Centrarchid Observations

by Robert Bock

I began my centrarchid observations about three years ago, when I brought back three pumpkinseed sunfish (*Lepomis gibbosus*) from a fishing trip. I'd been enchanted by this colorful species ever since I was 10 years old, when I caught pumpkinseeds with tiny hooks and a bobber fished from a hand held line.

Observing the spawning and nest-tending behavior of this species would be an interesting experience, I thought at the time. I set up my three new arrivals in a 65 gallon tank that I'd purchased just for the occasion. Full length adults, they ranged in size from six to eight inches. They held much of their color in the aquarium neon blue cheek lines, bright yellow-orange bellies and blue trim around the dorsal and tail fins. All of them acclimated to tank life remarkably fast. Within 24 hours, they were schooling against the glass and chasing their reflections. They even took meal worms from my hand.

This peaceful scene soon ended, however, as I witnessed the behavioral changes male centrarchids undergo in response to extended day length and warm temperatures. I must've been preoccupied that night as I left my basement fish room, for I forgot to turn the tank lights out. (Rest assured, the lights of all my native tanks are now connected to timers.) The next day, the once peaceful male had metamorphosed into a ferocious monster. He hovered over the spawning pit he had just excavated in the gravel, as the females cowered behind the rocks. I removed the battered females and treated them faithfully with antimicrobials I bought from the aquarium store. Despite my best efforts, they eventually died of infection from their wounds. The male remained in spawning mode, continuing to enlarge the nest by "shimmying" like a mollie, blasting the gravel out of his way with the back-andforth motion of his tail.

Although the breeding attempt failed, I did learn from it—something that had never been described in any of the references I'd collected. The conspicuous opercular spot—the bright red "ear" spot on the edge of the fish's gill covers—served a highly useful purpose. When I introduced another pumpkinseed to the tank (separating the new arrival from the original male with a glass partition) the two fish charged the glass, flaring their gill covers like Siamese fighting fish. Like the hourglass on a black widow spider, the opercular spot was red, nature's universal warning color. Its meaning to rival males is unmistakably clear: stay away.

I also learned that many *Lepomis* species will hybridize readily with related species. The new fish, stouter bodied and more drab than my original male, was not a female, as I had thought. Less colorful than a nesting male pumpkinseed, he was probably a hybrid between a pumpkinseed and a bluegill. The latter form is a favorite of fishermen and has been extensively stocked throughout the U.S.

Such ready crossbreeding is a hindrance to developing a pure strain. Aquarists collecting sunfish from bodies of water where there are two or more species present should examine each individual closely to make sure it is not a cross between different species. Furthermore, housing males and females of two or more species in the same aquarium could result in a nest full of unwanted hybrids.

Next, I continued my breeding attempts, this time with two types of Enneacanthus sunfish. The males of these diminutive species were too small to do any damage to their tank mates, and so would not repeat the carnage of my earlier experiment with pumpkinseeds. I obtained several bluespotted sunfish (Enneacanthus gloriosus) and a few blackbanded sunfish (E. chaetodon). Although I kept them for more than two years, they've yet to spawn. From the beginning, I was meticulous about providing them everything they needed. For starters, blackbandeds and bluespots require soft acid water. This required removing the dissolved limestone from my local tap water by running it through either a deionizer or a water softening pillow. I then acidified the water, by filtering it through peat moss and adding commercial pH reducing solutions. I performed this water softening ritual once a week, when I did 20 percent water changes.



Pumpkinseed. Illustration by Robert Bock.

Too fussy to accept dried or prepared foods, my *Enneacanthus* lived on a diet of live black worms, live and frozen brine shrimp, frozen blood worms, frozen glass worms, and finely chopped cooked shrimp.

Although my *Enneacanthus* never spawned, I learned something from that experience as well. Again, I observed first hand what I'd never seen written in any text book. Most male centrarchids become conspicuous at spawning time. Their colors intensify and they stake out territories clear of any cover. Presumably, this increases the chances that they will be seen by breeding females, and allows rival males to give them a wide berth. My male pumpkinseed, for example, not only excavated a nest in the open, he uprooted all the plants near the nest.

Contrary to what some of the written accounts say, my male blackbanded sunfish did not excavate spawning pits in the gravel as the larger *Lepomis* species do, although they did stake out a small territory of sorts. In fact, they became as inconspicuous as possible. They pushed out hollows in the java moss I had planted and remained in these hiding places almost all the time, coming out only to feed or to chase intruder blackbandeds away from their territory.

During breeding season, male blackbandeds also change color slightly, to match their surroundings. Those kept against dark gravel will turn dark, whereas those kept on light colored gravel tend to fade. For males of this species—bereft of any defenses against predators—the reproductive strategy was not to conspicuously stake out a territory, but to become as difficult to see as possible.

