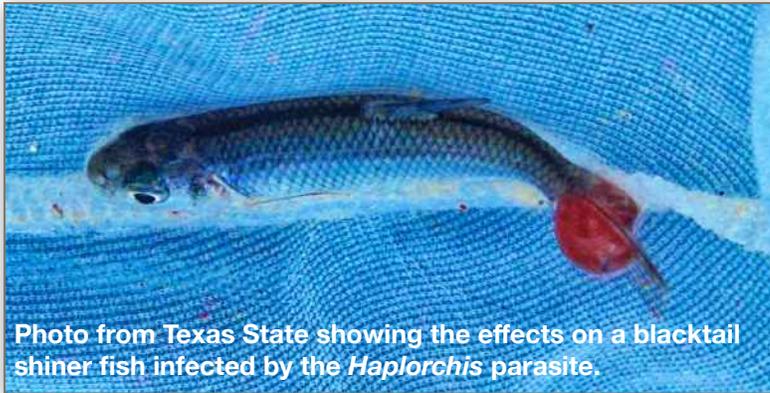


Photo from Texas State showing the effects on a blacktail shiner fish infected by the *Haplorchis* parasite.

The *Haplorchis* parasite targets and infects the soft tissue surrounding the fin areas of fish. Under high densities, the parasite can greatly reduce the ability of the fish to control its fins and jaws. That makes it more difficult for the infected fish to find food and makes it easier prey for other fish. Laboratory studies have shown very high concentrations of the parasite in fish can cause them to die within days.

“Dr. David Huffman, a parasitologist, and graduate student Allison Scott at Texas State [University] are currently doing some focused research on the *Haplorchis* parasite and its potential impacts to the fountain darter,” said EAHCP Chief Science Officer Dr. Chad Furl. “We are sharing our data with them and we are interested to see how things develop with their work, which should be completed over the next several months. While we know *Haplorchis* infects fountain darters in the wild, our bio-monitoring studies over the last several years show that the populations of fountain darters are robust and stable. So, that’s good news. However, you always have to be vigilant about the potential for parasite populations to grow as well. And we are watching this very closely.”

According to Dr. Huffman, Texas State University’s research will include elements of lab experiments as well as testing in the wild. Researchers are planning to infect fish at various concentrations and measure the impacts. In preliminary studies, researchers found that higher concentrations of snails in the Comal River also produced higher levels of the parasites, potentially infecting more fish in that particular area.

“One of the factors we must certainly be aware of is low flows in the Comal Springs,” Furl noted. “For the past year or so, above average rainfall has produced very high flows in the springs and higher flows amount to more dilution of water column cercaria. But, clearly we know that South Texas droughts are very common and so we need to be prepared for eventual low flows in the Comal Springs and how that could be a problem for parasites becoming more dense there as well.”

The Comal and San Marcos Rivers are not only homes for the fountain darter. They also sustain substantive recreational activities throughout the year. So, if the *Haplorchis* parasite is bad for the fountain darter, can there be any problems for humans who recreate in the Comal and San Marcos Rivers?

“The only way for humans to become infected with this parasite is for them to eat raw fish right out of the river that carries the *Haplorchis*,” Littrell confirmed. “So, there should be no worries with people having fun on and along the rivers. However, we should remind people who own aquariums that they should not be dumping them into wild areas like this. In fact, it is illegal to do so in New Braunfels for the reasons we’ve been talking about.”

EAHCP STEWARD SHORT TAKES

4th Annual River Guardianship Symposium a Success

On September 11, 2019, EAHCP Staff participated in the 4th Annual River Guardianship Symposium hosted by the San Marcos Mermaid Society. This year's panel discussions featured the topic of "Nature and Nurture: Cultivating Community Guardianship". EAHCP participated as an exhibitor along with 12 other local river stewardship and volunteer organizations. Additionally, Melani Howard, HCP Manager for the City of San Marcos, received the River Guardianship Honoree award. Congratulations Melani and a special thank you to the San Marcos Mermaid Society for hosting such an important event!

Dos Rios Watershed Clean-Up Set for Sept. 21

The City of New Braunfels, with the help of local partners and sponsors, is hosting the 3rd Annual Dos Rios Watershed Clean-Up on Saturday, September 21st from 9 AM until noon. In case of inclement weather on September 21st, October 5th has been selected as a rain date for the event. This year the City of New Braunfels is partnering with Headwaters at the Comal. The Headwaters at the Comal grounds will be our morning meeting location, a clean-up location, and where everyone will meet for lunch once the clean-up has wrapped up. [You can read more about the event and sign up for activities at this link.](#)

Sessom Workday in San Marcos - Sept. 28

The next Sessom Workday is scheduled for Saturday, September 28, from 8-10 am. Tasks include removing invasive ligustrum, constructing contour terracing, dragging small brush to be chipped, pulling invasive seedlings, broadcasting native seed and removing trash. Meet at Vie Lofts (formerly Ella Lofts) parking lot (817 Chestnut St). Parking will be available at six designated spots in the parking lot or along street. **Wear closed toed shoes.** Tools will be provided. Kolaches and coffee will be provided beforehand by our sponsor Dos Gatos Bakery. RSVP to eweeks@sanmarcostx.gov.

EAHCP Implementing and Stakeholder Committees to Meet in October

A meeting of the EAHCP Stakeholder and Implementing Committees will be held on October 3, 2019 at the Edwards Aquifer Authority at 10 a.m. As a reminder the meeting will be available to live stream at this link. <https://edwardsaquifer.legistar.com/Calendar.aspx>

Keep San Marcos Beautiful Sponsoring the 2019 Fall River Clean Up Oct. 5

The 2019 Fall River Clean Up is Saturday, October 5th! Registration will begin at 8:30am at your clean up location's headquarters and the clean up will begin at 9am. Lunch and a free T-shirt will be provided.

T-shirts are available on a first come, first served basis. If you want your size, make sure to show up early! Please carpool if you can and if you would like to, bring a filled water bottle. If you are volunteering in the Cottonwood Creek area, please wear waders or shoes and clothes you don't mind getting wet. If you are signing up as an organization, please sign up with your organization name, an appropriate email address, and number of people expected to attend. [You can find out more about the event at this link.](#)

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - October 2019

What's in "Store" for ASR

Aquifer Storage and Recovery a major component in protecting endangered species



In many ways, the Carrizo Aquifer in South Bexar County is like buried treasure. It has been sitting there, below the Earth's surface, for millions of years. And while it has supplied some drinking and agricultural water to a sparsely populated area of the county over the years, the real gold wasn't discovered until about 20 years ago. That's when the San Antonio Water System determined that the sand aquifer could be used to store water...a lot of water.

"The Aquifer Storage and Recovery (ASR) facility we operate has turned out to be quite the gem, not only for SAWS' water resource plans, but also for the Edwards Aquifer Habitat Conservation Plan (EAHCP)," said Patrick Shriver, SAWS Water Resources Project Coordinator. "Our pilot program from the late 1990s showed that the Carrizo Aquifer would safely hold about 20,000 to 30,000 acre-feet of water. However, more recent studies have put the total storage capacity as high as 230,000 acre-feet with a planning volume of 200,000 acre-feet. And that new storage number became a game changer for the entire Edwards Aquifer Region."

Aquifer Storage and Recover - Continued

Today, the SAWS ASR site, called H2Oaks Center, is the third largest aquifer storage and recovery facility in the nation. Storing water underground is environmentally friendly and is not subject to evaporation as is water found in a surface water reservoir. Additionally, water stored in a sand aquifer like the Carrizo Aquifer is less susceptible to contamination as compared to water stored in a traditional reservoir.

Early in the EAHCP's formulation, the SAWS ASR facility was targeted as a potential tool in the EAHCP's overall goal of keeping the Comal and San Marcos Springs flowing during a drought of record, which in turn



Jim Winterle, left, and Patrick Shriver show the agreements between EAHCP and SAWS that helped make the ASR facility a central component in protecting endangered species.

would help protect the endangered species living there. Once developed, the EAHCP's programs and projected outcomes gave the U.S. Fish and Wildlife Service (FWS) the confidence to issue what is called an "incidental take permit." That would allow the Edwards Region to continue pumping water from the Edwards Aquifer, albeit at lower

amounts, during a drought of record. But, how could the FWS be certain that the Comal Springs wouldn't go dry during a repeat of the drought of record (1949-1956) in which the water did stop flowing in 1956 for six months?

"Computer modeling, which is essentially very sophisticated number crunching, helped us determine how much water would continue to flow from the Comal and San Marcos Springs if we implemented the various springflow protection measures outlined in the EAHCP," said Jim Winterle, EAA director of modeling and data management. "While there was a very good groundwater model used to produce the first HCP, we've spent the last five years updating that original groundwater model. The first model only captured data from 2001-2011. However, we have added more data and refined data through 2015. The significance there is that we now have solid rainfall, water use and springflow data which were affected by a major drought 2011-2014 included in the groundwater model."

Winterle described the way the groundwater model runs various scenarios as a "bottom up analysis." That means his team runs the model first using a drought of record scenario with the entire Edwards Region pumping the full amount of water allowed by law. When that occurs, the springs go dry. Next, they layer on the springflow protection measure of water use restrictions implemented in Stages 1-4 in the drought management plan. That scenario also produces dry springs.

Aquifer Storage and Recover - Continued

The next step is to apply results from the EAHCP's Voluntary Irrigation Suspension Program Option (known as VISPO) and ASR Programs. The models show that after the ASR Program is added to the mix, the springs will continue to flow during a drought of record.

"I know this seems a bit complicated, but the main point people should know is that the ASR Program is the key component in helping us protect the endangered species in the driest of times and thus comply with the federal permit," Shriver said. "That really wouldn't be possible without that large water storage capacity the ASR affords SAWS and the EAHCP."

Early in the ASR Program's history, Edwards Aquifer water rights holders were paid to lease their water to the Edwards Aquifer Authority, which is a member of the EAHCP. SAWS would then pump that amount of water from their wells into the Carrizo Aquifer. Now that program has nearly reached its goal of storing 125,000 acre-feet of actual water (40.7 billion gallons) at ASR on behalf of the EAHCP, the ASR Program now is contracting with water rights holders to agree not to pump their water when certain aquifer conditions exist. So, during a drought of record, large amounts of water would not be pumped directly from the Edwards Aquifer as they are during normal periods. The significantly reduced pumping means that the Comal and San Marcos Springs will continue to produce the fresh water which supports the endangered species and their habitats.

"Now, just because SAWS had this great storage facility, it didn't mean that they would automatically give the EAHCP access to it," Winterle noted. "It took us a couple of years to work out a mutually beneficial operating agreement. At the beginning of the agreement, the EAHCP and SAWS teams would get together quarterly to assess operations and make adjustments as necessary. Now, things are running very smoothly and we don't need to meet quite as often. But, if we find ourselves in another extended dry stretch, the operating agreement calls for weekly meetings."

Both Winterle and Shriver acknowledge that the success of the ASR Program heavily depends on good science and good will between the EAHCP and SAWS. However, they also know that the good fortune of having access to the natural treasure of the Carrizo Aquifer made it all possible in the first place.



Saturday Oct 26 - Sessom Natural Area Workday

Where: Sessom Natural Area (meet at Vie Lofts parking lot- 817 Chestnut; 6 spaces are designated for park users)

When: Saturday, October 26, 9-11 a.m.

Activity: removing invasive ligustrum, constructing contour terracing, dragging small brush to be chipped; pulling invasive seedlings, broadcasting native seed and removing trash.

Special Instructions: wear closed toed shoes; tools will be provided.

Contact: Eric Weeks (eweeks@sanmarcostx.gov) to volunteer

ASR and VISPO Sign Up Deadlines Extended

The deadlines for signing up for the Voluntary Irrigation Suspension Program Options (VISPO) and the ASR Program have been extended to the end of this year. If you have Edwards Aquifer water rights permits to enroll, please contact Javier Hernandez at:

jhernandez@edwardsaquifer.org or 210-222-2204.

[You can read more about the ASR Program here.](#)

[You can read more about the VISPO Program here.](#)

EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - November 2019

Partnering to Prevent Pollution

EAA and SA Fire Department collaborate to protect the Edwards Aquifer



Chuck Ahrens and Michael Wagner (right) at a San Antonio Fire Department hazmat vehicle.

“Mulchie” started it all. Part of the Edwards Aquifer Region’s water lore is the massive mulch fire that ignited Christmas night in 2006 near Helotes. The mulch pile had been continually added to over a period of four years and had grown to an estimated 80 feet high and 800 feet long. From the distance, it looked like it could be another hillside in the Texas Hill Country. In the end, it cost about \$5.8 million and took three months to extinguish. Throughout the ordeal, the fire gained worldwide media coverage, was the subject of various poems and songs and earned that “Mulchie” nickname.

Aquifer Storage and Recover - Continued

The biggest issue with the process of snuffing out the fire was that the mammoth mountain of mulch sat on the Edwards Aquifer Recharge Zone. Consequently, the enormous volume of water being poured on the fire created a toxic stream of runoff. Due to the environmental issues at hand, the San Antonio Water System shut off the water to stop the potential for contaminating the aquifer.

“Needless to say, the whole mulch fire episode initiated new environmental concerns,” said Chuck Ahrens, the Edwards Aquifer Authority’s water resources director. “There was all kinds of smoke and ash in the air and we were all concerned with the contaminated runoff getting into the aquifer. And while there were a few wells in the area that showed some contamination from the mulch fire runoff, we were fortunate that the problem was not widespread and did not impact any public supply water wells. But, what we all learned



The Emergency First Responders Project is a collaborative effort of staff from various departments at the Edwards Aquifer Authority.

was that there needed to be some changes with how such fires are managed on the Edwards Aquifer Recharge Zone and how we monitor and address firefighting there. Mulchie was truly the impetus for the program we are implementing now with cooperation from the San Antonio Fire Department (SAFD) and other agencies.”

Ahrens explained that after the mulch fire incident, the State Legislature gave the responsibility for monitoring and mitigating potential impacts from firefighting water runoff to the Edwards Aquifer Authority. Initial efforts to create a program stalled a bit, but over the last several months, a new plan to track and develop programs to mitigate impacts from firefighting on the recharge zone has taken hold. The City of San Antonio provided a \$218,900 grant for analysis and training, the San Antonio River Authority stepped up to manage the funds and the Edwards Aquifer Authority (EAA), San Antonio Fire Department and Texas A&M University - San Antonio collaborated to put the program components together.

“Since the San Antonio Fire Department has a state-of-the-art hazmat program, we were already active in pollution prevention efforts that can be a part of fighting fires,” said SAFD Captain Michael Wagner. “However, when the EAA approached us about taking our efforts to the next level in protecting the Edwards Aquifer Recharge Zone, our leadership team welcomed the opportunity.”

Pollution Prevention - Continued

Texas A&M University - San Antonio staff then reached out to the Texas A&M Engineering Extension Service (TEEX) training school to enlist their knowledge in developing some best management practices (BMP) for the program. TEEX is home to some of the world's top training facilities for emergency preparedness and trains nearly 200,000 firefighters, Homeland Security officials, law enforcement and other emergency responders from around the world each year.

“The TEEX faculty is world class and we were thankful for their participation in helping us formulate a direction for the program,” Ahrens noted. “The EAA has also had regular meetings with the SAFD leadership group, and Captain Wagner in particular, as we try and understand how we can incorporate recharge zone protection BMPs for firefighters working in Northern Bexar County.”

The early research and series of meetings have produced significant goals for the program. The EAA will be visiting all regulated facilities located within the city limits of San Antonio and on the Edwards Aquifer Recharge Zone. The EAA's Small Container Rules require facilities that store more than 1,000 gallons of regulated substance in containers smaller than 500 gallons to submit facility maps and an inventory of regulated substances that are housed onsite. Using the facility maps and the regulated substance inventory, EAA staff plans to create a database that firefighters will have access to in case they have to fight a fire in the Recharge Zone. Additionally, the EAA will be creating an innovative site-specific GIS maps that will show firefighters the most environmentally sensitive areas of a given piece of property. The site-specific maps will also show firefighters which direction the water will run given the slope near facilities storing large quantities of possibly harmful materials.

“Having this type of information available as our units approach the scene of a fire will be invaluable to us,” Wagner said. “While our first priority is saving lives, we are also extremely conscious of protecting the environment. We can pour tens of thousands of gallons of water on a burning structure and we all know that the water has to go somewhere. If we can see that the runoff could enter a sinkhole or other recharge feature from that data the EAA provides, we can immediately set up berms and other containment materials to mitigate contamination of the aquifer.”

Through collaboration with the SAFD, EAA is already getting email notices about any fires occurring on the recharge zone. Ahrens said those notifications are not meant to trigger a water quality team from the EAA heading out to the fire, but more about having the opportunity to do some post-event water quality sampling.

“San Antonio firefighters are well trained and we are not going to get in the way of them doing their jobs. However, the open line of communications and data sharing will help both of us,” Ahrens concluded. “Our long-term goal is for comprehensive training on this issue to become a standard component for every new firefighter joining the SAFD. The Edwards Aquifer will always be an essential water supply for San Antonio and other communities around the region, so we need to ensure that we're taking every step we can to protect it from potentially contaminated runoff that can occur as firefighters do their jobs on the Edwards Aquifer Recharge Zone.”



EAHCP STEWARD SHORT TAKES

EAA Partners with Morgan's Wonderland to Build Education Center



Gordon Hartman, left, and Roland Ruiz show off a rendering of the new education center planned for the Morgan's Wonderland Camp.

The Edwards Aquifer Authority (EAA) announced a partnership with ultra-accessible™ Morgan's Wonderland Camp (MWC), a 102-acre recreational oasis on the northern outskirts of San Antonio that will year-round offer a summer camp-type experience to those with and without special needs. It has been of longstanding importance to the EAA to impart water wisdom by cultivating a curiosity for the life-sustaining groundwater system below our feet – The Edwards Aquifer.

“Our partnership with Morgan's Wonderland Camp will be manifested in the creation of the EAA Education Outreach Center,” said Roland Ruiz, EAA

General Manager. “It reflects the way we must approach our work moving forward – through inclusion, imagination, and innovation – if our legacy is to be a sustainable Edwards Aquifer for generations to come.”

The \$2.5 million EAA Education Outreach Center will encompass 3,500 square feet and feature unique learning experiences that will broaden imaginations through participation in innovative STEM opportunities with an inclusive mindset. The \$28 million, ultra-accessible Morgan's Wonderland Camp, which is slated for completion in the latter half of 2020, will be able to accommodate, at one time, up to 525 campers of all ages and abilities along with staff for day, weekend or week-long camp sessions.

Joint Committee Meeting Scheduled for Dec. 19

A joint meeting of the Stakeholders, Science and Implementing Committees is scheduled for Thursday, Dec. 19, 10 a.m., at the Edwards Aquifer Authority offices in San Antonio.

Sessom Creek Cleanup Day Happening Saturday, Nov. 23

The next Sessom Creek workday is scheduled for Saturday, Nov. 23, from 9 a.m.-11 a.m. Tasks for the day include removing invasive ligustrum constructing contour terracing, dragging small brush to be chipped, pulling invasive seedlings, broadcasting native seed and removing trash. Volunteers will meet at the Vie Lofts parking lot at 817 Chestnut St. Tools will be provided, and be sure to wear closed toed shoes for the day. Pizza will be provided at the end of the cleanup event. RSVP to eweeks@sanmarcostx.gov.

