

KEEPING AND SPAWNING ARKANSAS DARTERS



Ray Katula

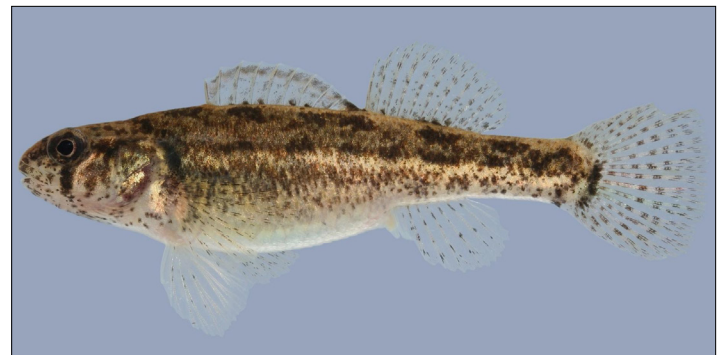
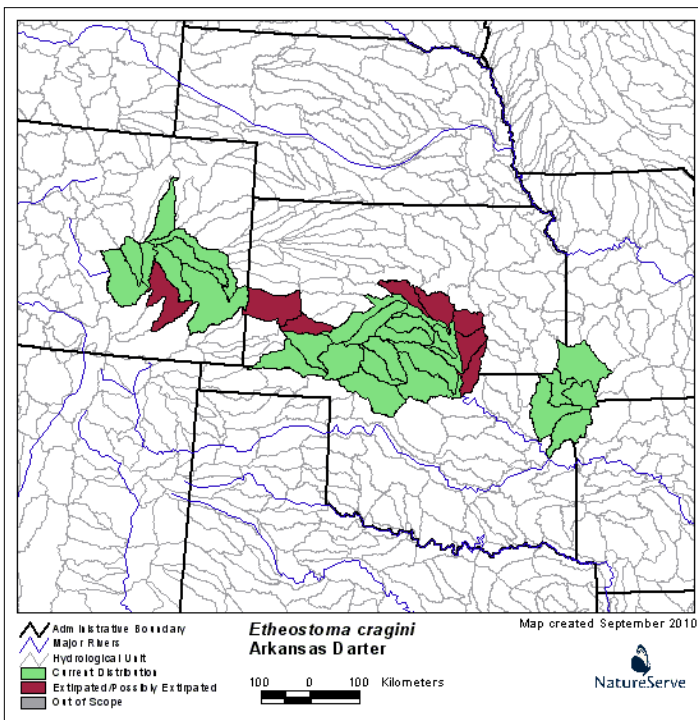
Onalaska, WI

Through my 40 years of fishkeeping, including keeping and maintaining a large number of darter species, I've yet to become bored with them. Many species exhibit exuberant colors in numerous variations. Darters also represent a working laboratory in the processes of evolution and are ideal for genetic studies. Many species have developed various modes of reproduction ranging from the very simple egg broadcasters to the much more evolved cave spawners.

The subject of this article is both modest in color and size, yet I have always had a special interest in them. The Arkansas Darter (*Etheostoma cragini*) is in a unique subgenus within the darter clade. Up to 2011, they were in the subgenus *Ozarka*, which reflected their primary location within the Ozark region of North America. Near et al. (2011) published a monumental work where they produced a phylogeny of virtually all the darter species using mitochondrial DNA

and two nuclear genes. They removed the Trispot Darter (*E. trisella*) from the group and added the Tuscombina Darter (*E. tuscombina*). The addition of the latter resulted in placing these species in the subgenus *Psychromaster*. They are found mostly within springs and seeps, a habitat which places them in a precarious situation. Although the *Psychromaster* darters were much more widespread during the prevailing cold of the last ice age, today only two forms are fairly widespread and common whereas the rest have restricted ranges and can be locally rare, as evidenced by their status as threatened or endangered.

