

FISH-WATCHING IN THE LITTLE TENNESSEE RIVER

By Bill McLarney, Franklin, North Carolina

On May 31, 1985, my brother-in-law Stanley Polanski and I were engaged in kick-net sampling of a portion of the Little Tennessee River near my home with a visitor, Steve Robinson of Los Angeles. Steve, a professional collector of coral-reef fishes for the aquarium trade, seldom sets foot east of the Mississippi unless it's to catch a plane from Miami to some tropical point. One of our goals was to show him that some of our native eastern fishes were as beautiful as any of his cherished marine exotics. In this we succeeded, with an adult male Redbreast Sunfish (Lepomis auritus, locally known as "Robin") in breeding color and several species of darters. Steve was especially taken with the Banded Darter (Etheostoma zonale) and the Greenfin Darter (E. chlorobranchium), since green fish are a rarity in his world. (The Greenfin Darter, at least here, is much more beautiful than any of the photos I have seen. The males have really glowing, semi-metallic green second dorsal, caudal, and anal fins with very distinct black and yellow marginal and submarginal bands. The breast is glowing turquoise, and the black vertical bars and red spots on the sides are not at all obscured by the dark background color.)

Equally beautiful, if less distinctive in color, is the Gilt Darter (Percina evides), and it was this species which brought me back to the river at the next opportunity. Stan, Steve, and I chanced to sight two Gilt Darters dashing about in a circle in and out under a large rock in about 8" of water. That they were a pair was evident from their behavior (hot pursuit) and obvious sexual dimorphism. The larger, pursuing fish was golden orange over the entire ventral half of the body, and sported an orange first dorsal fin. (As with the Greenfin Darter, this fish and others I have caught are far more beautiful than in any photos I have seen.) The female had a slight golden glow, but was less brightly colored. The blue-black saddles and large, roundish lateral blotches of both fish were sharply defined, and served to distinguish them at a glance from any other darters known to exist in the Little Tennessee.

On June 3, I returned in the hope that the Gilt Darter pair would still be engaged in breeding activity. Water conditions were perfect; we have had a dry spring, and the often turbid Little Tennessee has usually been low and quite clear (bottom was visible at 3' in flat-topped water). The river is about 100' wide at my observation point, located at the transition between an upstream flat-topped run and a downstream pool. Here the river drops about 18" over a rock ledge, forming a series of swift chutes and a plunge pool. Toward the right bank, the river drops more gently over a sand- and gravel-bottomed riffle which flows at an angle of about 30 degrees to the main current. My fish were about a foot upstream of the lip of this riffle, and about 20' from the right shore.

Equipped for Fish-watching

My equipment for observing the fish amounted to four items. The polaroid sunglasses, pencil, and notebook were conventional enough, but I suppose the inclusion of a folding aluminum lawn chair was a little odd. I know it struck some of my neighbors that way; a county road parallels the opposite shore at

this point, and several cars slowed to allow their occupants to gawk.

What strikes me as curious is that I have never seen, or heard of, anyone setting a chair in the middle of a river to watch fishes. But if you have ever even once spent an hour or more on hands and knees in a riffle, wishing for a dry hand to take notes, or draped uncomfortably and perilously over a stream bank, you will understand my motivation. My method is not as unreasonable as it seems at first, since most fish respond in fright not to the visual presence of an object in human form, but to noise or sudden movement. So, if one can manage to sit fairly still, there is often no reason to endure discomfort in observing river fishes. I find that with some attention to placement, the weight of my body holds the chair securely in up to two feet of flowing water.

In this instance, I was able to place my chair in about a foot of water, slightly toward the bank and just barely downstream of the "target" rock, so that my right foot was about two feet from it. The main criterion for selecting this spot was to minimize sun glare. Upstream and to my right, the water depth increased rapidly to more than three feet. To my left and upstream was a shallow run which had silted in to some extent, though large rocks broke through the sediment at many points. Here the water gained velocity, and silt deposits were reduced as the river approached the riffle. The area immediately in front of and to the left of me had a clean gravel bottom and ranged from a foot to about two feet next to the bank.

The River Chub Appears

It was apparent that darters were not the only fishes utilizing the area. About five feet upstream of the darter rock, in about two feet of water, was a chub nest—almost certainly the work of the River Chub (Moxonia micropogon, locally known as "Hornyhead" or "Knottyhead"). Upstream and to my left, only about four feet from shore, was another—a failed project, apparently, for it was seriously silted and its top protruded from the water. For those who have not seen them, the nests of the Moxonia chubs are quite distinctive, consisting of large, ovoid piles of stones that stand out sharply in clear water.

