



EDWARDS AQUIFER  
AUTHORITY

25<sup>th</sup>

ANNIVERSARY

1996 - 2021

# NEWS DROP

M A G A Z I N E

A QUARTERLY PUBLICATION

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**ROLAND RUIZ**

EAA GENERAL MANAGER

**ON JUNE 28, 1996, THE EDWARDS UNDERGROUND WATER DISTRICT CEASED TO EXIST, SUCCEEDED IMMEDIATELY BY THE EDWARDS AQUIFER AUTHORITY WITH THE MISSION TO MANAGE, ENHANCE, AND PROTECT THE EDWARDS AQUIFER SYSTEM. THE REST, AS THEY SAY, IS HISTORY.**

Dear Friends,  
I have on previous occasion referenced the quote from 19th century Danish philosopher, Søren Kierkegaard: *“Life can only be understood backwards; but it must be lived forwards.”*

On June 28, 1996, the Edwards Underground Water District ceased to exist, succeeded immediately by the Edwards Aquifer Authority with the mission to manage, enhance, and protect the Edwards Aquifer system.

The rest, as they say, is history.

Today, as we approach the silver anniversary of our beginning, the journey of the past 25 years beckons us to acquaint ourselves with that place and purpose from which we started; not merely for the sake of nostalgic sentimentality but for the cause of clarity as we move forward.

As muddled as the history of the Edwards Aquifer is with legal conflict and political controversy, out of turmoil the EAA has emerged

as a vanguard for consensus and certainty in aquifer management. As a result, we acknowledge that today we are better for the journey taken, and justifiably hopeful for the one before us.

As we stand on the precipice of the **“next generation”** of our mission: one based on the proposition that the long term sustainability of the aquifer can be assured through regionwide collaboration and inclusion, we recall the words of then-Governor George W. Bush.

In a May 19, 1996 article in the San Antonio Express-News, the would-be president of the United States was quoted as follows: “The people on the Edwards (board) are plenty capable of handling the issue themselves.”

The people in that region can figure out how to manage the aquifer better than the federal government or a federal judge can.”

Twenty-five years later, we can say with confidence: indeed, Mr. President. Indeed.



**POWERING UP YOUR KNOWLEDGE ON ALL THINGS EAA**

ANN-MARGARET GONZALEZ, EAA PUBLIC AFFAIRS LEAD, AND BRENT DOTY, EAA RESEARCH MANAGER FOR AQUIFER SCIENCE

**THE EAA RECHARGE ZONE PODCAST IS BACK FOR SEASON 2! HOSTS ANN-MARGARET GONZALEZ, EAA PUBLIC AFFAIRS LEAD, AND BRENT DOTY, EAA RESEARCH MANAGER FOR AQUIFER SCIENCE, WILL CONTINUE TO BRING YOU INTERVIEWS WITH EAA STAFF ON TOPICS RANGING FROM AQUIFER MANAGEMENT, PROTECTION, EDUCATION AND MORE.**



**Season 2, Episode 1 | What's in store for the EAA?** Hosts Brent Doty and Ann-Margaret Gonzalez speak with **EAA General Manager, Roland Ruiz**, as he further expands on the "Next Generation" initiative as a way to broaden the EAA's opportunity to partner and collaborate, discusses a land management demonstration site that is underway at the EAA Field Research Park, and highlights the future EAA Education Outreach Center at Morgan's Wonderland Camp.

**Season 2, Episode 2 | Will berm and swales be winning water retention practices on the Recharge Zone?** Hosts Brent Doty and Ann-Margaret Gonzalez speak with **EAA Executive Director of Aquifer Management Services, Mark Hamilton**, about long-term research for groundwater systems, surface water systems, and soil and land management practices out at the 151-acre EAA Field Research Park located in the Cibolo Creek Basin on the Edwards Aquifer Recharge Zone.



**Roland Ruiz**  
EAA General Manager



**Mark Hamilton**  
EAA Executive Director of Aquifer Management Services

Click on any of these logos below to go to the podcast:





### AN AQUIFER OUTLOOK DURING SNOWMAGEDDON 2021

PAUL BERTETTI, EAA DIRECTOR OF AQUIFER SCIENCE

ACCORDING TO THE AUSTIN/SAN ANTONIO WEATHER FORECAST OFFICE (2021), THE HISTORICAL EIGHT-DAY PERIOD OF WINTER WEATHER THAT OCCURRED DURING FEBRUARY 10-18, 2021 BROUGHT SEVERAL INCHES OF SNOW ACROSS SOUTH-CENTRAL TEXAS, AND MAJOR IMPACTS TO POWER, TRAVEL, AND ACCESS TO WATER ACROSS THE STATE.



Comal Springs in New Braunfels, Texas on Monday, February 15, 2021. Photos courtesy of Mariah Bonham, Groundwater Protection Coordinator.

In addition, this winter event brought up some questions as to its effects on the Edwards Aquifer levels, specifically at the J-17 Index Well in Bexar County.

To provide some context to the questions posed, the EAA permits 572,000 acre-feet of water for municipal, industrial, or agricultural use to permit holders throughout a jurisdiction that spans across 8 counties including Uvalde, Medina, Bexar, and parts of Atascosa, Caldwell, Guadalupe, Comal and Hays counties.

