

# CONSERVATION FISHERIES, INC.: A LIFELINE FOR ENDANGERED AND THREATENED SPECIES

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## ABOUT CFI

Conservation Fisheries, Inc. is a non-profit, 501(c)3 organization in Knoxville, Tennessee. Founded in 1986 and incorporated in 1992, CFI is a captive propagation hatchery dedicated to the preservation of aquatic biodiversity in our streams and rivers. Over the last few decades, we have developed techniques to propagate more than 75 non-game fishes, including some of the most imperiled species in the southeastern United States. We were the first private facility in the Southeast to propagate rare, non-game fishes for recovery work.

Our primary goal is to restore fish populations that have been eliminated due to various anthropogenic impacts such as habitat destruction and fragmentation, development and impoundments, unregulated agricultural practices, and sedimentation. Our restoration efforts typically include propagation, rearing, releases, surveying, monitoring, or any combination of these. We also produce many rare or difficult-to-collect species for other purposes related to aquatic conservation such as to be used as hosts for mussel propagation, research projects, and assurance colonies.

We look forward to sharing information about the species we are working with, impacts of our restoration efforts, and how those passionate about native fish conservation can get involved with and support our efforts as a leading conservation organization.

## THE HISTORY OF CFI

The catalyst for CFI's work happened years before our organization was founded. In 1957 Abrams Creek in the Great Smoky

Mountains National Park was poisoned as part of a misguided reclamation project. To make a more hospitable environment for non-native trophy trout, the poison was introduced in Abrams Creek to remove large fishes thought to be competition. While this effort did clear out the carp, buffalo, and other intended species, it also killed off the smaller fishes in the stream, such as madtoms and darters. While many resistant fish species were able to return to the stream, several smaller and more sensitive species were found to be extirpated.

After a handful of preserved specimens from the misguided Abrams Creek reclamation project made their way to the University of Michigan Museum of Zoology, madtom expert William "Ralph" Taylor discovered that there was a madtom specimen that was previously undescribed. In other words, new to science! It was first assumed to be a Brindled Madtom *Noturus miurus*, but after realizing that the Brindled Madtom range didn't extend to that part of the Smoky Mountains, Ralph knew it must be a different species. Calling them Smoky Madtom *Noturus baileyi*, Ralph traveled to Tennessee in 1959 to see if he could find any existing populations. Unfortunately, no populations were found, and the Smoky Madtom was assumed extinct.

About 20 years later, Gerry Dinkins, a graduate student at the University of Tennessee, Knoxville, was leading a seining crew of the Young Adult Conservation Corps workers and discovered a population of Smoky Madtom in nearby Citico Creek—the only population of this species ever found! In the same creek, while snorkeling at



Evan Poellinger photographing fish while snorkeling. (Photo by Derek Wheaton)



Yellowfin Madtom. (Photo by Evan Poellinger)



Smoky Madtom. (Photo by Derek Wheaton)

night he later found a population of Yellowfin Madtom *N. flavipinnis*, which was also thought to be extinct at that time.

Elsewhere, our eventual co-founders, Pat Rakes and J.R. Shute, both had environmentally fueled childhoods. While Pat started keeping aquariums at a younger age, J.R.'s first personal aquarium was during his college years. They each eventually moved to Knoxville, Tennessee, to receive their Masters in Zoology at UT-Knoxville, working under the famed ichthyologist Dr. David Etnier. As the two were finishing up their respective degrees, Dr. Etnier approached them about reintroducing the Smoky Madtom and Yellowfin Madtom back into Abrams Creek by way of propagation. This project was to be funded by the US Fish & Wildlife Service in an attempt to restore some of the original biodiversity to this stream. As Pat and J.R. were both avid aquarists and trained ichthyologists, they seemed like the perfect pair for the job!

From there, a passion was born in the two biologists who both noticed a need for native fish propagation—a niche that they decided to fill. Thirty-seven years later CFI has grown from being a few tanks in a graduate student's office at the University of Tennessee, Knoxville, journeying through many other temporary locations including the back of J.R.'s aquarium store, and finally ending up in our current 5,000 square-foot building just a few minutes down the road from the university. Several years ago we added Derek Wheaton and Evan Poellinger to our team, both incredible biologists who credit NANFA with their lifelong passion for native fishes and who likely wouldn't be a part of our team today without NANFA's influence. CFI has been steadily growing as an organization, adding even more biologists to our team, and we look forward to a facility expansion in the near future to allow us to work with even more native, non-game species.

#### SPECIES SPOTLIGHT: CRYSTAL DARTER *CRYSTALLARIA ASPRELLA*

The Crystal Darter is not federally listed but is listed as Endangered in the states of Wisconsin, Florida, and Missouri. In Minnesota and Arkansas it is listed as a Species of Concern, and is considered extirpated in Illinois. Its native range includes portions of the Mississippi River Basin from Wabash River, Indiana, to southeast Oklahoma, and south to southern Mississippi, northern Louisiana, and southeast Oklahoma. It can also be found in the Gulf Slope in Escambia, Mobile Bay, Pascagoula, and the Pearl River drainages in Florida, Alabama, and Mississippi.

CFI's work with Crystal Darter ran from 2014–2017, and again from 2021–2022 to develop propagation protocols for a surrogate



Crystal Darter. (Photo by Derek Wheaton)

species for the federally Endangered Diamond Darter *C. cincotta*. Crystal Darter and Diamond Darter are the only members of the *Crystallaria* genus, so although Crystal Darter is a species of concern, it is more ethical to develop propagation protocols using this more common species before working with the extremely rare Diamond Darter.

To develop propagation protocols, we first needed to set them up in tanks in a way that mimics their natural environment, both in terms of water quality and habitat. Most species require an adequate amount of cover in their tanks, but Crystal Darter is different in that it burrows in the substrate rather than use structures for cover. Therefore, their tanks were void of cover, but with plenty of specialty, uniformly sized substrate to allow for sufficiently oxygenated water flow throughout, both for the burrowing adults and their eggs.

We passively collected larval fish, meaning we allowed the eggs to hatch in the tanks with their parents, then collected the pelagic larval fish via a drain flow system. Larval fish would then be transferred to large, round, black tubs for rearing. We observed a high number of larval mortalities in their rearing tubs, which led us to observe that they were not feeding well. To fix this, we added green water (diluted algae) to their tubs, which we believe allowed for less light to be reflected into the rearing tub, allowing the larval fish to see their food better while also decreasing stress. After this change, we noticed a significant decrease in larval mortality. Past this point, the Crystal Darter gave us little trouble, and we ended the spawning season with hundreds of juvenile fish.

As larval fish, Crystal Darter started out eating marine rotifers. As they became a few days old, we supplemented brine shrimp into their diets. Both of these live foods require some level of saltwater, so when they were added to a freshwater recirculating system, they would eventually die and begin to decompose if not eaten by the larval fish. This required meticulous cleaning of the rearing tubs. To combat this, we also fed freshwater *Ceriodaphnia* to our larval fish, which, if not eaten, will stay alive in the rearing tubs. As the Crystal Darter got larger, we began feeding them *Daphnia* and Grindal Worms. Adult Crystal Darter were fed *Daphnia*, blackworms, and frozen bloodworms.

CFI doesn't anticipate working with this species again because we feel confident about the propagation protocols that we've developed, but we hope to be able to try our hand at propagating Diamond Darter very soon.

#### KEEP IN TOUCH:

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