Where the wild things are

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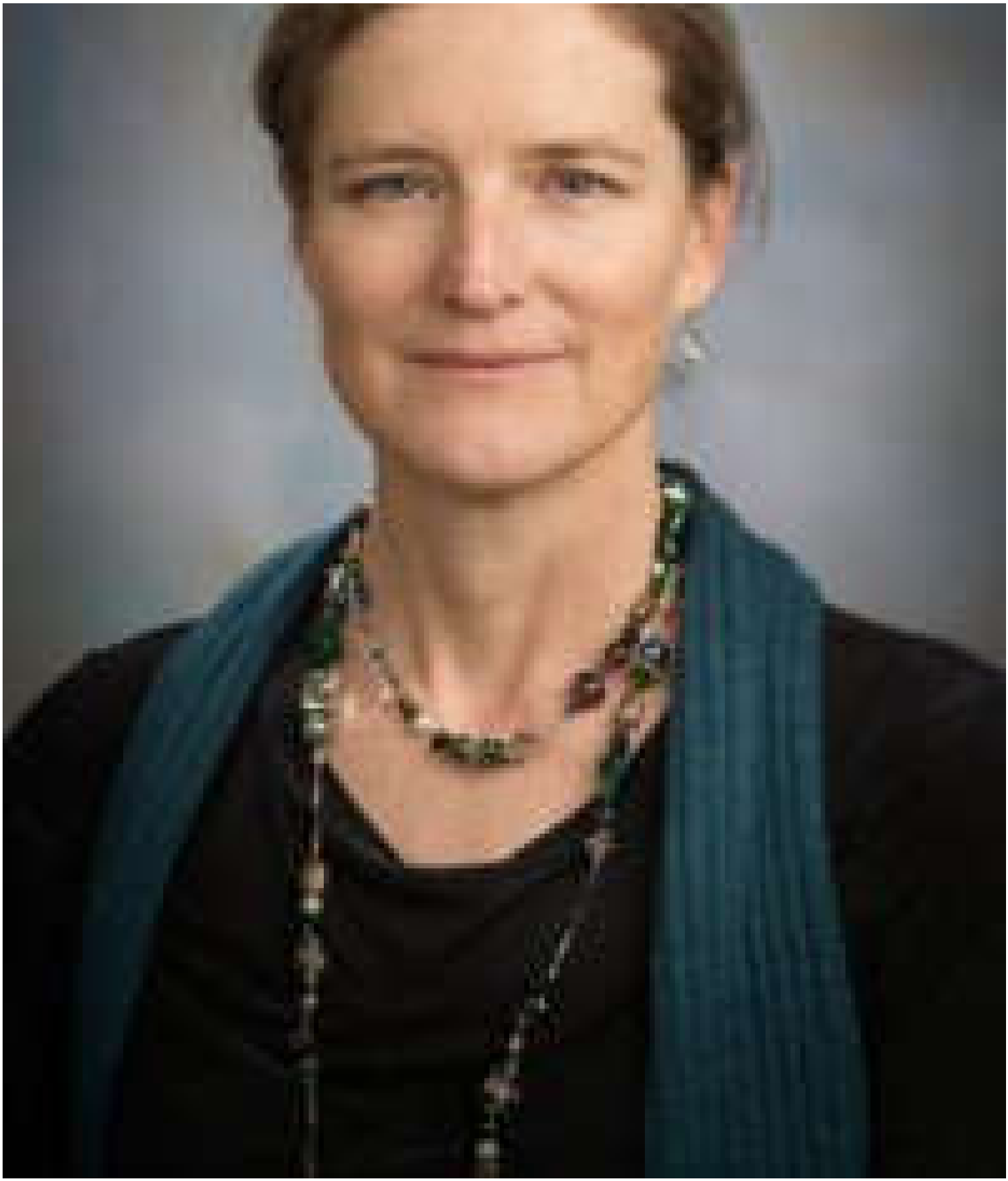
By Jason Kosovski

As climate change and biological invasions continue to impact global biodiversity, scientists at Colorado State University and the University of Colorado–Boulder have recently published work that suggests that the way organisms move to new areas, or range expansion, can be impacted directly by evolutionary changes. Their work, published in *Nature Communications*, challenges the traditional theory that only demographics such as birth, death and migration determine range expansions. The researchers' findings add evolutionary processes, which occur during the course of a range expansion, as determining factors.