Trinity University Student Sarah Mock Interns with EAHCP

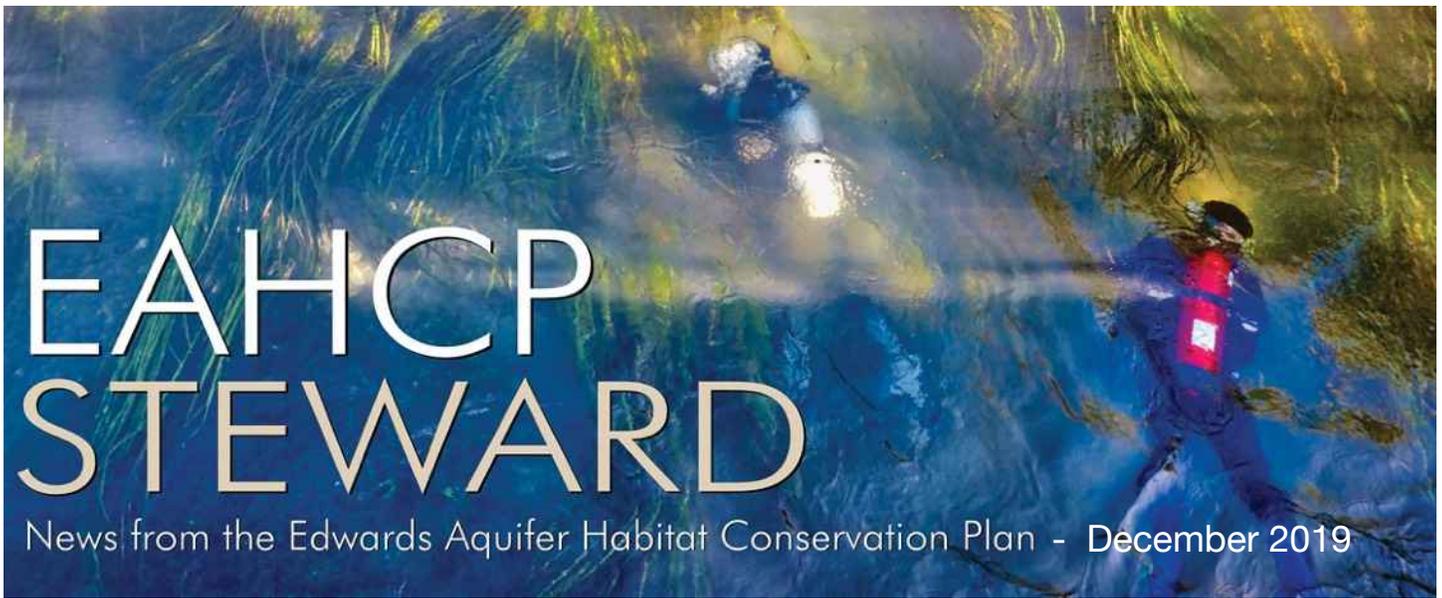
Trinity University student Sarah Mock earned one of the Edwards Aquifer Authority's sought after intern positions and will be working with the Edwards Aquifer Habitat Conservation Plan (EAHCP) team through the end of this semester. She is pursuing an economics and environmental double major and is scheduled to graduate next May.

Her work with the EAHCP includes managing administrative records, working on website updates, conducting a literature review on zebra mussels and learning some GIS applications. Additionally, she has had the opportunity to accompany some of the field teams to observe their work.

"I really enjoyed the outdoor work and learning about the various types of water quality testing and endangered species studies the contractors and staff are working together on," Mock said. "This opportunity has really given me, in just the past few weeks, a good idea of how I can use my degrees in the future. There is an impressive group of programs in just the EAHCP alone and I feel very fortunate to have the opportunity to get a first-hand look how they're being implemented to protect the endangered species."

LinkedIn: <https://www.linkedin.com/in/sarah-mock/>





Dream BIG

EAA Supports Big Brothers Sisters Mentoring Program



The Big Brothers Big Sisters (BBBS) program has a storied history. It has operated for 115 years going back to a juvenile court in New York City where Ernest Coulter, a court clerk, noticed that an inordinate number of fatherless boys were appearing before the judge. So, he gathered 50 volunteers to

mentor those boys and started a movement that is still growing and evolving today. And while that amazing story is worth knowing and telling, the true impact of the program is felt when you witness the connection between a mentor and a child and understand how a positive human bond can help shape both of their lives in a big way.

The program calls mentors “Bigs” and the children “Littles.” Big Brothers Big Sisters has learned that connecting “Bigs” with middle school children is the best opportunity for both the kids and mentors to bond. These are very formative years for the soon to be teenagers and a time when an adult can help create a solid foundation for them.

Aquifer Storage and Recover - Continued

“There are two main components to Big Brothers Big Sisters where you can be a mentor in a workplace scenario or in a community setup,” said Damon Childs, Edwards Aquifer Habitat Conservation Plan (EAHCP) contract administrator and a board member for Big Brothers Big Sisters of South Texas. “In the workplace program, you meet with your Little once a month typically during the lunch period. Contact with your Little is pretty much limited to that one hour for the month. The community facet of the program allows you to visit your Little a couple of times a month, take them places and communicate with them more freely. I’ve been fortunate to have participated under both sets of guidelines and I can say that helping young kids like that gives you a deep sense of satisfaction. I can only hope that I’ve given them as much as they’ve given me.”

Childs says that he got involved in BBBS right after he earned his undergraduate degree from the University of Texas at San Antonio. He was paired with an eight-year-old named Isaiah and stayed involved through BBBS until Isaiah aged out of the program at 21. They are still friends today. Isaiah, now 24, attended Child’s graduate degree ceremony and wedding as well. They’ve continued to keep up with each other’s lives and families as you might expect a bond created over 16 years would engender.



“Isaiah is a fine young man,” Childs said with a proud smile. “He’s in the telecom construction business and still trying to find his way a bit on a career path. He is smart and works hard so I have every confidence he will get where he wants to be in life.”

Shortly after becoming a “Big”, Childs was asked to be on the board for the South Texas Chapter of Big Brothers Big Sisters. He recalled that he immediately said yes and now has a decade of experience as an official with the organization. About a year ago, he decided to get the Edwards Aquifer Authority (EAA) involved in the BBBS workplace program.

“When Damon approached me about being a Big, I was a little hesitant about joining,” noted Latifah Jackson, a Contracts and Business Development Coordinator for the EAA. “I was wondering how I would relate to a sixth grader and what I might have to offer her. But it didn’t take too long before we got to be friends. Not long after I was paired with my Little, Mo’nay, her family moved to another part of the city. I didn’t want her to think that I was going to abandon her, so I decided to transition from the limited contact workplace format to the community part of Big Brothers Big Sisters where I will be able to spend more time with her and pick her up for outings and such. I just want to be there to support her and guide her the best I can.”

Pollution Prevention - Continued

Both Childs and Jackson explained that connecting with family members is extremely important to being a successful Big. Jackson said she regularly texts Mo'nay's Mom to keep up with their lives and Mo'nay's progress in school.

The EAA now has 17 Bigs who get to meet with their Littles, all from Jackson Middle School, once a month at the EAA. The Bigs and Littles share lunch, work on an activity together and have some on-one-on time before the Littles get back on the bus and head to school. These meetings give the kids an opportunity to discuss anything that is on their mind with the full attention of their mentors.

Jackson and Childs say they've noticed that some of the kids have picked up an interest in science after learning about the Edwards Aquifer and EAHCP program that helps protect the endangered species found in the Edwards Region.

On one particular visit, the group was given a 3D video presentation from the EAA Communications Department of the Edwards Aquifer. The kids got to experience what it would be like to navigate through a cave and learn about the geological features that exist right beneath us.

"Mo'nay was interested in animals and science when we first met," Jackson said. "She is now particularly interested in endangered species. She was surprised to find out that you don't have to go to some exotic location in the world to find an endangered species. We have them right here in our own back yard."

"It would be awesome to someday have one these kids be an intern at the EAA and maybe even find a job here," Childs noted. "Latifah says that sometimes you just have to plant a seed, care for it and good things will happen. I couldn't agree more with that sentiment and that's really the whole philosophy behind Big Brother Big Sisters. You never know who is going to inspire you. And after being a part of the program for so long, I know that inspiration works both ways between Bigs and Littles."



EAHCP STEWARD SHORT TAKES

Joint Committee Meeting Scheduled for Dec. 19

A joint meeting of the Stakeholders, Science and Implementing Committees is scheduled for Thursday, Dec. 19, 10 a.m., at the Edwards Aquifer Authority offices in San Antonio. If you have any questions or if you want to RSVP, just email eahcp@edwardsaquifer.org.

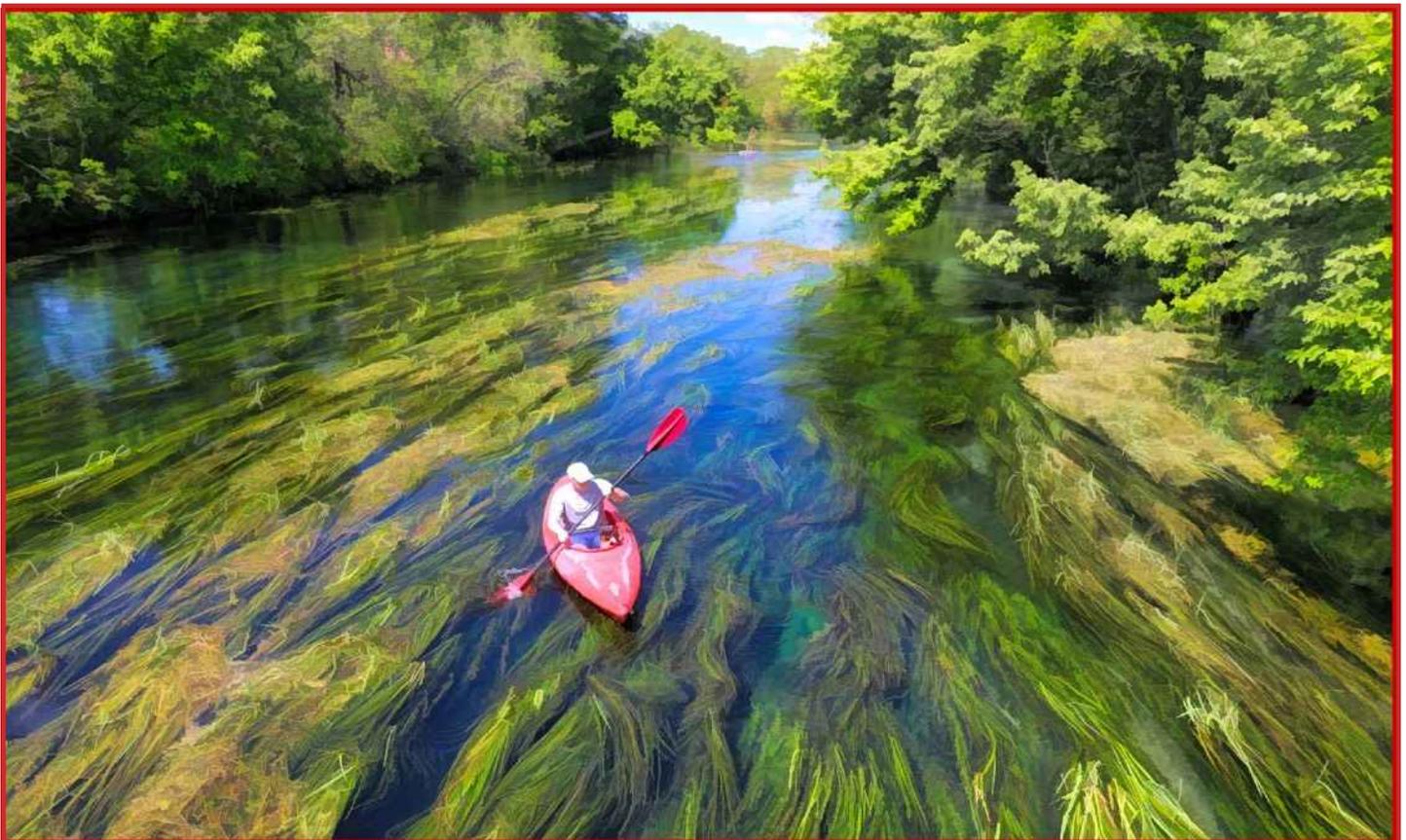
EAA Offices will be closed Dec. 24-26

Short Takes - Continued



Comal Springs Riffle Beetle Work Group Concludes Work for 2019

The Comal Springs Riffle Beetle Work Group completed its work for 2019. With several research efforts in the works for 2020, the committee will convene at the end of next year to review research results. Pictured left to right are: Conrad Lamon, Ken Ostrand, Butch Weckerly, Tom Arsuffi, and Chad Norris.



*Happy
Holidays*

*From your friends at the
Edwards Aquifer Habitat Conservation Plan*

APPENDIX H2
2019 *News Drop* Magazine
(Quarterly Publication)

Spring 2019 *News Drop* Magazine

Summer 2019 *News Drop* Magazine

Autumn 2019 *News Drop* Magazine

Winter 2019 *News Drop* Magazine

NEWS DROP

M A G A Z I N E

A QUARTERLY PUBLICATION

SPRING 2019



Edwards Aquifer Authority



Roland Ruiz - EAA General Manager

I am pleased to present the inaugural issue of the Edwards Aquifer Authority (EAA) NEWS DROP quarterly magazine!

We are introducing the NEWS DROP as a way to stay in touch with you and to share with you the work we do and, more importantly, why we do it. In each quarterly issue, we will bring attention to our latest efforts, programs, projects and key initiatives from throughout our service region.

We will bring you stories highlighting various aspects of our mission--everything from status updates on our Habitat Conservation Plan to the latest developments in other water conservation and aquifer protection and research initiatives.

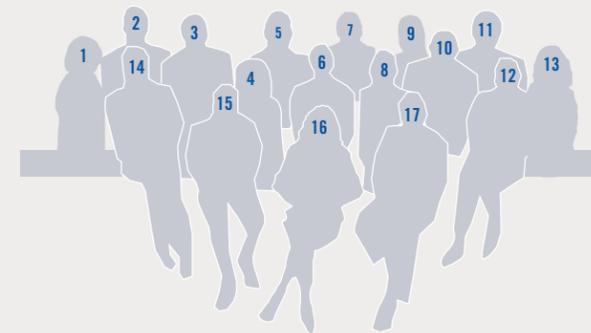
You also will learn about our non-profit support organization, the Edwards Aquifer Conservancy, and how individuals, community organizations, educational institutions, and businesses can partner with us to raise awareness, understanding, and support of our mission.

All this is part of a greater vision of tomorrow: one centered around an engaging EAA culture of service and collaboration connected by the common value we share in managing, enhancing, and protecting the region's primary water resource, the Edwards Aquifer, for today and for generations to come.

It is in this spirit that we invite you, our friends and neighbors, to learn more about the aquifer and consider how we can best work together to sustain and preserve it.

Hope you enjoy, and thanks for reading!

2019 EAA **BOARD OF DIRECTORS**



- 1. Carol Patterson, Dist. 1; 2. Rader Gilleland, Dist. 15; 3. Ronald Walton, Dist. 9;
- 4. Deborah Carington, Dist. 6; 5. Don Laffere, Dist. 14; 6. Enrique Valdivia, Dist. 7;
- 7. Scott Yanta, Dist. 12; 8. Gary Middleton, SCTWAC; 9. Rachel Allyn Sanborn, Dist. 11;
- 10. Ron Ellis, Dist. 5; 11. Byron Miller, Dist. 2; 12. Abelardo Salinas, Dist. 3;
- 13. Kathleen Krueger, Dist. 8; 14. Patrick Stroka, Dist. 10; 15. Clark Ward, Medina/Uvalde;
- 16. Luana Buckner, Dist. 13; 17. Ben Youngblood, Dist. 4

FEATURED STORIES | SPRING 2019

Inaugural Issue

3. THERE IS ONE UNIVERSAL CONSTANT ABOUT MONEY

The Edwards Aquifer Conservancy

5. WHEN A WELL ISN'T WELL AFTER ALL

Why is the Presence of Abandoned Wells so Critical?

7. WELCOMING SCOTT STORMENT

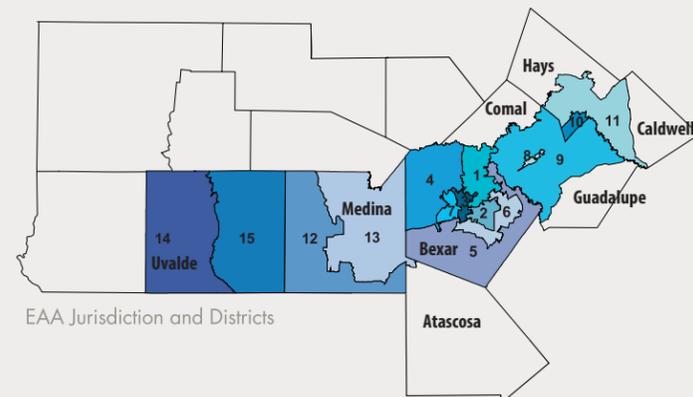
Habitat Conservation Plan's Newest Sr. Director

9. REPRODUCE TO REINTRODUCE

New Research on Endangered Species

11. GIVE AND TAKE

The Endangered Species Act and the "Taking" of Species



EAA Jurisdiction and Districts

There Is One Universal Constant About Money

— AND THAT IS, THERE NEVER SEEMS TO BE ENOUGH OF IT TO MEET EVERY NEED. HERE AT THE EDWARDS AQUIFER AUTHORITY (EAA), WE ACT AS RESPONSIBLE STEWARDS OF THE FUNDS ENTRUSTED TO US TO CARRY OUT OUR MISSION OF MANAGING, ENHANCING AND PROTECTING THE EDWARDS AQUIFER.



Ron Ellis - EAA Board Treasurer & EAC Chairman

The EAC has just completed a strategic plan and has established the primary funding goals for 2019 to be pollution prevention, STEM/Education outreach & scholarship, and water recharge enhancement. Within these goals, initiatives, such as the creation of a fund dedicated to addressing abandoned wells, can have a profound impact on the quantity, quality and general wellbeing of the water supply within the aquifer region.

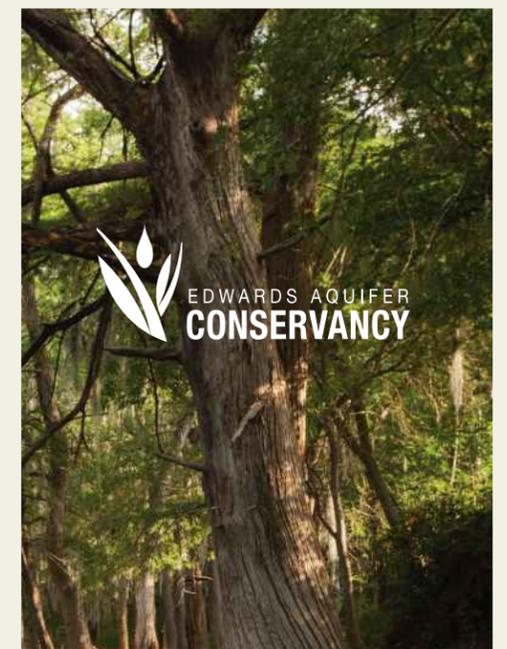
The EAC plans to escalate its efforts to raise awareness and share information about the Aquifer with potential financial supporters, and work to secure financial gifts and grants for these efforts. In time, the Conservancy could become a major source of funding for the EAA, and further advance the agency's mission beyond its current means.

EVERY DAY THE MEN AND WOMEN OF THE EDWARDS AQUIFER AUTHORITY (EAA) perform a myriad of tasks, ranging from administration to science research. The results of these collective efforts advance the mission in a truly meaningful way.

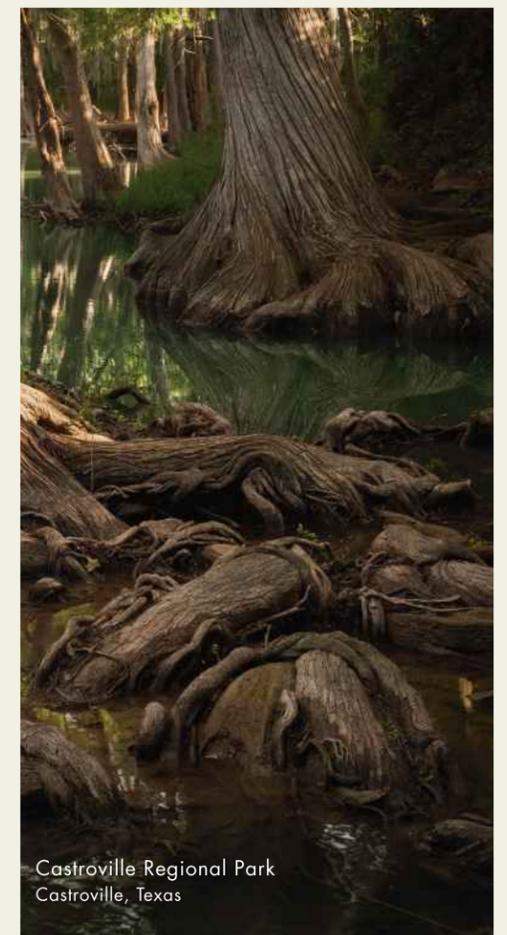
There are, however, opportunities just beyond the grasp of our annual budgets – prospects that, with the appropriate financial support could be realized and make the Aquifer that much more secure and productive. In 2014 the EAA established the Edwards Aquifer Conservancy (EAC) as a 501(c)(3) tax-exempt organization, to serve as a supporting organization for the EAA.

