

Unsung Heroes of Conservation

The room is filled with the low hum of hundreds of water pumps. The sounds of trickling water faintly whisper back and forth from different corners. The air is heavy, but noticeably cooler than the heat hanging around just outside. Entering the room kind of feels like you've just sat down on a mossy rock, near a cool mountain stream. Only the rock is a bare, concrete floor and the sky is florescent lights. Instead of trees, there are rows and rows of industrial-strength steel racks. Each one is at least as long as a semi-truck trailer, with three shelves reaching up to touch the canopy.

The shelves are loaded down with fish tanks of all different sizes. Most of them are rectangular 25- or 35-gallon tanks, like what you would see at a pet store. What's different about these tanks are what is inside of them. There are fish inside of them, sure. But these ones aren't for sale. Housed in these plain glass tanks are some of the rarest fish the world has never seen.

This room is the command center and hatchery of Conservation Fisheries Inc, a non-profit conservation organization in Knoxville, Tennessee. It's here where species are snatched back from the edge of extinction through captive breeding programs. It's here where little-known imperiled fish are nurtured until they are ready to be released into the wild. For a handful, this room houses the last remaining members of their kind left in all the world.

All of this started because of one little fish named the Citico Darter. Compared to the bright, flashy colors of some of the fish in other tanks, this slim brown darter smaller than your pinky finger, isn't much to look at. However, for what it lacks in aesthetic, it makes up for in

having helped to save many species from the brink of extinction. Once considered a long-gone relic of the past the Citico Darter was rediscovered in the 1980s in a little creek in Monroe County, to which it owes its name. This discovery kickstarts our story. The story of the Citico Darter is the story of saving the southeastern United States' remarkable fish.

J.R. Shute is one of the cofounders of Conservation Fisheries. In the mid 1980s he and fellow cofounder Pat Rakes were master's students in zoology at the University of Tennessee. Both of them had shared a love of aquaria and fish keeping throughout their adolescence and into adulthood. When they were approached by one of their professors asking if they would be interested in trying to captively breed a local endangered fish for release into Great Smoky Mountains National Park, they jumped at the opportunity. That fish was the Citico Darter.

You see, the Citico Darter historically inhabited Abram's Creek inside Great Smoky Mountains National Park in Blount County, Tennessee. But due to the application of a pesticide used to kill aquatic fish for a prospective trout project by the Park in 1957, the Citico Darter was eliminated; along with sixty-four other native fish species. The project was part of an attempt to turn Abram's Creek into a world-class trout fishery. It would ultimately fail.

Dr. Paul Super, Science Coordinator for the Park Service, expressed genuine regret on behalf of the park for its past transgressions. He said, "In the past there was a greater emphasis on pushing people to enjoy the outdoors by providing opportunities for outdoor recreation, rather than preserving natural resources. The Park looks upon that with a fair amount of shame and embarrassment." The Park's modern goal is to emphasize the preservation of natural resources for future generations. Bringing back what had once been lost, like the Citico Darter, was part of the new plan.

The process of captively rearing Citico Darters for release into Abram's Creek faced a multitude of challenges. For starters, little was known about the life history of Citico Darters: how they breed, what they eat, what habitat they need, or what kind of water chemistry is ideal. Furthermore, no one had ever reared these fish in aquariums and there weren't any books that had been written on raising native fish in captivity. As students, Shute and Rakes had to start out not knowing anything about how to make this a success because it had never been done before. It would prove to be a project fraught with trial and error.

Before long, graduation was upon them and Shute said he had the somber realization that no one was coming along behind them to take this project and keep it going. They decided to approach the federal and state agencies that had partnered together for the project to ask them if they could contract directly with Fish and Wildlife Service rather than having them go through the University of Tennessee. The agencies involved agreed and Conservation Fisheries was born.

Progress was very slow. It seemed like every time they released more darters in Abram's Creek they would vanish. Their return surveys couldn't turn up a shred of evidence that fish had ever been there. It would take nearly five years before Shute and Rakes would find any proof of the fish they had been releasing into Abram's Creek. Shute said they began to dread going out to look for fish. Their spirits were low. They had been stocking the Citico Darter into Abram's Creek for years now. Shute said they didn't know if they were being eaten by something or if they were just dying. Eventually they found a dead Citico Darter and got super excited just at having found something. Even if it was dead. Fish and Wildlife Service kept telling them, "You

know, we really need some success here because we can't keep funding this project if it's not going to work." Shute says doubts were high, but they never planned on giving up. Then one evening while Shute and his family were on vacation, they got a call from Rakes in the middle of the night. Shute says he answered the phone to the breathlessness of Rakes shouting, "I found some! I found some!"