Therefore, **EAA Director of Aquifer Science, Paul Bertetti**, provided the following statement addressing the decline at J-17 Index Well that occurred on Friday, February 19 on the tail end of the winter event,

**"The decline in the Edwards Aquifer water level measured at the J-17 Index Well (and the associated reduction in springflow at Comal Springs) is likely due to a number of factors associated with increased demand and pumping of the Aquifer. The Edwards Aquifer is the main source of water for the region, and due to the necessity of many water suppliers refilling storage systems and resupplying water to their customers there is a decline in the aquifer levels. We will likely see a leveling out at the J-17 Index Well in Bexar County as demand goes down and other sources are brought back online.**

**Lastly, the Edwards Aquifer System may receive some recharge benefits that could be attributed to the continuation of the melting snow across the region." (February 2021)**

Austin/San Antonio Weather Forecast Office. (2021). Austin/San Antonio Weather Forecast Office Weather Event Summary. February 2021 Historical Winter Storm Event South-Central Texas. National Oceanic and Atmospheric Administration National Weather Service. Retrieved March 9, 2021, from <https://www.weather.gov/media/ewx/wxevents/ewx-20210218.pdf>



## INTERNATIONAL YEAR OF CAVES AND KARST 2021

INTERNATIONAL UNION OF SPELEOLOGY



THE INTERNATIONAL YEAR OF CAVES AND KARST (IYCK) IS AN INITIATIVE OF THE INTERNATIONAL UNION OF SPELEOLOGY (UIS), AND ITS MAIN GOAL IS TO EXPLORE, UNDERSTAND, AND PROTECT BY IMPROVING PUBLIC UNDERSTANDING OF HOW CAVES AND KARST TOUCH THE DAILY LIVES OF BILLIONS OF PEOPLE. THE EAA IS ONE OF 154 INTERNATIONAL AND NATIONAL PARTNERS WORKING TO SPREAD AWARENESS FOR CAVES AND KARST, SPECIFICALLY RELATED TO THE EDWARDS AQUIFER.

Furthermore, the International Cave Animal of the Year are **cave beetles**, and the intent behind this UIS initiative is to raise awareness for the little-known zoological diversity in subterranean habitats, which contributes to a global awareness for the importance of cave protection (International Union of Speleology, 2021).

**Did you know?** The U.S. Fish & Wildlife Service (USFWS) has designated eight species that live in the Edwards Aquifer, the San Marcos Springs, and the Comal Springs aquatic ecosystems as either threatened or endangered. The Edwards Aquifer Habitat Conservation Plan (EAHCP) is intended

to provide assurance that suitable habitat for these covered species will remain in both the San Marcos and Comal Springs.

Of these designated species, the Comal Springs Dryopid Beetle is subterranean aquatic beetle found exclusively in the Comal and San Marcos Spring systems, and the petitioned Texas cave diving beetle is not currently listed as an endangered species, but rather as a species petitioned to be included on the federal list of threatened and Aquifer endangered species within the Edwards System.

Source: International Union of Speleology. (2021). International Year of Caves and Karst. IYCK 2021. <http://iyck2021.org/>

**INTERNATIONAL YEAR OF CAVES AND KARST 2021**  
 „Explore, understand and protect“  
 Organized by the International Union of Speleology

**EXPLORE** a fascinating world within our world. Through the IYCK web page and links to partner organizations, you can discover caves and karst. Visit show caves, parks, and join groups that study them.

**UNDERSTAND** how caves and karst areas affect your lives. Are you one of the hundreds of millions of people whose water comes from caves? How many foods do you enjoy and need which depend on karst and animals like bats?

**PROTECT** caves and karst areas, as many of them are being damaged and destroyed. Is not an idealistic environmental goal, but simple self-protection of human needs and lives!

[www.iyck2021.org](http://www.iyck2021.org)



Texas cave diving beetle

**The Comal Springs dryopid beetle (*Stygoparnus comalensis*) is a subterranean aquatic beetle found exclusively in the Comal and San Marcos Spring systems of the Edwards Aquifer in Central Texas. The foremost threat to the species is over extraction of water from the aquifer, as Comal Springs dryopid beetles rely on consistent levels of springflow in and around the spring openings they inhabit (U.S. Fish and Wildlife Service [USFWS], 1997).**

The Edwards Aquifer Habitat Conservation Plan implements water quality monitoring and Conservation Measures such as the Voluntary Irrigation Suspension Program Option and the Aquifer Storage and Recovery programs to help maintain springflow for these aquifer dwelling species.

### **Physical description and Life History**

The Comal Springs dryopid beetle is the only known subterranean member of the family Dryopidae (USFWS, 1997).

Physically, the species

have non-functioning eyes and wings, a reddish-brown and thinly pigmented, translucent body, segmented antennae, and has been described as the “long-toed water beetles” (Arsuffi, 1993; USFWS, 1997).

The Comal Springs dryopid beetles respire underwater via a plastron, a mass of setae on the underside that work to trap a thin layer of air and force the diffusion of dissolved oxygen from the surrounding water (Brown, 1987; USFWS, 2013a).

This method of respiration is most effective in areas with ample springflow, since high springflow equates to increased levels of dissolved oxygen in the water (USFWS, 2013a).

Comal Springs dryopid beetles are most commonly found in subterranean areas where little is known of

their behavior, reproduction, and lifespan in the wild. The Comal Springs dryopid beetle cannot swim and the exact depth to which this species navigates within spring opening is unknown (USFWS, 1997).

### **Distribution**

In and around spring orifices of Comal and San Marcos Springs, more specifically in Landa Lake, Spring Lake, Hueco Springs, and Fern Bank Springs (Gibson et al., 2008; USFWS, 2013a).

### **Habitat and Diet**

Critical habitat for the Comal Springs dryopid beetle is designated as 39.4 acres of surface and 139 acres of subsurface, specifically the beetle has been collected within 360 ft (110 m) of spring orifices



Comal Springs dryopid beetle

(USFWS, 2013b). Comal Springs dryopid beetles have been consistently collected in and around the roots of sycamore trees growing near spring openings; these root mats may serve as the primary habitat of the species (Kosnicki et al., 2019).

