

## Intersex fish: Causes may be many

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USGS Scientist Vicki Blazer gets ready to dissect a bass. Scientists are trying to figure out why male fish are showing up with female characteristics. (WTOP Photo/Lainie Frost)

[Neal Augenstein](#), WTOP Radio

KEARNEYSVILLE, W. Va. -- To the naked eye, the smallmouth bass lying before biologist Vicki Blazer looks normal and healthy. If it had not been caught in the Shenandoah River and anesthetized here at the U.S. Geological Survey's fish lab, it would most likely have lived its full lifespan of 18 years.

You wouldn't know from looking at it, but the brown male smallmouth bass also has the sex characteristics of a female bass -- and represents a microcosm of how unknown contaminants in waterways are altering the physiology of creatures that live in them.

"What we're seeing in the smallmouth bass is individual oocytes or immature eggs in the testes of the male fish," says Blazer, a fisheries research biologist who discovered the phenomenon in 2003.

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Blazer came across the unusual fish while trying to figure out why 80 percent of the Shenandoah's smallmouth bass and sunfish had died.

"The intersex is important and has attracted a lot of attention, but to me it's just an indicator that there's something wrong," says Blazer.

But exactly what that "something" is remains unclear, although Blazer and other researchers believe the intersex condition is caused by endocrine-disrupting

compounds, including natural and synthetic estrogens. Those estrogens are used in birth control pills or in hormone replacement therapy.

"We tend to think of chemical contamination more commonly downstream of a lot of industry, downstream of really high human population. But that's not what these areas are. There's a lot of agriculture."

Blazer says despite the intersex condition, male fish continue to produce sperm and reproduce.

"In the Shenandoah we've been finding 80 to 100 percent of the males are intersex. In the South Branch (of the Potomac), it's more between 30 to 60 percent."

Dressed in a green polo shirt with the USGS logo and sneakers, Blazer dons rubber gloves and injects a syringe into the bass, to begin a necropsy.

As she gently probes and separates the organs inside the bass, Blazer looks for evidence of how the environment affects fish living in the rivers.

"This is the liver, and you see all those real tiny white spots? Those are all parasites. In some of these fish we're finding up to 60 percent of the liver is being replaced by parasites."

"We don't know for sure what it means, but I can't help but think it's certainly not good for the fish when a huge amount of liver, as well as spleen and kidney are replaced by parasites."

Researchers in the lab remove most of the fish organs, for study under the microscope. Pieces of gill, liver, spleen, anterior kidney and any lesions are stored in a white plastic bottle, preserved in a fluid that prevents the tissue from decomposing.

Eventually, cross sections of the tissue, only five microns thick, are mounted on slides, for Blazer's observation under the microscope. Under high magnification that she then brings up on her computer screen, Blazer points to evidence of the intersex condition.

"On the right-hand side, we have a cut of a normal testes. All we see are tubules filled with sperm. On the left-hand side, we see some of the tubules filled with sperm, but also see these structures, which are the individual immature eggs or oocytes."

Blazer believes the smallmouth bass' reproduction process may play a role in causing intersex.

"The males make a nest, and the females lay the eggs in the nest. The eggs are in the sediment for a while and the males actually take care of the nest, so the eggs are actually in the sediment," says Blazer.

"It could be that a lot of these chemicals are ending up in the sediment, so the fish are being exposed during the egg stage or when they're very young. And that's the most sensitive time that's been shown in the lab for these chemicals to cause intersex."

Blazer doesn't believe scientists will identify a singular cause of the intersex condition.

"We don't think we'll find a specific chemical, or even one or two specific chemicals. We really think that a lot of it is the complex mixtures, and that they won't be from one source. They're going to be from wastewater treatment. They're going to be from agriculture. They're going to be from industry."

Blazer says it's likely the marvels of science that make life better on land are contributing to the area's troubled waters.

"These are the 'emerging contaminants.' The things we didn't necessarily think were going to be a problem -- birth control pills, pharmaceuticals, some of the newer herbicides, pesticides. Now we're recognizing these *can* be potential problems."

*Ashlee Monroe contributed to this article.*

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