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*A crash in the population of Archey's frog in the central Coromandel Ranges is a matter of major concern to scientists. Archey's frog has a very limited distribution; it occurs only in the Coromandel Ranges and at Whareorino in the western King Country.*

early 1980s. Still others are in serious decline. Disturbingly, some of the declining species inhabit near-pristine rainforests in remote parts of Queensland, where pollution and habitat destruction are not obvious factors.

One species of frog, the golden bell frog *Litoria aurea* was once so common in its native Australia that it was collected by the bucketful for dissection classes by Zoology students. In New South Wales it has disappeared from 90 percent of its range, and is currently considered threatened. The causes of decline (aside from collection!) are not understood.

This same frog species was introduced to New Zealand earlier in the century, and there is some anecdotal evidence to suggest declines here too. But any declines have been patchy, and in other areas the species has recovered or even appeared at sites from where it was not previously known.

One obvious threat to the Australian frogs here is the mosquito fish, *Gambusia*, introduced to control mosquitoes. Although smaller than guppies, the aggressive fish attack their much larger prey by tearing strips of skin and flesh off. Bruce Waldman believes mosquito fish are a major threat, not only to *Litoria* frogs, but also to native fish and invertebrates. (See also *Forest and Bird*, November 1998.)

Bruce Waldman and a colleague at Otago University, Phil Bishop, have established a database on the three *Litoria* species present in New Zealand

which, with their own research and information from the public, aims to find out about distribution trends. Monitoring the introduced Australian species may provide important clues about possible threats to our native species. The only previous mapping survey was one coordinated in New Zealand by Ben Bell in the 1970s.

Bruce Waldman says finding the causes of decline may be no easy task. In some areas in both Central America and Queensland, dead frogs have been found with lesions and scars, possibly caused by a Chytrid fungus. The fungus has, as yet, not been found in New Zealand. While at least one researcher has speculated this fungus may be a major cause of frog decline, Waldman cautions that causal factors are likely to be more complicated. For instance, in North America large declines in frog populations have occurred before, from an *Aeromonas* bacterium, which is normally harmless, but under certain conditions causes symptoms of a lethal, highly contagious frog disease known as 'red leg'.

All sorts of factors may be interacting to cause decline of certain species: for example, climatic stress may render a frog species more susceptible to disease — even one which is not normally problematic. Similarly, when suitable habitat becomes restricted, conditions will be more crowded for frogs at remaining sites, thereby rendering them more vulnerable to predators and disease.

Identifying causes of decline may

involve some cunning detective work, and Bruce Waldman says the whole issue has highlighted the importance of long-term studies where normal frog population dynamics are well documented. Without long-term studies it would be difficult even to know if a decline has occurred. Ben Bell's long-term work in the central Coromandel Ranges is a perfect example — without it, we might not have known about the crash there, at all.

Ben Bell thinks climate change is one factor that may have possibly been responsible in central Coromandel. Other possible causes of decline include habitat disturbance, illegal collection, predation, and disease. Native New Zealand frogs are very sensitive to habitat disturbances, and Ben Bell wanted to know if his own sampling technique might have been responsible for the decline at the survey sites. To test this, he re-surveyed a line that had not been monitored since 1983, and was therefore unlikely to have suffered much research disturbance. But the line came up with the same crash results as his regular sites, and searches by DoC staff in other nearby locations indicated similar results.

While 1080 poison has been used to control possums in areas of Coromandel in recent years, declines of Archey's frog have occurred both in areas where 1080 has and has not been used, strongly suggesting that the toxin is not responsible for recent frog declines. Archey's frog populations, carefully monitored at Tapu on the Coromandel by Alison Perfect and Ben Bell over the months before and after a 1080 drop in June 1995, showed no decline in numbers.

Although native frogs are fully protected (you need a DoC permit even to look for them), illegal collection is a possible cause of decline that needs consideration, Ben Bell says.

'But', he cautions, 'You would expect a decline from collection to be more patchy than what is evident.'

Predation is another possible factor. At Whareorino, predation of Archey's frogs by rats has been documented, but this seemed to affect mainly the larger frogs, especially females (which are larger than males). In the central Coromandel Ranges, it is mostly the larger females