My entry to the river (heralded by a stumble over a slippery rock in the deeper near-shore channel) alarmed any fish in the vicinity, and it was fifteen minutes before I saw my darters. Apparently the spawning act was completed, for I saw little activity, only an occasional head protruding inquisitively from under a rock. That was all I observed, except that at the end of the observation period I removed the rock, causing a fish—presumably the male Gilt Darter—to dart off excitedly. There were about 100 eggs attached to the undersurface of the rock. (This is at variance with such literature as I have on hand. Although I have no description of Percina evises spawning, all of what I have on other Percina spp. indicates that they are substrate spawners, and do not place adhesive eggs on the undersides of submerged objects as do some Ktheostoma spp.)

While I was frustrated by the darters, and considered searching for another pair, the presence of the chair inhibited me (or is it that it inspired me?). Anyway, the chub nest soon provided me with all the action I could ask for. About 20 minutes after my arrival, a large chub (about 7") appeared

from the upstream pool. Its underside, from head to tail, was a vivid orange-pink. The dorsal surface and sides were olive-brown, the scales distinctly outlined. Dorsal and caudal fins were yellow and the lower fins whitish. From collecting experience, I was virtually certain it was the River Chub, but I had to take into account the fact that two other species of large chubs had been recorded in the Little Tennessee drainage. There is only one record of the Bluehead Chub (Nocomis leptocephalus). I was able to determine that it was not that species by the absence of a blue head (conspicuous in all the breeding male N. leptocephalus I have seen) and dark lateral band, and by the arrangement of the nuptial tubercles on the head. On the Bluehead Chub, these "horns" are confined to the area between the eyes, whereas on my fish the tubercles formed a "V" extending from the mouth along both sides of the dorsal surface of the head to a point parallel with the posterior edge of the eye. Absence of the lateral band and the position of the mouth (slightly subterminal rather than terminal) eliminated the possibility of its being a Creek Chub (Semotilus atromaculatus), a common enough species in the watershed, but one which ordinarily spawns in small creeks, not in the main river channel.

Soon after arrival, the male chub set to work enlarging his nest. He would drift five or six feet downstream to the head of the riffle, pick up a rock, return, and place the rock on the nest. Most of the rocks chosen were more or less round and about one inch in diameter; however, a few much smaller or larger rocks were used, as well as one distinctly flat rock. The largest rock taken was an elongate one easily two inches long. Most of the rocks were simply picked up in the jaws, but occasionally the fish found it necessary to dislodge a rock with a sharp twist of the body. When carrying rocks upstream to the nest, the fins were held tight against the body. The fish swam entirely with powerful strokes of the body and caudal fin, whereas in normal swimming the fins are extended.

Stone-carrying was done in bouts of 15-20 minutes' duration. During these bouts, activity was continuous; one stone was carried and placed every 10-15 seconds. Some of the between-bout periods--which lasted anywhere from a minute to half an hour, but seemed to average around 10 minutes--were devoted to feeding on floating or drifting material. On one occasion, the fish came vertically half out of the water, apparently in an attempt to capture a flying insect (unseen by me). When it took floating food, it did not do so in the manner of salmonids or shiners, which often barely dimple the surface; rather--perhaps owing to the subterminal mouth--it raised itself up until the dorsal fin and the entire portion of the body above and forward of a line from the dorsal fin insertion to the lower lip was out of water, and "scooped" the food.

I interfered with my subject once, by flipping a shiny penny into the water near it during a feeding period. It immediately pursued the penny, catching up to it just an instant after it hit bottom. On picking it up and perceiving its inedibility, the fish's behavioral mode changed and it swam directly to the nest, where it deposited the coin. It then resumed nest-building behavior.

Most of the between-bout periods were devoted to what I took to be searching for a female. Sometimes this involved drifting down through the riffle (sometimes

passing directly between my feet) to an unknown point behind and downstream of me. Sometimes the fish would disappear upstream into deeper water. In either case, it would usually return from downstream, sometimes near shore, but always avoiding both the very shallow riffle about 10' to my left and the silted area. Occasionally it would not leave the area, but would dash about in a tight loop around or to one side of the nest for a minute or two. On one of these occasions it encountered a smaller male River Chub, which was aggressively driven away downstream over the riffle.

