# EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - February 2021

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# Wishing Jim Winterle Well

**Editor's Note** - Earlier this year, Jim Winterle decided to call it a career and retire from the EAA. The EAHCP Steward has always reached out to Jim whenever data analysis or groundwater modeling topics surfaced as part of the EAHCP's programs. And he was always right there for us. So, we thought we should do one last interview with him to get his thoughts on the work accomplished during his decade with the EAA and EAHCP. After reading this interesting Q&A, you should give a listen to our podcast with Jim. He had some interesting things to say about droughts of record and the future of data research and how it could apply to the EAHCP.

#### **Jim Winterle Interview - Continued**

During his tenure with the EAA, Jim Winterle served as the Director of Modeling at Edwards Aquifer Authority where he oversaw the development of regional groundwater and watershed models as part of the EAA's Aquifer Science program. He holds bachelor's and master's degrees in Hydrology from the University of Arizona. Prior to working for EAA, Winterle was a group manager at Southwest Research Institute's Center for Nuclear Waste Regulatory Analyses, where he led the development of multi-system performance assessment models to evaluate the safety performance of high-level nuclear waste disposal systems. In addition to hydrological science, he has expertise and research interests in statistical forecasting methods, climate science and risk communication.

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



EAHCP to utilize SAWS ASR facility to store water for future droughts.

**Winterle** - 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.

**EAHCP Steward** - 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?

**Winterle** - 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.

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

**Winterle** - 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

#### **Jim Winterle Interview - Continued**

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.

EAHCP Steward - Would you consider the groundwater model like eyes being able to see into the aquifer?



Winterle - 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 a created a structural threedimensional 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.

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

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

EAHCP Steward - How has all of that data helped you?

**Winterle** - 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.

**EAHCP Steward** - 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?

**Winterle** - 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

#### **Jim Winterle Interview - Continued**

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.

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

**Winterle** - 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.

**EAHCP Steward** - Jim, any final words for us? You've always been such a great resource for the EAHCP Steward's work in telling these great stories about the EAHCP and associated science. We will definitely miss working with you. But, how are you feeling about your next steps?

**Winterle** - 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.



# Claire Carlson Creating Endangered Species Story Maps for EAHCP



The Edwards Aquifer Habitat Conservation Plan (EAHCP) has continued the work study program with Trinity University student Claire Carlson through the end of the spring semester. She is currently pursuing a triple major in economics, environmental studies, and political science and is scheduled to graduate this May. Her work with the EAHCP includes creating story maps of the covered species using GIS applications.

Originally from Minnesota, Carlson came to Trinity University on a debate scholarship and plans to study environmental law following graduation. "Working with the EAHCP team, I have learned a lot about water quality testing methods, the karst aquifer system, springflow protection programs, and the endangered species inhabiting the aquifer," Carlson said.

Follow the link to view Claire's story map on the San Marcos salamander: <u>https://storymaps.arcgis.com/</u> stories/c46f6e8b1cae48879e8243c5989e157e

Linkedin: https://www.linkedin.com/in/claireccarlson/

### Great Texas River Clean Up in San Marcos Scheduled for March 6



The 2021 Spring Clean-Up will be held Saturday, March 6th. Due to COVID-19, this river clean-up will be different than previous events, but similar to the fall river clean up event. You will find a great description of the event at <u>www.facebook.com/GreatTexasRiverCleanUp</u>.

If you have any questions, contact Amy Thomaides at AThomaides@sanmarcostx.gov.

Here is a link to Spring River Clean-Up Map: <u>http://bit.ly/GTRCU-MAP-2021</u>



# **Thanks for Participating in EAHCP Steward Survey**



Thanks to our many readers for taking time to fill out the survey regarding stories you've enjoyed in the past plus your thoughts on stories you would like to see in the future. Here are the results from the survey.

#### Here are the totals on articles liked.

EAHCP Construction Projects - 16 EAHCP People - 12 EAHCP Contractors - 5 Research on Endangered Species - 18 Volunteer Work - 15

We also received some recommendations for future stories. Here are a few of those idea:

- · legislative or legal issues that might impact EAHCP
- climate impacts in future updates to the EAHCP permit

 comprehensive review of the EAHCP, from the beginning to where we are now

• what landowners on the recharge zone are doing to protect the Edwards Aquifer

## Springflow Habitat Protection Work Group Meeting Feb. 19

The Springflow Habitat Protection Work Group will be meeting on Feb. 19<sup>th</sup> at 9 a.m. via Microsoft teams. Mark your calendars today. You can find all of the information you'll need to attend the meeting at the link below. Plus, you can access previous meeting information there as well.

www.edwardsaquifer.org/habitat-conservation-plan/administration/work\_groups/springflow-habitat-protection-work-group