Arkansas Darters are not entirely colorless, as their lower half is covered with yellow to red on males with an intermediate orange being the most common. Arkansas Darters are strongly bicolored with the upper half being brown to tan. Females have a lesser degree of coloration. During spawning,



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Arkansas Darter (*Etheostoma cragini*) male (top) and female. (Photos by Uland Thomas)

male Arkansas Darters will also display a mid-lateral stripe which is brassy to metallic gold in color. The first dorsal fin of the male has an orange medial band, and the rest of the fins are mildly banded with brown or black specks. The female has a completely white venter and less color in the dorsal fin. Immature fish of both sexes resemble the female. Characteristics of the *Psychromaster* darters include a very distinct tear-drop bar hanging beneath their eyes.

There are seven species of *Psychromaster* darters: five found in the Ozarks and two in Tennessee and Alabama.

THE OTHER PSYCHROMASTER DARTERS.

The Stippled Darter (*E. punctulatum*) resides in the mountains of southern Missouri and northern Arkansas. It is perhaps the most colorful of all *Psychromaster* darters and is the most widespread and common species. The entire venter region on males is bright orange or red. The caudal peduncle has a blue mid-lateral stripe. The first dorsal fin is colorful, with an exterior and interior band of orange and a middle stripe of blue. The second dorsal fin is completely orange or yellow. Its common name comes from the stippling of small

spots on the upper part of its brown body.

The Sunburst Darter (*E. mihileze*) is found in the northern tributaries of the Arkansas River, mostly confined to the Ozark regions of northern Arkansas, southwestern Missouri, and northeastern Oklahoma. It is similar to the Stippled Darter but does not possess the blue stripe, and the red venter appears more orange. It is common within its limited range and is the only other *Psychromaster* darter occasionally sympatric with the Arkansas Darter. It is believed that they spawn along or underneath undercut banks.

The Autumn Darter (*E. autumnale*) is found only in the White River drainage and tributaries, and the upper Current and Eleven Point rivers in Missouri and Arkansas. It differs from the similar-looking Stippled Darter but lacks a black edge on both dorsal fins.

The Slackwater Darter (*E. boschungii*) is found in a small area of south central Tennessee and conjunctly in northern Alabama. They are somewhat similar to the Stippled Darter, but have no blue on their bodies and no stippling on the upper part of the body. Their extremely small range and overall rarity have placed them on the federal threatened list. Un-



Sunburst Darter: male (top) and female. (Photos by Lance Merry)



Paleback Darter, tributary to Caddo River, AR. (Photo by Dave Neeley)

Stippled Darter: male (top) and female (Photos by Uland Thomas); Stippled Darter ova. (Photo by Ray Katula)

like Stippled and Arkansas Darters, Slackwaters do not bury their eggs, but rather deposit them on plants.

The Paleback Darter (*E. pallidorsum*) is similar to the Arkansas Darter but is more slender, has more orange on its ventral areas, and has a wide, pale olive stripe extending down the middle of its back. It also has a very wide tear-drop bar. They have an extremely small range, living only in the upper Caddo River of Arkansas. Paleback Darters also spawn in vegetation in seepage water in open pastures or wooded areas.

The Tuscumbia Darter (*E. tuscumbia*) is probably as threatened as the Slackwater Darter. An obligatory inhabitant of springs and spring fed streams found around the southern bend of the Tennessee River, which has been dammed forming Pickwick Reservoir, thus engulfing much of their restricted range. One known population in Tennessee was inundated by the reservoir and no other populations have since been located in that state. They still reside in a small number of existing springs, 14 according to the Boschung and Maiden (2004). They are a smaller species only reaching 52 mm. Unlike the majority of its relatives, this species is lacking in color. Basic color is brown or tan with minor mottling. They can display small iridescent gold blotches along their sides and melanophores are more intensified in spawning males. Their fins are plain aside from some fine stippling. Typical of the subgenus *Tuscumbia*'s possess a strong sub-orbital bar beneath their eye. Spawning is said to take place within substrates of gravel and also in vegetation depending upon habitat and population. They spawn from January to March. The author had briefly collected at a known locale

for this species, Beaverdam Pond in Limestone County of Alabama, but no specimens turned up albeit plenty of Spring Pygmy Sunfish (*Elassoma alabamae*) were seen as well as a large number of Warmouth, (*Lepomis gulosus*). Spring Pygmy's and Tuscumbia Darters are protected so no specimens were or would be retained. The author wondered if the Warmouth were natural or introduced and if introduced would they pose a threat to their rare co-inhabitants.

