

Conservation Fisheries, Inc. and the Reintroduction of Our Native Species

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In the southeastern U.S. there have been only a few fish reintroductions attempted. The reintroduction of a species where it formerly occurred, but is presently extirpated, is a technique used to recover a federally listed species. This technique is often suggested as a specific task by the U.S. Fish & Wildlife Service when they prepare recovery plans for endangered species. Four fishes, which formerly occurred in Abrams Creek, located in the Great Smoky Mountains National Park, are now on the federal Endangered Species List. These are: the Smoky Madtom; Yellowfin Madtom; Citico Darter; and the Spotfin Chub. The recovery plans for all of these fishes recommend reintroduction into areas historically occupied by the species. If reintroductions are successful, the species are one step closer to being “recovered,” with the possibility of down-listing or eventual removal from the Endangered Species List.

In 1957, a “reclamation” project was conducted in Abrams Creek. In conjunction with the closing of Chilhowee Dam on the Little Tennessee River, all fish between Abrams Falls and the mouth of the creek (19.4 km/12 miles to Chilhowee Reservoir) were eliminated. This was done using a powerful ichthyocide (Rotenone) in an attempt to create a “trophy” trout fishery in the park. Since then, many of the 63 fishes historically reported from Abrams Creek have made their way back, however nearly half have been permanently extirpated because of the impassable habitat that separates Abrams Creek from other stream communities, including the aforementioned species. These stream fishes are not able to survive in or make their way through the reservoir that Chilhowee Dam created to repopulate flowing streams like Abrams Creek.

The Smoky Madtom, *Noturus baileyi*, was formally described in 1969 and was based on five specimens collected during this 1957



Fig. 1.

The diminutive Smoky Madtom, *Noturus baileyi*, shares habitat with the Yellowfin Madtom, *Noturus flavipinnis*, but is limited to the Little Tennessee River system. Once thought extinct, this species was fortunately found surviving in a small stretch of a Tennessee mountain stream.



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Fig. 2.

The Citico Darter, *Etheostoma sitikuense*, is a recently described species. Note the translucent egg mimics on this male's dorsal fin. He uses these to impress females as he attracts them to his chosen nest site located under an elevated stone.

reclamation. Because it had never been reported from any other location it was presumed to be extinct after the use of Rotenone in Abrams Creek. However, in 1981, a population was discovered in the Cherokee National Forest, in nearby Citico Creek (also a Little Tennessee tributary). The species was subsequently listed as Endangered under the Endangered Species Act (ESA).

The Yellowfin Madtom, *Noturus flavipinnis*, historically was apparently much more widespread. It ranged throughout large and medium-sized rivers and creeks in the upper Tennessee River drainage, from southwestern Virginia to about the Georgia/Tennessee state line. The species was also believed to be extinct when it was formally described in 1969, because no specimens had been collected at any of the historical localities since the turn of the last century. However, in the late 1970s and early 1980s, three geographically isolated Yellowfin Madtom populations were discovered. One of these was in Citico Creek where they coexisted with Smoky Madtoms. At the time of the Citico Creek discovery, the species had already been listed as a Threatened species under the ESA. Since the time of listing, at least one of the other populations (Copper Creek in southwest Virginia) has drastically declined due to ongoing siltation. Although the extent of the Yellowfin Madtom's current range in Citico Creek is very restricted, the population in the sheltered Cherokee National Forest appears to remain healthy.

Although known to be distinct for several years, the Citico Darter was only recently given a formal scientific name, *Etheostoma sitikuense*.

The Citico Darter (formerly included as a population of the Endangered Duskytail Darter, *E. percnurum*) is known only from Citico Creek and preserved specimens from the Abrams Creek Rotenone poisoning.

The Spotfin Chub, *Erimonax monachus*, was historically found in larger streams throughout most of the Tennessee River drainage, from its headwater tributaries in southwestern Virginia, downstream through Alabama and back into the lower portion of the Tennessee River drainage in middle Tennessee. Currently, there are only four known populations in four Tennessee River tributary stream systems. As might be expected for a species that was once apparently relatively wide-ranging, there are many streams where the species has disappeared, including Abrams and Citico Creeks.

