



One Fish, Two Coasts – Same Big Problem

Declining populations of Southern Flounder are a challenge for coastal states across the south.

story by **SHANE BONNOT**

SOUTHERN FLOUNDER ARE IN TROUBLE.

Gradually, over the last three decades, populations have been in decline and the abundance of flounder across their entire geographic range are at near-record lows. Fishery managers from Texas to North Carolina are grappling with difficult management decisions as previous actions taken by the states have only manufactured temporary results. The common theme in the plight of the Southern Flounder is the adverse effects of warming ocean temperatures on environmental sex determination, survivability of larvae and subsequent recruitment into the estuaries.

The past five years are the top five warmest years in the ocean historically recorded with modern instruments, and the past 10 years are also the top 10 years on record (Cheng et al 2020). In the Gulf of Mexico, young Southern Flounder larvae thrive at 62-65 degrees F. Their temperature tolerance increases dramatically post metamorphosis ($\frac{1}{2}$ to $\frac{3}{4}$ inch length), but during the first 45-60 days of a flounder's life it is critical that water temperatures remain stable in the mid-60s for survivability and favorable sex determination at a 1:1 ratio. Luckenbach et al. 2009 reports that optimal water temperatures produce at most 50 percent female Southern Flounder, while warm and cold temperatures outside of the sweet spot will masculinize fish, up to rates of 94 percent male (Honeycutt et al. 2019).

WARM WINTERS AND THE RISK OF MASCULINIZATION | Because of sexually dimorphic growth, Southern Flounder fisheries are dependent upon larger females. Female Southern Flounder are sexually mature by two years of age (roughly 15-17 inches in length) and can live 7 to 8 years. Due to their relatively short life span, approximately five year-classes of female Southern Flounder contribute to the spawning biomass at a given time. Male flounder are even shorter-lived, topping out at just 3 years of age, and while some can reach 17 inches length, they rarely reach lengths in excess of 14 inches. The take-away message - repeated warm winter water temperatures not only decrease survivability of larvae; they also skew the sex ratios to a higher propensity of the shorter-lived males, most of which never enter the fishery.

Historically, the stock has been able to recover from back-to-back warm winters, but a third or fourth consecutive warm winter coupled with consistent harvest pressure has far-reaching implications on the fishery. Continue the pattern for decades and you will begin to hear the following terms to describe the state of the fishery: record lows, repeated recruitment failures, or over-fished and undergoing overfishing.

How do states manage a fishery that seems to have more questions than answers? What management options are being explored to combat the troubling trends in the Southern Flounder fishery?

GULF OF MEXICO | According to Texas Parks and Wildlife Department (TPWD) data, the spawning stock biomass has decreased by 73.2 percent from 1983-2018 and larvae recruitment levels have dropped off substantially, with 2016 and 2017 the two lowest years on record. The most recent regulation changes for Southern Flounder occurred in 2014, when the state moved to extend the November two-fish bag limit through Dec. 14.

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The Department is once again looking at possible management changes to increase overall stock abundance and is considering a seasonal closure, increasing the minimum size to 15 inches, and tightening up on the under-reporting of commercial landings. Two bright spots in the Texas fishery are the strong year class from 2018 recruitment and TPWD's increased focus on Southern Flounder stock enhancement. With two new hatchery buildings com-



photo by SHANE BONNOT

ing online, TPWD will soon be able to ramp up their Southern Flounder stock enhancement efforts, thanks in part to CCA Texas. The Louisiana Department of Wildlife and Fisheries has been concerned about Southern Flounder for a couple of years and has considered conducting a tagging study to help gather needed data. They are currently working on tag retention issues and developing a robust experimental design to gather data relevant to the fishery. Louisiana State University is developing a time series for the 34 estuaries in the Gulf and Atlantic to measure the scale and severity of Southern Flounder declines. As to why the declines in the population are occurring, they are also considering the hypotheses that winter water temperatures affect survivability of larvae and the masculinization of the stock.

Fishery managers in Alabama have been witnessing declining numbers for several years, attributing the declines to warmer winter water temperatures and drought effects on estuarine salinity levels. They are currently conducting a three-year research project, utilizing Sport Fish Restoration Funds, which attempts to gather information about Alabama's flounder population including abundance, habitat preference and potential fidelity for specific bay systems.

"A reduction in habitat coupled with the effects of increasing winter water temperature on flounder survival and growth in other research suggest Alabama has fewer years where conditions were favorable to Southern Flounder compared to the number of years where conditions were unfavorable," said Kevin Anson, with the Alabama Department of Conservation and Natural Resources/Marine Resources Division. "Recently, a stock assessment was performed by Dr. Sean Powers (Department of Marine

Sciences at the University of South Alabama and the Dauphin Island Sea Lab) and others, and the results indicate recruitment has fallen below what would be considered normal since 2009."