Specifically, the EAC is a fundraising entity, whose purpose is to seek financial support to supplement the costs of additional EAA initiatives and projects that would contribute to the sustainability and vitality of the Edwards Aquifer.

Since its inception, the EAC has received major funding from the CEMEX Company which supported an Education Excursion Program whereby educators were given exclusive access to aquifer-related locations and personal interaction with EAA staff geologists, hydrologists and biologists at no cost. And H-E-B underwrote the cost for a Virtual Edwards Aquifer Experience to be offered online to educators, students and the public. That experience can be accessed at www.aquiferium.org.



If you would like to learn more about the Conservancy, and how you can help, please contact Mike De La Garza at mdelagarza@edwardsaquifer.org, or Breanna Saucedo at bsaucedo@edwardsaquifer.org.



Castroville Regional Park
Castroville, Texas

When a Well Isn't Well After All

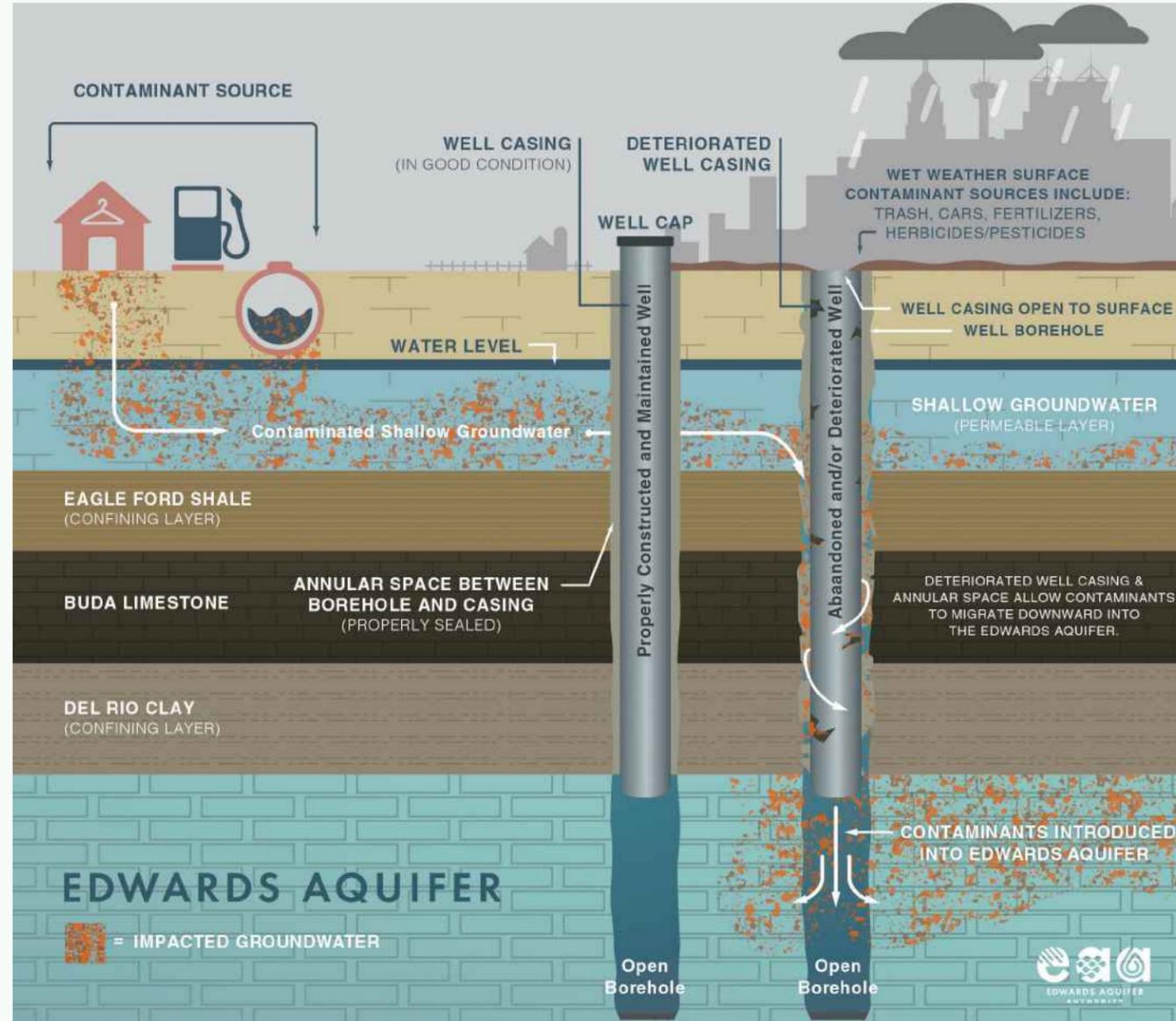


Illustration: "Potential for Edwards Aquifer Groundwater Contamination; Abandoned and/or Deteriorated Wells."

THE EDWARDS AQUIFER AUTHORITY'S PRIMARY MISSION IS TO MANAGE, ENHANCE, AND PROTECT THE WATER AND INTEGRITY OF THE EDWARDS AQUIFER. One of the primary threats it deals with are wells that have been abandoned, have not been properly maintained, or are in a state of deterioration. These wells represent a primary danger to the EAA mission and occupy a top-of-mind status.

There are approximately 300 abandoned wells within the EAA jurisdiction. Abandoned wells are defined as wells not physically or legally capable of making beneficial withdrawals; are not currently registered, and/or carry no official permit to operate.

When a Well Isn't Well After All [Cont.]

There are different approaches to fixing an abandoned well. It could be a relatively easy fix, or one that presents more complexity. Easy fixes include reconnecting power, installing a water meter for non-exempt wells, or simply registering the well itself. On the other hand, fixing an abandoned well due to deteriorated condition might necessitate a repair where the well must be fixed to meet proper specifications from the EAA. Roger Andrade, EAA Groundwater Protection Manager, states that specific repairs may include extending casing to a minimum of 12 inches above ground surface, installing a liner in the well, or capping a well through an EAA capping permit, allowing for possible future use.

The EAA relies upon GIS technology to map well locations. In considering the severity of each of the wells, the program ranks the abandoned wells based upon highest to lowest ratings, vis-a-vis the potential risks to water quality. Factors to be considered include: poor surface conditions; deteriorated casings; and relative proximity to known contamination, development density and traffic.

The repair or permanent plugging of a well can be an expensive proposition. To secure wells properly and professionally, care must be taken to employ experts who will meet the EAA standards, as mandated by law. The availability, or lack thereof, of appropriate funds is always a constraint. Hence, the need for the EAA's ranking of abandoned wells, so it can address those that require the most attention initially, and work the list accordingly.

One of the opportunities for funding may come through the Edwards Aquifer Conservancy, a non-profit institution which has been established to raise funds for important EAA initiatives. The Conservancy is studying ways in which funds could be identified and secured to facilitate and accelerate permanent closures of these wells. It hopes to realize results on this front soon.

Until then, the EAA will continue to monitor and assess the overall circumstances of the critical wells list, and work to identify and assess wells throughout the EAA jurisdiction to minimize potential risks to water quality.



EAA technicians inspecting a well

WHY IS THE PRESENCE OF ABANDONED WELLS SO CRITICAL?

Wells are essentially conduits that go directly into the belly of the aquifer—like straws stuck into the ground that offer an uninterrupted flow. When a well is not maintained or hasn't been properly secured, there is a risk that contaminants of all kinds could flow downward directly into the waters of the aquifer, causing contamination.



Welcoming

SCOTT STORMENT

SCOTT STORMENT IS NEW TO THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN (EAHCP), BUT HE HAS A WEALTH OF ENVIRONMENTAL AND PROGRAM MANAGEMENT EXPERIENCE VERY SIMILAR TO THE EAHCP'S MISSION. NEWS DROP HAD THE OPPORTUNITY TO SIT DOWN WITH STORMENT TO GET HIS THOUGHTS ABOUT THOSE PAST PROJECTS AND THIS NEW MAJOR STEP IN HIS CAREER.

NEWS DROP: Welcome to the EAHCP team. We know you've been on the job a handful of weeks and are still getting the lay of the land at the EAA, but there are lots of people interested in getting to know you. Give us a quick rundown of your educational background and professional experience.

Storment: It is definitely a pleasure to be at the EAA and managing the EAHCP. I earned a bachelor's degree from Texas A&M before heading to the University of New Mexico to do my graduate studies in Natural Resource Planning and Environmental Finance. After getting my master's degree there, I was fortunate to lead a binational watershed enhancement program as a staff member for the Texas Natural Resources Conservation Commission, which is now the Texas Commission on Environmental Quality. Our job was to develop best practices for improving water quality in the Rio Grande River watershed that encompassed Colorado, New Mexico, Texas and Mexico.

That project involved dealing with some endangered species and their habitats as well. In addition to environmental conditions, we also worked with communities in that watershed and the Mexican government to balance the economic development with environmental needs. After completing work on the Rio Grande Alliance, which is what that project was called, I transitioned to using some of my environmental finance training in the wastewater infrastructure development sector.

There I managed some programs aimed at helping the half million people living in the "Colonias," which were substandard housing communities along the Texas-Mexico border. That experience led me working in the Governor George Bush administration as the first director for Colonias Initiatives. We helped people who were desperately poor connect their small homes to sewer lines to improve sanitation there. From there I transitioned the North American Development (NAD) Bank in San Antonio and worked on water, wastewater, energy and air quality projects.

This was also the timeframe when renewable energy supplies were being developed and so I had the opportunity to learn a lot about solar, wind and even bio-gas power. Everything the NAD Bank financed had to include some sort of environmental improvement aspect to it.

I left the bank to start my own environmental services company. We did projects in the U.S. and Mexico and I had the good fortune of doing some work for major companies like USAA. One of the things I managed was the Water Forum, a local event that focused on regional water issues.

That event helped me get to know some of the folks from the Edwards Aquifer Authority. I briefly worked for a company called Ameresco before coming to the EAA. There I learned a tremendous amount about water conservation technologies which should transfer very well to my new work on the EAHCP.

NEWS DROP: Sounds like your work experience has an abundance of similarities to what the EAHCP is about, which should be a nice head-start for you.

Storment: The overlap is very striking for me. I've helped develop small and large watershed plans in this area of the country. And in every case, there is a direct link between the river system and the local aquifers. Each system contains water quality and quantity issues to deal with. Additionally, an important component of these types of projects is teaching communities about these resources and how they can help protect them. All three of those topics are directly relevant to priorities of the EAHCP and EAA. After spending so much of my recent career on the water infrastructure side, it has been refreshing to reengage on the environmental policy, program and planning aspects that make up the EAHCP.

NEWS DROP: Speaking of policy and science, how do you see those things coming together in the EAHCP?

Storment: Well, there are a myriad of official participants in the EAHCP, and then there are several non-voting participants who are definitely involved in this program. What amazes me most is how successful the program has become using a consensus-based approach to decision making.

These are not easy issues to manage and there are very different points of views on managing resources like the Edwards Aquifer. However, I think there are two very important factors that make this type of decision making system work here. First, there has been a plethora of solid, scientific studies to inform decision makers and interested parties along the way.



Scott Storment - Sr. EAHCP Director

Additionally, the common interest of managing resources from a local, or in this case, regional aspect rather than deferring to state or federal authorities is a definite motivator for working together. From my experience, solving problems regionally are always the best ways to get positive results for a group like the Edwards Aquifer community. I am a firm believer in that approach.

NEWS DROP: After studying the EAHCP for a short time, what are the things that stand out to you as the most important next steps in the program?

Storment: There are a number of decisions to be made about Phase 1 and 2 of the EAHCP coming in the near term. I'm fortunate to have inherited a successful and well-running program, but as we all know, there is a long path before us and I'm definitely looking forward to working with everyone on this challenge.

REPRODUCE TO REINTRODUCE

New Research on San Marcos Salamanders & Texas Blind Salamanders Underway

“Our team of young scientists are extremely engaged and enthusiastic. We learn new things each day and then have to assemble those bits of information into sound science we can pass on to other researchers and the EAHCP team”— Dr. Lindsay Campbell

ONE CRITICAL ASPECT OF THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN (EAHCP)

research program entails learning how to best capture endangered species from the wild and reproducing them in a refugia lab. That effort is meant to ensure there are plenty of Edwards Aquifer Region endangered animals held in captivity to reintroduce into the wild if a severe drought or other unforeseen disaster happened to wipe out the species now living in the protected habitats.

“We have some experience with reintroducing the endangered fountain darters and Texas wild-rice back into the wild, but we are really at the beginning of generating that body of knowledge about the San Marcos salamander and Texas blind salamander,” said Dr. Lindsay Campbell, a U.S. Fish and Wildlife Service supervisory biologist and point person on the EAHCP refugia program. “This presents interesting challenges in collecting endangered salamanders from the wild and figuring out how best to maintain and reproduce them in the lab.”

Collecting the Texas blind salamanders involves catching them with traps or drift nets over springs. The research team members set traps in two different 30-foot Edwards Aquifer wells about a mile from the San Marcos refugia center.

After testing various types of traps, they settled on two heavy plastic minnow traps tied together with thread that will not degrade. The team typically works over a two-week period going out three days a week to lower and retrieve traps. They use small bits of potato peels and pistachio nuts as bait to draw in the salamanders.

San Marcos salamanders are collected by hand using divers at Spring Lake and snorkeling just below Spring Lake dam. Drift nets are employed at the diversion spring in Spring Lake.

“The food we use in the Texas blind salamander traps grows biofilm while it’s in the Edwards well, which then attracts the invertebrates the salamanders feed on,”

said Kelsey Anderson, a U.S. Fish and Wildlife Service biological science technician working at the San Marcos refugia center. “We only keep one out of three [Texas] blind salamanders we catch in traps.

That is a limit we placed on ourselves in order to be conservative with our preservation efforts. We just don’t know enough about these salamander population numbers to be too aggressive in taking them out of the wild at this point.

However, when we collect Texas blinds in a drift net that are shot out an aquifer spring, we take 100 percent of those thinking that they will not survive in the lake or river environment.” Once the salamanders have been captured and quarantined to ensure their health and the health of other salamanders in the lab, the fun and interesting work begins.

The lab is now tagging the salamanders to set a baseline of information from the date they were placed in their new homes.

The tagging system is based on colors and helps team members quickly identify males from females and then monitor their growth and habits over time. However, when we collect Texas blinds in a drift net that are shot out an aquifer spring, we take 100 percent of those thinking that they will not survive in the lake or river environment.”

Campbell explained that the long-term goal is to have 500 San Marcos salamanders and 500 Texas blind salamanders on hand for reintroduction if that is ever needed. The current reintroduction strategy would be to release 50 individuals per stocking site with the goal of 500 total individuals released and monitored during the first stage of reintroductions.

“One of the things you quickly learn about this research is that there are

many details you have to know before you ever get to that point of reintroduction.

For example, if we needed those salamanders to be 30 centimeters in length for reintroduction, we need to learn how long it takes for them to grow into that length.

Then you take another step back and figure out what the survival rate is of salamanders to that life stage to calculate how many salamanders you would need to hatch to get to the target number of individuals at 30 cm

Then you calculate how many clutches of eggs it would take to get your target number to hatch and how long it would take to produce that many clutches. Another step back informs you about the whole husbandry process.

So, really, we’re just beginning to refine this knowledge of our salamanders and put more solid parameters on the estimates from the past.”

The first part of the team’s husbandry research on San Marcos salamanders showed that the males can be very persistent in the pursuit of a female who is ready for the “courtship dance.”

Given that new knowledge, they will be placing the males and females together in groups, but will be removing the males after 48 hours to reduce the potential stress on females.

The females typically oviposit eggs about a month after mating has occurred, and the team has observed clutches of eggs numbering anywhere from seven to 73 eggs.

“We feel positive that this research will lead us to knowing as much about these endangered species as we do now know about others protected by the EAHCP,” Campbell concluded.

TEXAS BLIND SALAMANDER



SAN MARCOS SALAMANDER

GIVE AND TAKE

Federal Permit Gives EAA, EAHCP Partners Ability to Study, Protect Endangered Species

THE ENDANGERED SPECIES ACT (ESA) PROHIBITS THE “TAKE” OF LISTED SPECIES THROUGH DIRECT HARM OR HABITAT DESTRUCTION. IN THE 1982 ESA AMENDMENTS, CONGRESS AUTHORIZED THE U.S FISH AND WILDLIFE SERVICE TO ISSUE PERMITS FOR THE “INCIDENTAL TAKE” OF ENDANGERED AND THREATENED WILDLIFE SPECIES. THAT MEANS PERMIT HOLDERS CAN PROCEED WITH AN ACTIVITY THAT IS LEGAL IN ALL OTHER RESPECTS, BUT THAT RESULTS IN THE “INCIDENTAL” TAKING OF A LISTED SPECIES.

.....
One of the most intensive efforts the Edwards Aquifer Authority (EAA) is engaged in today deals with the Edwards Aquifer Habitat Conservation Plan (EAHCP). While the EAA is one of five permit holders associated with the EAHCP, the agency dedicates additional personnel and financial resources to the program primarily because it helps achieve its mission of managing, enhancing and protecting the Edwards Aquifer.

THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN PARTNERS WERE GRANTED AN INCIDENTAL TAKE PERMIT (ITP) FROM THE U.S. FISH AND WILDLIFE SERVICE IN 2013. However, there was nothing incidental about the seven-year application development process.

And today, maintaining compliance with the ITP is all business for the EAHCP team. “The whole purpose of everything we do as part of the EAHCP program is to comply with our Incidental Take Permit which outlines what we must do to protect the endangered species during a drought of record,” said Scott Storment, EAHCP program manager. “The permit actually helps drive many of the decisions we make. From our research, we are learning how much water from the springs the species need to live in worst case drought scenarios. That way, we don’t spend extra dollars and resources going beyond those parameters.” “Our permit does specify a limit on the numbers of endangered species like the fountain darter or Texas blind salamander that we can take,” Storment explained. “And to reiterate, taking means doing any kind of harm to the species, disturbing their habitat or anything of that nature. Taking doesn’t just mean killing a darter or salamander. We know that public recreation, our field research and other types of activity near the spring openings causes harm to the species, so we’ve developed many programs to mitigate that habitat disturbance in order to maintain our permit.”

Storment noted that most people around the Edwards Aquifer Region are well aware of the various uses of the water from the aquifer. He also expressed that everyone knows during the 1950s drought of record, the Comal Springs went dry. While the Endangered Species Act didn’t exist at that time, the species did. In the 1990s, various organizations brought a lawsuit against the federal government because nothing had been done to protect the Edwards Aquifer endangered species. It was that lawsuit and the desire to maintain regional control of the Edwards Aquifer water use that jump started the various aquifer protection plans in place today. In fact, the creation of the Edwards Aquifer Authority was created to manage pumping from the Edwards Aquifer as a means to help protect spring flows in New Braunfels and San Marcos.

“Despite the great work and progress of the EAA, there was still no guarantee that the springs would not go dry in another drought of record,” Storment explained.

“So in the 2006-2007 timeframe, stakeholders from around the Edwards Region came together to create a specific plan to keep the springs flowing during a drought of record. That plan was developed as a Habitat Conservation Plan and ultimately submitted in 2012 to Fish and Wildlife Service as part of the Incidental Take Permit application. It is important to understand that an ITP is a legally binding agreement between the U.S. Secretary of the Interior and the permit holders. In our case, that is the Edwards Aquifer Authority, City of New Braunfels, City of San Marcos, City of San Antonio through the San Antonio Water System and Texas State University.”

The Edwards Aquifer ITP will run through 2028. The 15-year Edwards Aquifer permit period is a relatively short timeframe for a typical ITP. But, the original EAHCP planning team knew the region still had much to learn about the Comal and San Marcos Springs systems. So, the team decided to spend the better part of the first permit cycle to become more knowledgeable about this ecosystem and then prepare to apply for a 30-50 year permit in 2028.

“The ITP permit process is obviously a lengthy and detailed path,” Storment concluded. “But, now that we have some very specific guidelines to follow, water providers and users in the Edwards Region have certainty in the amount of water they can count on from the Edwards. That goes a long way toward creating sound water management plans into the future. Our cities now have confidence that having a stable water supply is a positive element of their growing communities.”