The Abrams Creek reintroduction project began in 1986, with a contract between the U.S. Fish & Wildlife Service (FWS) and Dr. David Etnier at the University of Tennessee (UT). Dr. Etnier had previously recommended to the National Park Service (NPS) that it would be a good idea to attempt to restore the native fish fauna in Abrams Creek. Reintroducing these four species would be a fine start to restoring the original Abrams Creek fish community. The watershed of Abrams Creek is mostly located within the park, thus the stream was considered to be a good candidate because of the excellent habitat and water quality.

For two consecutive years, Dr. Etnier, FWS and NPS personnel, and the North Carolina and Tennessee Wildlife Resources Commission

collected Spotfin Chubs from the Little Tennessee River in North Carolina above Fontana Reservoir and transported them to Abrams Creek. At the same time, efforts to produce Smoky and Yellowfin Madtoms in captivity were begun at UT. For the madtom project, captive propagation was the method chosen to produce animals for the reintroduction efforts because the Citico Creek populations of both madtom species were too small to remove individuals for stocking. This effort was and has continued to be supported by endangered species funds, secured from the FWS by the Tennessee Wildlife Resources Agency (TWRA). Since the personnel responsible for the hatchery techniques and the field monitoring left the University of Tennessee (J. R. & Peggy and Patrick Rakes), the project went with them, but Dr. Etnier has continued to be involved since its beginning. This contract is now between TWRA and Conservation Fisheries, Inc. (CFI), a tax-exempt, nonprofit company. The Citico Darter portion of the project was initiated in 1992, when the FWS contracted with CFI to attempt captive breeding for reintroduction of these darters into Abrams Creek. Also, in 1992, the agencies involved in the attempted Abrams Creek Spotfin Chub reintroduction project agreed

to discontinue the collection and stocking of adult animals as only one Spotfin Chub had been seen at any of the reintroduction sites since stocking. It was decided that if any additional stockings were attempted, the individuals should be captively produced. Therefore at that time, CFI was contracted to work with this beautiful species. For the duration of the project, the Cherokee National Forest has provided funding so that the status of the Citico Creek source populations of the two madtom species and the Citico Darter have been regularly monitored. CFI has also suggested and helped follow through on management activities to protect these populations.

Snorkeling is the preferred method used to survey the fish populations in both Citico and Abrams creeks, and to monitor the status of the Citico Creek populations and also to determine the success of the reintroduction efforts. Abundance indices (the number of fish observed per unit effort, using consistent methods and personnel) developed from these snorkel surveys have also provided information for managing the Citico Creek populations.

In Abrams Creek, we have seen individuals of all four reintroduced species during our snorkel surveys. In fact, for the past 10 years



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Fig. 3.

Snorkeling is the best technique to observe, capture and monitor lots of our native fishes. CFI spends many hours below the surface, day, and even at night, documenting these various species.



Fig. 4.

A view down one of the aquarium alleys where CFI raises a variety of endangered species for reintroduction to their native habitats.

or so, snorkel surveys indicate that the two madtoms and Citico Darter are becoming almost as numerous as they are in the source population, Citico Creek. The restored fishes are reproducing and dispersing into further reaches of the creek not stocked in the past. The Spotfin Chub, however, has never appeared to thrive in Abrams Creek. Our feeling, and that of other professionals, is that the Abrams Creek watershed is not large enough to support the species, as typically Spotfin Chub are found in larger streams. Before the closure of Chilhowee Dam, Abrams Creek was connected to the Little Tennessee River and it is likely that the chubs only utilized the lowermost portions of Abrams Creek and spent most of their life in the much larger Little Tennessee River. After several years, attempts to restore this species into Abrams Creek were suspended.

