



The next time you drive across one of the hundreds of streams in the Etowah River watershed there will not be a sign that says, "Caution: Fish Crossing," but perhaps there should be. It would be a great way to call attention to the fact that when we build a road across a stream, in many cases the fish who live downstream can no longer swim under the road to go upstream. The problem is the new culvert, which is installed to channel the streams' water beneath the road. Culverts make survival hard for many of the fish. But fortunately, there are plans to develop better methods of building stream crossings which will correct the problem.

The intersection of roads and streams in the Etowah is an issue that University of Georgia environmental engineering student Heidi Millington is researching for the Etowah Habitat Conservation Plan (www.etowahhcp.org). She has been conducting field research to identify possible improvements for stream crossings and developing new design criteria to ensure fish can swim freely, unimpeded by the construction.

"My research is focusing on how roads, as currently designed and built, act as barriers to fish swimming upstream," said Millington. "There are many different reasons culverts can pose a problem to fish. Sometimes it is because the culvert is too small for the amount of water flowing through it. The water rushes through the culvert very fast and at these high velocities, fish that try to swim upstream work so hard to swim through the water that they often become too fatigued and simply cannot make it through the culvert.

"Other culverts may be sized correctly, but because there is a drop from the outlet of the culvert to the water surface below, the culvert acts as small dam that the fish cannot swim over. Fish in the Etowah are quite small and they aren't strong swimmers, so they can't jump up into culvert openings when they're swimming upstream," Millington said.

To put it simply, the culverts just are not "natural" enough to fool the fish into thinking they are part of the stream.

The main problem is that culverts act as barriers that separate populations of fish, making them more prone to localized extinction. Some of the Etowah fish species need to migrate upstream to spawn, or make short annual migrations for other reasons. Their migrations are not as dramatic as they are for salmon, but still, very important.

"In the Etowah, there are endangered and threatened fish like the Cherokee darter, and we're trying to make sure their habitat is not fragmented, so they don't become extinct," says Millington.

What then is the answer to the riddle: "How does the fish cross the road?" Research indicates that it is better if the road goes over the fish. The ideal solution is to build bridges instead of culverts.

"A bridge has much less of a negative impact on the stream than a standard culvert. But people often use culverts instead because bridges are more expensive. Bridges require much more stringent engineering requirements because they must be safe for humans. We're trying to make these crossing safe for fish as well," says Millington.

Road crossings can be bridges, fords or cul-



A culvert high above the water's surface makes it impossible for fish to swim upstream.

verts, but when it comes to protecting our fish, some designs are better than others, she said.

Culverts can be traditional boxes or pipes, bottomless or embedded in the stream gravel. Bridges and bottomless culverts are preferred where funding is available. Embedded box or pipe culverts should be used where free span bridges and bottomless culverts are too expensive. Larger culverts are generally better as the velocities are lower. All culverts should be sized to be able to handle the 100-year flood.

For more information on stream crossings in the Etowah River watershed, contact Curt Gervich, outreach coordinator for the Etowah Regional Aquatic Habitat Conservation Plan at 678/801-4013 or email curt@etowahhcp.org.

For more information about the Conservancy's work in the Etowah watershed, visit www.nature.org/georgia. If you would like to be added to the Conservancy's email updates list for the Etowah please call 770/704-7280.



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