

# TANK-SPAWNED BLUENOSE SHINERS



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After 13 years of trying, Bluenose Shiners (*Pteronotopis welaka*) finally spawned in my fish tank (Figure 1). I will explain why there is still uncertainty in my process, detail the procedure used, and speculate on which factors led finally to success. No knowledge will be held back.

This paper is not about the natural history of *welaka*, collecting fish, or pond-spawning *welaka* (achieved on July 25, 2009). If you want to read about my pond success (20 pond-spawns to date), read my article, “A Singular Bluenose Shiner Success,” published in 2011 in the *Tropic Tank Talk*, magazine of the Greater Detroit Aquarium Society.

## FULL HISTORY OF SPAWNING

I have checked reports of *welaka* being spawned in ponds. Two people produced a grand total of 21 *welaka* offspring in ponds before I got my first pond spawn. After mine, two others have had reasonable success and multiple spawns (i.e., Bill Flowers [Indiana] and Brian Zimmerman [Ohio]).

I have also heard and read about six people claiming to have tank-spawned *welaka*. I have communicated with all six (one each in Massachusetts, Indiana, Virginia, and Alabama, and two in Florida). None of them have distributed offspring or made Breeder Award Program claims. Some of them have given descriptions or even fish that were not *welaka*, and two of them have since admitted that the *welaka* didn't spawn. Another, Tony Kroeger, claims to have used cichlids to trigger the *wela-*

*ka* to spawn and he intends to write an AC article detailing his method.

## TANK SPAWNING PROCEDURE

Based on eight years of failures in tanks and ponds, successful spawns in ponds, and ten successful spawns in tanks, I will try to blend my experience into a description of one breeding cycle. First, start with males and females. This is not so easy because Redeye Chub (*Notropis harperi*) and Coastal Shiner (*N. petersoni*) look much alike and also closely resemble and are found with *welaka*. The *welaka* need to be at least two inches long and in good condition. The males will have spangles, a blue nose, and large fins once mature. One-year old fish are desired as I have never had any live through a second spring.

A good *welaka* spawn in my pond would produce 70 fry. In 2017, my *welaka* were too old, and then in 2016, there were no spawns in ponds and no attempt in tanks. In 2015, the summer temperatures were simply too low to stimulate spawning. During this streak without success, I hypothesized another factor. The idea came to me because I have snorkeled in the natural habitat with *welaka* in southern Alabama. I tried to chase the *welaka* into the weeds, but they refused to go and made a dash past me causing me to think that *welaka* don't like plants? During the 2016 unsuccessful year in my pond, maybe there were too many plants around the sunfish nest, which made it too easy for the sunfish to defend his nest. That is why I have no plants in my breeding tank.

For my breeding tank I use a 4-foot long 70-gallon aquarium (Figure 2). The bottom has been smeared with brown silicone rubber. A container of gravel with enough sand to fill the spaces was added for the sunfish. The sand helps keep food from dropping between the pieces of gravel and then rotting. Most of one side of the gravel container had a cut-out down to gravel level. A tip from a cichlid expert who told me that the ability to see and flee is important. The tank was heated to 72° F, had an air-driven Matten filter at one end, and exposure to light from the outdoors. The room was lit 14 hours per day. The fish were fed with crumbled Wardley Flake Food, cracked Purina Sport fish ¼-inch pellets, and a few feedings of frozen blood worms. Since *welaka* eat food as

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Figure 1. Male Bluenose Shiner (*Pteronotropis welaka*).

it passes by in the current (or sinks), I assumed feeding three times per day would be better than once. A piece of egg crate light diffuser was added to give the *welaka* an escape from the sunfish. This piece did not seal off any space, thus allowing sunfish some protection from other sunfish.

I added a 3-inch male, a 2½-inch female, and a 1½-inch male Dollar Sunfish (*Lepomis marginatus*) to the tank. Dollars are like Longears (*L. megalotis*) except they like lakes and still water. Four male and six female *welaka* were added to the tank.

A major source of difficulty has been getting the sunfish to spawn. I have heard plenty about and tried using the tricks of cichlid keepers: load the tank with many potential pairs to disperse the aggression and use multiple spawning sites. I have seen females reject weaker males, and sneaker males attempt to get in on a spawn (which also makes it hard to be sure that females were actually females.) There are two critical differences between sunfish and cichlids. One, the breeding season ends for sunfish, freeing them from nest guarding duties and allowing them to relentlessly pursue and kill any other sunfish, male or female. Second, after years of pondering why the sunfish were dying, my best hypothesis was that the sunfish flee; they don't hide. Plenty of flower pots and rocks did little good. Instead of turning the corner and ducking into a flower pot, the sunfish would flee, reach the end of the tank, and cower at the surface or bottom. Usually this fish was removed but still died two days later from injuries.

