

An investigator uses forceps to hold a bass fin sample while cutting a piece for DNA testing.



DON P. BROWN

Passing the Genetic Test

Bass in This School Must Make the Grade



EDITOR'S NOTE: This is the third article in a series detailing the efforts of the Oklahoma Department of Wildlife Conservation to produce trophy largemouth bass in Oklahoma's waters.

By Don P. Brown, Information and Education Specialist

University of Oklahoma undergraduate Katie Shauberger gripped a pipette tool in one hand, and a bottle of ethanol in the other. On the laboratory counter in front of her were colorful plastic boxlike racks holding hundreds of clear vials with lids popped open.

Carefully and methodically, Shauberger drew ethanol into the pipette and transferred 600 microliters into each of the open vials. It was just another of the 15 detailed steps that are required to extract DNA from a small piece clipped from the tail fin of a largemouth bass.

Such genetic testing is a cornerstone of the Wildlife Department's ongoing effort to produce trophy bass for anglers in Oklahoma by producing and stocking Florida largemouth bass (FLMB). And the recipe for making monster bass calls for a special ingredient: Florida bass genes.

"Unfortunately, Florida and northern largemouth bass cannot be distinguished visually. So, we must rely on genetic testing to



Investigators in the University of Oklahoma's biology department work in the lab to perform genetic testing on bass fin clips from the Durant State Fish Hatchery.

distinguish between the two,” said Cliff Sager, senior biologist for the Wildlife Department’s South Central Region. “The ODWC contracts with OU to conduct genetic testing of our hatchery brood stock and our wild populations. This testing is important to maintain the genetic purity of our hatchery brood stock as well as monitor the success of our stockings into wild populations.”

IT’S CSI FOR FLMB

For the past six years, OU Biology Department professor Dave Hambricht has served as principle investigator for the Wildlife Department’s FLMB genetic testing program. Research associate Rich Zamor and several biology under-

grads and graduate students have been involved in testing the fin clip samples the Department collects each year at the Durant State Fish Hatchery and lakes throughout the state.

This year, about 350 fin clips were collected from potential FLMB brood fish. The OU investigators are tasked with extracting the genetic material, or DNA, from those fin clips and sequencing the genes in each sample so the Department can be assured that pure Florida bass are being used to produce fingerlings for stocking.

“It’s very similar to a crime scene investigation. It really is like a fish crime lab,” Zamor said. “Without this lab work, there’s no way to know for sure whether we have Florida bass.”

Here’s a brief overview of the DNA testing process that each fin sample goes through. Fin clips are sent to the OU lab, and investigators take a sample from each clip for DNA testing and place it into a separate labeled vial with a lysis buffer and proteinase K. The remaining portion of the fin is saved in its original vial so that a backup sample will be available if needed.

The test vials are placed in a hot-water bath for about two hours. Then they are removed from the water, and ammonium acetate is mixed into the vials before they go into a freezer for 15 minutes. Next, the vials are loaded into a centrifuge, where they spin for 10 minutes. Each vial goes through several more spin sessions in the centrifuge to gradually filter out all undesired elements except the fish’s DNA.

Finally, investigators have created a clear pellet of fish DNA. All of the other biological material has been consumed during the process. The DNA then undergoes a process called PCR, in which the amount of DNA is amplified so that it may be sequenced. The sequencing results of each sample are



University of Oklahoma biology graduate student Jessica Beyer looks on as biology undergraduate Katie Shauberger uses a pipette to add ethanol to a vial.

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OU research associate Rich Zamor collects this year's fin clip samples from Wildlife Department senior biologist Kurt Kuklinkski at the Oklahoma Fisheries Research Laboratory in Norman, the first step in the DNA analysis that is a cornerstone of the Department's Florida bass stocking program.

read to determine whether the DNA is from a Florida bass, a northern bass, or a combination of the two.

Those results are what Durant hatchery personnel will use to ensure the Florida bass brood stock to be used in this year's stocking program are pure Florida bass.

"Florida largemouth bass and our native, northern largemouth readily cross and produce hybrids," Sager explained. "The first-generation cross maintains the growth potential found in pure Florida bass."

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OU research associate Rich Zamor places vials containing fin clip samples into a centrifuge.

"Unfortunately, continued back-crossing with northern bass, which are generally much more abundant in our lakes, results in a 'watering down' of the Florida genetics and the growth potential. That is why continued stocking efforts are needed at most of our lakes – to maintain the inflow of pure Florida bass into the population.

