Drought Length Influences Survival of Fish in Stream Pools

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University of Arkansas researchers have found that not all pools of water are equal from year to year when it comes to housing fish species during dry spells - a finding that becomes increasingly important during unusual and prolonged drought conditions.

Dan Magoulick, associate professor of biological sciences in the J. William Fulbright College of Arts and Sciences, and graduate student Matt P. Dekar published their findings in the journal *Ecology of Freshwater Fish*.

"Drying in one year is not necessarily the same as drying in another year," Magoulick said. "The dynamics of these systems where you have regular drying has become increasingly important to understand because of global climate change."

Streams that dry up regularly in the summer turn out to be fairly rare and therefore not well studied. There are some ecosystems in Australia, South America and Africa that have such streams, and in the United States there is the Ozark and Boston Mountains region of the central United States, which is where Magoulick and Dekar performed this study.

The researchers examined isolated pools on Haw, Hurricane and Indian creeks in the Boston Mountains ecoregion in Arkansas. They captured and counted fish in 17 pools on the three creeks in 2002, and in 22 pools in 2003. They used statistics to calculate the number of different species

in a given pool, the total number of fish in a given pool and the density of central stonerollers and creek chub, two keystone fish species. They also measured the area, the depth, the canopy or openness and the substrate composition of the ground beneath the stream.

They found that the number and type of fish found in a given pool varied according to physical factors: However, the importance of these factors varied between years.

"We found that certain abiotic factors, such as pool depth and total volume, are important to the fish and the species diversity and density in the system," Magoulick said. "However, what happens one year isn't necessarily going to happen the next year."

In 2002, the researchers found more fish in pools in more open areas with a greater variety of stream beds, and they found fewer fish in larger, deeper pools. However, in 2003, when streams dried up sooner, the diversity of fish in a given pool was higher in larger pools, but there were fewer fish in deeper pools and pools with more substrate diversity.

"There are a lot of subtle and complex interactions when a stream dries," Magoulick said. The geology and hydrology of the stream plus the different types of species that live in it all affect the system.

The next step will be for the researchers to assemble models of the stream drying and population statistics to see if they can predict what will happen to the fish populations under different conditions - particularly changes in climate involving precipitation or temperature.

Source: University of Arkansas, Fayetteville