Restoration projects are rarely overnight successes. It took nearly 12 years for the success of this project to become evident. These fishes are small, and don't move very far in the stream after they've been stocked. To ensure that they eventually occupied a sizeable portion of Abrams Creek, we had to make many stockings at several widely separate localities. Even though success seems imminent, we continue to add "new genes" to the population using fishes propagated from Citico Creek stock.

Are we finished with this project? We regularly discuss our results with the FWS, TWRA, NPS, and other professionals, and this group

helps decide the best approach for the coming season. At this time, we have refocused our propagation and reintroduction efforts toward recovering these fishes in the Tellico River, another tributary to the lower Little Tennessee River, part of which flows through the Cherokee National Forest. The Citico Darter, both Yellowfin and Smoky Madtoms, and Spotfin Chub are being propagated and stocked into the Tellico River. At this time, all four species are reproducing and dispersing in the river. We are hopeful that the Spotfin Chubs might find enough habitat to establish a thriving population; however, of the four species, we have seen the least success with the Spotfins. The goal, of course, is to recover all these fishes so they no longer need the protection of the Endangered Species Act.

Armed with knowledge acquired during these projects, CFI has been able to embark on other fish restoration projects. We are now working to restore Yellowfin Madtoms into reaches of the Powell River in Virginia where past mining activities had eliminated the species from the upper portion of its range. We have also worked with federal, state, non-governmental partners and landowners to help prevent the seemingly imminent extinction of the Barrens Topminnow, *Fundulus julisia*, found only on the Barrens Plateau region of south-central Tennessee. Drought and the lowering of the water table by water-demanding nurseries have periodically dried the spring heads of several sites and their habitat.



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Fig. 5.

J.R. Shute and Pat Rakes in front of their many aquaria housing some of our most beautiful and endangered North American native fishes. Their work has successfully brought recovered species back to locations where past human activities extirpated their presence. Our watersheds must be protected so our unique fishes can survive and thrive.

Another project that shows early signs of success is the restoration of the Endangered Boulder Darter, *Etheostoma wapiti*, and the Spotfin Chub back into Shoal Creek, which is located in south-central Tennessee and northern Alabama. Both species were eliminated from Shoal Creek around the turn of the last century. The Boulder Darter is now known only from the Elk River flowing through Tennessee and Alabama where the population appears to be subsisting in relatively low numbers. Reestablishing these rare darters into Shoal Creek will help make sure we don't have all our fish in one bucket! Over the past couple years, we have seen evidence that our stocked boulder darters are reproducing in Shoal Creek and have just begun to disperse in the stream. Spotfin Chubs have been much more difficult to monitor, in part because we have only been able to release relatively small numbers and there is so much available habitat for this specialized minnow. It is literally like looking for a needle in a haystack; however, we have seen numerous individuals, and our observations suggest that at least some reproduction is taking place. One fish was collected more than 10 miles below all the release sites, having traversed that distance in a little more than a year!

Captive propagation is only one tool that is available to help recover rare or endangered species. There are many cases where this is not the desired option to take. Releasing propagated fishes back into the wild is never something to be taken lightly and must be studied

carefully! In many cases, more harm than good can be the result of such an action as has been documented repeatedly. Most states now rightly prohibit the unauthorized release of any aquatic organisms into the wild.

Conservation Fisheries has to obtain all the proper permits from both federal and state agencies and consult with these agencies as well as other experts before undertaking any reintroduction project. But when and where appropriate, captive propagation and reintroduction can mean the stark difference between a species surviving and thriving or facing complete extinction! In addition, sometimes what we learn about the life history of the fish we raise, especially the larval life history, can translate into enhanced decisions regarding how best to manage these wild and native populations in the future.

Regardless of what we are able to accomplish at CFI, "Protecting The Habitat" of these and all native aquatic species stands above all else as the single most important factor for their continued existence!

Color photos of several fish mentioned in this article can be seen on page 13. For more information about CFI's reintroduction efforts or to view videos and pictures of their work, please visit <http://conservationfisheries.org>.

