

February 7, 2013

**SDAFS Alligator Gar Technical Committee Meeting  
Warm Springs NFH Report**

**Alligator Gar FY 2012 Production**

Warm Springs NFH alligator gar program is part of a restoration program covering the Mobile and Mississippi river drainage basins. Close cooperation with Private John Allen NFH (source of our fry) along with other state and federal agencies is involved to undertake management objectives for this top-level predator. This is a summary report highlighting work during FY 2012.

Building upon lessons learned during 2011, the hatchery staff focused on reducing handling and transportation mortalities of fry incurred at the onset and during the first 72 hours once they arrived at the hatchery. Going into our 6<sup>th</sup> production year, instead of transporting 5 day (DAH) old fry, right in the middle of their larval to juvenile developmental stage, Carlos Echevarria transported 12 day (DAH) old fry via shipping boxes from Private John Allan NFH on May 4<sup>th</sup> 2012. Pictured below are younger fry (still exhibiting attachment and clumping on bottom and sides of tanks) as transported in 2011. Fry received this year were free swimming in the water column and ready to feed. We theorized that shipping or transporting these fish during the critical stage of larvae/post larvae (endo-exogenous feeding period) to juvenile (exogenous feeding period- free swimming stage) is detrimental to their normal development and responsible for over 50% mortalities in the first 72 to 96 hours after arrival to the hatchery. Presence of high oxygen super-saturation in plastic bags (styrofoam boxes), or water in hauling tanks during transportation could potentially have an adverse effect on their development during this critical period.



Dr. G. Adams (UCA)



Upon arrival at Warm Springs they were tempered and counted into our tank culture system. One of the twelve 24 inches diameter tanks is pictured below left. As the fish grew through the production season they were graded and moved to progressively larger 42 inches diameter tanks, some of which are pictured at right. Multiple layers of containment screens were used to prevent escapement. All waters were discharged into a containment pond adjacent to the building that is dedicated for use with holding of out of

basin species. Pond is treated with hydrated lime every other day to terminate any escapees.



Both filtered pond water and treated spring water sources were used for culture of alligator gar during the year. The constant temperature spring water was buffered to an alkalinity and hardness level of at least 100-110 ppm throughout the first six weeks of culture and slowly decreased to 60 ppm a week before stocking. Our buffering system utilizes fluidized high calcium content limestone which also helped maintain pH values between 7.0 and 8.0 through the year. Filtered pond water was utilized to provide warmer water beneficial for rapid growth of the gar. When necessary, spring and pond water were blended to provide temperature control throughout the production season. On May 4<sup>th</sup>, the boxed fry were tempered into 23 C degree water, oxygen levels were over 8.0 ppm and pH 7.3 ppm.

The fry were received in excellent condition. Of the 2,435 fry received only 25 mortalities occurred during transportation and handling. The remaining 2,410 fish were moved into the 24 inches diameter tanks.

Keeping with the protocol used last year, we used the same feeding rations as last year, using Otohime brand from Reed Mariculture, Inc. artificial feeds, and live brine shrimp during the early phases of alligator gar fry culture. Following stocking of the fry on May 4<sup>th</sup>, the free swimming fry were observed feeding on the floating Otohime B1 feed (250 – 360u) that same afternoon and evening. The table below provides a general schedule of when feeds were introduced as the gar grew. Days of culture is based on time at Warm Springs, not the age of the fry. Brine shrimp use was discontinued a few days after receipt of the fry as the gar transitioned to Otohime B1 very quickly. Otohime B2 will be used this year in 2013 as the next size feed.