THE ARKANSAS DARTER

The name Arkansas Darter seems somewhat inappropriate, as within their range they appear to be the least common within that state. In fact, the Arkansas Darter had never even been caught in Arkansas until 1979. They do occur within the Arkansas River drainage, and this probably accounts for their name. They range from northwestern Arkansas to southwestern Missouri, westward to near Fort Collins, Colorado. Despite this wide range, it is extremely sporadic in occurrence. As previously implied, the Arkansas Darter inhabits springs, seeps, and small creeks. They are associated with aquatic vegetation, and the bottoms are often filled with muck. The propensity of the plains states (where *cragini* occur) to irrigate, tapping underground aquifers, has had the consequential effect of drying up springs and seeps. Since this species cannot occupy downstream areas, there is little chance of them recolonizing a spring once it has dried out. Another problem is people building a residence, and then modifying a spring to suit the needs of the landowner, which often means stocking non-endemic fish species. This has also led to the elimina-



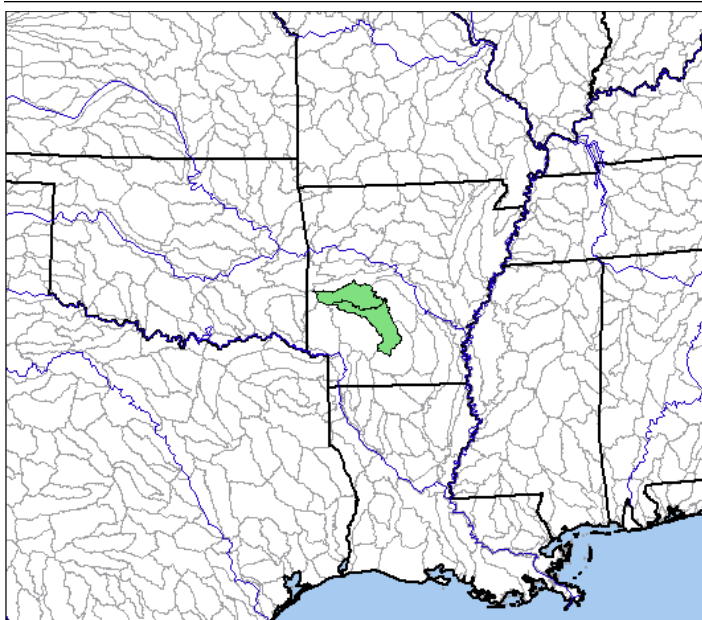
Slackwater Darter. (Photo by Conservation Fisheries Inc.)



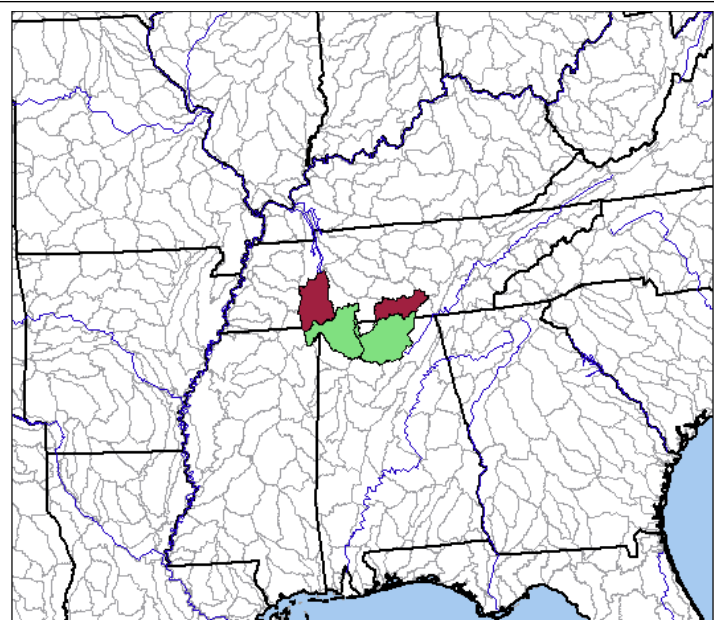
Tuscumbia Darter. (Photo by Fritz Rohde)