"That is also why it is so important to maintain the purity within our hatchery's brood stock. We don't want to begin the stocking process with fish that are hybrids and already partially 'watered down' genetically," Sager said.

BASS FROM THE PAST

Former Fisheries Division Assistant Chief Gene Gilliland said the goal of the Wildlife Department's Florida bass stocking program is to give anglers the chance to catch more trophy fish – meaning lunkers that tip the scale at 8 pounds or more. And decades of research have shown that Florida bass can grow bigger faster with the right conditions.

"The native northern largemouth bass very seldom grows much larger than about 8 pounds," Gilliland said. But it does happen occasionally. Back in June 1941, Oklahoma City angler Herbert Rodgers hauled an 11-pound, 15-ounce lunker out of the Kiamichi River. That native bass held the state record for almost 42 years. And Walt Fortner's 1988 state record, a 12.38-pounder from a Stephens County farm pond, also proved to be an extremely old native bass; that lunker had celebrated 14 birthdays. But when Florida bass genetics are in the mix, the chances for growing monster bass that weigh more than 8 pounds increase greatly.



An old newspaper photo shows Oklahoma's longtime record largemouth bass that was caught in the Kiamichi River by Herbert Rodgers in June 1941. The bass weighed 11 pounds, 15 ounces, and the record stood for nearly 42 years before stocking of Florida bass began in Oklahoma.

"The Oklahoma state record largemouth bass was caught back in the 1940s, and that record stood for decades until it was broken by a fish caught out of Lake Lawtonka that turned out to be a Florida bass," Gilliland said. That 1983 catch by James Porter weighed 12 pounds, 1.6 ounces, and tests indicated Porter's bass was 11 years old and the offspring of a Florida bass.

With just one exception, every state record largemouth since 1983 has carried some percentage of Florida genetics.



Oklahoma's first state record largemouth bass confirmed to contain Florida genes was this 12 pound, 1.6 ounce lunker that James Porter caught in April 1983 at Lake Lawtonka.



OU student Katie Shauberger processes some of the largemouth bass fin clippings submitted by the Wildlife Department.

“In every case, these fish have gotten bigger but not necessarily older,” he said of the state’s succession of record largemouths during the past 25 years. And that’s why the Wildlife Department wants to be sure the brooding fish at the hatchery are 100 percent Florida bass.



Rich Zamor and Katie Shauberger work on another tray of vials for the Wildlife Department’s Florida bass stocking program.



Rich Zamor checks the results of previous DNA analysis conducted for the Durant Hatchery.

HISTORY IN THE MAKING

OU biology graduate student Jessica Beyer is in her second year as part of the Florida bass investigative team in the lab. Her pride was apparent as she held a sample vial containing a clip from the current state record largemouth bass, caught at Cedar Lake in March 2013. “I was the one who got to cut the fin clip. It was very exciting!”

Beyer understands that the work she and the other OU investigators are doing is part of the procedure that will likely produce the next Oklahoma state record bass. She’s helping to shape history.

“I really enjoy this process. And I also really like contributing to these concrete decisions that are being made about the Oklahoma lakes, about the fish in our lakes. We are providing evidence that people are using to make decisions about which fish are going to be added to these lakes, and I think that’s really fantastic,” she said.

Beyer said she spent a great deal of time outdoors with her family while growing up in Wisconsin. “I went out fishing a lot. I spent a lot of time around lakes and rivers,” she said. “So, that definitely led me to pursue this career.”

Beyer said three different markers are used to provide information about the fish’s genetics. “When we get the results, we can tell whether it’s a Florida strain, an Oklahoma strain, or a hybrid between the two. It gives us a lot of information that can then be used to make decisions.”

OU investigator Zamor was equally enthusiastic about the potential trophy bass he was helping to create.

“Everybody wants to catch that big fish, and I think using the Florida largemouth bass is the way to do that. The Florida fish are well-known for adding to the fishing experience. They are bigger, and they fight harder,” Zamor said.

“I think this is a project we should be doing. But that’s because one of the main goals of the Department is to improve recreational fishing, and this is a great way to do that,” he said.

“The bigger the fish, the better the fish story.”

NEXT ISSUE: Which potential brooding bass will make the cut? Armed with the genetic “report card,” Department hatchery personnel must now separate the winners from the losers in the race to produce the biggest bass possible. Don’t miss the next part of our series, “Making Monsters!” 🌿