Now to *welaka*. Many top-notch aquarists have tried providing spectacular care, only to fail. They have seen the males spar with each other. I have watched for years and have never observed a female pay any attention to males,

sparring or not. Good care and a typical minnow spawning set-up have never produced a single *welaka* egg for anyone.

This time, I got lucky; cooperative sunfish spawned instead of killing each other. By the end of the summer, this pair of sunfish had spawned 12 times. After the first successful *welaka* spawn, I did not want to risk a shock to the *welaka* fry from changing water, so I took 20 gallons from the spawning tank to use in the fry tank. With only one pair of Dollar Sunfish spawning, I cannot claim that this method has been thoroughly tested, and luck may have played a large part in this successful tank spawn of *welaka*.

#### CONSIDER THIS THE START OF THE WELAKA BREEDING CYCLE

Water is quickly dripped in to fill the 70-gallon tank over 12 hours, cold tap water going through a carbon block filter. The tank still contains the small pair plus smaller male Dollar Sunfish and a group of young mature *welaka*. Furrows are raked into the surface of the gravel using my fingers.

Over the next two to three weeks, the fish are fed daily. Occasional supplements of live baby brine shrimp or frozen bloodworms are given. The *welaka* seem to have taught the sunfish that they are too fast to be caught and eaten. The egg crate provides extra protection for the *welaka*.

The first sign that someone is ready for breeding is the male sunfish will fan out a nest with his tail. This is easier to notice because the furrows are erased. He will chase *welaka* away from the nest. He also chases the extra male sunfish short distances. Spawning is getting closer if you see the males swim toward the female, waggle his body, and try to lead her back to the nest.

The *welaka* males should be doing something similar. They show interest in the sunfish nest, swimming over it on occasion when the sunfish is off or distracted. The male *welaka* will also spar with each other. The sparring probably is for dominance and being able to spend a little more time a little closer to the sunfish nest. The pecking order gets worked out and the sparring decreases. Adding a new top-male from another tank will produce a protracted bout of *welaka* sparring. The males will waggle for the female and try to lead her over the sunfish nest. There is no pairing-up or grouping of the *welaka*.

The female *welaka* have never shown any interest in what the males were doing (one exception mentioned later).

I have tried adding sunfish milt. The male *welaka* get excited and spar more. Females – no reaction. Adding sunfish eggs (not fully ripe) leads to a feeding frenzy by the male and female *welaka*. No change to the *welaka* breeding status was observed.

You might see the sunfish spawn. (It is okay if you miss it.) I usually spy the eggs in the sunfish nest. After the first



Figure 2. Breeding set-up in 70-gallon aquarium

day, the eggs have fallen between the gravel and are harder to spot. This is not critical to catch because later you can spot the sunfish wigglers' tails waving from the gravel. Any of these events will tell you where the tank is in the spawning sequence:

Day 0 – see sunfish spawn or eggs

Day 1 – harder to see eggs

Day 2 – wait\*

Day 3 – wait

Day 4 – see wiggling tails: time to vacuum the gravel.

\*Once, I took a scoop of gravel from the nest at the Day 2 point. The only eggs that I found were the larger, sunfish eggs.

The *welaka* stay above the surface of the nest. They don't seem to be trying to eat any eggs. I never had a chance to determine if *welaka* eat free-swimming sunfish fry.

The *welaka* need an opportunity to spawn over the sunfish nest without the male Dollar chasing them off. When? Maybe the male Dollar gets nervous in full sunlight and decides to move to a less bird-predator vulnerable location. Maybe during the short bursts of the male Dollar chasing other sunfish. Maybe from the sheer number of *welaka* to chase off. Finally, maybe at twilight or during the night? I have seen in the fading light females and males darting near the nest. I have heard that sunfish tend to spawn during the full moon; a better situation to guard the nest around the clock? (I have 40 hours of webcam video if you want to watch for a spawning act.)

