

**Long-term variability in temperature, precipitation, and snow cover in the  
Australian Alps: Is there a link with declines of alpine frogs?**

William Osborne, Maxine Davis and David Hunter\*

University of Canberra, Applied Ecology Research Group, Australia

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Will.Osborne@canberra.edu.au

David.Hunter@canberra.edu.au

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\* Please see the full list of authors under **Notes to readers** at the end of this article.

**Abstract**

A number of species of frogs are confined to the Australian Alps. These include notably two species of Corroboree frog (*Pseudophryne corroboree* and *P. pengilleyi*), the Alpine Tree Frog (*Litoria verreauxii*) and the Baw Baw Frog (*Philoria frosti*). Three species, the Southern Corroboree Frog, Northern Corroboree Frog and the Baw Baw frog are found only in particularly wet and cool parts of the Alps region. Each species is considered to be particularly vulnerable because of their dependence on water seepage into shallow pools or depressions which are used as breeding sites. All have unusual life-histories characterised by small clutch size, and, in the case of the Corroboree Frogs, by having over-wintering tadpoles which spend six to eight months in the pools. The frogs are particularly vulnerable to dry conditions which may desiccate eggs or dry the shallow breeding pools. In fact, below a certain threshold, precipitation may be less than that required to maintain the permanency of breeding pools, offering one explanation as to why these species are confined to wetter regions. During the last twelve years there has been a substantial decline in populations of the Baw Baw Frog and both species of Corroboree Frog. Monitoring of breeding aggregations indicates there has been a gradual loss of local populations and corresponding contraction of geographic range. This study examined whether long-term changes in weather patterns may have been responsible for the decline. Annual fluctuations and longer-term oscillations characterise the precipitation record in the Australian Alps during the last century. We found the onset of the decline coincided with particularly severe summer droughts during a long period of below average summer precipitation (1979-1987). Analysis of monthly and daily precipitation records supported the possibility that the frogs may have experienced increased

mortality as a result of dry weather during critical stages of their life-history. That changes in moisture availability may be implicated in the decline is reinforced by the observation that the frogs disappeared from the driest part of their range first, with the few remaining larger populations occurring in the wettest part of the range. The reason for the continuing decline in abundance is still not clear, and long-term monitoring and demographic analysis is required to determine the potential for each species to recover from the present extremely low numbers.

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### Notes to readers

Please find the full list of authors below:

William Osborne  
Resource and Environmental Sciences  
School of Resource  
Environmental and Heritage Sciences  
Division of Health, Design and Science  
University of Canberra  
Australia

Maxine Davis  
Applied Ecology Research Group  
University of Canberra  
Australia

David Hunter  
Applied Ecology Research Group  
School of Resource  
Environmental and Heritage Sciences  
Division of Health, Design and Science  
University of Canberra  
Australia  
[David.Hunter@canberra.edu.au](mailto:David.Hunter@canberra.edu.au)

Gregory Hollis  
Applied Ecology Research Group  
University of Canberra  
Australia

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