After about two hours of intermittent nest-building, a female did appear, from deeper water upstream, and apparently spawning took place. I say "apparently" because this fish was only seen on the upstream far side of the net, where visibility was poorest for me. I saw both fish alternately occupy a position directly over this corner of the nest for about 20 minutes, but could not observe their behavior. After an interval of 15 minutes, during which the female disappeared and the male concentrated on adding stones to that corner of the nest, the female (possibly another female) returned and repeated the performance.

Prior to "spawning," the male placed most stones directly on or slightly upstream of the top of the nest. Afterward, he seemed to pay particular attention to the area the female had visited. While he continued to haul most rocks from downstream, some were also removed from the very edges of the nest for this purpose.

Interloper

An interesting interlude in my observations was provided by what first looked as though a diver were waving a red flag on the pool-riffle margin well upstream of the chub nest. As the red object drew nearer, it could be seen to be attached to a fish about 16" long. I had first observed this fish on May 31, and knew it to be a sucker. On that date, on June 3, and on each of three subsequent days, it appeared at about the same time, 4:30 p.m.—drifting almost passively downstream, head down and tail up, occasionally pausing to root vigorously in the substrate, as evidenced by the increased speed of the "flag" and a small plume of mud. On this occasion, it briefly inspected the chub nest from the downstream side, then drifted on until it felt the pull of the fast water flowing over the chutes, upon which it surged upstream and out of sight.

The vivid red tail narrowed its owner's possible identity to two out of the seven species of Catostomids native to the Little Tennessee, either the Shorthead Redhorse (Moxostoma macrolepidotum) or the River Redhorse (M. carinatum). My view of the fish was very good; at one point it passed within 6" of my foot. I was thus able to identify it as M. macrolepidotum on the basis of the falcate (curved) distal edge of the dorsal fin and the somewhat pointed snout. In the sunlight it gave off bronze and coppery reflections as if it had been dusted with glitter. Although conventional notions of piscine beauty ordinarily exclude the Catostomids, it was definitely a beautiful animal.

River Chub Relocates

When I returned the following afternoon, the chub nest was gone. A patch of unusually even-sized stones gave away its location, but I never would have noticed had I not known where to look. My first inclination was to blame some

larger animal, possibly the redhorse. A brief search turned up another chub nest just downstream, at the very lip of the riffle, in the area where the male had found most of his stones. I decided to settle into my chair and await events.

Fifteen minutes later, a male chub, presumably the same individual, appeared from downstream to my left and went straight to the old nest site. There he immediately picked up a stone and carried it downstream to the new nest, a performance which he repeated in the same manner and at the same rate as before. By the next afternoon, he had completely transferred the old nest to the new site.

From examination of the two nests, I was able to get a clear idea of River Chub nest architecture. Apparently the males begin by digging a shallow depression about the size of the nest and removing any fine materials from it. (I did not witness this part, but assume it is done either by vigorous undulations of the body, as with Centrarchids, or with powerful sideways sweeps of the tail, as with salmonids). Then it is filled with rounded stones of a suitable size and gradually built up to a sizeable mound.

The nest is not simply heaped up and left to take its own shape; rather, longitudinal depressions slightly larger than the fish's body are left by piling stones on either side of a line. The new nest contained one such chamber, and it soon became apparent that it was a spawning chamber after a female about 5" long appeared inches below the nest.

This fish, unlike the male, had no reddish coloration. The lower fins were translucent yellowish, and there were no tubercles. She did have a distinct dark lateral band and a suggestion of a caudal spot, which if I had seen her alone, might have suggested a species other than N. micropogon; however, considering her company, and bearing in mind that the lateral band in many species of Cyprinids intensifies at times of excitement, I rejected that notion as highly unlikely.

At first, the male ignored the female and continued to move stones. This female also picked up stones, but only small ones an inch or less in diameter. She confined her activity to the immediate perimeter of the nest and never moved a stone more than a foot, and often only an inch or so. It was impossible to avoid the anthropomorphic analogy of a male Homo sapiens trudging back and forth to the moving van with piece after piece of heavy furniture while his wife adjusted the pictures on the walls.

