Frogs in hot water: Habitat shrinking for Gondwana rainforest mountain frogs

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Richmond Range Mountain Frog is a tiny amphibian, growing to just 3 centimetres in length . Credit: David Newell Southern Cross University

Urban myth has it that a frog placed in cold water that's brought to the boil will not react, dying a horrible death. Clearly this is a fallacy, yet climate change is forcing a similar predicament for mountain frog

species stranded on "islands in the sky," according to a new Southern Cross University study.

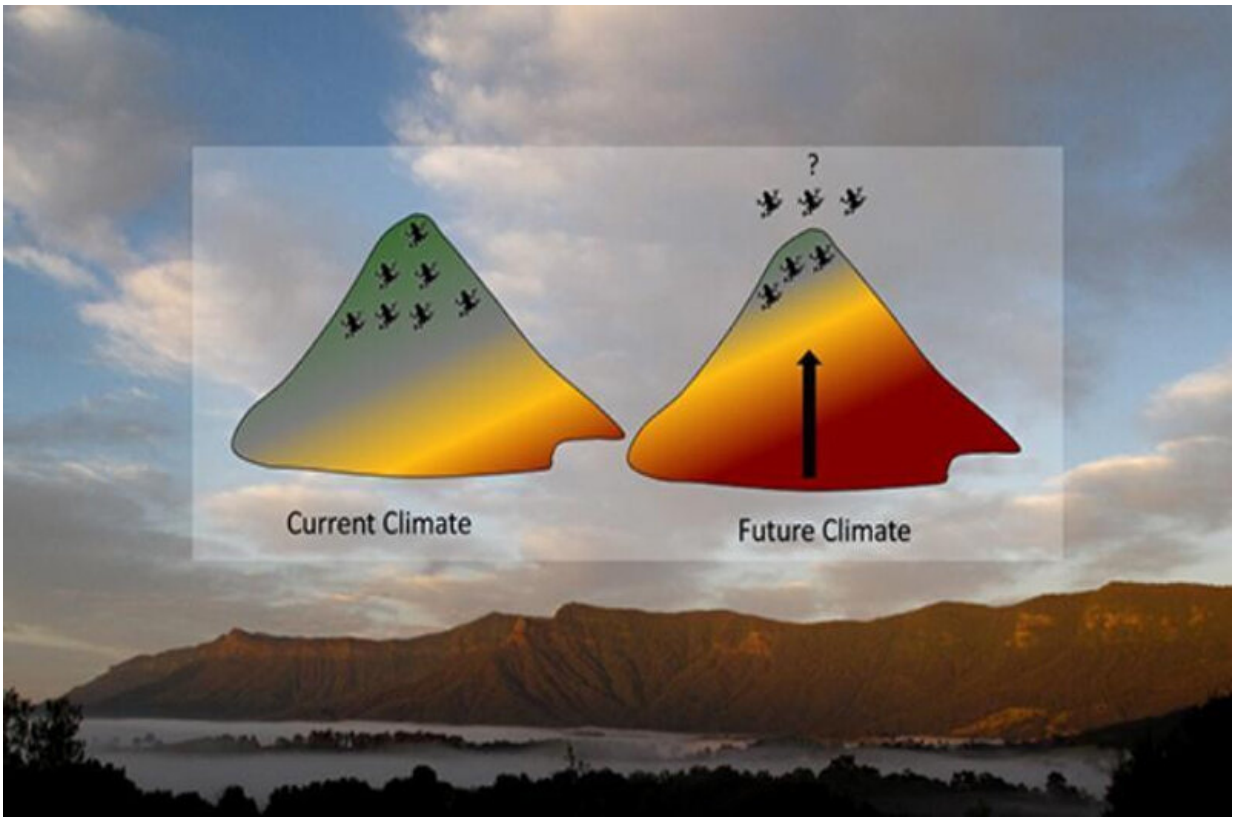
Published in *Scientific Reports*, the study predicts that two of these mountain frogs (Philoria kundagungan and Philoria richmondensis) are on a path to extinction by 2055, despite the fact that their habitats are well protected within Gondwana World Heritage listed national parks around the NSW/Queensland border.

"Under the worst-case scenario of three degrees of warming, up to 91% of their ecological niche will be lost within a relatively short time," says lead author and Southern Cross University Ph.D. researcher Liam Bolitho.

"Even under current projections of warming by 1.5 degrees Celsius, we expect that these frogs will not survive in half of their current mountain habitats.

"Frogs are particularly vulnerable to climate change because they require moisture for breeding, have a bi-phasic life cycles and are explicitly linked to environmental temperature."

The mountain frogs (Philoria) are an ancient lineage of frogs that occur within very small patches of mountain top rainforests, six of which are restricted to the cool temperate rainforests of northern NSW and SEQLD. They are one of the key outstanding universal values of the World Heritage listing because they have speciated based on the biogeography of Australia's rainforests.



'Islands in the sky' concept diagram. Credit: Sophy Millard

"Because these frogs cannot move far from their headwater stream breeding sites, they are now effectively stranded on islands in the sky," said project lead Dr. David Newell.

While the study modeled two species of mountain frogs, the researchers believe the results will apply to all of the species due to similarities in their ecology.

"One of these species, Mount Ballow Mountain Frog (Philoria knowlesi), is completely new to science, having been described earlier this year, and it is very disturbing to think that this frog may well be extinct within 30 years of discovery," Dr. Newell said.

During the catastrophic wildfires of 2019/2020 extensive areas of mountain frog habitat was impacted. These forests have not been subjected to fire previously.

"We have little doubt that these events are linked to climate change. Post-fire monitoring has revealed ongoing declines and localized extinctions as well as the emergence of an additional threat—feral pigs. Pigs can completely destroy the habitat of these frogs within a very short period," Dr. Newell said.

Typical frog habitat in the Richmond Range. Credit: David Newell

"Without urgent intervention these frogs will be lost forever within our lifetimes."

With the assistance of the Australian Government's Bushfire Recovery for Wildlife and Habitat, WWF Australia's Rewilding Australia Program, the NSW Government's Saving our Species (SoS) program and the NSW National Parks and Wildlife Service, Southern Cross University has started a captive husbandry program dubbed project GRASP, with the aim to undertake conservation translocations to bolster remaining populations.

More information: Liam Bolitho et al, Extensive range contraction predicted under climate warming for two endangered mountaintop frogs from the rainforests of subtropical Australia, *Scientific Reports* (2022). DOI: 10.1038/s41598-022-24551-5

Provided by Southern Cross University