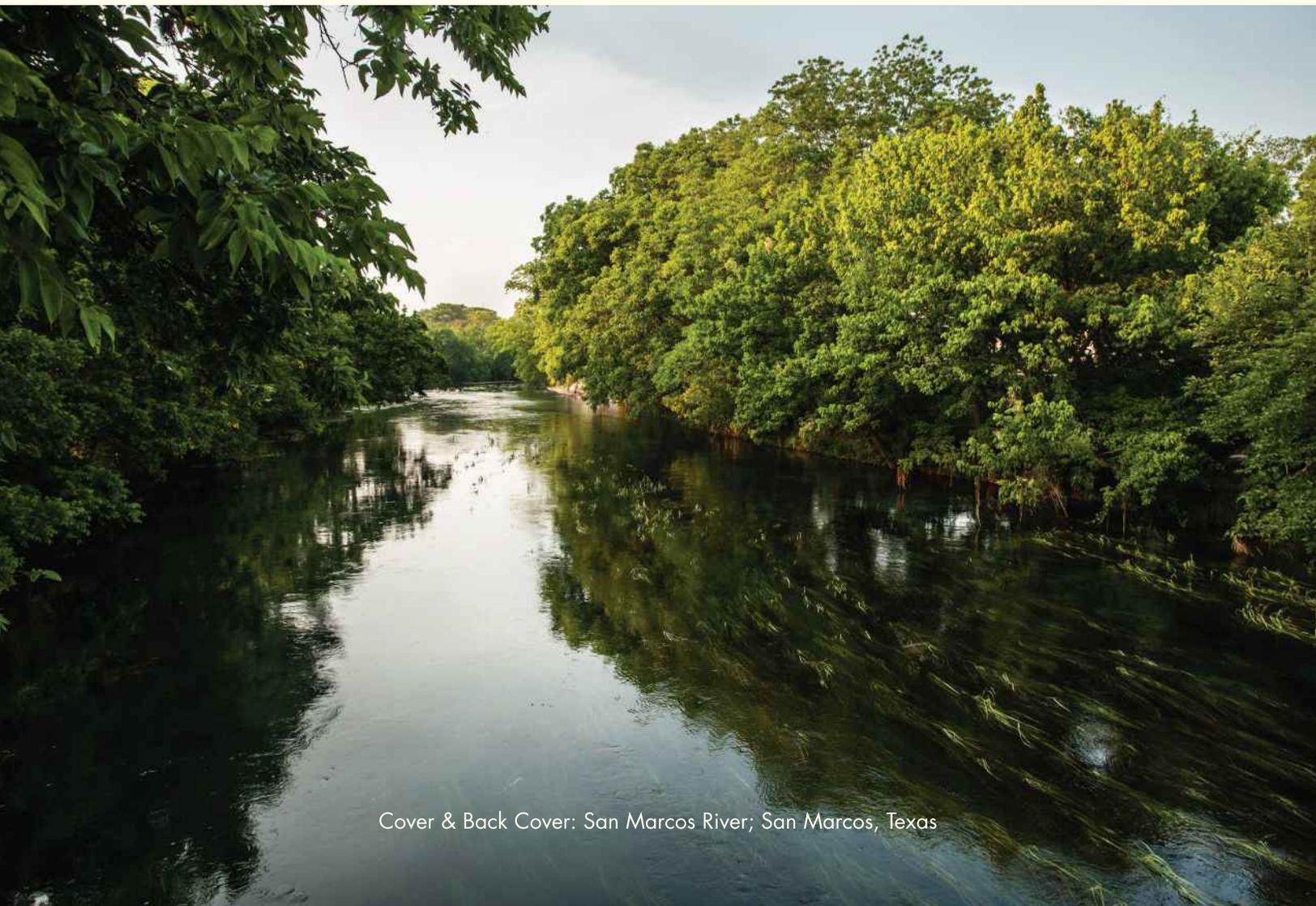


FOUNTAIN DARTER



900 E Quincy
San Antonio, TX 78215

 EdwardsAquifer  TheEdwardsAquifer  edwardsaquiferauthority **EDWARDSAQUIFER.ORG** | 210.222.2204



Cover & Back Cover: San Marcos River; San Marcos, Texas

NEWS DROP

M A G A Z I N E

A QUARTERLY PUBLICATION

SUMMER 2019



Edwards Aquifer Authority

Legislative Update from the General Manager

With the 86th regular session of the Texas Legislature in our rearview mirror, we can look to the future with a renewed sense of confidence that the good work of the EAA will continue on sure footing for the foreseeable future.

HB 2729 – Authored by Rep. Ina Minjarez, helps to further clarify that our enabling statute, the EAA Act, is henceforth the primary law on which we can rely, rather than the broader statewide groundwater law found in Chapter 36 of the Water Code. More specifically, HB 2729 incorporates the most important and administratively relevant elements of Chapter 36 into the EAA Act. The effect of this is that the portions of the general law in Chapter 36, which we have historically relied on as the legal basis for carrying out much of the day to day operational functions of our agency, can now be found in our enabling statute.

So in the years ahead, as our lawmakers grapple with management of groundwater around the State of Texas, they can modify Chapter 36 as necessary without the burdensome complications created by the EAA and its unique character as a groundwater regulatory authority. As a result, it will be less likely that future changes in statewide water law will have unintended consequences for the Edwards Aquifer and our present and future Habitat Conservation Plan, because our mission will be largely self-contained within one body of law – the EAA Act – and thus insulated from changes to general water law.

Additionally, we now have a requirement to report to the Edwards Aquifer Legislative Oversight Committee each biennium as a means to keep the legislature informed of any issues or matters of interest relating to the Edwards Aquifer and its management as we approach each legislative session.

The other notable change brought about by HB 2729 is a limitation on how much the EAA Board of Directors may increase aquifer management fees (AMF) in a given year. The bill limits AMF growth to eight percent per year for non-agricultural permit holders. Agriculture fees remain set in statute at \$2 per acre-foot. Although, we have held the line on AMFs since 2012, we welcome the imposed limitation because it fosters responsible governance and helps bolster our commitment to exemplary fiscal stewardship as we continue to focus on building greater shared value around our mission.

HB 3656 – Authored by Rep. Andy Murr, clarifies previously unsettled questions about what should happen to certain Edwards irrigation water rights when historically irrigated farmland becomes developed for non-agricultural uses. Specifically, HB 3656 codifies into the EAA Act a process whereby landowners with Edwards water rights originally permitted for and restricted to agricultural use on historically irrigated land may change and transfer their authorized (permitted) water use to non-irrigation use, if and when their land is developed and can no longer be used for agricultural purposes. This bill protects the property right interest in Edwards irrigation groundwater and directly addresses a legal dispute over the EAA Board of Directors' authority to allow the conversion of restricted irrigation water to other, more broad uses, and validates the board's past actions where these conversions have been previously approved.



Two bills in particular – HB 2729 and HB 3656 – were passed into law this session and each help to eliminate uncertainties around the EAA mission.

Included in the bill is a process whereby Edwards permit holders may contest applications by other Edwards permit holders seeking to convert their restricted irrigation water to other uses.

In the context of the big picture of the sustainability of the Edwards Aquifer, these changes to the EAA Act eliminate a number of uncertainties that could have clouded the effective management of the Aquifer well into the future. With these changes, however, our focus on building greater certainty around this vital resource and the various stakeholder interests that rely on it gains new ground. We look forward to working with all our constituents in new and exciting ways that continue to bring us together as partners in managing, enhancing, and protecting the Edwards Aquifer system.

ROLAND RUIZ

FEATURED STORIES | SUMMER 2019



EAHCP Volunteer, wearing a blue shirt, at the San Marcos River.

EAHCP

5. PUTTING NATIVE VEGETATION ON THE MAP

Five-Year Cycle for Monitoring Vegetation Completed

7. BY THE NUMBERS

Comparison Table for the 5-Year Study

9. PUT ME IN, COACH!

Volunteers Help with Our Programs

11. HOME AWAY FROM HOME

Our Refugia for Endangered Species Opens

EAA

13. LIVING & LEARNING

An Intern's Tell All

15. THRU THE CHUTE TO THE COMAL RIVER, WE GO

Winning First Place at this Year's Race

17. GROUNDWATER CONSERVATION GRANT PROGRAM

Program Honored with the "Water Conservation & Reuse" Award



Communications & Development Intern, Elexus Liggins, on the left, at the 2019 San Antonio Rodeo EAA's Booth.

EAA BOARD OF DIRECTORS MEETINGS

JUNE 11 | JULY 9 | AUGUST 13 | SEPTEMBER 10

*EAHCP Completes Five-Year Cycle
For Monitoring Vegetation*



Putting Native Vegetation **ON THE MAP**

“It

was a sizable task, and maybe a bit of a brain tease at the start.” Those few words from Casey Williams, a BIOWEST biologist, gives you an idea of the thoughts running through his mind as he launched his kayak into the San Marcos River to begin mapping the submerged aquatic vegetation (SAV) of the entire San Marcos and Comal River systems.

“I had been doing some spot [SAV] mapping in the river systems before the Edwards Aquifer Habitat Conservation Plan (EAHCP) five-year program began in 2013, but thinking about getting through the entire San Marcos and Comal Rivers was a new hill to climb,” Williams said. “It wasn’t just the magnitude of the effort, but I also wanted to make sure that the final product was beneficial to the EAHCP team members.”

To create the map, Williams would head out in a kayak with his portable GPS system, paddle around a patch of plants and record the GPS coordinates into his device. In addition to the plant location information, Williams would make notes of the percentage of each plant species within a patch. Kristina Tolman, EAHCP Coordinator, then used ArcGIS to calculate the total coverage of each SAV species for the 2013 and 2018 mapping events within the San Marcos and Comal systems.

Both Williams and Kollaus commented on the positive improvements of Texas wild-rice in the San Marcos River. From 2013 to 2018, Texas wild-rice has expanded an estimated 5,914 square meters, a 240 percent increase, through planting and natural expansion. Overall, nearly 70 percent, 35,000 square meters, of the San Marcos habitat was covered with non-native plants in 2013. However, by 2018, that invasive plant covering had been reduced to 22,000 square meters.

Texas wild-rice in the San Marcos River, TX

“One very important aspect of this five-year mapping program is that we use the data to update the biological goal reporting we must provide to the U.S. Fish and Wildlife Service as part of our Incidental Take Permit, which is what governs the whole EAHCP program,” Kollaus stated. “We have to provide data on how our habitat restoration programs are effecting the endangered plant and animal species within both river systems. So, the detailed mapping program plays a key role in helping us document those stories.”

“It is improbable to think that we might someday have 100 percent coverage of native plants in this Edwards Aquifer fed ecosystem. We are really shooting to reverse the ratio of natives to non-natives,” Kollaus concluded:

“...We just want to give our native vegetation a fighting chance to flourish and it looks like we’re starting to win that battle.”

The 2013 SAV mapping effort set the baseline for future years so the EAHCP could monitor progress in removing non-native plants in the system and replacing them with native species. The planting of native vegetation was expected to have a reciprocal positive impact on the endangered species living in the river systems, as well as the general health of the overall ecosystem.

Spotlight

Kristy Kollaus, EAHCP Environmental Scientist, has also witnessed the native vegetation improvements and stated that this whole process has helped the EAHCP team members adapt to new findings.

“One of the things we learned from reestablishing native plants in the river systems is that some native species fare better in certain locations than others,” Kollaus noted.



By the Numbers Changes in Aquatic Vegetation - 5 Year Study

COMAL	2013	2018
Cabomba	9%	12%
Hygrophila	30%	19%
Ludwigia	2%	4%
Nuphar	5%	2%
Sagittaria	8%	14%
Vallisneria	42%	43%
Other	4%	6%

SAN MARCOS

Cabomba	6%	3%
Colocasia (Elephant Ear)	10%	2%
Hydrilla	36%	33%
Hydrocotyle	—	0%
Hygrophila	20%	19%
Ludwigia	—	1%
Potamogeton	6%	3%
Sagittaria	5%	9%
Zizania (Texas Wild-Rice)	9%	27%
Other	8%	3%

● Non-Native

Native aquatic vegetation: *Ludwigia*, *Sagittaria*, and *Vallisneria* in the Comal River, TX

Spotlight



The Comal and San Marcos Rivers look very different today than five years ago. The EAHCP programs have reinstated native plants to the point where, “The elephant ears are gone and the endangered native Texas wild-rice has really grown beyond what I anticipated.”

Casey Williams, BIO-WEST Biologist



Conservation Crew Volunteers

WHILE THERE IS

On-going research and science driving the Edwards Aquifer Habitat Conservation Plan (EAHCP), there is no short supply of volunteer work happening in New Braunfels and San Marcos.



And summertime is peak season for many of those efforts, like those by a group of volunteers in San Marcos called the “Conservation Crew.”

“We developed the concept of a Conservation Crew in 2013 to help implement our responsibilities under the EAHCP,” said Eric Weeks (Habitat Conservation Plan Specialist). “Each day, we’ll have four to six Crew members head out in teams along the river to help keep it free of debris and, most importantly, to connect with as many visitors as possible in explaining the uniqueness of the San Marcos River and the endangered species living there.”

While some of the members are paid by Texas State [University], others are earning college credits required for their majors with this work. And fortunately, some people just volunteer for free just because they love the river,” Weeks said.

Put Me In, Coach!

Volunteer Programs Thriving in New Braunfels & San Marcos

Another volunteer group protecting the San Marcos Springs is the San Marcos River Foundation (SMRF). And while SMRF does their fair share of river cleanups and other activities, a substantial focus is on protecting the recharge zone above the San Marcos River by acquiring easements to keep that land undeveloped.

A short drive south from San Marcos, you’ll find the Headwaters at the Comal, a nonprofit group where volunteers contribute their time, talent and dollars to protect the Comal Springs and Comal River. Other volunteer groups in New Braunfels provide support in planting native riparian vegetation around eroded banks along the Comal River and litter cleanups in the Dos Rios watershed.

River stewardship runs deep in the heart of these Spring communities. The EAHCP program is thankful for the hard work volunteers dedicate to improving the health of the Central Texas spring ecosystems.

For more information on volunteering in the San Marcos and Comal Rivers, please visit eahcpsteward.org/volunteer.

Spotlight



The EAHCP’s collaboration among local contractors and public, private, and volunteer groups has allowed for significant removal of invasive elephant ear plants with corresponding increases in native riparian vegetation and contributions to bank stabilization projects.

In 2016, the Texas Commission on Environmental Quality presented the EAHCP and Partners with the **Environmental Excellence Award** for their efforts toward habitat restoration.

HOME AWAY FROM HOME

EAHCP OFFICIALLY OPENS LONG-TERM REFUGIA FOR THREATENED & ENDANGERED SPECIES

Scientists know that at some point, there will be another drought of record matching or surpassing the event of the 1950s.



Texas Blind Salamander

When that occurs, they will be much more prepared than the first time around. Part of that preparation is securing a safe haven for federally-protected species which rely on the cool, stable aquatic environment they live in near the Comal and San Marcos Springs and Rivers. Think of it as a home away from home for the Edwards Aquifer endangered species.

The culmination of several years of planning for that refuge came about on May 25th as officials from around the Edwards Region gathered to officially open the the new Edwards Aquifer Habitat Conservation Plan (EAHCP) refugia facility at the San Marcos Aquatic Resource Center (SMARC) as well as a backup refugia facility located in Uvalde.

The new building utilizes the U.S. Fish and Wildlife Service's designs to meet certain specifications for the threatened and endangered species, including tanks for housing the species, security systems, energy-saving solar panels and a quarantine building. The quarantine building at SMARC contains separate plumbing, air conditioning, and electrical systems that separate the wild specimens from the healthy, preexisting specimens housed in the refugia building tanks.

"The Refugia Program is designed to create a habitat in a laboratory that endangered species collected from the wild can be housed during extremely low springflows in the natural environment," said Scott Storment, EAHCP program manager. "Our goal is to house the species while learning as much as we can about them in order to grow species populations."

Spotlight

"The bottom line goal of this refugia program is compliance with the Incidental Take Permit issued by the U.S. Fish and Wildlife Service which is a crucial part of the EAHCP," said Edwards Aquifer Authority Board Chair Luana Buckner.

"The permit actually helps drive many of the decisions we make as a partner in the EAHCP. And so we were very excited to see the EAHCP achieve the milestone of completing this state-of-the-art laboratory in San Marcos."



Luana Buckner, EAA Board Chair



Texas Blind Salamander

Living + Learning

AT THE EAA

By: Elexus Liggins

Communications & Development Spring 2019 Intern



EAA Building in Bexar County, TX

The Edwards Aquifer Authority (EAA) is fully committed to providing exciting, engaging and stimulating internships to students who wish to pursue work in support of the mission.

The opportunity for students to practice what they are learning through their respective curriculums, and enhance their practical knowledge while acquiring professional insights, is clearly worth pursuing.

Simply put, the Intern Experience at the EAA is wonderful in many respects, and one that is highly recommended to any student seeking an opportunity for hands-on work in a field that either directly or indirectly relates to their current education and prospective career pursuits. For those who live to learn, there are few other opportunities that compare.

Currently, the EAA offer 3 types of internships: semester internships, high school internships, and the leadership internship program, which is a two-semester internship. The semester program involves college students and rotates through Fall, Spring, and Summer every year. It is driven by specific needs requests from various departments. High school internships are offered for the summer. The high school internships are part of the EAA's community outreach efforts. As for the leadership internship program, an intern is placed on the path of learning within both the Aquifer Management and Administrative and Financial Services Division.

There are two positions allocated for the leadership internship program. The two interns essentially shadow an Executive Director's division, by working in each of the divisions departments. **Maggie Veliz**, EAA Employment and Benefits Supervisor, oversees the internship programs.

She and her team undertake a myriad of tasks to accomplish their work, including posting internships and collecting candidates, coordinating interviews, and support in choosing and onboarding the successful candidates.

Every intern experience is different, based on the needs of the respective department.

However, there are some essential skills that are a part of

Spotlight

“Take advantage of the opportunities you come across by nurturing that passion burning within you and once you graduate, take that passion and go light your world.”



Maggie Veliz,
EAA Employment & Benefits Supervisor

the learning experience.

Chief among them: an appreciation for paying attention to what is being said and done by supervisors and fellow employees, who bring and are willing to share their expertise to those willing to take it to heart.

Additionally, interns typically walk away with a heightened appreciation for the Aquifer and its critical role in creating and sustaining the livelihood of numerous cities and towns, and the millions of people who live and work in the Aquifer Region.

My own experience as an intern in the Communications & Development department allowed me to gain a greater appreciation for the variety of techniques used to communicate the EAA message.

Whether it was supporting the San Marcos Aquatic Resource Center Refugia Grand Opening or participating in the exhibit presentation at the San Antonio Livestock Exposition, the opportunities to present and share the EAA's mission of managing, enhancing, and protecting the Edwards Aquifer should always be planned well, and taken seriously.

Spotlight

“My own experience as an intern in the Communications & Development department allowed me to gain a greater appreciation for the variety of techniques used to communicate the EAA message.”



Elexus Liggins,
EAA 2019 Spring Intern

Plus, it was great to be paid, and work around some fantastic mentors!

There were other interns this past Spring at the EAA. Among them was **Ayesha Meghani**, who served in a Pilot Internship, and had the pleasure of working in Information Technology, Human Resources, External/Regulatory Affairs and Finance.

A student of the University of Texas at San Antonio pursuing a Public Administration degree, she favored the legal department, as it best correlated with her interest. She was able to work with the permit team and other areas of the ERA.

A highlight of her time here was when she went on a field trip to a farm in Uvalde to visit a permit holder and witnessed an inspection.

Ayesha sees where the work product not only positively impacts today but creates a ripple effect for future generations.



Ayesha says her intern experience impressed upon her a clear awareness of the efforts by the EAA to develop a legacy in its work.

CONT. NEXT PAGE

LIVING & LEARNING CONT.

Another intern, **Aaron Ramirez**, worked in the Information Technology Department.

A Saint Mary's University student majoring in Computer Applications, he couldn't have found himself in a more satisfying and beneficial situation.

While here he had the responsibility of cleaning and wiping 40 computers.

He also had the occasion to order different products which involved talking to vendors, getting price quotes, and submitting purchase orders, among other things.

His lasting impression is that he realized that the EAA is more than he initially presumed.