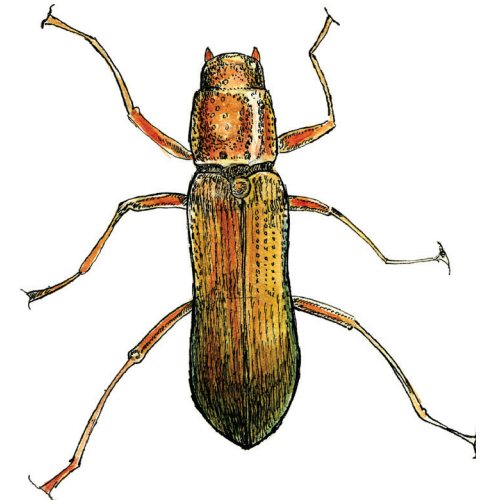
The required temperature range of the Comal Springs dryopid beetle is that of the springwater at Comal and San Marcos Springs, 22 to 24°C (Edwards Aquifer Recovery Implementation Program, 2012; USFW, 2013b).

Diet is thought to be comprised of bacterial biofilms of decomposing leaf and wood material, particularly that of sycamore roots, although the precise food source remains unknown (Kosnicki et al., 2019; USFWS, 2013a).

**Common name:** Comal Springs dryopid beetle  
**Scientific name:** *Stygoparnus comalensis*  
**Endangered Species Act status:** Endangered  
**Maximum size:** Reach a size of approximately 3 mm (~0.12 inches; USFWS, 1997).

Comal Springs dryopid beetle text by Connor Helsel.

For more information and to view the citations for these species, please visit <https://www.edwardsaquifer.org/habitat-conservation-plan/>



Comal Springs dryopid beetle



**“M” KEEPS ENDANGERED SPECIES IN GOOD CONDITION**

CONDITION M

**THIS IS SOUTH CENTRAL TEXAS AND PEOPLE WHO HAVE LIVED HERE AWHILE UNDERSTAND THE WEATHER ROLLER COASTER WE ALL RIDE EACH YEAR. IN ADDITION TO SIGNIFICANT VARYING DEGREES OF TEMPERATURES EXPERIENCED THROUGH THE FOUR SEASONS, THIS PART OF TEXAS ALSO CAN ENCOUNTER FEAST OR FAMINE WHEN IT COMES TO RAINFALL. IT'S BECAUSE OF THOSE DRY SPELLS THAT CONDITION M WAS INCLUDED IN THE EDWARDS AQUIFER HABITAT CONSERVATION PLAN'S (EAHCP) INCIDENTAL TAKE PERMIT FROM THE U.S. FISH AND WILDLIFE SERVICE.**



Condition M? Yes, you would have to be a bit of an insider to know what Condition M is, but those who have to follow its guidelines when triggered have studied it, know how to implement its provisions, but also have some thoughts about it going forward. Melani Howard, who manages the City of San Marcos' EAHCP program, has had to implement Condition M three times. The most recent occurrence began in December.

"Well, 'Condition M' does sound a bit exotic, but it is a fairly simple set of rules that states when the San Marcos springflows decline

to 120 cubic feet per second (cfs), our field research, construction activities and other types of work in the San Marcos River near the springs must either stop or be curtailed. That is because low flows in the river caused by diminished springflows create a greater potential for harming the endangered Texas wild-rice stands and the endangered fountain darter habitat. The interesting thing to note now is that since the first time we implemented Condition M in 2014, we have learned a great deal about the San Marcos Springs and River ecosystem.

That knowledge gives us a lot more comfort now about how Texas wild-rice will respond to dry conditions than what we knew the first time around."

**CONDITION M DOES APPLY TO THE COMAL RIVER WHEN SPRING FLOWS REACH 130 CFS. HOWEVER, DUE TO HOW RECHARGE AFFECTS THE COMAL SPRINGS AND THE SAN MARCOS SPRINGS DIFFERENTLY, CONDITION M DID NOT TRIGGER IN NEW BRAUNFELS IN 2020.**

The protection measure is closely monitored by EAHCP staff to watch for springflows to





consistently stay above the 120 cfs trigger. For example, recent rainfall created a short period of springflow readings above 120 cfs, but then flows quickly decreased to below the threshold so Condition M remained in effect. Fundamentally, the removal of work restrictions in the San Marcos River due to Condition M are determined on a case-by case basis.

“When Condition M is triggered, we stop planting native aquatic plants as well as terrestrial native plants in the riparian areas near the river banks,” Howard explained. “We also have a very active program of removing invasive aquatic plants, like hydrilla, from the river. But, to do that, we have people in the river where Texas wild-rice lives. That kind of foot traffic, so to speak, can harm Texas wild-rice plants and other endangered

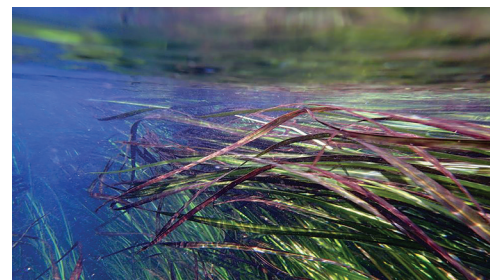
species so that type of work is temporarily curtailed.”

While many of the ITP conditions are not flexible, Howard noted that the U.S Fish and Wildlife Service did make some allowances to the EAHCP when it came to litter removal and vegetation mat control. The first set of rules limited all aquatic restoration work when Condition M is in place.

However, EAHCP managers were able to demonstrate that the accumulation of floating mats of vegetation increased during low flows and actually created problems for the endangered species, such as reduced water velocity and blocking sunlight, if not removed. The managing of litter through snorkeling was prohibited before it was shown that the benefits of that effort outweighed the detrimental

effects of not continuing that work.

