

Study shows salamander survival rates depend on drought, climate change

October 10 2012



Credit: Kristen Cecala

On the heels of one the worst U.S. droughts in more than half a century, a new study raises questions about the future of one of the most integral members of stream ecosystems throughout the Southeast – the salamander.

Biologists at Wake Forest University and Davidson College conducted five years of research that shows how [salamanders](#) and other aquatic animals react to [drought](#), shedding light on the impact of [climate change](#) and urbanization on salamander populations. Their findings appear in the scientific journal *Herpetologica*.

Unfortunately, the heat is on for the amiable [amphibian](#).

Researchers studied the Northern Dusky Salamander at 17 sites in the Charlotte-Mecklenburg County, N.C., area from 2005 to 2009, which included 12 months of exceptional [drought conditions](#) (Sept. 2007 to Sept. 2008).

While adult salamanders had 90 percent [survival rates](#) from one month to the next, their larvae, which must be submerged in water for development and metamorphosis, disappeared from an average 30 percent of sites during the drought year. When [water levels](#) in the areas observed reached a 110-year low, adult salamanders migrated from streambeds to underground or high-humidity refuges at twice the rate seen during non-drought conditions.

"With climate change models predicting that droughts will become longer in duration and more severe, having knowledge of animals' response strategies to extremely dry conditions is critical to their future survival," said Steven Price, who was a Wake Forest graduate student at the time of the study and now is an assistant professor of stream and riparian ecology at the University of Kentucky.

"During the drought, adult salamanders demonstrated a 90 percent survival rate from one month to the next. It sounds pretty high, but at this rate, less than one percent would survive a four-year drought suggested under certain [climate change scenarios](#)," Price warned.

Salamanders play an important role in maintaining balance in forest ecosystems. They feast on stream invertebrates that help regulate the nutrients derived from leaf litter in waterways. As prey for birds and mammals, their place in the food chain remains an important one.

Robert Browne, the Wake Forest biology professor who oversaw the research, said solutions such as wider riparian zones – the biologically distinctive land that borders waterways such as rivers, creeks and streams

– could help protect salamander species long-term.

"The Charlotte metro area expanded like crazy during the time of our research, and development, like drought, has a major impact on the fragmentation of habitats," said Browne. "Protecting and widening the riparian buffer zones would not only provide them shelter during dry conditions, it would also prevent erosion and absorb silt, which negatively impacts the survival of stream-dwelling animals."

Thus, drought may interact with local land-uses resulting in a particularly bleak outlook for salamanders and other semi-aquatic organisms.

More information: Paper online: www.hljournals.org/doi/full/10.1002/OLOGICA-D-11-00084.1

Provided by Wake Forest University

Citation: Study shows salamander survival rates depend on drought, climate change (2012, October 10) retrieved 25 April 2024 from <https://phys.org/news/2012-10-salamander-survival-drought-climate.html>

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