

# NOTES ON THE BANDED SCULPIN, Cottus carolinae, IN KENTUCKY

by JIM PITTS

Original Description: Potamocottus carolinae - Theodore N. Gill, 1861.  
Observations on the genus Cottus, and descriptions of two new species.  
Proc. Boston Soc. Nat. Hist., 8:40.

Two species of freshwater sculpins (Cottidae) inhabit Kentucky streams. These bizarre fishes, the Banded Sculpin, Cottus carolinae, and the Mottled Sculpin, C. bairdi, may be separated by the following sets of characteristics:

C. carolinae

C. bairdi

Lateral line complete or nearly so	Lateral line usually incomplete
Chin mottled	Chin uniformly pigmented
Crossbands rather pronounced	Crossbands less pronounced

C. bairdi is generally distributed from the Tennessee River system in Alabama and northward through eastern Kentucky to Hudson Bay. Trautman (1957) notes relict populations of "...this or another form..." in the Ozarks and along the Idaho-Montana border. C. carolinae's distribution has been cited as extending from Georgia to Mississippi and north to Indiana and Illinois. The Kentucky distribution of each species is shown in Figure 1. It should be noted that C. carolinae is not found in the extreme western portion of the State. The readily obtainable, westernmost Kentucky records occur in Barnes Hollow Creek, Beechy Creek, and Donaldson Creek (all in the Lake Barkley drainage) where the species was reported as abundant by Resh, Baker, and Clay (1972). Clay (1962) states that certain streams "...particularly... ones near the central portion of the state, are devoid of sculpins without apparent cause." The spotty distributions of both species are characteristic of relict forms which at one time enjoyed a much broader range.

A diminutive or absent air bladder, dorsally located eyes, and large pectoral fins make the Kentucky sculpins well adapted to life on the riffles. A large mouth with rows of incurved teeth make these species formidable predators of invertebrates and small fishes. Both sculpins are known to frequently ingest members of their own species. Koster (1937) states that more young of the year sculpins were found in sculpin stomachs than all other fish species combined. Craddock (1965) notes that there is seasonal variation in the diets of C. carolinae specimens 75-125mm in length, with fish not ingested by this species in summer and winter. Exceptions to this observation occur as noted by Blankenship and Resh (1971). The author recently found a C. carolinae specimen in an uncatalogued UL collection preserved with a small sculpin still in its mouth. It is noteworthy that the darters which

also inhabit the riffles do not share this cannibalistic tendency (most have very small mouths). Many brightly colored species such as the Rainbow Darter, Etheostoma caeruleum, maintain themselves over large ranges with practical immunity to predation by other fishes. It would seem that one of the major advantages afforded by the riffle habitat is the protection from predators it grants to its inhabitants. Speculatively, this allows some species to maintain themselves at low population densities. Cannibalistic Cottus species may find establishment or re-establishment of self-perpetuating populations from small stocks more difficult than many darter species that do not experience much predation. This may contribute in part for the lack of sculpins in many suitable streams.

Cottus carolinae is generally assumed to be an inhabitant of only pollutant and silt-free streams, however, some exceptions have come to the authors attention. Two specimens of C. carolinae (UL 1230) were taken from the Middle Fork of Beargrass Creek in 1961. This stream is heavily polluted by wastes from its urban surroundings in Jefferson County, Kentucky. In the fall of 1973 some small C. carolinae specimens were collected by a University of Louisville ichthyology class in a section of Otter Creek in Hardin County, Kentucky. At that time, this portion of the stream was so heavily silted as to be free of most of the expected fish life. A survey of the upper Salt River of Kentucky, conducted in 1968-69 (Hoyt, Neff, and Krumholz 1970) yielded the following comments concerning the collection of C. carolinae in this drainage: "Taken on riffles of noticeable gradient below pools having much silt and agricultural waste runoff." In contrast are the following statements by Trautman (1957) in relation to the Ohio habitat of C. bairdi: "The densest populations occurred in brooks or streams of clear water, having a rocky or sandy gravel bottom, with or without aquatic vegetation. The majority of the more flourishing populations were in brooks of high gradients; but occasionally large populations were present in low-gradient streams of unusually clear water, having bottoms relatively free from clayey silts or other pollutants, and a permanent flow... The clear cut Ohio distributional pattern of this sculpin demonstrates the absolute need of a suitable habitat to a species of animal. Although this sculpin was present in all major stream systems in numbers sufficient to "stock" these entire systems, it was confined to only portions of these systems where its habitat niche occurred."