**BECAUSE THE SAN MARCOS RIVER IS A HEAVILY RECREATED AREA, THERE ARE ADDITIONAL GUIDELINES IN CONDITION M ABOUT HOW THE “STATE SCIENTIFIC AREA” IS MANAGED DURING LOW-FLOW PERIODS. IN 2012, THE TEXAS PARKS AND WILDLIFE DEPARTMENT DESIGNATED A TWO-MILE STRETCH OF THE SAN MARCOS RIVER FROM THE SPRING LAKE DAM TO THE AREA NEAR THE SAN MARCOS WATER TREATMENT PLANT AS A STATE SCIENTIFIC AREA IN ORDER TO PROTECT TEXAS WILD-RICE.**



**ADDITIONALLY, THE STATE RULE ALLOWED THE RESTRICTION OF CERTAIN SECTIONS OF THE RIVER ASSOCIATED WITH TEXAS WILD-RICE STANDS TO BE TEMPORARILY DESIGNATED AS OFF-LIMITS WHEN THE RIVER’S FLOW FALLS BELOW 120 CFS. THOSE AREAS ARE CLEARLY MARKED WITH BOOMS, BUOYS AND SIGNAGE AT RIVER ACCESS POINTS SO THE PUBLIC KNOWS TO STAY OUT OF THE MARKED PARTS OF THE RIVER.**

This year, though, because Condition M triggered during December when there was reduced recreation and pandemic-related closures, the EAHCP decided not to install the restricted area markers because that work could cause unnecessary disturbance to the species.

“When Condition M was created, we were at the beginning of implementing the EAHCP and really had a lot of research to do and a lot to learn from those studies. We were also in the midst of a fairly serious drought,” Howard commented. “But, over the past few years, we have come to see how very resilient Texas wild-rice is and what the benefits can be to endangered species habitat by replacing nonnative plants with natives. In fact, we could find that EAHCP work is actually more beneficial for Texas wild-rice if it is continued during low flows.”

Who knows, we might be able to show that much of the provision is not needed because of all of the other programs we have in place to protect endangered species and habitats. Until then, we will diligently follow the plans in place while we’re learning.”

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Editor’s Note: The spring flow level as of the date of publishing this article.

San Marcos River: [https://waterdata.usgs.gov/tx/nwis/uv?site\\_no=08170500](https://waterdata.usgs.gov/tx/nwis/uv?site_no=08170500)

Comal River: [https://waterdata.usgs.gov/tx/nwis/uv?site\\_no=08169000](https://waterdata.usgs.gov/tx/nwis/uv?site_no=08169000)



**AN INTERVIEW WITH:  
JIM WINTERLE**

RETIRING EAA DIRECTOR OF MODELING

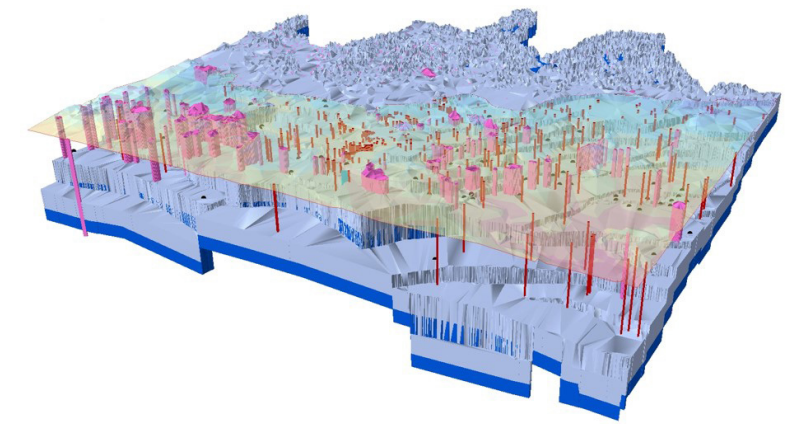
**Q - First of all, congratulations on your retirement announcement. What's the plan for this next step in your life?**

A - Thanks for the well wishes. Yes, I formally made the announcement at the EAA board meeting in January. I've really enjoyed my time with the EAA. This is a great place to work where innovation and imagination are encouraged. That, plus the topic of water science is truly challenging and I've been fortunate to have had the opportunity to spend the last 10 years of my life working in this field.

**Q - So, you mentioned the science of water. The Edwards Aquifer is truly a one-of-a-kind resource in the world. What are your thoughts about the aquifer, and how has research developed over the last decade?**

A - Well, let's start from the time that I got here in 2011. When I came here, the Habitat Conservation Plan (HCP) had just been approved by the U.S. Fish and Wildlife Service.

Part of our early work was to update the groundwater model that had been used to establish key elements of the springflow protection programs.



Early on, we were heavily relying on contractors to do the heavy lifting for us when it came to modeling. But, I quickly found out that there were very good people here and so we started down the path of building in-house capabilities.

Currently, there are four people in my area and all have very strong scientific backgrounds.

So, over the last several years, we've accomplished our goals of building and updating a groundwater model for the Edwards Aquifer Authority, which by the way has been reviewed by the National Academy of Sciences and other regional independent science review panels.