In his mind, the EAA goes beyond its daily tasks of website data collection, aquifer management and other tasks that are at the core of its mission.



Aaron realized the EAA is more than he initially presumed; the dedication and passion of EAA's staff is what Aaron will long remember.

Students who have interest in studying current internship opportunities should visit **edwardsaquifer.org** for more information.

Thru the Chute to the Comal River, We Go!

Thru the Chute is an annual cardboard boat race held at the New Braunfels City Tube Chute hosted by the New Braunfels Parks and Recreation Department.



Every April, on the banks of the Comal River, Thru the Chute enthusiasts gather eagerly watching cardboard boats sail through the water.

It's where fun meets water and raising awareness for the shortest river in Texas, the Comal River, which is also where the Comal springs discharge. These springs are home to some of the endangered species that live in the Edwards Aquifer.

As opening festivities commenced, it was finally EAA's turn, so the team of three hopped aboard their cardboard vessel with no decorations or showy theme in sight, nothing but their comradery and sleek, streamlined boat ready to secure the winning time.

The EAA has had a presence at the event over the past few years, but this year the 1st place victory in the expert class was secured by **Branddon Trigg, Chris Morgan, and Charles Bradshaw!** Way to go!



To relive the team's victory head over to the EAA's official YouTube channel to watch their video at:

<https://youtu.be/MdZH23AGk2Y>

Above: Chris Morgan, Branddon Trigg, and Charles Bradshaw.

On the Right: The 1st place trophy that Roland Ruiz (Photo: second from the left) presented, along with captain hats.



The EAA's Groundwater Conservation Grant Program was recently recognized and awarded the "Water Conservation and Reuse Award" for a non-utility direct by the American Water Works Association.

Crescent Bend in Bexar County, TX

Since 2009, the EAA Groundwater Conservation Grant Program

has worked towards implementing best management practices. The grant is made available to Edwards Aquifer permit holders interested in carrying out innovative techniques to conserve water.

In the years following its inception, the grant funded leak detection and water saving lavatory projects. In 2016, the EAA's Grant Program began focusing on awarding funding through the EAA Agricultural Irrigation Efficiency Improvement Program, which supports practices that can be used in an agricultural setting to save water.

These practices include sprinkler and micro-irrigation equipment systems for permitted irrigation users.

The application process is encouraged through added incentives for the conversion of less efficient to efficient irrigation methods, such as installation of linear or center pivot sprinklers and subsurface drip irrigation systems. Since the program's more recent focus on agricultural irrigation efficiency there has been 700 acre-feet of water saved annually. Furthermore, in 2018 the grant funded projects that totaled about 163.59 acre-feet or 53,305,965 gallons.

Isabel Martinez, Conservation Coordinator for Water Resources at the EAA, oversees the program and can vouch for the effectiveness and success of the implemented water saving practices. "It's a privilege to work with our grantees on the projects that are funded through the EAA Groundwater Conservation Grant Program. The grant program allows the EAA to connect with our permit holders and develop partnerships that have contributed to an increase in conserving more water over the years.

The AWWA is an international nonprofit society, with an emphasis on science and education, focused on the management of water. The AWWA's Conservation and Reuse Division honors conservation and reuse practices pertaining to water.

Spotlight

"The grant program... [is] a testament to the EAA's commitment of working with water users in the region to effectively manage and protect the Edwards Aquifer."



Isabel Martinez,
EAA Conservation Coordinator
for Water Resources



900 E Quincy, San Antonio, TX 78215
edwardsaquifer.org

EDWARDSAQUIFER.ORG | 210.222.2204

 EdwardsAquifer  TheEdwardsAquifer  edwardsaquiferauthority

Cover: State Natural Area in Bandera County, TX | **Back Cover:** Cypress Creek in Wimberley, TX

NEWS DROP

M A G A Z I N E

A QUARTERLY PUBLICATION

AUTUMN 2019



CONTENTS



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



 **AQUIFER STORAGE & RECOVERY FACILITY, BEXAR COUNTY**

EDWARDS AQUIFER HABITAT CONSERVATION PROGRAM [EAHCP]

Turning Back the Tide **P.6**

Saving for a Sunny Day **P.10**

Tip of the Spear **P.14**

EDWARDS AQUIFER AUTHORITY [EAA]

Defining Our Future, Our Legacy **P.4**

Drought Management **P.18**

Then & Now **P.21**



COVER & BACK COVER

 **Guadalupe River,
New Braunfels, TX**

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



 **AQUIFER STORAGE & RECOVERY
FACILITY, BEXAR COUNTY**



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.

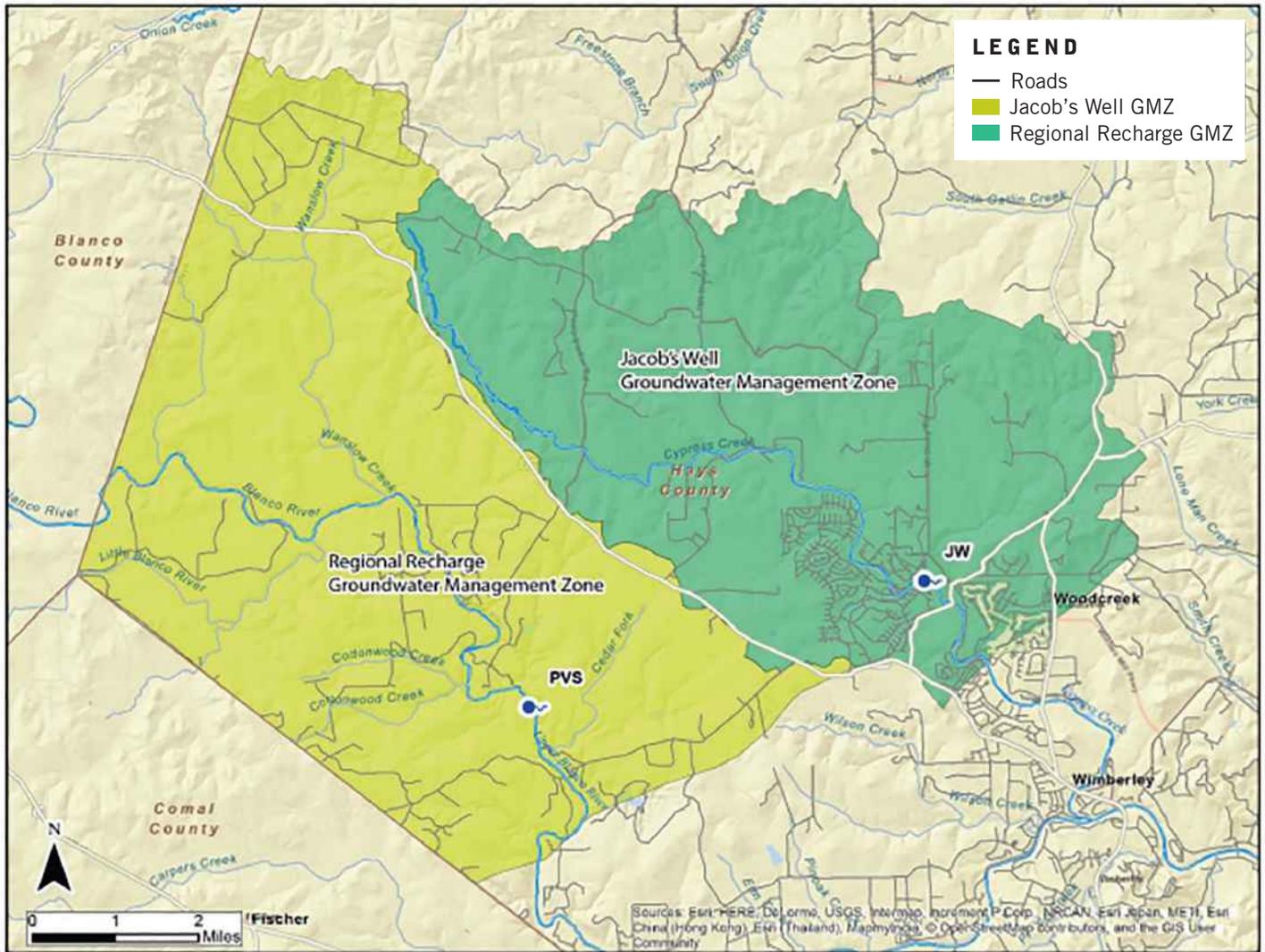


Figure 1. Areas of hydrologic influence to Jacob’s Well shown in hatched areas. Potential groundwater management zones are shaded green and yellow. The area of the Jacob’s Well Groundwater Management Zone is 34 square miles and the area of the Regional Recharge Groundwater Management Zone is 56 square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



 JACOB'S WELL



THE EDWARDS AQUIFER THEN

5-30-26



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>



 **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.



EDWARDS AQUIFER
AUTHORITY

EDWARDSAQUIFER.ORG | 210.222.2204

 EdwardsAquifer  TheEdwardsAquifer  edwardsaquiferauthority

NEWS DROP

M A G A Z I N E

A QUARTERLY PUBLICATION

WINTER 2019



I S S U E
004

C O N T E N T S

004 | A MESSAGE FROM THE GENERAL MANAGER

Thanks and Hope this holiday season

006 | EAA RECHARGES ITS EDUCATION OUTREACH

An educational partnership

010 | EAC LAND ACQUISITION FOR RESEARCH

A Field Observatory is in the works



014 | “MULCHIE”

The mulch fire episode

020 | DREAM BIG

The EAA mentors

025 | EAA CONTINUOUS RESEARCH ON SUPERFUND SITE

EAA research ensures aquifer protection

029 | WATER QUALITY

25-Years worth of collected data

A MESSAGE FROM THE GENERAL MANAGER

“We have much for which to be thankful and hopeful for this holiday season. The year 2019 proved to be a momentous one for the EAA as we introduced some significant initiatives that promise to transform our work in the years ahead.”

These include developments in the following programmatic areas.

SERVICE THROUGH BUSINESS AND COMMUNITY DEVELOPMENT

Our Inclusion Initiative built inroads to our local business communities in 2019 in ways we’ve never done before. This program, intended to remove barriers and create pathways to partnerships between local minority, women-owned businesses and governmental agencies such as ours, produced its first graduates of the EAA Recharge Bootcamp. Through the recharge bootcamp, nine local small businesses gained new skills and insights into various aspects of business development and strategy through a series of EAA-sponsored classes aimed at helping them grow and build new relationships and alliances in the community.

EDUCATION AND CONSERVATION THROUGH PARTNERSHIP

The announcement of plans for a new EAA Education and Outreach Center at the soon-to-be-built Morgan’s Wonderland Camp signaled the dawning of a new and exciting era in the effort to reach, teach and engage people of all ages in understanding the virtues of aquifer conservation and protection. The imaginative partnership between the EAA and Morgan’s Wonderland is expected to be realized in the establishment of the first-ever education and outreach center dedicated solely to the purpose of introducing people to the Edwards Aquifer some time in 2020.

STEWARDSHIP AND SUSTAINABILITY THROUGH SCIENCE

The acquisition of approximately 150 acres of pristine land located on the recharge zone of the aquifer helped fuel the vision of an outdoor learning laboratory for aquifer field research and observation. These properties, acquired through the City of San Antonio Edwards Aquifer Protection Program and then gifted to the Edwards Aquifer Conservancy, provide the EAA a platform for carrying out meaningful, long-term research on various aspects of aquifer recharge, protection, and management that could further ensure the continued sustainability of the Edwards Aquifer for generations to come.

These initiatives, in their collaborative nature and creativity, illuminate the path of ***inclusion, imagination and innovation*** that we have undertaken in order to reshape and invigorate the work of the EAA and to revitalize our mission to manage, enhance, and protect the Edwards Aquifer system.

Our pledge to you in 2020, then, is this: Inclusion, imagination, and innovation will be the EAA way.

We will carry out our mission by engaging you — our permit holders, stakeholders and neighbors — with world-class service, sound science and research, and open and responsive communication.

ON BEHALF OF THE EMPLOYEES AND BOARD OF DIRECTORS OF THE EAA, HERE’S WISHING YOU A MOST HAPPY AND PROSPEROUS 2020!

Right Page: EAA’s General Manager, Roland Ruiz gives an interview at the site for future EAA Field Research Observatory.



EAA TO RECHARGE ITS EDUCATION OUTREACH

This latest venture in the EAA's story will bring together children and youth of all abilities and teach them about one of the most prolific aquifers in the world.

Skies were gray and rain was falling – actually, rather appropriate for a late October day at the site of the soon-to-be-constructed Morgan's Wonderland Camp. The day marked the official announcement of the Edward Aquifer Authority entering into a formal partnership with the Camp and committing to the onsite construction and operation of an EAA Education Outreach Center. The announcement was made jointly by Gordon Hartman, Founder of the Gordon Hartman Family Foundation and Creator of the Morgan's Wonderland Camp, and Roland Ruiz, EAA General Manager. Joining them were members of the EAA Board of Directors, who, along with Karston, the EAA Texas Blind Salamander, and Joy the Butterfly, the Camp's Mascot, took part in a traditional groundbreaking to signify the occasion.

By partnering with with ultra-accessible™ Morgan's Wonderland Camp (MWC), a 102-acre recreational oasis on the northern outskirts of San Antonio that will year-round offer a summer camp-type experience to those with and without special needs, the Edwards Aquifer Authority will take advantage of its unique location on the Recharge Zone to impart water wisdom by cultivating a curiosity for the life-sustaining groundwater system below our feet – The Edwards Aquifer.

“Our partnership with Morgan's Wonderland Camp will be manifested in the creation of the EAA Education Outreach Center,” stated Roland Ruiz, EAA General Manager.

Cont.







ABOVE Morgan's Wonderland Founder, Gordon Hartman and EAA General Manager, Roland Ruiz.

TOP OF PAGE Conceptual rendering of EAA Education Outreach Center.

“It reflects the way we must approach our work moving forward – through inclusion, imagination, and innovation – if our legacy is to be a sustainable Edwards Aquifer for generations to come,” said Ruiz.

On the cusp of celebrating nearly 25 years managing, enhancing, and protecting the Edwards Aquifer, the EAA believes in cultivating an appreciation for the preservation of the Morgan's Wonderland Camp site situated on the Edwards Aquifer Recharge Zone, and raising awareness for the importance of both quality and quantity of water in the Edwards Aquifer. This latest venture in the EAA's story will bring together children and youth of all abilities and teach them about one of the most prolific aquifers in the world.

The \$2.5 million EAA Education Outreach Center will encompass 3,500 square feet and feature unique learning experiences that will broaden imaginations through participation in innovative STEM opportunities with an inclusive mindset. A permanent location for a dedicated EAA Education Outreach Center at Morgan's Wonderland Camp will give the EAA a platform to educate daily.

The \$28 million, ultra-accessible™ Morgan's Wonderland Camp, which is slated for completion in the latter half of 2020, will be able to accommodate, at one time, up to 525 campers of all ages and abilities along with staff for day, weekend or week-long camp sessions.

“We are truly excited about the inclusion of the EAA Education Outreach Center at Morgan's Wonderland Camp, which definitely will be a fun place as well as a learning place,” stated Gordon Hartman, Creator of the Camp. “In collaboration with EAA, we'll be able to offer community-based instruction sessions to campers as well as students from area schools and home schools. When learning becomes fun, lessons are more likely to be remembered.”

Hartman noted that MWC will have a multi-platform zipline that can accommodate wheelchairs, a stable and horses for horseback riding, a nature farm, multiple swimming pools and a relaxing river, an archery range, an enclosed sports pavilion and a challenge course with climbing walls for campers of all abilities, to name a few MWC features. ■



ABOVE EAA mascot, Karston; Community Advisory Board member, Chris Herring; EAA Board members, Don Laffere; Deborah Carington; Carol Patterson; EAA's General Manager, Roland Ruiz and Morgan's Wonderland Founder Gordon Hartman; EAA Board members, Byron Miller; Rachel Allyn Sanborn; Patrick Stroka; and Morgan's Wonderland mascot, Joy.

TOP LEFT Gordon Hartman and EAA Board Members, Carol Patterson and Don Laffere.

TOP RIGHT Mark Hamilton, EAA Executive Director of Aquifer Management Services, and Brock Curry, EAA Deputy General Manager.

THE EDWARDS AQUIFER CONSERVANCY IS ACTIVELY SEEKING UNDERWRITING FOR NAMING AND OTHER SIGNAGE SPONSORSHIP OPPORTUNITIES FOR THE EDUCATION OUTREACH CENTER. FOR MORE INFORMATION VISIT THE EA CONSERVANCY TAB AT WWW.EDWARDSAQUIFER.ORG.



CONSERVANCY ACQUIRES LAND FOR FIELD RESEARCH OBSERVATORY

November 14th, 2019 marked a red-letter day for the Edwards Aquifer Conservancy (EAC), the supporting non-profit organization for the Edwards Aquifer Authority (EAA), as it was formally granted the deeds to 150+ acres of land known as the Cibolo Vista Tracts 1 and 2 by the San Antonio City Council. The property, located just north of the soon-to-be-constructed Morgan’s Wonderland Camp, represents a \$5.5 million gift to the Conservancy – the largest gift received to date.

The EAA is proposing to operate a field research observatory on the properties, which would include a thorough science-based initiative to collect groundwater levels, water quality data, soil sampling and mapping of karst features like springs or seeps in the area. The EAA will be responsible for the field research observatory and maintenance of the properties in accordance with the City of San Antonio’s conservation easement requirements. The principal purpose of the EAA Field Research Observatory is to develop, research, and implement practices that lead to enhanced water quality and quantity for the region.



“The acquisition of this property demonstrates the value of the Edwards Aquifer Protection Program (EAPP) in incentivizing conservation of lands within the most environmentally sensitive areas of the recharge and contributing zones of the aquifer,” stated Roland Ruiz, General Manager of the EAA. “The transfer of these particular tracts of land to the Edwards Aquifer Conservancy further raises the return on investment of the program because these properties will not only be conserved, they will now provide us a new and meaningful platform to conduct long-term scientific, field research along a critical stretch of the recharge zone, which can ultimately have a generational impact on our understanding and management of the Edwards Aquifer.

It gives us a 150-acre, learning laboratory, that will enable us, for example, to better quantify impacts of adjacent aquifers and surface water influences, and to evaluate creative best management practices that could lead to better water quality through improved retention and infiltration techniques that will ultimately result in a more sustainable aquifer.”

The relative proximities of the Education Outreach Center at Morgan’s Wonderland Camp and the Field Research Observatory will be leveraged upon – with each of the facilities supporting each other’s primary missions of educational outreach and scientific research, respectively. The potential synergy represents a quantum leap in extending understanding, awareness and aquifer insights to all peoples across the Edwards Aquifer region. ■

THE EDWARDS AQUIFER CONSERVANCY IS ACTIVELY SEEKING UNDERWRITING FOR NAMING AND OTHER SIGNAGE SPONSORSHIP OPPORTUNITIES FOR THE FIELD RESEARCH OBSERVATORY COMPLEX. FOR MORE INFORMATION VISIT THE EA CONSERVANCY TAB AT WWW.EDWARDSAQUIFER.ORG.

ABOVE Conceptual rendering of EAA Field Research Observatory.





“Mulchie”

The Mulch Fire Episode



ABOVE EAA Water Resources Director, Chuck Ahrens, and San Antonio Fire Department Captain, Michael Wagner.

TOP OF PAGE After the fire.

“**M**ulchie” started it all. Part of the Edwards Aquifer Region’s water lore is the massive mulch fire that ignited Christmas night in 2006 near Helotes. The mulch pile had been continually added to over a period of four years and had grown to an estimated 80 feet high and 800 feet long. From the distance, it looked like it could be another hillside in the Texas Hill Country. In the end, it cost about \$5.8 million and took three months to extinguish. Throughout the ordeal, the fire gained worldwide media coverage, was the subject of various poems and songs and earned that “Mulchie” nickname.

The biggest issue with the process of snuffing out the fire was that the mammoth mountain of mulch sat on the Edwards Aquifer Recharge Zone. Consequently, the enormous volume of water being poured on the fire created a toxic stream of runoff. Due to the environmental issues at hand, the San Antonio Water System shut off the water to stop the potential for contaminating the aquifer.

“Needless to say, the whole mulch fire episode initiated new environmental concerns,” said

Chuck Ahrens, the Edwards Aquifer Authority’s water resources director. “There were all kinds of smoke and ash in the air and we were all concerned with the contaminated runoff getting into the aquifer. And while there were a few wells in the area that showed some contamination from the mulch fire runoff, fortunately the problem was not widespread and did not impact any public supply water wells.