The Citico Darter project would become the seminal project of Conservation Fisheries and would help write the books for captive propagation of endangered species of freshwater fish in the Southeast. The methods that were developed for captively breeding the Citico Darter, would soon be put to use helping other endangered fishes. The lessons learned at Conservation Fisheries had a wide range of applications for other species who have faced great odds.

For example, Conservation Fisheries has bred some species of fish at the hatchery whose offspring swim up to the top of their aquariums immediately after hatching. Shute speculates that this activity helped these young fish use the swift current of their native streams to disperse to new locations after hatching. Conservationists can use this information to make sure the places where this new species is released includes swift currents and protected habitat downstream for offspring to move into. By observing what makes these rare and obscure fish thrive in aquaria, Conservation Fisheries can make real-world contributions towards their preservation.

Sometimes the most difficult part about working with endangered species is simply convincing the public they are worth saving. Why should people care about little fish like these? "They are part of the incredible biodiversity of aquatic life present in the Southeast, and as such

are part of our natural heritage,” says Meredith Harris, Reintroduction Biologist at the Tennessee Aquarium Conservation Institute in Chattanooga, TN. “We are in the midst of a dangerous game of Jenga, and each species is like a block holding up the entire ecosystem. As we lose species one by one, the tower gets weaker, and eventually one seemingly insignificant block could bring the whole ecosystem tumbling down.”

Many Tennesseans might be surprised to find out that this area is home to more diversity in freshwater fish species than the rest of the United States and Canada combined. This region boasts more than four hundred species of fish, most of them endangered or threatened, that call the various watersheds of the Southeast home. We are living in a biodiversity hotspot that is unrivaled in the temperate world. According to Dr. Anna George of the Tennessee Aquarium, “It’s like an underwater rainforest” in our rivers and streams. “All of these different species add up to a beautiful and colorful mosaic that helps support our high quality of life here.”

Although the Citico Darter itself and Conservation Fisheries have done a great deal towards preserving native fish so that future generations might have the opportunity to experience this underwater rainforest, making the public aware that they exist at all is another major challenge. It’s hard to convince people the value of saving something they’ve never seen or heard about. While the names trout, bass, and bluegill come to mind easily enough, many people would be hard pressed to name just one of the rare fishes that call our local rivers and streams home. So, the next time you find yourself taking in the scenery along the river, take a moment to consider what might be swimming below the surface.

Take a snorkel with you the next time you head out for some fly fishing and see if you can spot a school of Saffron Shiners flashing bright red in the current. If you have a creek or spring in your backyard or neighborhood, go investigate it for Barcheek Darter or Laurel Dace. On your next camping trip to the Smokies, bring a flashlight with you and head out to Abram's Creek after dark to spotlight Smoky and Yellowfin Madtoms looking for a midnight snack.

Not all of the fish you will see will be vivid and animated. If you see a dull, little brown fish, take a moment to consider that while this one might not look very impressive, it serves a role in its ecosystem and holds intrinsic worth. While it might not mean much to you, it might mean the world to the stream. Or it might have helped save a lot of other fish you deem more worthwhile. It might even be a Citico Darter.

Holly Whited

Explanation of my role regarding this document

I am the sole writer and researcher for this article. I prepared for this writing by reading primary literature and by reaching out to Conservation Fisheries, Inc, the Tennessee Aquarium Conservation Organization, and the National Park Service for interviews and questions surrounding the topic. I also visited Conservation Fisheries, Inc for an interview with Mr. Shute and he gave me a tour of the place and was able to show me the subject of this writing, Citico Darters, in person. I also conducted a phone interview with Dr. Paul Super with the National Park Service. Dr. Littmann was my professor at the time of this writing and he blessed me with his editorial skills. I have included my sources below.

Thank you.

Sources

1. J.R. Shute, co-founder of Conservation Fisheries, Inc located at 3424 Division St, Knoxville, TN. He can be reached by email at: jrshute55@gmail.com
2. Paul E. Super, Science Coordinator for Great Smoky Mountains National Park. He can be reached at: paul_super@nps.gov

3. Anna L. George, Vice President of Conservation Science and Education at the Tennessee Aquarium in Chattanooga, TN. She can be reached at: alg@tnaqua.org
4. Meredith Harris, Reintroduction Biologist at the Tennessee Aquarium Conservation Institute. She can be reached at: mhh@tnaqua.org