Ruth Hufbauer, professor of Bioagricultural Sciences and Pest Management

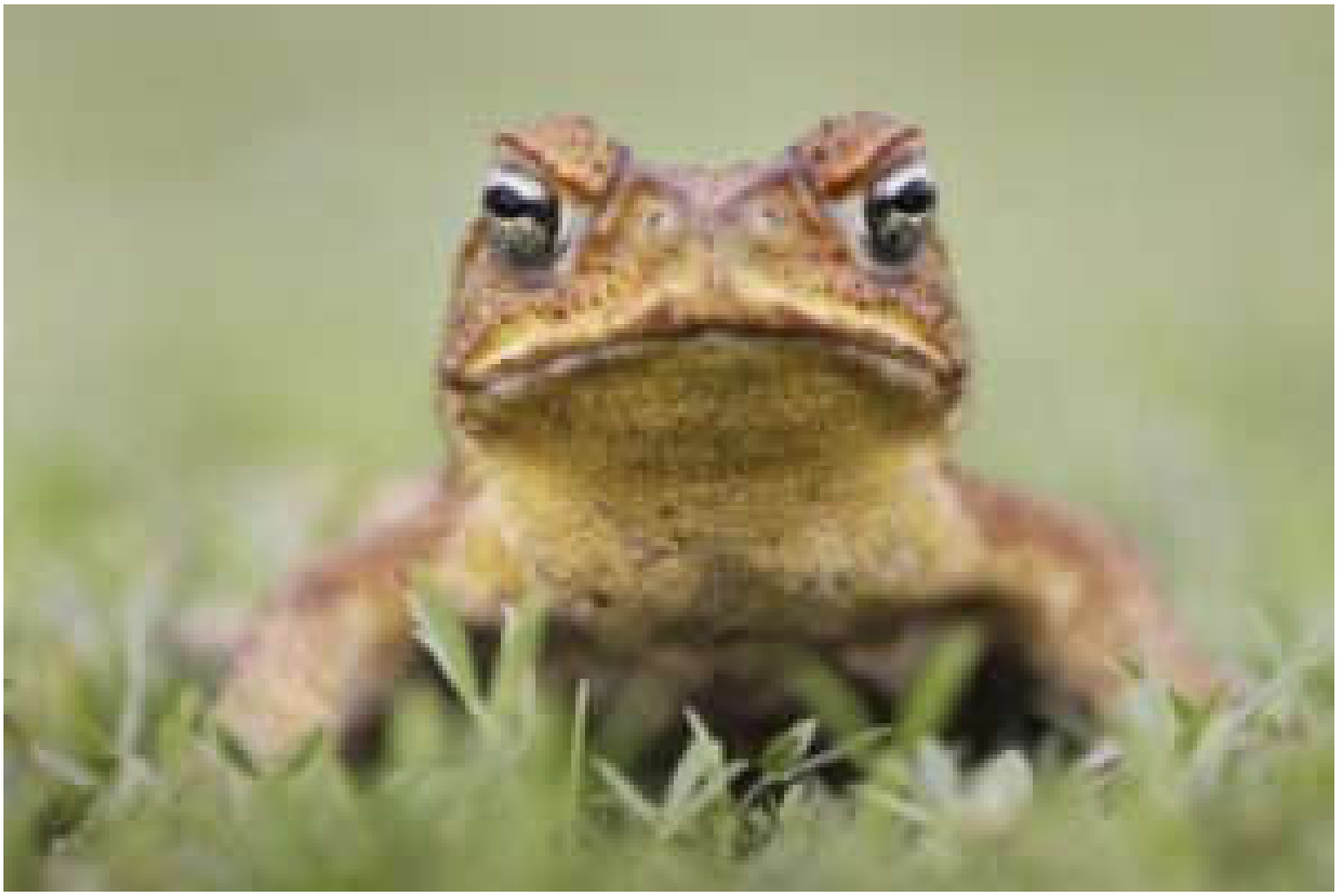
Evolution is not easy to measure

Evolution is not easy to measure in a field setting, which is why Ruth Hufbauer, a professor in CSU's Department of Bioagricultural Sciences and Pest Management, and her colleagues Christopher Weiss-Lehman

and Brett Melbourne, from CU's Department of Ecology and Evolutionary Biology, used flour beetles (*Tribolium castaneum*) to observe evolutionary processes in controlled environments.

The researchers created two different kinds of range expansions – structured, where they allowed beetles to expand across a landscape generation to generation under normal conditions, and shuffled, where each individual beetle was counted in a landscape each generation and then mixed together and put back. By putting the same number of individuals at a given location in a landscape as had originally been there, the researchers were able to reproduce the demographics of the landscape as it was prior to shuffling, while mixing up any genetic structure that have developed. The shuffled beetles moved across the landscape more slowly and more predictably. In contrast, normally structured populations moved faster on average, but with more variation in movement, making them less predictable. After eight generations of range expansion, three distinct populations of the beetles were compared including those found at the core and at the edge of the structured landscapes, and those that were shuffled into new areas.

Increasing the rate of movement



In the wild, similar evolutionary processes are seen in cane toads.

"For populations that are expanding their range, for example due to climate change, we have found that organisms are moving faster in ways that are hard to predict," said Hufbauer. "What this study has shown is that evolutionary processes can increase rates of movement, but also variation in how fast species move, and allow us to get a better sense of where organisms might go in the future."