Cottus carolinae may be an occasional cave inhabitant in Kentucky. While at Auburn University in Alabama, the author witnessed a gentleman excited over his find of a bizarre fish in a northern Alabama cave. The fish was a sculpin of either the C. carolinae or C. bairdi form. While the author knows of no collections of C. carolinae from Kentucky caves, populations of this species are known to exist in streams issued from caves. Kentucky is a site of much Karst topography, where caves, sinks, and underground streams are abundant. The occasional residence of C. carolinae in this niche would seem a likelyhood.

#### Collecting and Aquarium Maintenance of Cottus carolinae

This species may easily be collected where it is abundant by techniques used to collect darters. Perhaps the most effective seining method involves

pushing a seine upstream behind a partner who kicks stones on the rocky bottom as he walks. The more furious the kicking, the more successful the technique becomes. This method should be avoided in the breeding season which may start in April in Kentucky. This species spawns on the undersides of stones and other overhanging objects (Lagler, Bardach, and Miller 1962). Destruction of the nests of this species can certainly do small populations no good. Heavy aeration of the transporting vessel is advised. Thick insulation of the container is necessary to minimize heating of the relatively cool water.

The author has maintained C. carolinae specimens in aquaria for many months. The basic needs of these fishes are rather minimal but should be provided if the sculpins are expected to appear healthy. Overhanging rock-work under which these fish may retreat is highly desirable. In order to avoid cannibalism, specimens of greatly different sizes should not share the same aquarium. Heavily aerated water seems to be preferred by this species. Food may be provided by stocking the tank with a good supply of small minnows and/or soft bodied invertebrates. With training, however, C. carolinae may be taught to accept thin strips of beefheart.

Breeding might possibly induced by profuse aeration and circulation of the water, frequent water changes, and the addition of numerous potential spawning sites. Warming of the water after some months at a lower temperature seems to trigger spawning in many North American fishes. This technique might also be applied here.

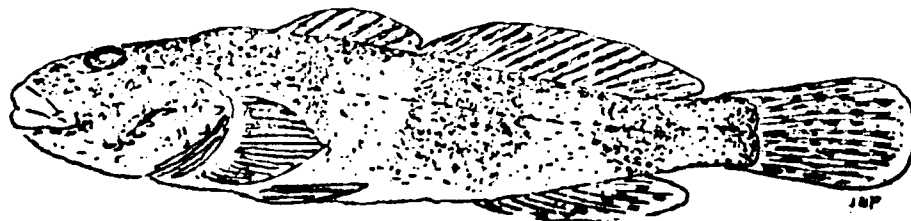


Fig 1: C. carolinae from Doe Run, Meade Co., KY. Drawing by author.

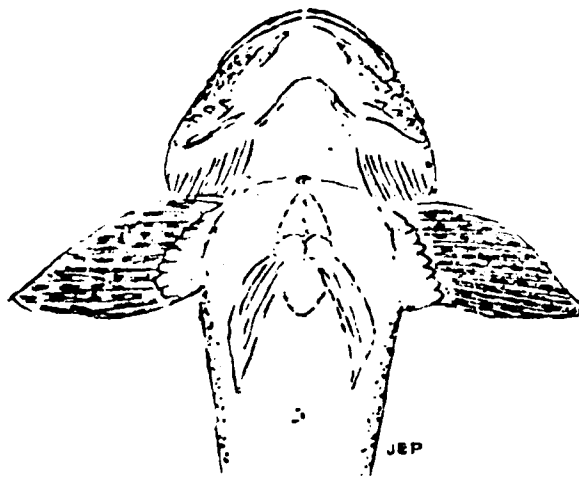


Fig 2: Ventral view of the head and stomach of C. carolinae. Drawing by author.