In contrast to the larger *Lepomis* species, the female blackbanded sunfish became more intensely colored during breeding season, with the contrast between their black and white bands increasing sharply. To my consternation, the female blackbanded sunfish I kept never ripened.

After three years of perseverance, I was finally rewarded with a spawning by another species. I had collected five longear sunfish (*Lepomis megalotis*) on hook and line from a stretch of the C&O Canal, outside Washington, D.C. This species is native to the Midwest, but was somehow introduced to the area.

I had set them up in a 65 gallon tank, along with juveniles of other sunfish species I had brought home from various fishing and collecting trips. At some point, it occurred to me that female sunfish might spawn in response to different environmental cues than did the males. My theory was that as days grew longer in the first cool days of spring, the males would enter the shallows and prepare their nest sites, getting things in order for the time when the females were ready.

The females, on the other hand, might not respond so much to day length as to temperature. As temperatures rose, the populations of aquatic insects and crustaceans would also increase, and the females would be assured of extra food for egg development. Warmer temperatures would also ensure greater fry survival.

After the male longears had staked out their territories, I added a heater to the tank and brought the water temperature up to 77°F. I fed them heavily, once a day, on Hikari Cichlid Gold that had been soaked for an hour or so beforehand. To compensate for the large quantities of waste these fish generated, I performed large scale water changes—sometimes as much as 75 percent—each week.

Within about two weeks, one of the males had excavated the typical circular centrarchid nest in the gravel. The night he completed it, I noticed a female approaching the nest for a brief instant before being chased away. I set my camcorder up in front of the tank. For about 20 minutes, the female approached repeatedly, and was chased away each time.

As the male left the nest to chase both the female and the various other sunfish species I kept in the 65 gallon tank, other longear males entered the nest briefly before being chased by the dominant male. Presumably, these were "sneakers," lower ranking males attempting to sneak in and quickly fertilize the eggs before the dominant male could notice them.

At this point, I divided the tank with a glass partition, to separate the spawning pair from the other fish, which the male was compelled to chase. Freed from the distraction, the pair soon began spawning. The female swam at about a 45° angle, while the male swam upright, their ventral fins nearly touching. The pair circled the nest for about 30 minutes as the female slowly released her eggs and the male fertilized them.

The male fanned the eggs until they hatched about five days later. Unlike the reports I've read of other *Lepomis* species, he did not tend the fry carefully until they were free swimming, but seemed to lose interest in them at this point. When the small Texas cichlid I'd kept in the tank began nonchalantly picking them off, I removed all of the adult fish.

Initially, the fry were tiny and helpless—nearly impossible to see with the naked eye. The only detail I could distinguish were the thread-like tails above the yolk sack. The fry needed no food for about a week, after which time they readily consumed brine shrimp nauplii. After 12 weeks, the fry eventually began to accept finely crushed bits of Hikari Cichlid Gold.

Cold treatment

Sunfish spawn in the spring, presumably in response to warmer temperatures and longer day lengths. Many references state that sunfish need colder temperatures in order to spawn. To cold treat my blackbanded sunfish, I keep them in an old picnic cooler in my backyard for a month or two. Because the fish's temperature is kept low, they need little food and oxygen. Because they only eat about once a moth, aeration and filtration is unnecessary.



Blackbanded sunfish. Illustration by Robert Bock.

NANFA member Peter Rollo has worked out a similar system, which he has written about in earlier issues of this publication. Basically, Rollo keeps his tanks from freezing by surrounding them with an electric heating tape. This method permits the use of a filter, something my picnic cooler cold treatment doesn't allow for.

Rollo and I disagree on the role that day length plays in sunfish spawning. Rollo contends that day lengths are irrelevant, that the shift from cold temperature to warm is the sole spawning trigger. From my experience with the larger pumpkinseeds and longears, however, I believe that longer day lengths are influential in triggering the nest-building urge in males. For this reason, I winter my centrarchids with a maximum of only eight hours of light a day. To test whether it's really necessary to cold treat blackbanded sunfish in the winter, Joe Hanyok has taken a few that I brought back from the New Jersey Pine Barrens and overwintered them at the same temperature he keeps his house. If they spawn, he's promised to let me know.

In springtime, food also becomes more abundant. My theory is that female sunfish need extra food to help them produce the large quantity of eggs they will later release.

For the longear sunfish I spawned, I was able to fatten them up with daily feedings of Hikari Cichlid Gold. I've found that it's best to pre-soak prepared foods. This way, the fish can absolutely gorge themselves without the food taking on water and rupturing their stomachs as it expands. For *Enneacanthus*, live blackworms—in addition to their daily feedings of other live and frozen foods will help to fatten them up. These species will also greedily consume finely chopped earthworms or shrimp.