**Q - Wow, that was a major step forward. Explain for us about how the groundwater model is being used.**

A - Sure. We currently use the model to look at the conservation measures in

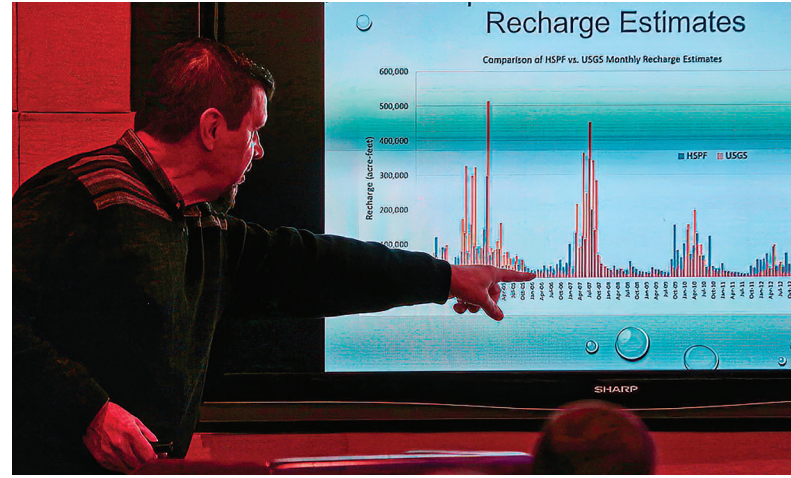
the HCP. Those include Voluntary Irrigation Suspension Program Option (VISPO), Aquifer Storage and Recovery Program (ASR) and the drought plan water reduction stages.

We needed to use the model to show the effectiveness of these programs to protect the endangered species by keeping water flowing at the Comal and San Marcos Springs during a drought of record.

Essentially, we insert drought scenarios into the groundwater model and then add on the reductions of water withdrawals provided by the springflow protection programs.

And we have been able to show that the springs can be protected by using these measures.

**Q - Would you consider the groundwater model like our eyes being able to see into the aquifer?**



A - Yes. I've heard it described as something like trying to read a book through a hole punch. There are a lot of "holes," meaning wells, in the aquifer.

There are literally tens of thousands of wells drilled into the Edwards Aquifer, and each of those wells provides us with data we can use to get a very good picture of what the aquifer looks like underground.

We can tell where fault lines are, where aquifer layers are offset and such. So, we have compiled all of this data and created a structural three-dimensional model of the Edwards Aquifer. From there we can study how water flows through the aquifer and how much water it can store.

Then, when you add the key component of how much water is recharged via rainfall.

The groundwater model will compare current conditions with data captured from past similar conditions and will generate very accurate descriptions of water levels throughout the system and amounts of springflow to occur as the aquifer fluctuates to various levels.

**Q - Well, maybe you're not flying as blind as it would seem by not being able to actually see the aquifer.**

A - Absolutely. There is a great deal of data people have been capturing for 90 years.

**Q - How has all of that data helped you?**

A - I would bet that the people collecting data in the 1930s wouldn't have guessed that their work would be so critical to our current computer modeling. Just like we probably can't know exactly how our data collection will help scientists in the future.

But, believe me, the data is what gives us great confidence in what the current groundwater models can predict.

**Q - So let's talk about recharge. It is a central component in how the springflow protection programs are implemented. But, the geological size and nature of the recharge zone should make it difficult to be precise on calculating recharge volumes, right?**

A - Recharge is the most uncertain calculation in the groundwater model. The U.S. Geological Survey, which provides those numbers to us, measures flows in stream beds above and below the recharge zone. The difference of the two gives us a good idea of how much water enters the aquifer through sinkholes and fractures in the streams where water collects after a rain.

They also add in a rainfall quantity component and how much we estimate just percolates into the ground.

While we say that the recharge calculation is a bit uncertain, especially during flood events, we know that when we sum up recharge estimates over the years and add actual pumping and springflow numbers, we are able to get a good picture of springflows and water levels as measured.

So, while a certain month of recharge estimates might be off 10-30 percent, over a longer period, the data evens out.

**Q - So now that everyone is comfortable with the current groundwater model's capabilities, what's next for your team's work?**

A - We are looking ahead to 2028 when the current federal permit expires and the Edwards Aquifer Habitat Conservation Plan team applies for a renewal, which is expected to be for a much longer time period than the original 15-year permit. What we are hearing is that since we will be applying for a much longer permit authorization, U.S. Fish and Wildlife Service will be looking for us to build in how changes in the climate over several decades could impact the Edwards Aquifer and

ultimately the endangered species and habitats. There is some data that shows the current climate warming some.

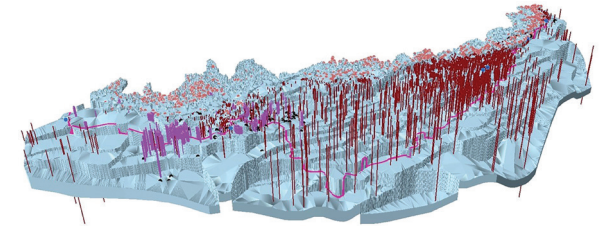
But, climate change is not all about temperature and associated evaporation, rainfall can fluctuate as well. There are also data points for wind speed and solar radiation to account for. Some of the predictions are showing drier summers but wetter winters.

So, without getting into the weeds too much, we will have the ability to plug in all of that data into our current groundwater model and provide some sound science to how climate change parameters might impact the Edwards Aquifer over multiple decades.

There are 34 global climate models and 20 of them are applicable to our region. That means there are 20 data sets we can use to help us understand impacts to the aquifer in varying climate change scenarios.

We already have a great head start in evaluating those global models and we've narrowed them down to five or six that will use.

As mentioned earlier, we are always challenged with trying to find innovative ways to do our work.



So we've taken that to heart and begun to look at maybe employing artificial intelligence (AI) to our process.

When you have huge data sets like ours there are some machine learning techniques available to employ and so we are evaluating if there might be some AI applications in our future.

**Q - Jim, any final words for us, as you embark on your next adventure?**

A - This really has been challenging and rewarding work for me. I work with very dedicated professionals and the groundwater modeling services we've provided have been key components in helping preserve the Edwards Aquifer not only for the endangered species, but for the two million people who rely on it each day.

That is definitely a source of pride that will always be with me.