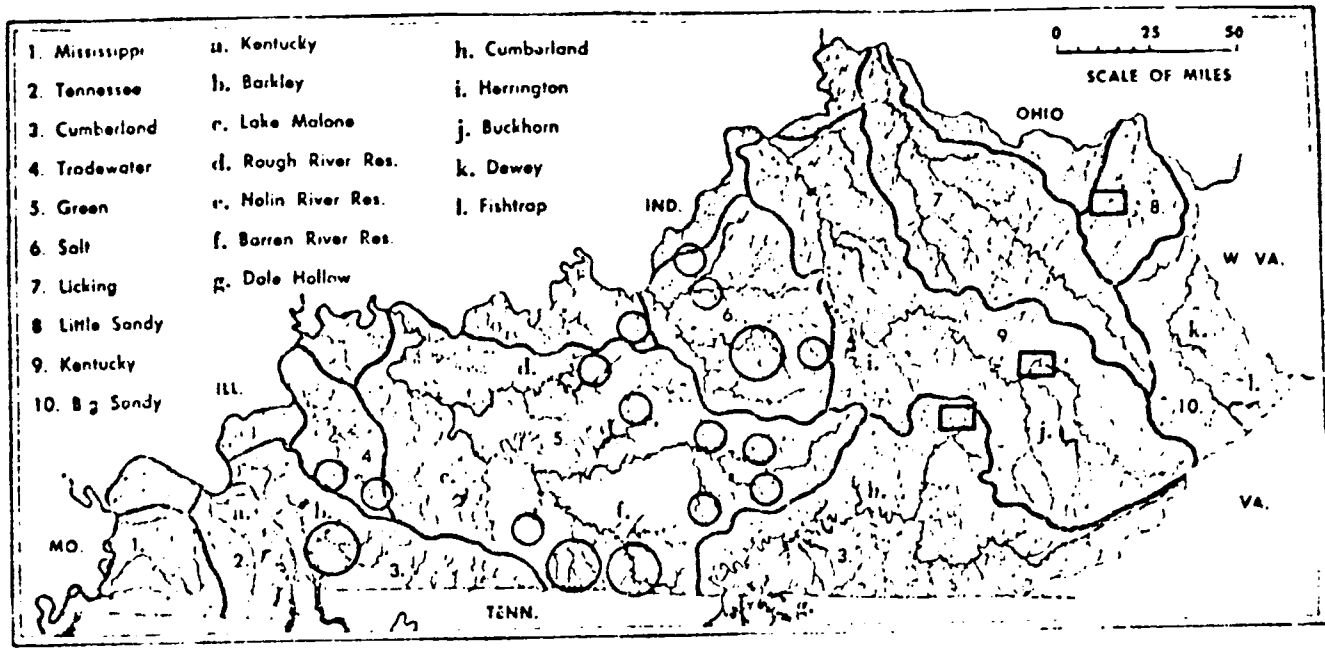


Fig. 1. Stream map of Kentucky. Drainage basins are denoted by numerals, impoundments by letters. All drainages except No. 1 are within the Ohio River Basin.

□ = Cottus bairdi

○ = Cottus carolinae

C. bairdi - University of Louisville Fish Collection number 5841; Branson and Batch 1972, and Branson and Batch 1974.

C. carolinae - University of Louisville Fish Collection numbers 66736, 11782, 7992, 11514, 12837, 5710, 10478, 5478, 11788, 12356, 7672, 6829, 5733, 5338, 11762, 5345, 79080, 7811, 11962, 7021, 6157, 5599, 11929, 6889, 5201, 6692, 6839, 10253, 5020, 5803, 5816, 6040, 6051, 7636, 8651, 1230, 12254, 7979, 5082, 10783, 6437; Resh, Baker, and Clay 1972, and Hoyt, Neff, and Krumholz 1970.

The above localities are not meant to be comprehensive, but merely indicators of the general Kentucky distributions of these species. No doubt, additional material from other institutions would fill in some of the gaps in these distributions.

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