

Largemouth bass vulnerability to being caught by anglers a heritable trait

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In an experiment spanning over 20 years, researchers at the University of Illinois have found that vulnerability to being caught by anglers is a heritable trait in largemouth bass.

The study began in 1975 with the resident population of [bass](#) in Ridge Lake, an experimental study lake in Fox Ridge State Park in Charleston. The fishing was controlled. For example, anglers had to reserve times, and every [fish](#) that was caught was put into a live well on the boat. The fish were measured and tagged to keep track of how many times each fish had been caught. All fish were then released.

"We kept track over four years of all of the angling that went on, and we have a total record - there were thousands of captures," said David Philipp, [ecology](#) and conservation researcher at U of I. "Many fish were caught more than once. One fish was caught three times in the first two days, and another was caught 16 times in one year."

After four years, the pond was drained, and more than 1,700 fish were collected. "Interestingly, about 200 of those fish had never been caught, even though they had been in the lake the entire four years," Philipp said.

Males and females from the group that had never been caught were designated Low Vulnerability (LV) parents. To produce a line of LV offspring, these parents were allowed to spawn with each other in university research ponds. Similarly, males and females that had been

caught four or more times in the study were designated High Vulnerability (HV) parents that were spawned in different ponds to produce a line of HV offspring. The two lines were then marked and raised in common ponds until they were big enough to be fished.

"Controlled fishing experiments clearly showed that the HV offspring were more vulnerable to angling than the LV offspring," said Philipp.

This selection process was repeated for several generations over the course of the 20 year experiment.

"As we had predicted, vulnerability was a heritable trait," he said. Philipp went on to explain that with each generation, the difference between lines in angling vulnerability grew even larger.

"Most of the selection is occurring on the LV fish - that is, for the most part, the process is making that line of fish less vulnerable to angling. We actually saw only a small increase in angling vulnerability in the HV line," Philipp said.

Male bass are the sole caregiver for the [offspring](#). Females lay eggs and leave. The male guards the nest against brood predators for about three to four days before the eggs hatch and another eight to 10 days after they hatch, before they become free-swimming. Even after the baby bass start to swim, the dads stay with them for another three weeks while they feed and grow, protecting them from predators.

Philipp explained that the experiment sped up what's actually happening in nature. "In the wild, the more vulnerable fish are being preferentially harvested, and as a result the bass population is being directionally selected to become less vulnerable. We selected over three generations, but in the wild the selection is occurring in every generation.

"We've known for 50 years that commercial fishing exerts selection on wild populations," he said. "We take the biggest fish, and that has changed life histories and growth patterns in many populations of commercially harvested species. Because there is no commercial fishing for bass, we were assessing the evolutionary impacts of recreational fishing."

Philipp explained that the perception among anglers is that catch-and-release has no negative impact on the population. During the spawning season, however, if bass are angled and held off of their nests for more than a few minutes, when they are returned to the lake, it's too late; other fish have found the nest and are quickly eating the babies.

Philipp recommends that to preserve bass populations across North America, management agencies need to protect the nesting males during the spawning season. "There should be no harvesting bass during the reproductive period. That makes sense for all wildlife populations. You don't remove the adults during reproduction.

"One of the big issues for concern is the explosion of tournaments. Lots of bass tournaments are held during the springtime because there are lots of big fish available. In tournaments you put fish into live wells, and yes, they're released, but they could be held for up to 8 hours first. They're brought back to the dock, miles from their nest. So, basically, if a [fish](#) is caught in a tournament and brought into the boat and put into a live well, his nest is destroyed."

Philipp recommended that if fishing tournaments were held during the spawning season, then regulations should require that there be immediate catch-and-release, eliminating the use of tournament weigh-ins.

Philipp urges management agencies to go even further and suggests that a portion of each lake could be set aside as a bass spawning sanctuary,

where all fishing would be prohibited until after bass reproduction is complete. In the rest of the lake, mandatory catch-and-release regulations could be put into place during that same reproductive period. In Illinois, the bass reproduction period is from about April 1 through June 15. Philipp said that in that way, anglers could help protect the long-term future of the resource without completely restricting fishing.

"The potential for angling to have long-term evolutionary impacts on bass populations is real. If we truly want to protect this valuable resource into the future, then we need to understand that and adjust our management strategies," Philipp said.

More information: Selection for Vulnerability to Angling in Largemouth Bass was published in *Transactions of the American Fisheries Society* 138:189-199, 2009.

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