But, what we all learned was that there needed to be some changes with how such fires are managed on the Edwards Aquifer Recharge Zone and how we monitor and address firefighting there. Mulchie was truly the impetus for the program we are implementing now with cooperation from the San Antonio Fire Department (SAFD) and other agencies.” Ahrens explained that after the mulch fire incident, the State Legislature gave the responsibility for monitoring and mitigating potential impacts from firefighting water runoff to the Edwards Aquifer Authority.



BRINGING AMERICA'S
BRAVEST
9-11-01

Velocity

SAN ANTONIO
FIRE DEPT.
HAZ-MAT
TEAM

823615



Initial efforts to create a program stalled a bit, but over the last several months, a new plan to track and develop programs to mitigate impacts from firefighting on the recharge zone has taken hold. The City of San Antonio provided a \$218,900 grant for analysis and training, the San Antonio River Authority stepped up to manage the funds and the Edwards Aquifer Authority (EAA), San Antonio Fire Department and Texas A&M University - San Antonio collaborated to put the program components together.

“Since the San Antonio Fire Department has a state-of-the-art hazmat program, we were already active in pollution prevention efforts that can be a part of fighting fires,” said SAFD Captain Michael Wagner. “However, when the EAA approached us about taking our efforts to the next level in protecting the Edwards Aquifer Recharge Zone, our leadership team welcomed the opportunity.”

Texas A&M University - San Antonio staff then reached out to the Texas A&M Engineering Extension Service (TEEX) training school to enlist their knowledge in developing some best management practices (BMP) for the program. TEEX is home to some of the world’s top training facilities for emergency preparedness and trains nearly 200,000 firefighters, Homeland Security officials, law enforcement and other emergency responders from around the world each year.

“The TEEX faculty is world class and we were thankful for their participation in helping us formulate a direction for the program,” Ahrens noted. “The EAA has also had regular meetings with the SAFD leadership group, and Captain Wagner in particular, as we try and understand how we can incorporate recharge zone protection BMPs for firefighters working in Northern Bexar County.”

The early research and series of meetings have produced significant goals for the program. The EAA will be visiting all regulated facilities located within the city limits of San Antonio and on the Edwards Aquifer Recharge Zone. The EAA’s Small Container Rules require facilities that store more than 1,000 gallons of regulated substance in containers smaller than 500 gallons to submit facility maps and an inventory of regulated substances that are housed onsite. Using the facility maps and the regulated substance inventory, EAA staff plans to create a database that firefighters will have access to in case they have to fight a fire in the Recharge Zone.

Additionally, the EAA will be creating an innovative site-specific GIS maps that will show firefighters the most environmentally sensitive areas of a given piece of property. The site-specific maps will also show firefighters which direction the water will run, given the slope near facilities storing large quantities of possibly harmful materials.

“Having this type of information available as our units approach the scene of a fire will be invaluable to us,” Wagner said. “While our first priority is saving lives, we are also extremely conscious of protecting the environment. We can pour tens of thousands of gallons of water on a burning structure and we all know that the water has to go somewhere. If we can see that the runoff could enter a sinkhole or other recharge feature from that data the EAA provides, we can immediately set up berms and other containment materials to mitigate contamination of the aquifer.”

Through collaboration with the SAFD, EAA is already getting email notices about any fires occurring on the recharge zone. Ahrens said those notifications are not meant to trigger a water quality team from the EAA heading out to the fire, but more about having the opportunity to do some post-event water quality sampling.

“San Antonio firefighters are well-trained and we are not going to get in the way of them doing their jobs. However, the open line of communications and data sharing will help both of us,” Ahrens concluded. “Our long-term goal is for comprehensive training on this issue to become a standard component for every new firefighter joining the SAFD. The Edwards Aquifer will always be an essential water supply for San Antonio and other communities around the region, so we need to ensure that we’re taking every step we can to protect it from potentially contaminated runoff that can occur as firefighters do their jobs on the Edwards Aquifer Recharge Zone.” ■





“Dream Big”

The EAA Mentors

The Big Brothers Big Sisters (BBBS) program has a storied history. It has operated for 115 years going back to a juvenile court in New York City where Ernest Coulter, a court clerk, noticed that an inordinate number of fatherless boys were appearing before the judge. So, he gathered 50 volunteers to mentor those boys and started a movement that is still growing and evolving today. And while that amazing story is worth knowing and telling, the true impact of the program is felt when you witness the connection between a mentor and a child and understand how a positive human bond can help shape both of their lives in a big way.

The program calls mentors “Bigs” and the children “Littles.” Big Brothers Big Sisters has learned that connecting “Bigs” with middle school children is the best opportunity for both the kids and mentors to bond. These are very formative years for the soon to be teenagers and a time when an adult can help create a solid foundation for them.

“There are two main components to Big Brothers Big Sisters where you can be a mentor in a workplace scenario or in a community setup,” said Damon Childs, Edwards Aquifer Habitat Conservation Plan (EAHCP) contract administrator and a board member for Big Brothers Big Sisters of South Texas.

“In the workplace program, you meet with your Little once a month, typically during the lunch period. Contact with your Little is pretty much limited to that one hour for the month. The community facet of the program allows you to visit your Little a couple of times a month, take them places and communicate with them more freely. I’ve been fortunate to have participated under both sets of guidelines and I can say that helping young kids like that gives you a deep sense of satisfaction. I can only hope that I’ve given them as much as they’ve given me.”

Childs says that he got involved in BBBS right after he earned his undergraduate degree from the University of Texas at San Antonio. He was paired with an eight-year-old named Isaiah and stayed involved through BBBS until Isaiah aged out of the program at 21. They are still friends today. Isaiah, now 24, attended Child’s graduate degree ceremony and wedding as well. They’ve continued to keep up with each other’s lives and families as you might expect a bond created over 16 years would engender.

Cont.





ABOVE Little Brother and Big Brother Damon Childs, Edwards Aquifer Habitat Conservation Plan (EAHCP) Contract Administrator, (at the EAA), and a board member for Big Brothers Big Sisters of South Texas.



ABOVE EAA staff with their Littles. **RIGHT** Jim Winterle, EAA Director of Modeling and Little. **LOWER RIGHT** Childs, Littles, and Big Brothers, Big Sisters Vice-President of External Relations & Big Sister, Christina Martinez.

“Isaiah is a fine young man,” Childs said with a proud smile. “He’s in the telecom construction business and still trying to find his way a bit on a career path. He is smart and works hard so I have every confidence he will get where he wants to be in life.”

Shortly after becoming a “Big”, Childs was asked to be on the board for the South Texas Chapter of Big Brothers Big Sisters. He recalled that he immediately said yes and now has a decade of experience as an official with the organization. About a year ago, he decided to get the Edwards Aquifer Authority (EAA) involved in the BBBS workplace program.

“When Damon approached me about being a Big, I was a little hesitant about joining,” noted Latifah Jackson, a Contracts and Business Development Coordinator for the EAA. “I was wondering how I would relate to a sixth grader and what I might have to offer her.

But it didn’t take too long before we got to be friends. Not long after I was paired with my Little, Mo’nay, her family moved to another part of the city. I didn’t want her to think that I was going to abandon her, so I decided to transition from the limited contact workplace format to the community part of Big Brothers Big Sisters where I will be able to spend more time with her and pick her up for outings and such. I just want to be there to support her and guide her the best I can.”

Both Childs and Jackson explained that connecting with family members is extremely important to being a successful Big. Jackson said she regularly texts Mo’nay’s Mom to keep up with their lives and Mo’nay’s progress in school.



“Mo’nay was interested in animals and science when we first met,” Jackson said. “She is now particularly interested in endangered species. She was surprised to find out that you don’t have to go to some exotic location in the world to find an endangered species. We have them right here in our own back yard.”

“It would be awesome to someday have one these kids be an intern at the EAA and maybe even find a job here,” Childs noted. “Latifah says that sometimes you just have to plant a seed, care for it and good things will happen. I couldn’t agree more with that sentiment and that’s really the whole philosophy behind Big Brother Big Sisters. You never know who is going to inspire you. And after being a part of the program for so long, I know that inspiration works both ways between Bigs and Littles.” ■

BIG BROTHERS BIG SISTERS | BBBS.ORG

The EAA now has 17 Bigs who get to meet with their Littles, all from Jackson Middle School, once a month at the EAA. The Bigs and Littles share lunch, work on an activity together and have some on-one-on time before the Littles get back on the bus and head to school. These meetings give the kids an opportunity to discuss anything that is on their mind with the full attention of their mentors.

Jackson and Childs say they’ve noticed that some of the kids have picked up an interest in science after learning about the Edwards Aquifer and EAHCP program that helps protect the endangered species found in the Edwards Region.

On one particular visit, the group was given a 3D video presentation from the EAA Communications Department of the Edwards Aquifer. The kids got to experience what it would be like to navigate through a cave and learn about the geological features that exist right beneath us.





EAA Continues Conducting Scientific Research At EPA Superfund Site



River City Metal Finishing (RCMF), located in Bexar County west of San Antonio, is a former metal plating shop that operated from 1994 to 2002.

RCMF was closed due to a series of compliance issues stemming from improper handling and disposal of chemicals associated with metal plating. In May 2018, the site was listed by the U.S. Environmental Protection Agency (EPA) as a Superfund site following a referral from the Texas Commission on Environmental Quality (TCEQ). During an inspection in 2016, TCEQ found heavy metal contamination of soil and shallow groundwater and potential contamination of Edwards Aquifer water.

In 2018, the EAA began independently researching this site and implemented a collaborative effort within the EAA's various departments to gather data. EAA staff reviewed the site's geology, water level data, groundwater chemistry data, and collected new groundwater samples from Edwards Aquifer wells in the area. Paul Bertetti, Director of Aquifer Science commended his staff, stating, "Aquifer Science staff at the EAA were able to quickly organize a water sampling plan and assemble a large amount of data to characterize the RCMF site before the first interagency discussions. They did a wonderful job employing several new software tools for the task."

EAA staff used data from wells in the RCMF area to create cross sections of geologic layers under the site. Information about the structure, such as location and offset of faults, helps staff evaluate the potential for contaminant transport from the surface to the Edwards Aquifer.

The EPA began its remedial investigation field work in March 2019. During the remedial investigation, which could last up to two years, the EPA will collect new water quality and soil samples from the site and surrounding areas. Furthermore, the EPA has also drilled several new monitoring wells to examine the potential for movement of contamination. The data from EPA's investigation will be used to conduct human health and ecological risk assessments, which will be used to guide recommendations about site clean-up.

The EAA plans to continue sampling wells near the site on an annual basis in coordination with the EPA investigation. In addition, the EAA will continue to assist with EPA's efforts and be a part of interagency discussions with their agency and other agencies, including TCEQ, Texas Department of Health and Human Services, and the U.S. Geological Survey (USGS).

"Fortunately, our sampling in 2018 and 2019 has shown that heavy metal concentrations in the Aquifer are far, far below any levels of concern for drinking water. In fact, our results indicate levels in the area are no different than background."

"Soils and shallow groundwater at the RCMF site are still contaminated. So, we will remain vigilant in our monitoring and continue working with the EPA to fully assess any risks from the site," said Bertetti.

EAA staff used data from wells in the RCMF area to create cross sections of geologic layers under the site. Information about the structure, such as location and offset of faults, helps staff evaluate the potential for contaminant transport from the surface to the Edwards Aquifer. ■

[Figure 1. on the following page summarizes this study.]



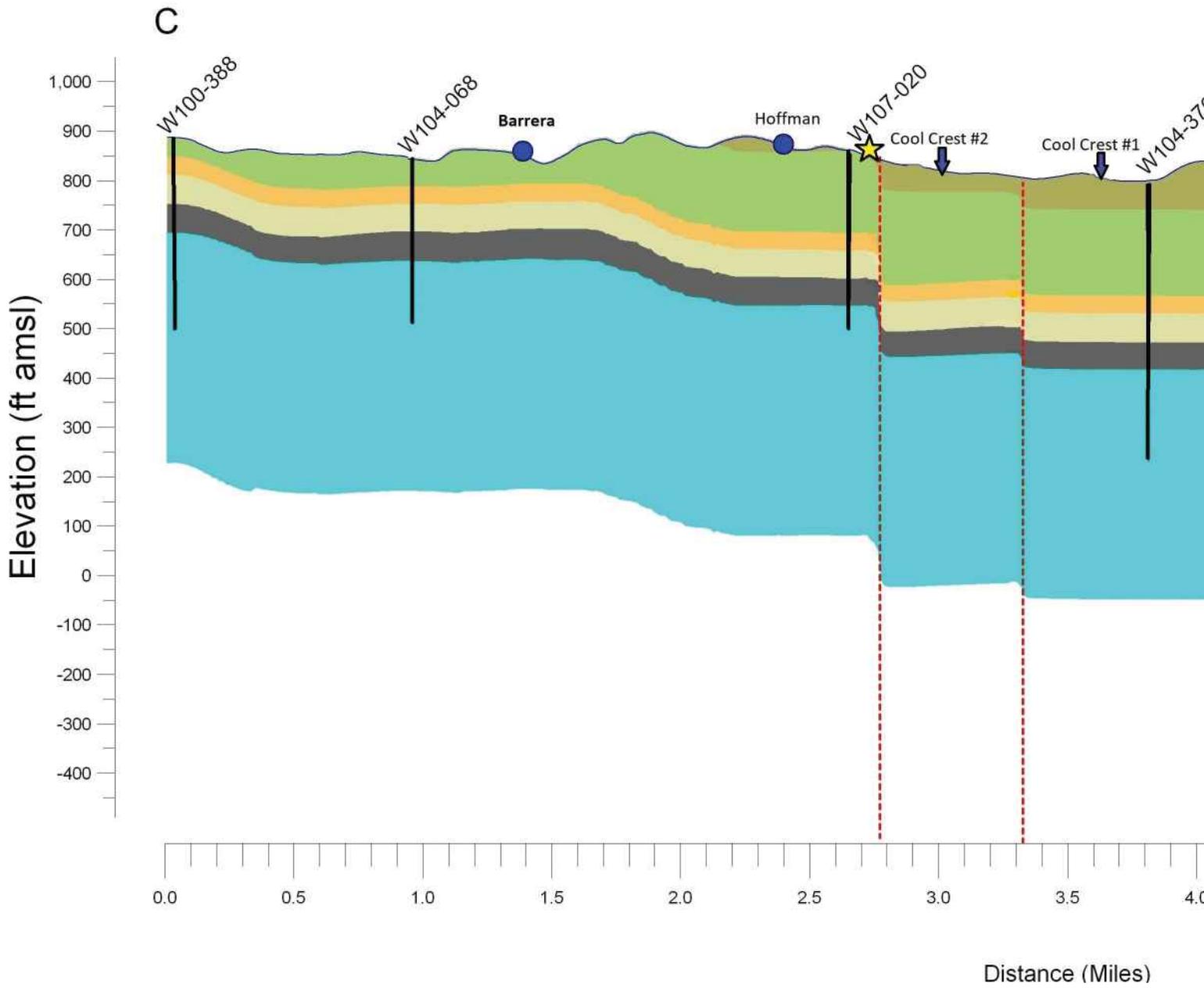
The Aquifer Science and Research Team performs several data collection tasks to include water chemistry samples, stream flow measurements, and research related water level transect data sets. Paul Bertetti is its Director.

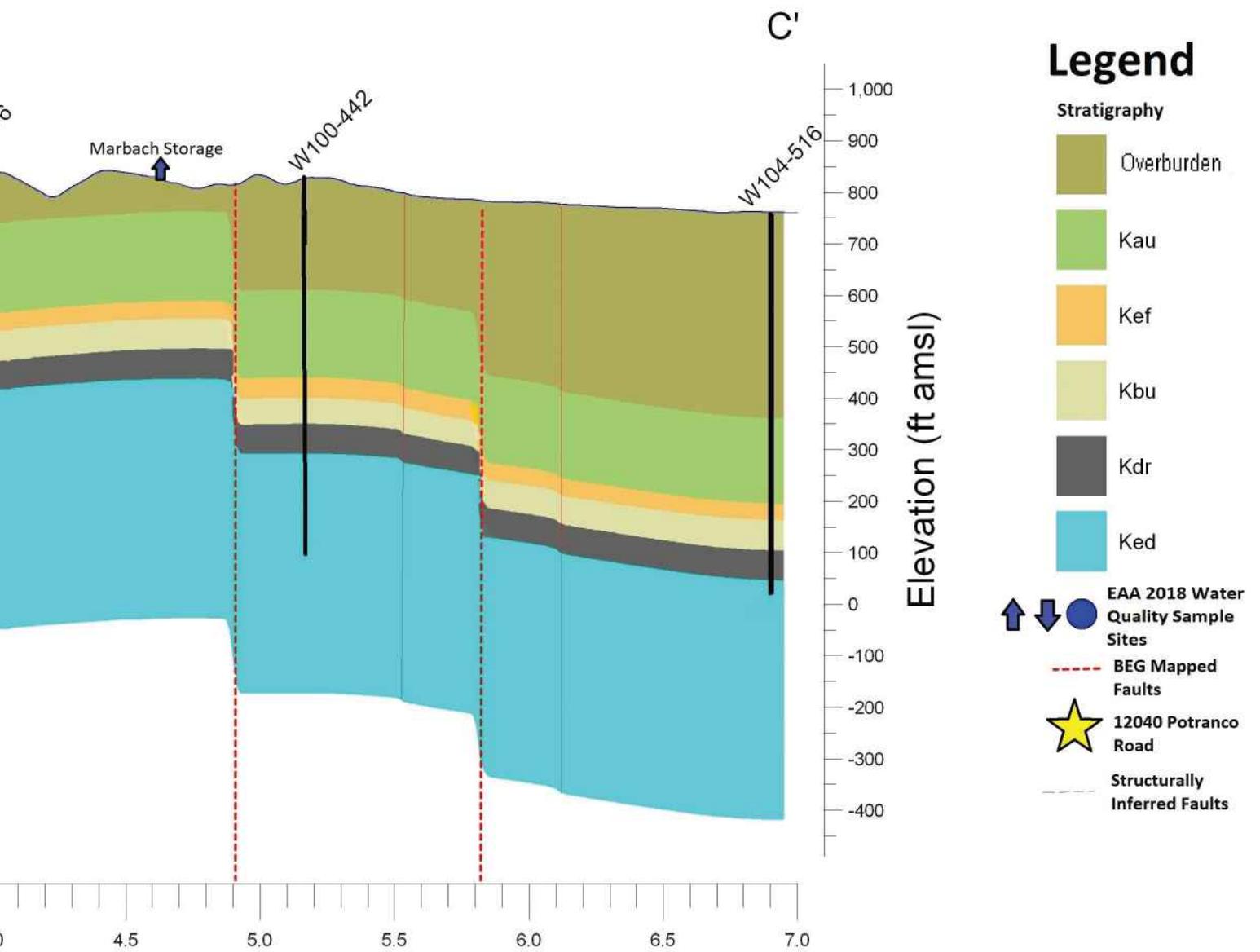
For more than 25 years, Mr. Bertetti has worked as a research scientist investigating a wide range of topics related to the hydrogeology and geochemistry of complex aquifer systems such as the Edwards, Carrizo-Wilcox, and Trinity aquifers. He has also conducted numerous in-field, laboratory, and modeling studies to examine the sorption and ion-exchange behavior of dissolved constituents in groundwater. Mr. Bertetti holds B.S. and M.S. degrees in Geology from the University of Texas at San Antonio.

What is a "Superfund"?

Superfund is the common name for the law that authorizes the state to take care of contaminated sites that have releases or potential releases of hazardous substances into the environment. The law gives the environmental agencies the legal power to clean up the sites and to recover cleanup costs from those who are responsible for the hazardous substances and solid wastes associated with the Superfund site ("State Superfund Program" 2019).

DATA FROM WELLS IN THE RCMF AREA





ABOVE EAA staff used data from wells in the RCMF area to create cross sections of geologic layers under the site (shown by the yellow star). Information about the structure, such as location and offset of faults, helps staff evaluate the potential for contaminant transport from the surface to the Edwards Aquifer.