Q = Question A = Answer



## PASSION PERSONIFIED

RACHEL SANBORN LEADS THE WAY IN PROMOTING A HEALTHY SAN MARCOS RIVER

**ENTHUSIASM WAS ONCE DESCRIBED AS "THE ELECTRICITY OF LIFE," AND RACHEL SANBORN'S ABSOLUTE LOVE OF THE SAN MARCOS RIVER IS UNMISTAKABLY ELECTRIC. AFTER ONLY A FEW MINUTES OF DISCUSSION ABOUT THE TOPIC, YOU CAN ACTUALLY FEEL YOURSELF ABSORBING HER PASSION FOR THIS UNIQUE SOUTH TEXAS NATURAL RESOURCE, AND THEN WANTING TO ASK "HOW CAN I HELP?"**



Maybe that's why she has been at the top of the leaderboard when it comes to training and involving citizen scientists in the San Marcos River Rangers' weekly water quality testing program performed at about 30 locations along the river.

"In 1997, I was looking for a way to volunteer in protecting the San Marcos River and this opportunity seemed fairly simple. So, I took the training to be a citizen scientist," Sanborn described. "The task, which required going out once a month to do some water quality testing, really fit nicely into my work and family schedule. So, I jumped in. I didn't have a background in the sciences but this group has always been about inviting everyone from the public into our work.

And they have definitely shown up to help."

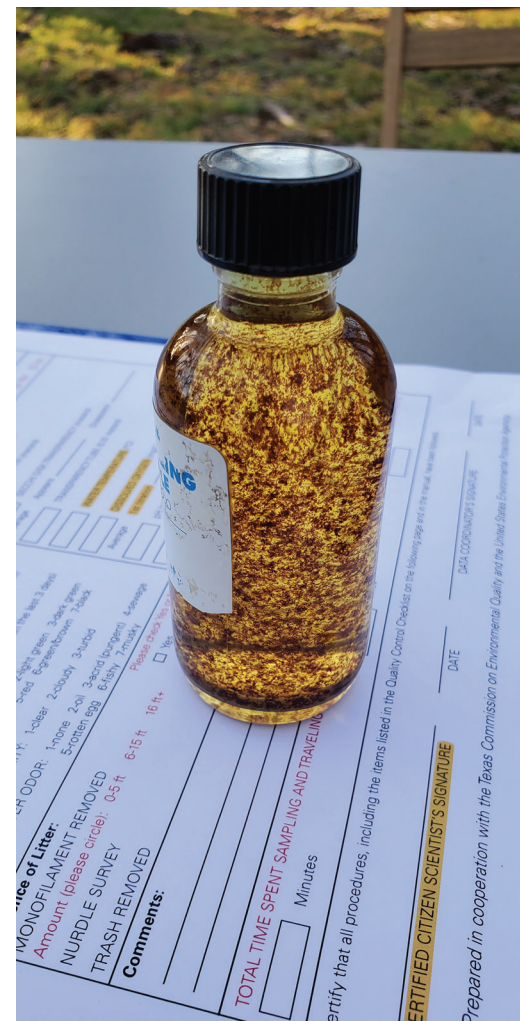
The River Rangers volunteer group, the largest group of its kind in Texas, is run by the San Marcos River Foundation (SMRF). It is also a part of a statewide program called "Texas Stream Team." The citizen volunteer groups began during the mid-1970s when the U.S. Environmental Protection Agency started creating a set of environmental regulations for the country. They knew they wouldn't have enough scientists to conduct the level of testing required in the regulations, so they initiated citizen volunteer groups to assist with that. Sanborn noted that even today, while there are many agencies and contractors who do water quality sampling throughout the year, those organizations

do not have the capacity to conduct sampling every week and are not able to physically observe the river on a regular basis. So, the River Rangers and other groups like them fill in the gaps.

"Currently, there are about 70 Rangers who go out at various times of the month to conduct the water quality sampling and at times just to observe any changes in the river," Sanborn said. "South Texas has an interesting climate in that we get floods, droughts and even the occasional snow storm as we experienced in late February. That type of weather can certainly change a stream over time. We want to be there to make note of those changes and make sure we get that information to the proper authorities."



**OVER A YEAR, THE RANGERS WILL TAKE APPROXIMATELY 450 WATER QUALITY SAMPLES. SANBORN SAYS SHE UNDERSTANDS THAT MIGHT BE A BIT EXCESSIVE FOR SUCH A COMPARATIVELY SHORT STRETCH OF RIVER.**



But, in the case of the San Marcos River and San Marcos Springs which are home to several endangered species, they have good cause for that level of participation from the community. The large amount of data produced by the group is first reviewed by SMRF.

After they analyze the information for trends and other types of potential environmental changes, they forward the reports to the Texas Stream Team (TST). TST input the data into an online viewer that is easily accessible to government officials, the public and interested stakeholders.

Ultimately, the sampling statistics are collected by the Texas Commission on Environmental Quality (TCEQ). TCEQ then compiles water quality sampling results from around the state and publishes that information every five as part of the TCEQ Clean Rivers program.

"Most people who know a little about the San Marcos River might think that this level of sampling might be overkill. They see the consistent clarity of the water, the temperatures are always about the same and overall it just looks beautiful," Sanborn stated.

"But, there are many things that you can't see. For example, the headwaters of the river is near a very active and developed part of the City of San Marcos.

So, we can get various types of pollutants and sediment running off into the river. Not surprisingly, our sampling has reflected that slight decrease of water quality in that area.

The finding was also confirmed by Texas Stream Team and TCEQ. Because of the potential for pollution there, the staff and member organizations of the Edwards Aquifer Habitat Conservation Plan (EAHCP) are focusing on that area and working to find solutions to prevent pollution from entering the river and causing harm to the endangered species habitat."