The first clue of success was tails sticking out of the gravel and wiggling. But, a plant-less tank, with egg crate, a few flowerpots, and a tray of gravel, is not a place for fry to hide. I wasn't going to take a chance, so I used a gravel vacuum to remove whatever was in the nest. Pouring off the water except for a quart of the five gallons, I transferred the fry to a clear glass bowl lit from the bottom. The different wigglers were seen, long and thin, and



Figure 3. Pre-free-swimming fry. Top: Thin body, *P. welaka* fry. Middle: Round body with tail, Dollar Sunfish fry. Bottom: Thin body, *P. welaka* fry.

wigglers with a round body and tail. Two species of fish in my tank, two species of fry, therefore success, possibly the first tank-spawning of *Pteronotropis welaka* in the world (Figure 3).

Since I didn't need any sunfish fry, I used a 2-foot long piece of airline tubing and mouth-pipetted the sunfish fry and snail poop out of the bowl, 20 minutes of work. Then nearly all of the water is poured off and replaced with aged tap water. The bowl was stored in the dark at 72° F. The next morning and night, the dead and crooked, and egg shells were removed and 99% of the water changed. Then, they were transferred to a 2½ gallon tank (or 20 long) with a sponge filter and a few bubbles to keep scum from forming on the surface. When the fry are free-swimming, live paramecia were fed every day for three weeks. The smallest Golden Pearls brand fry food was dusted on the water surface during weeks 1 to 4. Crumbled flake food was added daily starting from week 3. Some baby brine can be added after week 1.

Some offspring develop with crooked backs. Possible alleviation of the shock of transfer, I will try to use less head when vacuuming out the nest, and start with three inches of water already in the bucket.

During one of the spawns, I was late vacuuming the gravel. When I looked in the bowl, all of the fry were old enough to be swimming. Separation would have taken four hours. Instead, all the fry were put in a 20-gallon-high tank. *Welaka* adults and *welaka* fry don't stay at the surface or along the bottom; they prefer to eat food mid-water. The sunfish fry hang near the bottom. After six weeks, I noticed that there was only one live sunfish in the tank. The other sunfish fry must have starved, being out competed for food from above by *welaka* fry.

This method allows for greater recovery and survival of the fry, averaging 150 *welaka* fry per Dollar Sunfish spawn. At one inch, fish slow down their growth (over the winter months.) My tanks get down to 63 F in the middle of winter. In spring, the *welaka* quickly develop into mature fish – feed them well.

A second set-up, similar except away from the window, only produced one batch of Dollar fry and no *welaka*. The nest was hard to distinguish. It turned out that only half of the Dollar fry were vacuumed out. The male Dollar aggressively defended the nest; even seven days after the fry were free swimming. This contrasts with the main spawning tank. After siphoning the nest, a 50% water change was performed. Without fry to guard, and with clean water, the sunfish came back into breeding condition in fewer days.

A total lack of interest by the female *welaka* until after the sunfish spawn hints that hormones are the spawning trigger. Once, after siphoning out the fry, I used a pump to circulate the water between the successful spawning tank and another with identical but fewer hours of direct sun. Little difference in behavior was observed.

The difference in the spawning time, as judged by the fact that both species become free-swimming at the same time despite the longer development time of Dollars, indicates that the *welaka* spawn two days after the sunfish. I suspect that the testosterone from the male Dollar aggression in guarding the nest is the *welaka* spawning trigger, which brings into question why the circulation of spawn-water did not work. I can't answer this.

Overall, 935 *welaka* were distributed to aquarium hob-

byists that I know, 137 were sold, 50 eaten by (now) larger Dollar Sunfish, 55 deformed were fed to *Fundulus catenatus*, which left me 140 for 2018's breeding attempts. The grand total for 2017 was 1,317 *welaka* fry produced. P.S. Don't net *welaka* fry. It may kill them.

My success sounds substantial, but how much was luck? I only had one successful breeding set-up and used only one pair of Dollar Sunfish.

What did I do differently than the other 12 years? Little things:

- A large window in a western door so there is direct evening sun on the sunfish nest.
- Small breeders- one male, one tiny male, and a female sunfish - none over three inches. Too small to eat *welaka*.
- Matten filter.
- Feeding cracked trout chow pellets so the female sunfish could fatten up again.
- Feeding frozen bloodworms to condition for spawning.
- *Welaka* stock from different river.
- Cooperating trio - the sunfish decided to spawn this time instead of killing each other.

**FOR THE FUTURE**

Maybe if the tank is larger than their breeding territory, fleeing sunfish won't be killed during breeding season. Maybe try just adding testosterone to the *welaka* tank with a fake nest. Maybe use cichlids that spawn consistently.

Now, which are important??

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