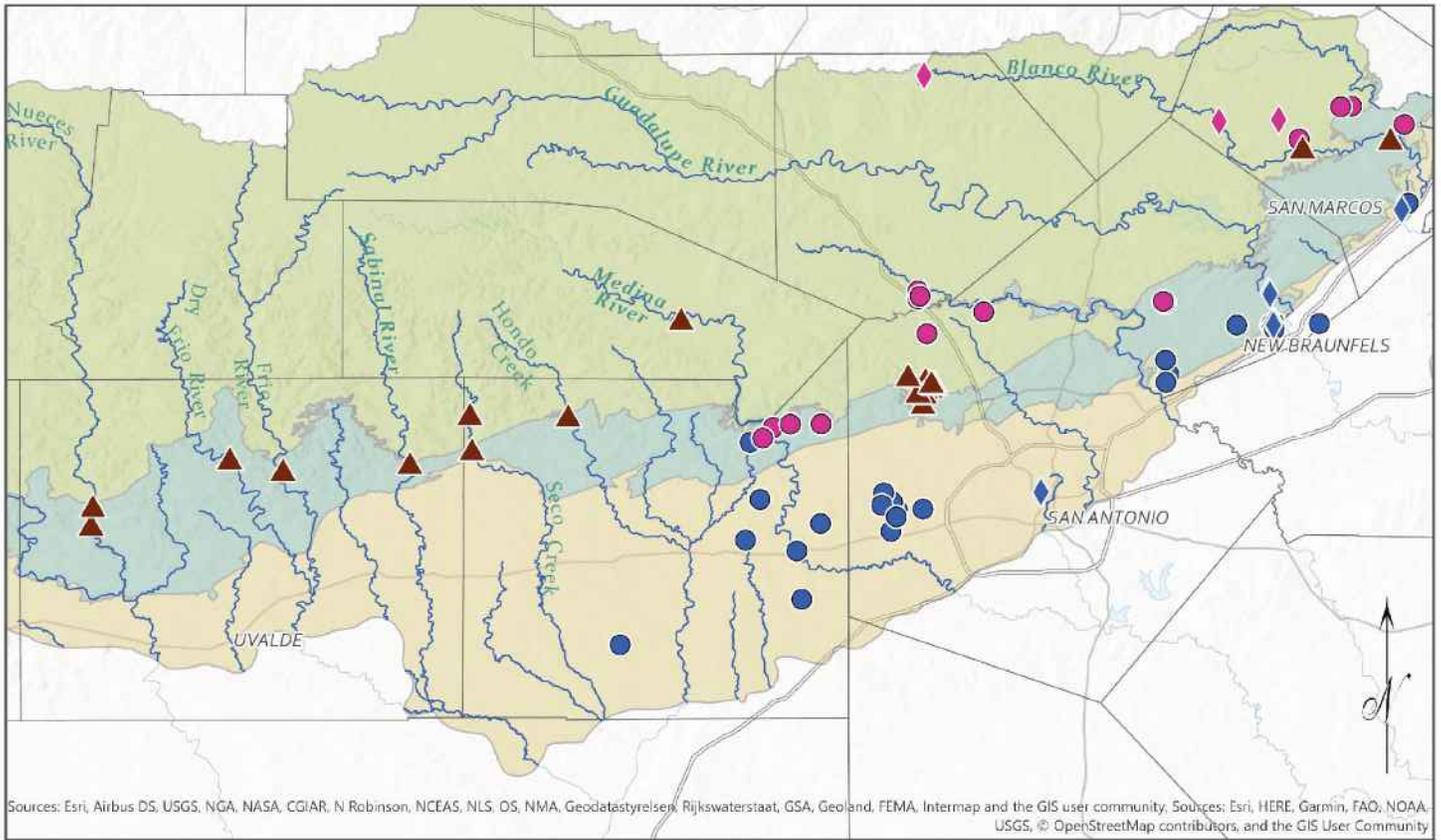


A person wearing a dark blue polo shirt and a yellow wristband is standing on the left side of the page, looking towards a river. The background shows a lush green forest and a body of water.

WATER QUALITY

Water quality data collected by the EAA over the past, almost 25 years is now stored in a new water quality data management software, Aquarius Samples. In the past, the department had relied on a Structured Query Language (SQL) for extracting data for reports. However, this newly implemented database houses streamlined field sample data in a centralized location in the cloud. This method for inputting data allows for information to be efficiently extracted and easily searchable for discovery, analysis, and reporting.

Cont.



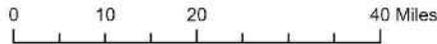
Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community. Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Explanation

- Surface Water Sample Location
- Trinity Well
- Trinity Spring
- Edwards Spring
- Edwards Well
- Artesian Zone
- Contributing Zone
- Recharge Zone

2018 Water Quality Sampling Locations

Scale: 1:900,000



Map 1. The map shows the locations for water quality samples collected by EAA staff in 2018. The samples represent 11 streams, 43 wells, 5 spring groups, and 2 alluvial wells. Samples were obtained from the Contributing, Recharge, and Artesian Zones of the Edwards Aquifer.

Every year the EAA publishes a Water Quality Summary with a reporting of water quality samples from streams, wells (Edwards Aquifer wells and Trinity Aquifer wells), and five spring groups (see map 1 for sampling locations examples from 2018). EAA’s annual reports on water quality summary, groundwater recharge, groundwater discharge and usage, or precipitation in the Edwards Aquifer region can easily be created with better data accuracy through quality control and quality assurance using Aquarius Samples.

“In recent years our advances in data collection methods and research interests had exceeded our ability to effectively store and transmit our results in once central location. The older system, once useful, became outdated and inefficient to use. To resolve this matter, the department acquired Aquarius Samples, a comprehensive, cloud-based water quality database. The system is easy to use and can rapidly filter data, narrowing thousands of results within seconds,” said Brent Doty, EAA Research Manager for Aquifer Science. The EAA Aquifer Science department will utilize Aquarius Samples when developing the 2019 Hydrologic Data Reports. ■

PICTURED RIGHT Gizelle Luevano, EAA Lead Hydrologic Data Coordinator and Jose Silvestre, an intern, analyzing samples in the Blanco River.





EDWARDS AQUIFER
AUTHORITY

EDWARDSAQUIFER.ORG | 210.222.2204

 EdwardsAquifer  TheEdwardsAquifer  edwardsaquiferauthority

APPENDIX H3
2019 EAHCP Conserve Newsletters

March 2019	<i>EAHCP Conserve</i> Newsletter
June 2019	<i>EAHCP Conserve</i> Newsletter
August 2019	<i>EAHCP Conserve</i> Newsletter
October 2019	<i>EAHCP Conserve</i> Newsletter
November 2019	<i>EAHCP Conserve</i> Newsletter
December 2019	<i>EAHCP Conserve</i> Newsletter

- March 2019 -

Time to Think About ASR-VISPO Program Opportunities



Javier Hernandez leads a public meeting to explain the differences and opportunities with the current ASR and VISPO Programs.

This year, 2019, is going to be a particularly important one for Edwards Aquifer water rights permit holders as it applies to the ASR and VISPO Springflow Protection Programs. Because the two programs are getting close to meeting their overall goals for enrollment, there may be limited opportunities for permit holders to make some money from their water rights after signups for 2020 (happening now) are closed.

“We were just shy of our 40,000 acre foot overall VISPO goal for this year and so we’re pretty happy about that,” said Javier Hernandez, ASR-VISPO Program Manager. “However, once we meet our goal in 2020, there will be no more room for new agreements until 2024. So, our permit holders will

have to wait four years until there is another opportunity to get into VISPO after the next round of agreements are signed. So, I would urge people to really take a look at their water use now and decide on whether they want to get into VISPO because there won’t be any space soon.”

The ASR Program currently has more than 35,000 acre feet of its 50,000 acre-foot permit goal enrolled. And while there will be some previously signed ASR leases coming due in the next couple of years, those who currently own those leases will have the first chance to renew in the ASR Program. That means that the overall opportunity to sign up for the ASR Program is dwindling as well.

ASR-VISPO Program Sign Ups - Continued...

Both ASR and VISPO are critical components of the Edwards Aquifer Habitat Conservation Plan and are known as springflow protection measures. They are designed to maintain quality water flowing in satisfactory amounts to maintain the habitats of endangered species living near the Comal and San Marcos Springs. In addition to having stored water on hand in preparation for drought of record conditions, the federal permit the EAA regional partners maintain also requires the partners to reduce pumping during such periods. And that is where the VISPO/ASR forbearance programs come into play.

Previously, ASR had been referred to as a leasing program since actual water was being pumped from the Edwards Aquifer

for storage in the SAWS-owned Aquifer Storage and Recovery facility in South Bexar County. For this year, ASR was converted to a forbearance program, similar to VISPO, since the program had reached its storage goals. And all new ASR and VISPO agreements will run through 2028.

"The ASR Program changed quite a bit for this year and we've had a lot of questions about it," Hernandez noted. "We always encourage permit holders to call, ask questions and let us help them decipher the best options for their particular cases. Not everyone uses their water the same way, so we understand that it sometimes takes talking through their current water use situations and then applying the ASR and VISPO parameters to those situations."

Here is some basic information on how the programs differ from each other.

VISPO pays more in a forbearance year but should trigger more often. ASR pays a little less per acre foot in a forbearance year, but should trigger less often because multi-year extreme drought conditions are rare. Current VISPO pricing includes a \$54 per acre-

foot per year standby fee in years that the program does not trigger. A \$160 per acre-foot price in forbearance years in addition to the standby rate (\$54 per acre-foot) brings the total of \$214 per acre-foot paid in years the program does trigger. ASR pays a straight \$100 per acre foot enrolled at all times.

"The weather is another component we always have to look at when trying helping people make decisions about which program to get into," Hernandez explained. "With all of the rain we've had in the last few years and Edwards Aquifer levels remaining at great levels, it is anticipated that the new ASR Forbearance Agreement will not trigger over the next few years. That means an enrollee will get paid for

having water in the program, but still have access to use that water or even be able to lease it to someone else."

Hernandez said he anticipates that permit holders will have through about mid-summer to make their decisions. There

are a number of older ASR leases that could be renewed soon leaving less room for new enrollees. Also, the VISPO Program is very close to reaching its overall goal for 2020.

"While we don't want to sound the alarm too loudly, the truth is that we are moving toward having both programs filled up for next year. For VISPO, that means permit holders won't have another chance to get in until 2024. The ASR Program will have a little more leeway for new enrollees, but because the chances of triggering ASR in the next few years are still low, we are anticipating that permit holders will want to get in fairly quickly to take advantage of the beneficial weather conditions."

You can call Javier Hernandez at 210-222-2204, ext. 139, or email him at jhernandez@edwardsaquifer.org if you have more questions about the ASR and VISPO Programs.

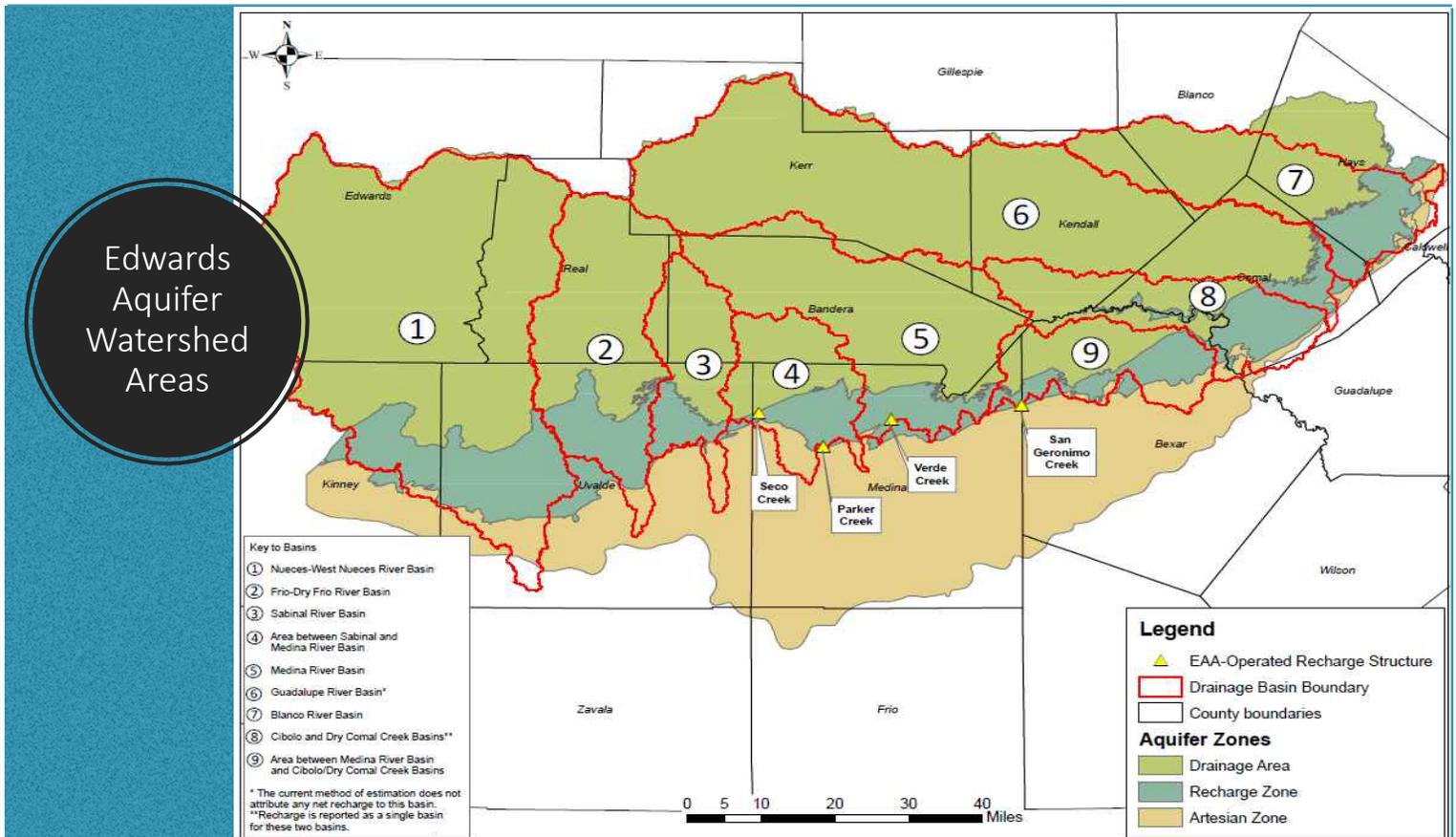
"While we don't want to sound the alarm too loudly, the truth is that we are moving toward having both programs filled up for next year. For VISPO, that means permit holders won't have another chance to get in until 2024."

- Javier Hernandez

- June 2019 -

Huge Edwards Aquifer Recharge Bodes Well for ASR-VISPO

ASR Program managers say forbearance will not trigger for 2020, 2021 due to large recharge



Rainfall and associated Edwards Aquifer recharge are two of the most important components of the ASR Forbearance Program, and also the most unpredictable. So, ASR Program managers were happy to report that the official recharge calculation for the Edwards Aquifer in 2018 totaled 1.1 million acre feet, or more than 358 billion gallons.

“We knew that rainfall was plentiful last year,” said Javier Hernandez, ASR-VISPO Program Manager. “But, we couldn’t really predict how that precipitation would translate into recharge. Obviously, we were quite happy to see that big 1.1 million acre foot recharge number officially reported by the U.S. Geological Survey, who is our partner in determining that statistic.”

The majority of recharge to the Edwards Aquifer originates as precipitation over the Drainage Area and Recharge Zone. The Edwards Aquifer Authority (EAA) maintains an agreement with the U.S. Geological Survey (USGS) to provide surface recharge estimates for eight of the nine drainage areas with streams that flow on to the Edwards Aquifer Recharge Zone (see map above). Recharge is estimated using a water-balance method that relies on precipitation and streamflow measurements across the region. The sixth drainage area, which is the Guadalupe River Basin, does not appear to provide significant recharge to the southern segment of the Edwards Aquifer, so recharge is not estimated for that drainage basin by the USGS.

Major Recharge Positively Impacts ASR Program - Continued...

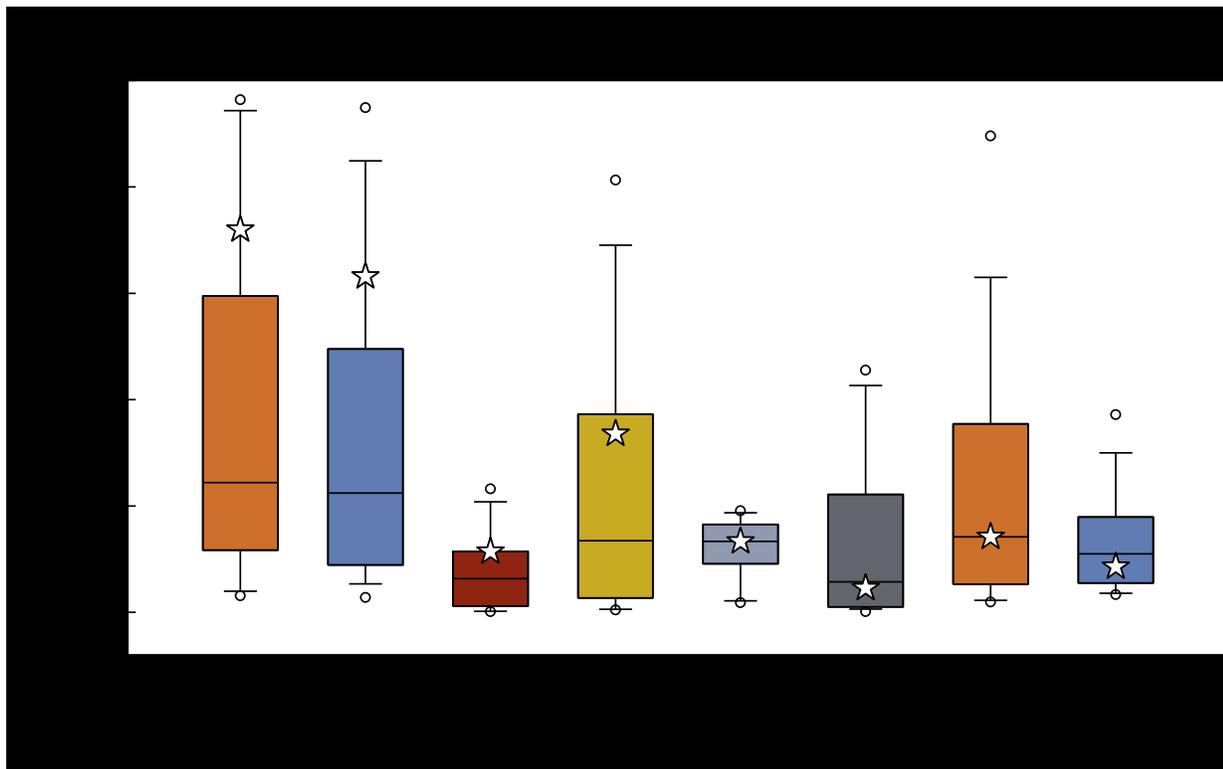
"Because the 2018 recharge number was so high, we are able to project that the ASR Forbearance Program will not trigger for 2020 or 2021," Hernandez explained. "That means that those enrolled in the ASR Program will be paid for the water they have in the program, but also be able to use that water any way that benefits them most during 2020 and 2021."

The ASR Program uses a 10-year rolling recharge average of 500,000 acre feet to determine whether the forbearance part of the program will trigger. Forbearance means that enrollees cannot use the water they have in the ASR Program for the calendar year following a year when the determination has been made that the 10-year average recharge dips below 500,000 acre feet. The large recharge number for 2018 brought the current 10-year average to 590,630 acre feet.

In addition to the good news about the ASR Program not triggering for 2020 or 2021, potential ASR Program enrollees need to consider the fact that the program is getting close to being sold out. The ASR Program currently has more than 39,000 acre feet of its 50,000 acre-foot permit goal enrolled. And while there will be some previously signed ASR leases expiring in the next couple of years, those who currently own those leases will have the first chance to enroll in the ASR Forbearance Program. That means that the overall opportunity to sign up for the ASR Forbearance Program is dwindling as well.

"We are moving toward having both of our forbearance programs, ASR and VISPO, filled up for next year," Hernandez noted. "For VISPO, that means permit holders won't have another chance to

get in until 2024. The ASR Program will have a little more leeway for new enrollees, but because the chances of triggering ASR in the next few years are still low, we are anticipating that permit holders will want to get in fairly quickly to take advantage of the beneficial weather conditions."