While the River Rangers are producing large quantities of water quality samples and accompanying data, they do not need to work with a water quality testing lab. Their water quality testing kit used on site includes the capability to test for pH, dissolved oxygen and conductivity which measures how much sediment is in the sample.

Additionally, they run *E.coli* tests primarily during the summer months when

overflow crowds of tubers descend on the San Marcos River to enjoy a relaxing trip downstream. If SMRF ever comes across a serious issue found in any of the water quality samples, they can reach out to a licensed lab for further examination of the water.

Sanborn's leadership in growing and sustaining the River Rangers over a couple of decades was recently recognized by Texas Stream Team with the Golden Secchi Award for her efforts.

In October of 2018, Texas Stream Team celebrated training its 10,000th citizen scientist, and decided to commemorate that milestone by creating a yearly award to recognize one dedicated citizen scientist of the year.

The award winner's name is etched into the trophy which remains on display at Texas Stream Team Headquarters.

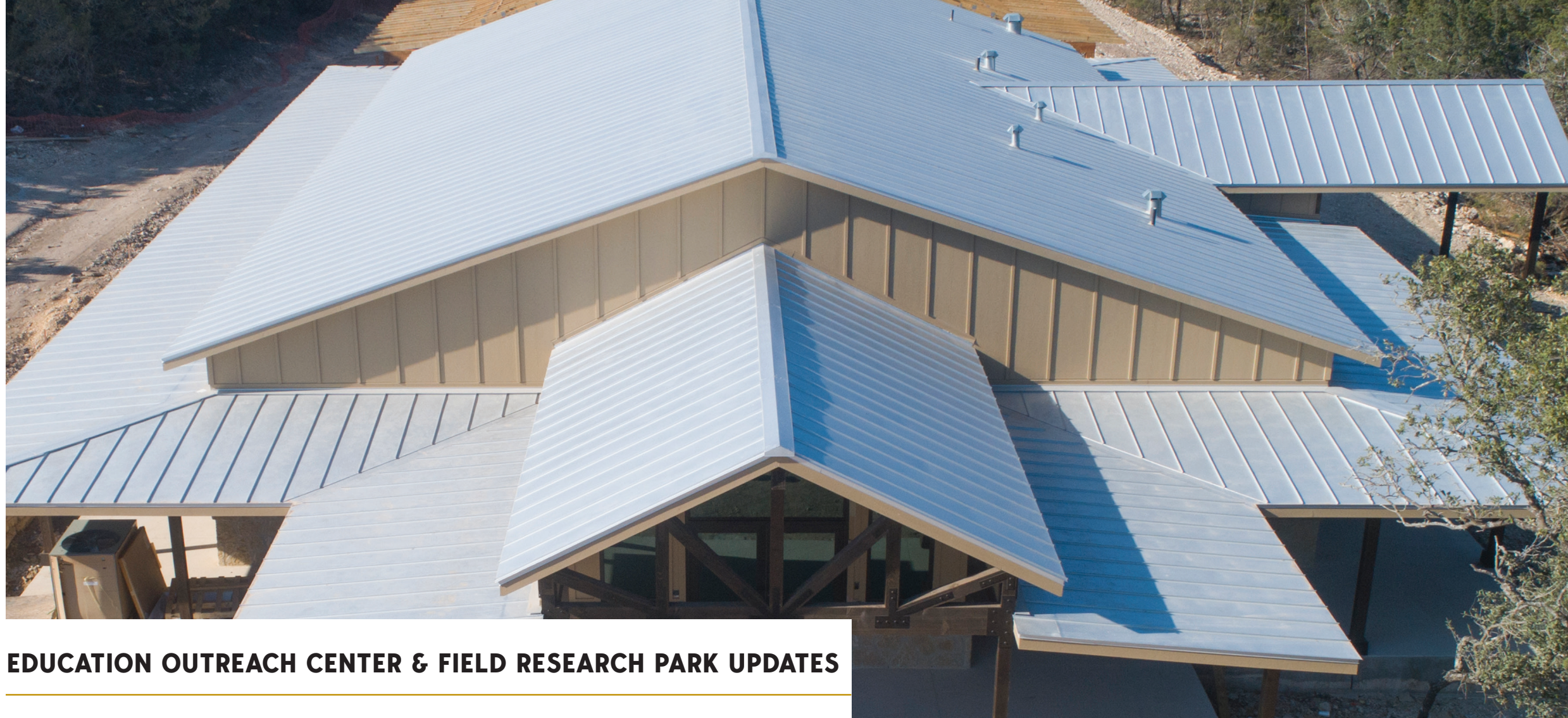
"That was definitely a very nice award to receive," Sanborn acknowledged. "I've trained about 700 people over my years with the River Rangers and I think I'd like to get to 1,000 someday.



People should know that Texas was an early adopter of the Texas Stream Team and there are groups all over that state who do this kind of work. The San Antonio River Authority has a new, very enthusiastic group now. Their volunteers even came to San Marcos during the months of the pandemic to get in some additional work.

Overall, this has been a very rewarding life experience. I've met some truly wonderful people and ultimately we've been able to help the community increase its appreciation of the San Marcos River and its ecosystem."





## EDUCATION OUTREACH CENTER & FIELD RESEARCH PARK UPDATES

*RAIN HARVEST, DEMONSTRATION GARDEN, & HAND-RAILING*

**THIS YEAR WE ARE CELEBRATING 25 YEARS OF MANAGING, ENHANCING, AND PROTECTING THE EDWARDS AQUIFER. FOR THE LAST 25 YEARS, THE EAA HAS BEEN DEDICATED TO ENGAGING AND INFORMING THE COMMUNITY THEY SERVE ABOUT THIS UNIQUE WATER RESOURCE WE SHARE.**

Research and education have been an integral part of the EAA, and with the construction of the Education Outreach Center (EOC) and Field Research Park (FRP) we hope to continue our long-standing commitment to education and community engagement.