Autumn Darter: female (top) and male. (Photos by Lance Merry)



Map created September 2010
Etheostoma pallidorsum
 Paleback Darter
 100 0 100 Kilometers
 NatureServe



Map created September 2010
Etheostoma tuscombium
 Tuscomb Darter
 100 0 100 Kilometers
 NatureServe

tion of several populations. Some remaining populations consist of only 100 or so individuals.

There are, however, new populations occasionally found, and small springs are not always adequately surveyed by fisheries personnel, and therefore, it is difficult to assess their true abundance. They are currently listed threatened in Colorado and Kansas and a candidate species for federal listing.

In 1986, while collecting in southwestern of Missouri, I caught six specimens of the Arkansas Darter. The location was a textbook example of the detriment manmade alterations have been to *E. cragini*. Beyond a barbed wire fence the seep was still natural, with much overhanging vegetation, much aquatic vegetation, and a bottom full of natural debris of twigs, wood, and mud. On the other side of the fence, as far as we could discern, the seep had been channelized with two dikes, one on either side of the seep. Despite exhaustive efforts, we could not obtain a single specimen of *cragini* from the channelized portion; yet it was rather easy to procure specimens from the natural portion of the stream.

Of the six specimens we obtained, there were two males and four females. After a few days in plastic bags and a free trip to California, they settled readily into life in a ten-gallon aquarium. With their diminutive adult size of two inches they probably could have been maintained in a well-kept five-gallon tank. Among darters, *cragini* are atypically very unaggressive. Even more unusual for darters, they remain unaggressive even during spawning.

Having spawned and cultured over 50 species of darters, I can say that, in my opinion, the Arkansas Darter ranks as one of the easiest species to spawn and cultivate. Perhaps the only frustrating aspect is the lack of producing large num-

bers of fry, since due to their small size, females simply don't produce large numbers of eggs. I also found that many of the eggs succumb to fungus, for perhaps a variety of reasons.

In 1993, I decided to document certain aspects of captive culture of this species, having already raised several generations. During the winter of 1992–1993 the fish had been exposed to temperatures of around 50° F, and during March the temperature had naturally and slowly raised to 58° to 64° F. On 31 March, I observed several signs of spawning activity. On 2 April, I removed 37 eggs from the ten-gallon spawning tank-fifteen of these had fungused. The good eggs were transferred to a nursery aquarium. On 13 April, about 55 more eggs were removed, and again half of them fungused.