So how much recharge is a lot? This chart shows where most of the recharge occurred. The line in each of the colored boxes shows the average recharge for each basin since 2000. The star represents the 2018 recharge number for each stream basin. You can see that in almost all western basins, the recharge number for 2018 is significantly higher than the average recharge number.

Both ASR and VISPO are critical components of the Edwards Aquifer Habitat Conservation Plan and are known as springflow protection measures. They are designed to maintain quality water flowing in satisfactory amounts to maintain the habitats of endangered species living near or at the Comal and San Marcos Springs. In addition to having stored water on hand in preparation for drought of record conditions, the federal permit that the EAA regional partners maintain also requires a significant reduction in pumping during such periods. And that is where the VISPO/ASR forbearance programs come into play.

You can call Javier Hernandez at 210-222-2204, ext. 139, or email him at jhernandez@edwardsaquifer.org if you have more questions about the ASR and VISPO Forbearance Programs.

- August 2019 -

Groundwater Trust Offers Savings for Permit Holders

EAA Also Offers VISPO Enrollment to M&I Permit Holders

Over the past few years, Edwards Aquifer permit holders have gotten to know the ASR and VISPO Springflow Protection Programs as great ways to earn some extra dollars from water they are not using each year. There is another program the Edwards Aquifer Authority offers that can save participants from having to pay aquifer management fees (AMF) during a given year.



The EAA's Groundwater Trust program allows permit holders to commit unused water to the Trust and the EAA will waive their aquifer management fees for the amount of water placed in the Trust. Because Municipal and Industrial (M&I) permit holders pay higher aquifer management fees than agricultural water rights holders do, the Groundwater Trust has a little more appeal to M&I users.

The Groundwater Trust Program is a program whereby a permit holder agrees up front to refrain from utilizing his or her water rights in a given year – regardless of any environmental triggers. While a permit is in the trust, the EAA does not charge aquifer management fees. So, by combining either the ASR or VISPO Programs with the Groundwater Trust, a permit holder can receive a regular payment under the ASR or VISPO forbearance agreement and avoid paying aquifer management fees in a non-trigger year. Here is an example of how the financials would work in that scenario.

M&I permit holders pay an \$84 per acre foot aquifer management fee. Under the new ASR Forbearance Program, permit holders are still required to pay aquifer management fees on the water they maintain if the program does not trigger for the year. So, essentially, the ASR Program payment of \$100 per acre foot will more than offset the permit fees. However, if the M&I permit holder chooses to put their water in the EAA's Groundwater Trust, the aquifer management fees are waived. That means the permit holder can profit the \$100 per acre foot payment for each acre foot enrolled in the Groundwater Trust and ASR Program at the same time.

Continued on the next page.

Groundwater Trust - Continued...

“We have had some interest in the Groundwater Trust component,” Hernandez said. “However, some permit holders think that they are locked into the Trust for the nine-year term like the ASR agreement. But, entering into the Trust is optional and they can make decisions on how long to enroll in the Trust, even if it’s year-to-year. Folks just need to keep in mind that there is an overall limit on how much water the Groundwater Trust will accept each year, so participation in that opportunity is on a first-come basis with preference given to those who enroll in VISPO or ASR”

Program	Term	Rate per acre-ft./ year	Program Trigger Requiring Forbearance	Can Use or Lease Out Water as Normal if not Triggered
ASR	9-Year beginning in year 2020	\$100 Regardless if forbearance is required	Forbearance is required if the 10-year annual recharge average is at or below 500,000 acre-ft.	Yes
VISPO	5-Year beginning in year 2020	\$54 each year \$214 Only if forbearance is required.	Rate is the same regardless of trigger. Forbearance is required if the level of the J-17 monitoring well is at or below 635ft. msl on October 1 st of any given year.	Yes
GW Trust	Year to year (multi-year option available)	Savings of \$84	Forbearance is required in any year that your groundwater rights are enrolled in the Trust.	No

Additionally, the EAA has decided to allow M&I permit holders to enroll in the VISPO program. Hernandez said they opened the door for M&I users to enroll into the five-year VISPO program because many of those permit holders felt that the nine-year ASR Forbearance Program was too long for them. So, if an M&I user enrolls in the Groundwater Trust in combination with the VISPO they would **save their \$84 per acre-foot in aquifer management fees** and earn \$54 per acre-foot per year from VISPO in non-trigger years and \$214 in trigger years.

It is extremely important to note that by enrolling in the groundwater trust is that **the enrollee can’t use their water in non-trigger years** as long as the water is enrolled in the Trust.

ASR-VISPO Getting Close to Capacity

ASR Program enrollees need to consider the fact that the program is getting close to being sold out. The ASR Program currently has more than 40,000 acre feet of its 50,000 acre-foot permit goal enrolled. And while there will be some previously signed ASR leases expiring in the next couple of years, those who currently own those leases will have the first chance to enroll in the ASR Forbearance Program. That means that the overall opportunity to sign up for the ASR Forbearance Program is dwindling as well.

Both ASR and VISPO are critical components of the Edwards Aquifer Habitat Conservation Plan and are known as springflow protection measures. They are designed to maintain quality water flowing in satisfactory amounts to maintain the habitats of endangered species living near or at the Comal and San Marcos Springs.

You can call Javier Hernandez at 210-222-2204, ext.139, or email him at jhernandez@edwardsaquifer.org if you have more questions about the ASR and VISPO Forbearance Programs.

This newsletter is dedicated to providing Edwards Aquifer permit holders useful information about the EAHCP spring flow protection programs.

- October 2019 -

VISPO, ASR Sign Up Extended to End of 2019

With programs nearing capacity, EAA establishes a waiting list



The Voluntary Irrigation Suspension Program Option, or VISPO as it is familiarly known, is getting close to filling up which means the opportunity for enrolling Edwards Aquifer water permits in the program is dwindling. In order to give permit holders a little extra time to get in on 2020 payouts, the Edwards Aquifer Authority has decided to extend the program sign up deadline through the end of 2019. But, now is the time to call to get all of the information you need to make a good decision in using your permits.

VISPO is a springflow protection measure of the Edwards Aquifer Habitat Conservation Plan (EAHCP) and administered by the Edwards Aquifer Authority (EAA). Currently, the EAA is looking to enroll 7,600 acre-feet of water in the program. Permit holders have enrolled 34,795 acre-feet of the 41,795 acre-foot program goal.

Both Irrigation and Municipal and Industrial permit holders can enroll in VISPO.

Those with permitted water rights from the EAA can enroll some of those rights in the VISPO Program and be compensated for doing so. As long as VISPO does not reach what is called a “trigger,” then the permit holders can use their water as they normally would. However, if the VISPO Program triggers during a dry year, then the permit holder is prohibited from using the amount of water enrolled in the program for the following year.

Here’s how the trigger mechanism works. If the water level at the J-17 index well in San Antonio is at or below 635 feet on October 1, EAA will notify program participants to suspend the use of the enrolled water for the following year beginning on January 1.

Currently, VISPO is a five-year agreement. Pricing is set at \$54 per acre-foot per year standby fee in years that the program does not trigger. A \$160 per acre-foot price in forbearance years in addition to the standby rate (\$54 per acre-foot) brings the total of \$214 per acre-foot paid in years the program does trigger. So, the big question becomes, what is the likelihood that VISPO will trigger in the next few years?

Continued on the next page.

VISPO, ASR Sign Ups - Continued...

With major rainfall occurring in 2018 and the first few months of 2019, computer models are showing that the chances are very slim that VISPO will trigger in near term. Here are the results from the latest computer projections.

Probability of VISPO Triggering

- Since the J-17 index well was well above 635 feet mean sea level on Oct.1, 2019, VISPO forbearance will not be required in 2020;
- For 2021–2027, the probability of VISPO triggering for any individual year is approximately 7%, based on the number of historical occurrences of the Edwards Aquifer reaching 635 feet on Oct. 1.
- As for the number of times VISPO might trigger over the seven years from 2021—2027, the chances are:
 - 1 or more VISPO trigger years = 40%
 - 2 or more trigger years =8.1%
 - 3 or more trigger years =1.0%
 - 4 or more trigger years =0.07%

Those numbers suggest that more often than not, permit holders with water enrolled in VISPO will have access to their water over the next few years.

For Municipal and Industrial (M&I) permit holders, pairing VISPO or ASR with the EAA's Groundwater Trust Program can help maximize financial benefits. The Groundwater Trust is a program whereby a permit holder agrees up front to refrain from utilizing water rights in a given year – regardless of any environmental triggers. **The key aspect of the program is that while a permit is in the trust, the EAA does not charge aquifer management fees.** So, by combining either the ASR or VISPO Programs with the Groundwater Trust, a permit holder can receive a regular payment under the ASR or VISPO forbearance agreement and avoid paying aquifer management fees in a non-trigger year.



Javier Hernandez explains ASR and VISPO triggers at a community meeting.

Because both VISPO and ASR programs are nearing capacity, the EAA has also decided to create a waiting list in case the programs fill up before a permit holder can enroll their water. VISPO includes a five-year option and there are still some older ASR leases coming to an end in the next year or two. So, there could be potentially be some opportunities in the near future and those spaces will go first to those on the waiting list.

“A permit holder making the decision to enroll in VISPO or ASR is just the first step in a process we have to go through to finalize the agreement,” said Javier Hernandez, who manages the ASR and VISPO Spring Flow Programs. “We have to get contracts drafted and signed. Then we must get those contracts approved by the EAA board. All of that work takes time, so we are really encouraging permit holders who are thinking about enrolling some of their water in either ASR or VISPO to call us in the next few weeks. We work with people one-on-one and provide different scenarios based on their actual and projected water use. We have all of their water use information handy, so it is very easy for us to work through things.”

You can call Javier Hernandez at 210-222-2204, ext.139, or email him at jhernandez@edwardsaquifer.org if you have more questions about the ASR and VISPO Forbearance Programs.

- November 2019 -

ASR Program Full, VISPO Availability Getting Slim *With programs at and near capacity, EAA establishes an end of year decline*



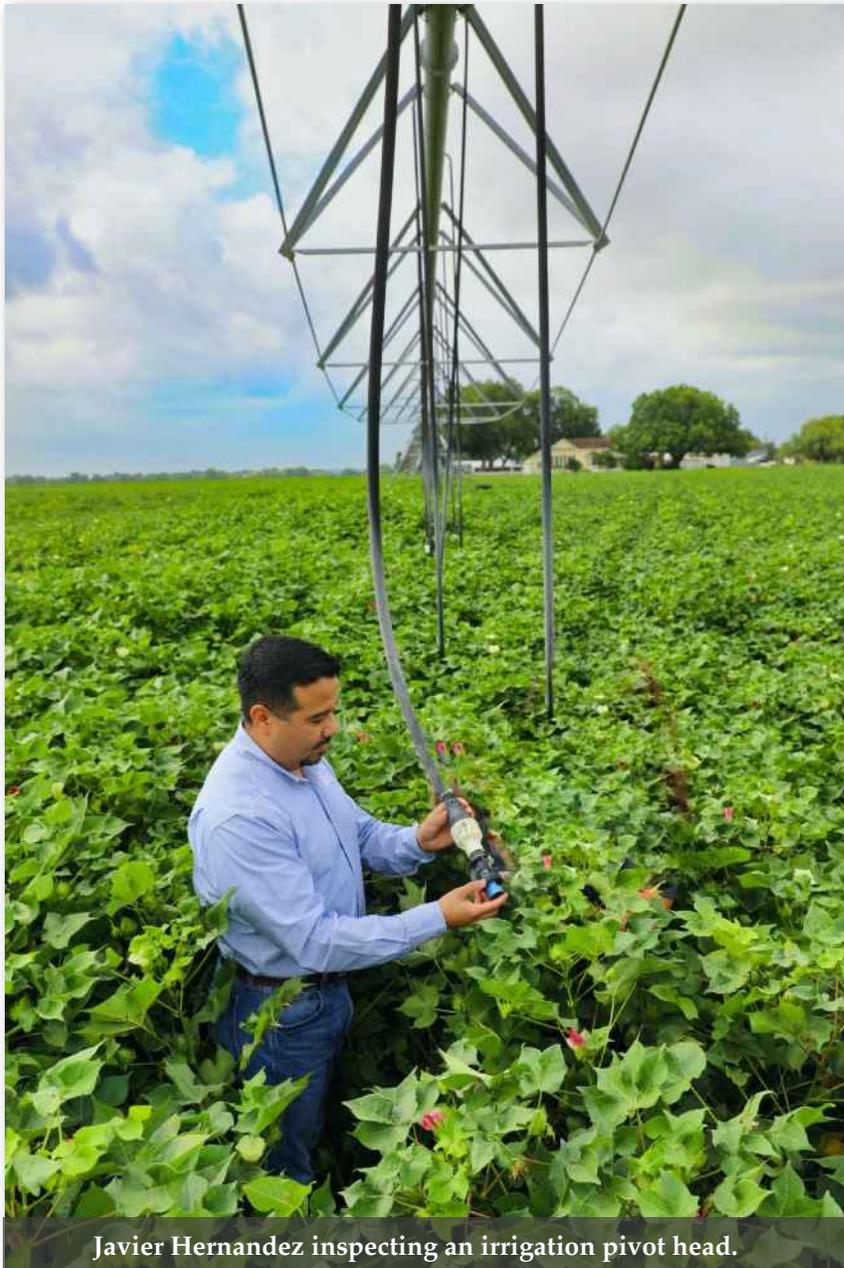
“The ASR Springflow Protection Program is now full. We are very grateful to the permit holders who stepped forth to enroll their water in ASR over the last several years,” said Javier Hernandez, who manages the ASR and VISPO Spring Flow Programs. “In the past month, we received enough water to get the program to the 50,000 acre-foot goal that was established by the Edwards Aquifer Habitat Conservation Plan (EAHCP). So, for now, we are not accepting any more water into the ASR Program.”

Hernandez did say that there is about 4,000 acre-feet of space left in the VISPO Program. However, he urged permit holders to call soon to finalize their decision making for the upcoming year. If a permit holder decides to enroll some water into VISPO, contracts still need to be drawn up, reviewed, submitted for approval and signed before Dec. 31.

With limited space left in VISPO and ASR now full, it is anticipated that the program could fill up quickly.

Continued on the next page.

ASR Full, VISPO Still has Room for Sign Ups - Continued...



Javier Hernandez inspecting an irrigation pivot head.

Those with permitted water rights from the Edwards Aquifer Authority (EAA) can enroll some of those rights in the VISPO Program and be compensated for doing so. As long as VISPO does not reach what is called a “trigger,” then the permit holders can use their water as they normally would. However, if the VISPO Program triggers during a dry year, then the permit holder is prohibited from using the amount of water enrolled in the program for the following year.

Here’s how the trigger mechanism works. If the water level at the J-17 index well in San Antonio is at or below 635 feet on October 1, EAA will notify program participants to suspend the use of the enrolled water for the following year beginning on January 1.

Since the J-17 index well was well above 635 feet mean sea level on Oct.1, 2019, VISPO forbearance will not be required in 2020. For 2021–2027, the probability of VISPO triggering for any individual year is approximately seven percent, based on the number of historical occurrences of the Edwards Aquifer reaching 635 feet on Oct. 1. However, for the term of the program (2020-2024), there is less than a 40 percent chance of triggering in at least one year.

“The EAA has a significant amount of historical data about aquifer recharge from rainfall and how that impacts the flows at the Comal and San Marcos Springs,” Hernandez explained. “Using that data, our science team runs the latest computer models to help give a very

good idea of what the future might look like as it relates to water levels in the Edwards Aquifer and the chances that the VISPO program could trigger a forbearance year. That can be very valuable information for permit holders trying to decide on whether to enroll water in the program or not.”

Currently, VISPO is a five-year agreement. Pricing is set at \$54 per acre-foot per year standby fee in years that the program does not trigger. A \$160 per acre-foot price in forbearance years in addition to the standby rate (\$54 per acre-foot) brings the total of \$214 per acre-foot paid in years the program does trigger. So, the big question becomes, what is the likelihood that VISPO will trigger in the next few years?

“Both Irrigation and Municipal and Industrial permit holders can enroll in VISPO. And we want everyone to know that we work with people one-on-one and provide different scenarios based on their actual and projected water use. There is no need for permit holders to dig up paperwork or anything like that. We have all of their water use information handy, so it is very easy for us to work through things,” Hernandez said.

You can call Javier Hernandez at 210-222-2204, ext.139, or email him at jhernandez@edwardsaquifer.org if you have more questions about the VISPO Forbearance Program.

- December 2019 -

Many Thanks to Participants Who Filled ASR Program *VISPO still has small opportunity for enrollments for 2020*



Edwards Aquifer Authority General Manager gives an interview on the recharge zone in Bexar County.

“When we first started the ASR Leasing Program in 2014, we had various community leaders like the Boehme, Yanta and Persyn families, cities and the larger organizations like CPS Energy and Uvalde Concrete step forward to be some of the first to sign up for the program,” said Roland Ruiz, EAA general manager and incoming Edwards Aquifer Habitat Conservation Plan (EAHCP) Implementing Committee chairman. “Those folks helped give the program credibility and encouraged others from around the Edwards Region to take a look at enrolling their water in the program. With the conclusion of 2019, we are extremely pleased to report that we have now filled the program through the year 2028 and met the goals we have under the EAHCP’s requirements. This is a major accomplishment on behalf of the entire Edwards Region and helps solidify the success of the EAHCP over the next nine years.”

The ASR and VISPO Springflow Protection Programs are key components in the EAHCP’s ability to protect endangered species and habitats by curtailing pumping from the Edwards Aquifer during a repeat of the drought of record.

Continued on the next page.

ASR Full, VISPO Still has Room for Sign Ups - Continued...

The EAHCP is essentially the agreement the Edwards Region has with the U.S. Fish and Wildlife Service to protect the endangered species living within the Comal and San Marcos Springs eco-system, especially during a drought of record. The current EAHCP requires that 126,000 acre-feet of water be stored in the SAWS' ASR facility in South Bexar County, with the EAA controlling an additional 50,000 acre-feet of permitted withdrawal rights which would not be pumped during a repeat of a drought of record. The EAA's updated computer model verified that the ASR and VISPO Programs were the most effective in helping the Comal and San Marcos Springs continue to flow even under drought of record conditions.



Endangered Species protected by ASR and VISPO Springflow Protection Programs. From left to right are the fountain darter, Texas blind salamander and Texas wild-rice.

"While ASR participants are being compensated for enrolling their water in the program, it is important to note that storing leased water and having agreements in place to require forbearance on pumping helps the entire region by giving us certainty through droughts," Ruiz noted. "ASR and VISPO are cornerstone programs that enable us to meet the U.S. Fish and Wildlife's requirements to protect the endangered species over time. Getting here has taken great collaborative efforts between SAWS, EAHCP team and those Edwards permit holders who consented to putting their water in the program. It was not easy, but I can say all of the hard work has paid off."

VISPO Still has Room for 3,300 Acre-Feet of Enrollments

Javier Hernandez, manager of the ASR and VISPO Programs, did say that there is about 3,300 acre-feet of space left in the VISPO Program. However, he urged permit holders to call soon to finalize their decision making for the upcoming year. If a permit holder decides to enroll some water into VISPO, contracts still need to be drawn up, reviewed, submitted for approval and signed before Dec. 31.

"We are quickly running out of time for enrolling water in VISPO for 2020," Hernandez underscored. "We already know that forbearance will not trigger in 2020. That means permit holders who enroll in VISPO can be paid for their water and still be able to use it however they would like. That's a huge upside for enrolling, but, we're running out of room in the program. After we fill VISPO, there won't be another opportunity to enroll water until 2024 and that's only if those enrolled now choose to get out of the program."

Currently, VISPO is a five-year agreement. Pricing is set at \$54 per acre-foot per year standby fee in years that the program does not trigger. A \$160 per acre-foot price in forbearance years in addition to the standby rate (\$54 per acre-foot) brings the total of \$214 per acre-foot paid in years the program does trigger.

"Both Irrigation and Municipal and Industrial permit holders can enroll in VISPO. And we want everyone to know that we work with people one-on-one and provide different scenarios based on their actual and projected water use. There is no need for permit holders to dig up paperwork or anything like that. We have all of their water use information handy, so it is very easy for us to work through things," Hernandez said.

You can call Javier Hernandez at 210-222-2204, ext.139, or email him at jhernandez@edwardsaquifer.org if you have more questions about the VISPO Forbearance Program.