The EOC construction has been going strong and we are excited to provide updates since our last article.

The installation of a 20,000 gallon tank has been completed. This tank along with a smaller demonstration tank will collect rainwater from the roof of the building to be used at the EOC for educational purposes. The smaller 1,000-gallon tank will provide water for the impending Demonstration Garden which will show visitors an example of a water saving garden demonstrating how native

plants are important for water conservation.

The Demonstration Garden will mirror some of the planting and conservation principles used next door at the FRP.

Just outside of the building, roads are being paved and walkways are being created for ease of access to the EOC and the surrounding attractions. With construction underway on the outside of the building, we look forward to work inside of the EOC.

As exhibit design is finalized and we move into the production phase, EOC staff have spent some time outlining exhibit elements and taping them up on the





floor to get a feel for the flow of the space.

AV and electrical access are being installed and the walls will soon be sealed to prepare for the arrival of exhibits late this summer. A server was installed allowing for wi-fi connectivity.

With the server installation, the building now has wi-fi and security cameras up and running. This will allow us to wrap up the design phase bringing us one step closer to having staff and visitors at the EOC.

Field Research Park construction has been progressing, including additions to the grounds around Headquarters with installation of a hand-

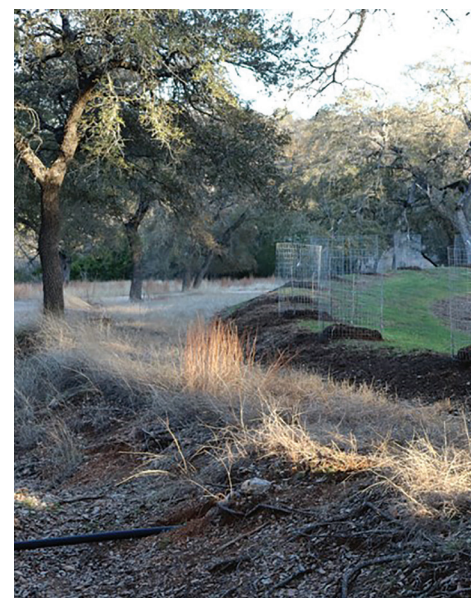
railing and bridge to improve safety and accessibility.

This will keep employees and visitors safe while also allowing them to take in all the scenery surrounding the FRP.

Progress on both buildings is moving fast and will be ready to house staff and host events very soon.

Despite the setbacks brought on by Covid-19 and the February Winter Storm, both facilities continue to provide excitement and enthusiasm throughout the EAA and the community.

The Edwards Aquifer Authority has been through a lot in the past 25 years and we have a lot more to look forward to!

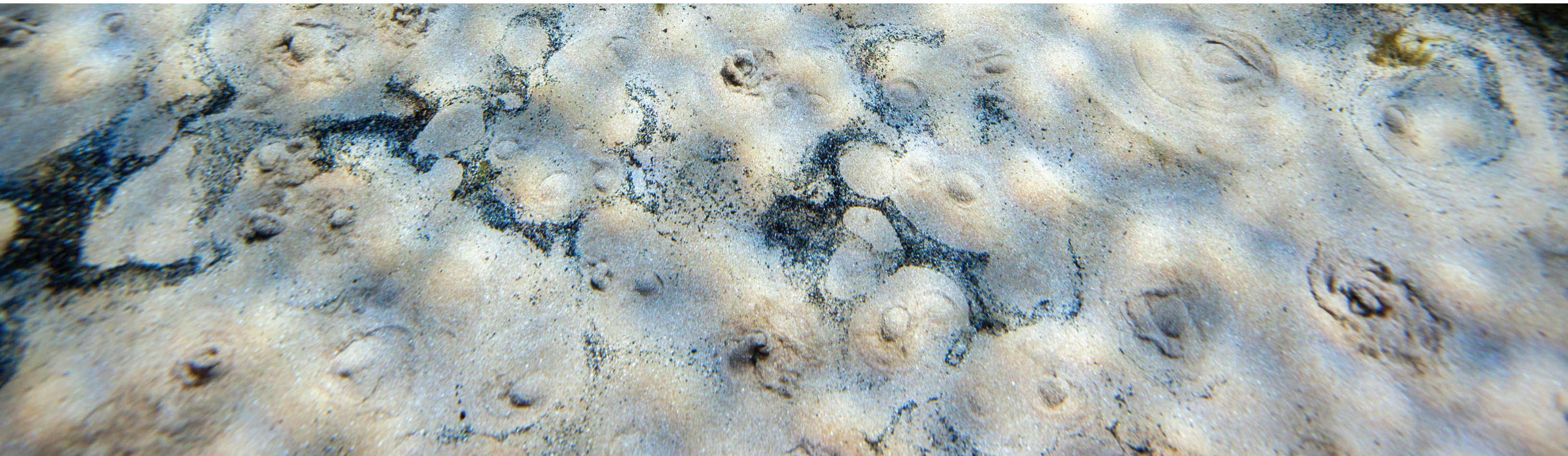


**IN LATE FEBRUARY, THE EOC HOSTED A VERY SPECIAL GROUP OF VISITORS - THE EAA INCLUSION AND INITIATIVE COMMUNITY ADVISORY COMMITTEE. THE GROUP TOURED BOTH THE EOC AND FRP. THE COMMITTEE SAW, FIRST-HAND, THE CONSTRUCTION PROGRESS AND LEARNED MORE ABOUT CURRENT AND UPCOMING INITIATIVES. THEY OFFERED IDEAS AND SUGGESTIONS ABOUT PARTNERSHIPS AND FUTURE EVENTS.**



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ANNIVERSARY

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