



EAHCP STEWARD

News from the Edwards Aquifer Habitat Conservation Plan - October 2021



R&D on Endangered DNA

Refugia scientists taking EAHCP genetic research and development to new levels

Adam Daw and Katie Bockrath at the Comal Springs in New Braunfels.

Is “extreme science” a thing?

That was a first thought after interviewing Adam Daw and Dr. Katie Bockrath, who are the newest U.S. Fish and Wildlife scientists leading the EAHCP’s refugia program. A quick Google search reveals the existence of a website for young people called Extreme Science. For adults interested in extreme science, you might want to follow Daw and Bockrath as they are about to lead the EAHCP into deeper molecular levels of endangered species studies. And while most PhD biologists might think this is fairly standard work, the average citizen will certainly be amazed by the complexity of the science.

Continued on the following page.

Refugia Science - Continued

Adam Daw, who is working out of the U.S. Fish and Wildlife Service's (USFWS) Uvalde National Fish Hatchery, will be leading the refugia program and his welcome to the program should be more of a welcome home for him. Daw grew up in New Braunfels and commented that he was quite familiar with the Comal River and Comal Springs systems having lived nearby before leaving to earn his undergraduate degree in marine biology from Texas A&M University at Galveston. He then acquired his master's degree in tropical conservation biology and environmental science at the University of Hawaii at Hilo. While finishing up his PhD studies, he landed the job with the U.S. Fish and Wildlife Service.

Daw's experience includes rearing of aquatic organisms in captivity to better understand their biology,



ecology and potential for commercial aquaculture and restoration. He has a diverse knowledge of both freshwater and marine organisms from microalgae to tuna. Recently, his focus of study has been in developing methods to rear species which are difficult to breed, particularly working on those species' early stages of life. Before starting with the USFWS, he was using genetics and

computer modeling research methods to understand how environmental parameters and culturing methods can impact the species being studied and their place in the ecosystem as well.

"It is really great to be back in the neighborhood I grew up in, and best of all, I'm getting to pursue a passion of mine which is studying endemic, challenging species," Daw said. "While there has been some great research done on the EAHCP endangered species, we are at a point of applying current science to helping us understand how to efficiently raise these species in captivity. With that foundation of knowledge, you can then develop computer models to predict species growth in both the wild and captivity. The level of science we are working in gets all the way down to the DNA and molecular structures of these species and their food sources. Our new research program lead and geneticist at the San Marcos Aquatic Resources Center, Katie Bockrath, has excellent experience in this type of work. And, I'm thoroughly enjoying the collaboration with her and the whole team as we want to take the refugia science for the EAHCP to new levels."

Bockrath earned her bachelor's degree in biology at the University of West Georgia and her PhD in genetics from the University of Georgia. Her PhD research focused on assessing aquatic biodiversity and conservation using genetics, population surveys and habitat measurements. She has examined how changes in the environment can cause molecular shifts in various species and their populations, used genetic barcoding to identify species, and used molecular biology to learn about the disease susceptibility of coral in the Florida Keys.

Continued on the following page.

Refugia Science - Continued

Bockrath joined the USFWS as a geneticist with the Whitney Genetics Lab at the Midwest Fisheries Center in Onalaska, Wisconsin. There, she studied the use of environmental DNA (eDNA) to monitor invasive species, primarily invasive carp. Invasive carp compete for the same resources young native fish need to grow and survive. “The study of the invasive carp in the Mississippi River Basin was quite extensive,” Bockrath explained. “We were taking about thousands of eDNA samples per year to help us understand how these carp

are moving and expanding their distribution. eDNA sampling enabled us to detect carp at the very edge of their range and in places they have never been caught. This leads to faster targeted carp removal. Much of what I’ve learned so far in molecular and genetic sciences will be applicable in our work here at the EAHCP refugia. There is still much to understand



Katie Bockrath checking lures for riffle beetles.

about these endangered species, especially when it comes to ensuring we have a representative population of them here at the refugia if something happened to those in the wild.”

As part of the EAHCP Incidental Take Permit with the federal government, a long-term refugia was required to be put in place. The purpose of the refugia is to preserve endangered species living in the Comal and San Marcos Springs areas in case something unusual, like a drought that matches or surpasses the drought of record from the 1950s, occurs in the natural habitat. The main refugia facilities officially opened in May, 2019 in San Marcos. A 4,000 square-foot backup refugia was completed about a year later at the USFWS Uvalde National Fish Hatchery.

The EAHCP will be initiating some genetics studies on the Texas wild-rice and Comal Springs riffle beetle this coming year and laying some groundwork for new genetic studies on the fountain darter.

“In studying the genetics of the Edwards Aquifer endangered species, we will be looking at the gene flow among various populations of those species. That means we will be identifying how diverse the population of each species is so we can make sure we have adequate representation of those animals in the refugia,” Bockrath explained. “This type of science is really fundamental and essential to our ability to repopulate the wild with the species from the refugia in a way that closely resembles those existing before the event that caused the need for repopulation.”

Get ready science fans. This will be extremely interesting research to follow over the next several years.

EAHCP STEWARD SHORT TAKES

U.S. Fish and Wildlife Service Proposes Delisting San Marcos Gambusia from Endangered Species List Due to Extinction

The U.S. Fish and Wildlife Service (USFWS) has declared the San Marcos gambusia extinct and proposed a rule to delist the small fish from the official endangered species list. It was listed as endangered on July 14, 1980. At the time, USFWS also designated approximately a half mile of the San Marcos River as critical habitat for the species. The San Marcos gambusia was endemic to the San Marcos River and had historically only been found in a section of the upper San Marcos River approximately from Rio Vista Dam to a point near the U.S. Geological Survey gaging station immediately downstream from Thompson's Island. Only a limited number of species of gambusia are native to the United States; of this subset, the San Marcos gambusia had one of the most restricted ranges.



Texas Parks and Wildlife photo of the San Marcos gambusia.

All currently available scientific data and field survey data indicate that this species has been extinct in the wild for more than 35 years. The last known sighting in the wild was in 1983 and captive breeding attempts failed. In 1985, the last captive female San Marcos gambusia died. Because no males remained, USFWS concluded captive breeding efforts, and no individuals remain alive in captivity today.

On March 20, 2008, USFWS published a notice in the Federal Register (73 FR 14995) that they were initiating a 5-year review of the species. Another 5-year study was started in 2018. The review relied on available information, including survey results, fish collection records, peer-reviewed literature, various agency records, and correspondences with leading gambusia species experts in Texas. That 5-year review recommended delisting the San Marcos gambusia from the endangered species list due to extinction.

Sessom Creek Workday Happening this Saturday - Oct. 16

The next Sessom Creek workday is scheduled for this Saturday, October 16, from 8 am -10 am. Tasks will include pulling chinaberry seedlings, removing purple trailing lantana and picking up litter to prepare for seeding this fall/winter. Gloves and bug spray will be provided, but be sure to bring a water bottle. The group will meet at Vie Lofts parking lot (6 designated spots for park users). Parking is also available along Chestnut, Walnut, and Acorn Streets. You can RSVP at: <https://www.signupgenius.com/go/30e084ba8ae2ca7fc1-habitat>.