As a result of that stock assessment they made several management changes, including an increase in the minimum size, reducing the recreational bag limit to five fish, and closing November to any harvest.

Alabama is also attempting to boost stock levels by establishing a stock enhancement program for Southern Flounder. CCA Alabama provided a donation to the Marine Resources Division to set up pre- and post-metamorphosis tank systems. The state has established a production goal of 60,000 one-inch

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fish to supplement the estimated 400,000 6-inch wild recruits that are required to maintain healthy population levels in Alabama's bay systems.

ATLANTIC COAST | The 2019 stock assessment of Southern Flounder in the South Atlantic indicated that the stock has been overfished for several decades and is currently undergoing overfishing.

North Carolina has established the following goals for rebuilding Southern Flounder stocks: end overfishing in two years and end overfished determination in 10 years. For 2019 and 2020, they aimed for a 62 and 72 percent reduction in total removals, respectively. As a result of these goals, the state closed the recreational and commercial seasons (the commercial season was reopened for an abbreviated period), adjusted commercial seasons for 2020, and established a seven-week recreational season beginning August 16, 2020.

The South Carolina Department of Natural Resources (SCDNR) also confirms that Southern Flounder are depleted and have been overfished for the past 30 years. Previous actions and current South Carolina flounder fishery regulations appear to have had a minimal long-term impact on improving or maintaining Southern Flounder stocks and, per SCDNR, any future meaningful reductions in flounder landings, will need to come from the recreational fishery. The state is in the process of scoping potential regulatory changes and considering the following management tools - changes in minimum size, implementing a slot limit, decreasing bag limits, decreasing boat limits and implementing fishing seasons. The SCDNR scoping survey can be seen at: bit.ly/floundersurvey.



photo by SHANE BONNOT

NEXT STEPS | There is no panacea within human control that will fix all the problems with Southern Flounder abundance. The best that fishery managers can do is to capitalize on years in which we have cold winters by adopting management strategies that increase spawning biomass and protect spawning aggregates at the most vulnerable and critical point of their life stage. Combining those efforts with additional management tools such as stock enhancement, angler engagement/education and fisheries research is a logical path forward as we continue to unpack the complexities within this struggling fishery. We may not be in control of what ails this fishery, but that is not an excuse for us to sit idly by and watch its demise. We can't fix everything, but we can do something, and flounder are something worth saving. 🐟

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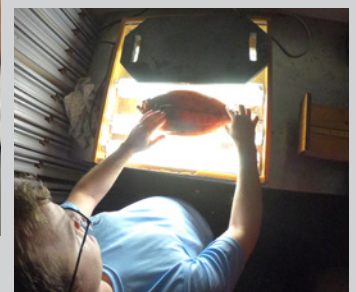
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Shane Bonnot is the advocacy director for CCA Texas, working closely with CCA committees, members and staff on interests and policies that are vital to the long-term sustainability of coastal marine resources. After receiving his Master of Science degree in Mariculture from Texas A&M University – Corpus Christi in 2003, he worked for the Virginia Institute of Marine Science as the oyster hatchery manager. In 2006 he moved back to Texas to work for Texas Parks and Wildlife – Coastal Fisheries Division in the stock enhancement program at Sea Center Texas, spending 5 years as hatchery biologist and another 5 years as hatchery manager.



photos by KASSIE GEORGE PHOTOGRAPHY



Anglers Step Up for Southern Flounder Enhancement

With Southern Flounder stocks under stress across most of their range, CCA chapters are stepping up support for hatchery programs to augment flatfish populations. Two standout examples can be found in Texas and Alabama.

As two new buildings come online, Texas Parks and Wildlife will soon ramp up its southern flounder stock enhancement efforts. The climate-controlled flounder buildings at the CCA Marine Development Center in Flour Bluff and Sea Center Texas in Lake Jackson should allow hatchery staff to expand production into months that were previously impractical due to constraints in infrastructure and other fish production priorities. The building at Sea Center Texas was made possible in large part from a generous donation of \$325,000 by CCA Texas members and industry partners, including Shell Oil Company.

“CCA Texas continues to be a proud partner of the stock enhancement program,” said Robby Byers, Executive Director of CCA Texas. “Our hope is that with increased production capabilities stock enhancement can aid in the recovery of the flounder fishery.”

All told, CCA Texas has donated more than \$1 million to support flounder research and stock enhancement projects.

CCA Alabama is also providing significant financial support to ramp up the state's hatchery capabilities for flounder. Members there are funding almost \$170,000 for everything from tanks to belt feeders to chilling units and lights and even for the overhaul of electrical and plumbing systems in the hatchery facilities.

In January, the southern flounder hatchery at the Alabama Marine Resources Division, Claude Peteet Mariculture Center had its first successful flounder spawn, and plans call for the 30,000 1.5-inch fingerlings to be released sometime in March 2020.