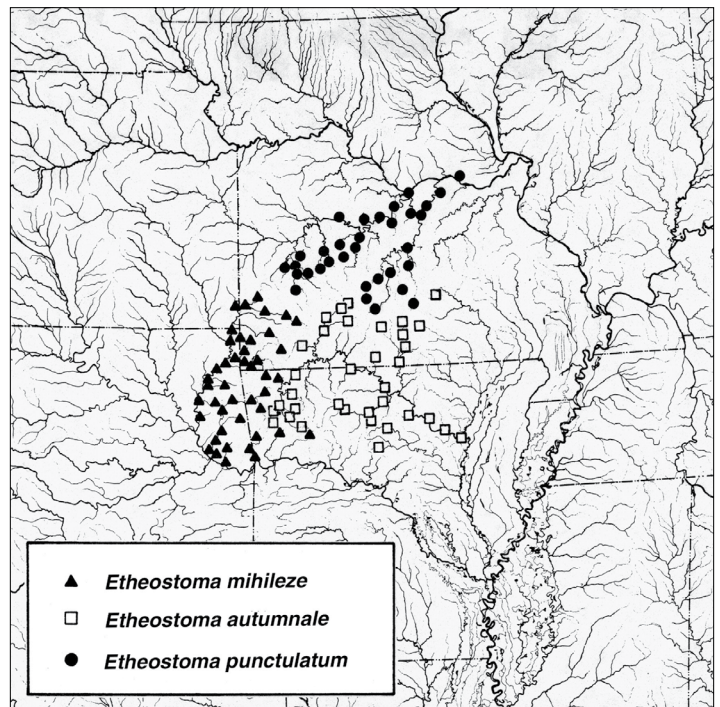
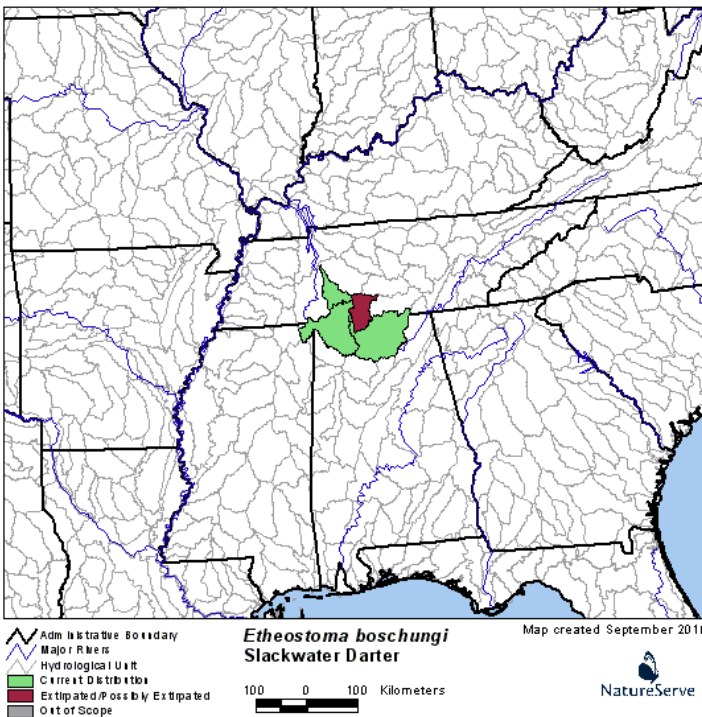
On 30 April, I spotted the first newly-hatched fry. What struck me as odd was how well-pigmented the fry were, something not common amongst darters. These had a distinct midlateral stripe!

Twenty-six more eggs were obtained from the breeding tank on 2 May, with about ten fungused.

These would be the last eggs I would obtain from the three females and two males. Overall I obtained about 50 fry, of which several were preserved in formalin for documenting age/growth increments. After 26 days, the fry were weaned off baby brine shrimp and onto finely chopped brine shrimp and small whiteworms. In one year they will be mature and ready to spawn.

Older females lay larger eggs, something I have not noted with any other species I've worked with, including the Stippled and Sunburst darters.

Distler (1972) recorded captive spawning. He noted that territories were not established, and that females would bury



Distribution of Sunburst (▲), Autumn (□), and Stippled (●) darters. (Mayden 2010)

themselves in the gravel and be accompanied by up to several males, who would mount her back. They would vibrate and deposit eggs within the substrate. My observations were identical. Noting that several *Psychromaster* darters deposit their eggs on plants, I did provide plastic plants, *Ambulia*, and *Anacharis* along with green yarn spawning mops. They always chose the substrate for spawning. This is, in fact, odd, since darters that live over mud substrates normally attach their eggs. Confinement in the aquarium could alter the fish's natural behavior, or it could be that their eggs can survive being buried within a substrate with sufficient water flow from the spring or seep.

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