Keeping sunfish has provided me with a unique opportunity to observe fascinating behaviors that few people have ever seen. For a future project, I may try to breed redbreast sunfish (*Lepomis gulosus*) from the Potomac River. This species is not as colorful as many of the other *Lepomis* species, but what color they do have—the bright orange breast—they tend to hold better in an aquarium than do other *Lepomis* species.

On my last trip to the New Jersey Pine Barrens with Peter Rollo, I brought back two mud sunfish (Acantharcus pomotis). These are highly efficient ambush predators. It's a mystery why there seem to be so few of them in the wild. I think I'll turn up the temperature on them, to see if there is anything in their spawning or fry rearing habits that account for their sparse numbers. I also brought back several blackbanded sunfish and a few banded sunfish (*Enneacanthus obesus*) from my Pine Barrens trip. These seem to be doing better than the original group I brought back from Delaware. This time, instead of softening and acidifying my tap water, I've been collecting rain water from my roof. (Before using this for water changes, I run it through a water softening pillow to remove any heavy metals that may be in it.) More than eight months later, the blackbandeds still have the orange trim in their pectoral fins and seem to be doing much better than my original group did. I've got a few wintering in a picnic cooler in my backyard, and will bring them in and try to spawn them in a few weeks.

But whether or not I'm successful in getting these four species to spawn, I'll no doubt learn more from other sunfish species in the future.

The sheer diversity of this family of fishes will no doubt provide me with fascinating observations for years to come.

Collecting Maryland Longears

Just how they got there, I'll probably never know. But longear sunfish are in the area around Pennyfield Lock in the Chesapeake and Ohio (C&O) Canal National Historical Park near Darnestown, Maryland. I caught several last year, brought a few home, and even watched a pair spawn in my 65 gallon tank (as I've described in the above article).

I'm not sure of the subspecies, but I think it may be Lepomis megalotis peltastes, occurring naturally in northern Ohio, Indiana, Illinois and Iowa. The species is small—no more than 5 inches in length, and not quite as brightly colored as the Kansas subspecies photographed by Garold W. Sneegas for *Tropical Fish Hobbyist* last year. It's an attractive, scrappy little fish, and you might want to pick up a few if you're ever in the area. Perhaps you'd be helping the environment by removing an introduced species. (At the very least, you wouldn't be doing any harm.) These fish will do well in hard, alkaline water. Limestone deposits abound in the area, and when I tested the water at Pennyfield last year, the pH was 8.0.

Where to find them

I've only collected longear sunfish in appreciable numbers from the canal near Pennyfield Lock about 10 miles north of Washington, D.C. Longears don't seem to be present in downriver parts of the canal like Swain's Lock and Widewater. (I did catch one longear, however, while fishing for redbreast sunfish at a power plant discharge several miles up river.) Water flows into Pennyfield from the Seneca stretch of the Potomac. Seneca is slow and calm, unlike the turbulent stretches down river at Great Falls. It's possible that the longears prefer this calm stretch, and except for an occasional stray, leave the faster flowing parts of the river to the indigenous redbreast sunfish. I haven't collected at Seneca yet, but am planning to do so this year.

The area is rich with history. At Seneca, General Lee's troops crossed the river on their way to Gettysburg, Pennsylvania. Pennyfield was the summer home of President Grover Cleveland, whose terms ran during the late 1800s. One of President Cleveland's favorite pastimes at Pennyfield was fishing for small-



mouth bass (another introduced species). If you're into angling, the upper Potomac offers some of the best smallmouth bass fishing in the country. The C&O Canal, now a National Historical Park run by the National Park service, traverses the shore of the Potomac River for 184 miles, from Washington, D.C. to Cumberland, Maryland. Construction of the canal began in 1828, to allow for shipping that would have been impossible along many of the rocky, shallow stretches of the Potomac. Despite its name, the canal never reached Ohio, having been abandoned after the Baltimore and Ohio Railroad reached there first.

How to get there

Take I-95 until you reach I-495, the Capitol Beltway. Go west, until you reach exit 38, River Road. Travel north for several miles and then make a left turn onto Pennyfield Lock Road. Follow this road for about 5 minutes, until you reach the canal. An excellent Montgomery County street map is available for \$9.95 from ADC, 6440 General Green Way, Alexandria, VA 22312; (703) 750-0510.

Regulations

Because the C&O is a National Park, collecting with a net or seine is prohibited there. However, with a Maryland fishing license, you can take as many as you want on hook and line. A size 12 or 14 hook works best. Bait it with a small chunk of earthworm, set it about 3 or 4 inches below a bobber and cast it 2 or 3 feet from the shoreline.

Be careful in the Potomac

Some parts of the Potomac River are extremely fast-flowing and dangerous, especially near Great Falls. Around hazardous areas, the National Park Service has posted signs saying "Danger. Even wading can kill." Take these signs seriously. Every year, a few people who don't think the warning applies to them end up drowning in the river.