

High levels of PFAS affect immune, liver functions in Cape Fear River striped bass

February 7 2020, by Scott Belcher



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Researchers from North Carolina State University have found elevated levels of 11 per- and polyfluoroalkyl (PFAS) chemicals in the blood of Cape Fear River striped bass. Two of those compounds—perfluorooctane sulfonate (PFOS) and Nafion byproduct 2—are associated with altered immune and liver functions in those fish.

Scott Belcher, associate professor of biology and corresponding author of a paper describing the research, led a team that included NC State colleagues Detlef Knappe, Ben Reading and postdoctoral researcher Theresa Guillette as well as partners from the North Carolina Wildlife Commission and the U.S. Environmental Protection Agency (EPA).

The team isolated serum from the blood of 58 wild caught Cape Fear River striped [bass](#) ranging in age from 2 to 7 years old. In collaboration with EPA researchers Mark Strynar and James McCord, they determined the concentrations of 23 different PFAS chemicals present in the serum using a combination of liquid chromatography and [high-resolution mass spectrometry](#).

"Testing blood levels gives you an idea of the 'body burden' of these particular chemicals," Belcher says. "The levels of these chemicals in the water were measured in parts per trillion, but in the serum of the [fish](#) levels are higher and in parts per billion, demonstrating that they have clearly bioaccumulated in these fish."

The team then compared the blood serum samples from the wild caught fish to those from a reference population of 29 striped bass raised in an aquaculture facility fed by ground water. "The serum levels of chemicals in the wild caught bass were 40% higher, on average, than the background levels found in this reference population," Belcher says.

In comparison to the levels of PFAS found in Cape Fear River water, elevated levels of PFOS and Nafion byproduct 2 were found in 100% and 78% of the wild bass samples, respectively. The [serum](#) concentrations of these compounds were associated with biomarkers of altered liver enzyme activity and immune function in those fish.

"These PFAS levels are some of the highest recorded in fish," Belcher says, "but one of the most unusual findings here is that smaller or

younger fish had the highest levels of these compounds. This points to the fact that PFAS chemicals are very different from other persistent chemicals, like mercury or PCBs. They have unique and very different [chemical](#) properties that cause them to bioaccumulate differently, and we're really just beginning to understand why and how they do what they do."

More information: T.C. Guillette et al, Elevated levels of per- and polyfluoroalkyl substances in Cape Fear River Striped Bass (*Morone saxatilis*) are associated with biomarkers of altered immune and liver function, *Environment International* (2020). [DOI: 10.1016/j.envint.2019.105358](#)

Provided by North Carolina State University

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