



Frog fightback starts now

Wendy Zukerman

FROGS across Australia and the US may be recovering from a fungal disease that has devastated populations around the world.

"It's happening across a number of species," says Michael Mahony at the University of Newcastle in New South Wales, who completed a 20-year study of frogs along the Great Dividing Range in Australia for the

Earthwatch Institute. Between 1990 and 1998 the populations of several frog species crashed due to chytridiomycosis infection (chytrid) caused by the pathogen *Batrachochytrium dendrobatidis*, but Mahony's surveys suggest that the frogs are re-establishing.

Barred river frogs (*Mixophyes esiteratus*) disappeared, he says, but now up to 30 of the animals have returned to streams across Australia's Central Coast. The

tusked-frog (*Adelotus*) and several tree frog species (*Litoria*) have also returned there. Ross Alford at James Cook University in Townsville, Queensland, says tree frogs are also repopulating other areas of the state after their numbers nosedived. Some have even reached pre-infection levels.

In the US there are also signs of recovery. Roland Knapp at Sierra Nevada Aquatic Research Laboratory at the University of California says mountain yellow-legged frogs (*Rana muscosas*) – once "driven virtually to extinction" – are returning. The big question is: are frogs now beating chytrid?

Using electronic tagging to

track frogs, Knapp (*Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.0912886107) and Mahony have separately found that recovering frogs are living with low-level infections of the fungus.

It is possible, they say, that the fungus has weakened in recovering areas. Knapp says there is evidence that the frogs are evolving. Initial findings from his team show that frogs from recovered populations can survive when challenged with a fungal strain, unlike frogs with no previous exposure to the fungus, which died after it colonised their skin.

At Vanderbilt University Medical Centre, Nashville, Alford and Louise Rollins-Smith found that a population of Australian green-eyed tree frogs previously decimated by the fungus produced more anti-microbial peptides – which inhibit fungal growth – on their skin than a less affected population (*Diversity and Distribution*, vol 16, p 703). "It's quite likely that populations are adapting and developing better defences," says Rollins-Smith.

Worldwide, most amphibian communities are not recovering, though earlier this year Ursula Tobler at the University of Zurich, Switzerland, showed for the first time that even in devastated populations, some tadpoles can survive infection (*PLoS One*, DOI: 10.1371/journal.pone.0010927). ■



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