FEED	Size	Days of Culture
<b>Brine Shrimp</b>	n/a	1 to 3
<b>Otohime B1</b>	250 – 360 u	1 to 10
<b>Otohime B2</b>	360 – 650 u	Not used 2012
<b>Otohime C1</b>	580 – 840 u	2 to 16

<b>Otohime C2</b>	840 – 1410 u	10 to 24
<b>Otohime EP1</b>	1.7 mm	16 to 35
<b>Silver Cup Steelhead</b>	1.5 mm	16 to 46
<b>Silver Cup Steelhead</b>	2.5 mm	20 to 61
<b>Silver Cup Steelhead</b>	3.5 mm	30 > 61
<b>Fathead minnows</b>		48 to 61

Managing water temperatures using blended water supplies required oversight in order to maximize growth but not so high as to setup conditions unfavorable for intensive culture of alligator gar. Temperatures ranged between 23 and 26 C degrees through most of the production cycle, but were kept at 21-22 C degree the first two week to reduce mortalities caused by predation. Lower temperatures can effectively reduce their high metabolism. Temperatures did climb past 28 C on one occasion and trigger an outbreak of columnaris (*Flexibacter columnaris*). Culture tanks were cleaned daily. Removal of excess feed was critical throughout the culture program. Of note, feeds in the 1.5 to 2.5 mm size range tend to sink rapidly out of reach of the surface feeding gar and can contribute to degraded water quality. Care was used to feed frequently, but in small amounts to reduce waste. Belt feeders are used to provide feed around the clock to keep them satiated (happy!) and to reduce predation.

As in 2011, the gar exhibits uniform growth with little cannibalism. Losses experienced or noted up through the first 20 days of culture were attributed to transportation, handling, cannibalism or fish picking at each other. These losses accounted for about 10 percent of observed mortalities during the whole program.

Under these intensive culture conditions and based on prior experience we were on guard for columnaris (*Flexibacter columnaris*) outbreaks. As needed, individual fish were examined by fish health biologists throughout the program to verify if bacterial infections were an issue when any mortalities were observed. This year we used oxytetracycline bath treatments at 35 ppm to treat infections when they occurred as well as short term bath treatments using diquat dibromide at 15 to 21 ppm for 1 hour treatments. Water temperatures were dropped below 25 C when fish were under treatment. Overall, mortalities were kept down this year by early recognition of infection, effective treatment protocols, dropping water temperatures and reducing handling. We limited handling to what was necessary in order to grade fish. This included reducing weight sampling as a means to avoid setting fish up for infections.



**Josh Simmons, WSNFH, caring for some of alligator gar reared this year at Warm Springs.**

Approximately two weeks prior to tagging and distributing alligator gar, fathead minnows were introduced into their diet to allow unlimited feeding opportunities for the gar. Commercial rations were reduced and eliminated to facilitate transition to a natural diet. Few gar mortalities were observed on a daily basis (5-6 fish/day) toward the end of the culture period (before we added fathead minnows), where the affected fish appear very anemic. We are pursuing the possibility of a nutritional deficiency linked to hematocrits less than 2% within the commercial diet, or possibly resulting from the extensive use of commercial rations through most of the program. Adjusting the frequency of feeding when using belt feeders can be reduced to alleviate this problem.

Overall, growth rates and survival were better in 2012 as compared to 2011. By July, survival averaged 70% compared to 26% at the same time in 2011. On July 3<sup>rd</sup>, 1,613 gar averaging 7.72 inches in length and weighing 146.0 lbs. were tagged with coded wire and distributed to the Hatchie River in TN.

An additional, 100 alligator gar were held back at Warm Springs in support of research on the species. Two transfers of six fish each have been made as of January, 2013 to Auburn University for studies related to the fish's physiology and genetics. An effort is being made to develop tests that will aid in determining sexes of immature alligator gar.

Carlos Echevarria participated in the SDAFS Technical Committee meeting at Biloxi, MS Jan. 26th through the 27th. Haile Macurdy gave a PowerPoint presentation on alligator gar culture at the Georgia AFS annual meeting in Macon, GA February 7<sup>th</sup>-9<sup>th</sup>.

For further information on Alligator gar, visit the website:  
<http://www.sdafs.org/alligar/index.html>



**Yearling and Sub adult alligator gar, WSNFH**