Eventually, the male took notice of the female and swam around behind her, whereupon she moved into the spawning chamber and quivered briefly (presumably expelling eggs, though I never saw any). When she moved out, the male took her place and repeated the performance. And so around and around they would go, taking turns in the chamber. Occasionally the female would pause in the chamber and insert her snout into the stone pile. Whether this represented feeding or part of spawning behavior, I could not say.

After about 15 minutes of this routine, the two fish would return to stone-gathering or disappear briefly. This continued for an hour and a half, at which time I had to leave.

On each of the two succeeding days, I did not see the female. The nest was complete, with no visible evidence of the spawning chamber. Both this

nest and its predecessor were heaped up about a foot off the bottom and built with the long axis parallel to the current and the peak slightly upstream of the center. The first net was about 4' long and $3\frac{1}{2}$ ' across. The second was of about the same volume, but--perhaps because it was in faster water--was more elongate than the first, about $4\frac{1}{2}$ ' x 3'. My crude but conservative estimate is that a single nest must contain on the order of 4,000 stones.

During these two days, I saw the male only intermittently. He would pass by the nest every 15 minutes or so, usually appearing from downstream and to the deep side. Occasionally, he would circle the nest or hover briefly in the vicinity. Otherwise, he paid it no attention. Whether this constituted guarding behavior, I do not know. Other fish did appear in the vicinity of the nest, but with the exception of the other male River Chub, he paid no attention to them.

Other Visitors

Smaller species of Cyprinids are known to use chub nests as spawning beds. This may have been what a group of four to ten two-inch Tennessee Shiners (Notropis leuciodus), which repeatedly appeared briefly over the downstream end of the nest, were doing.

One of my most exciting observations was a solitary Spotfin Chub (Hybopsis monacha), which put in a cameo appearance, swimming slowly (and unmistakably) by the nest. This species, listed by the Federal Endangered Species Program as threatened, and by the state of North Carolina as endangered, was "rediscovered" in the Little Tennessee a few years back. There are presently only two known reasonably healthy populations of the Spotfin Chub, one of which is in the Little Tennessee, but it has yet to turn up in my nets. (The other population is in the Emory River, Tennessee.)

The Spotfin Chub paid no attention to the River Chub nest, and neither did any of the darters. In fact, they were curiously absent from the immediate vicinity of the nest, though they were almost omnipresent elsewhere within my view (except in the silted area). I observed three species feeding and occasionally chasing, but saw no definite breeding behavior. In addition to the Gilt Darter and Banded Darter, the most frequently seen (and collected) species was the Spotted Darter (Etheostoma maculatum), considered to be "of special concern" in North Carolina, but obviously doing well in the Little Tennessee.

Of species which did inspect the nest, the most frequent was the Bigeye Chub (Hybopsis amblops), a nondescript little fish which I take the liberty of identifying here on the basis of having captured several of the same size as those observed in the same area on preceding days. Others, in addition to the previously mentioned Tennessee Shiner and Shorthead Redhorse, included a single three-inch Cyprinid which seemed to be the Whitetail Shiner (Notropis galacturus). It hovered over the upstream end of the nest repeatedly. Also, a single, juvenile Smallmouth Bass (Micropterus dolomieu) dropped in briefly.

On June 7, heavy rains raised the level of the Little Tennessee, which, as I write, is opaque, red, and probably capable of washing me away with my chair.

My recent experience leaves me speculating on two questions. The first

is ecological: What is the overall role of the River Chub, and other stone-nest builders, in the ecology of rivers like the Little Tennessee? The intermediate role of the River Chub in the food chain is obvious, and the use of chub nests by smaller Cyprinids is well documented. But, in an essentially clear-water, hard-bottomed stream like the Little Tennessee, increasingly subject to periods of high turbidity and siltation as a consequence of agriculture and residential development, what is the importance of a species that piles up (and therefore cleans) 4,000 or more stones and then arranges them so that water can flow freely through them, what does this mean in terms not only of Cyprinid survival, but subsequent use by invertebrates? Perhaps that is *Nocomis micropogon*'s most important role in the ecosystem. Maybe a review of the literature on *Nocomis* spp., which I plan to undertake, will prove enlightening, but I am not presently aware of any papers on the subject.

My second question is particularly, though not exclusively, for NANFA members. Why don't I see more folding chairs in the rivers? I have just spent parts of four days lounging in the sun, with my feet in cool water and the murmur of riffles in my ears, and it sure is easier than splashing about with nets or fussing with aquaria. There are plenty of bird-watchers in the woods, but where are the fish-watchers in the rivers?

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