

PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE
Official publication of The Australian Rangeland Society

Copyright and Photocopying

© The Australian Rangeland Society 2014. All rights reserved.

For non-personal use, no part of this item may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior permission of the Australian Rangeland Society and of the author (or the organisation they work or have worked for). Permission of the Australian Rangeland Society for photocopying of articles for non-personal use may be obtained from the Secretary who can be contacted at the email address, rangelands.exec@gmail.com

For personal use, temporary copies necessary to browse this site on screen may be made and a single copy of an article may be downloaded or printed for research or personal use, but no changes are to be made to any of the material. This copyright notice is not to be removed from the front of the article.

All efforts have been made by the Australian Rangeland Society to contact the authors. If you believe your copyright has been breached please notify us immediately and we will remove the offending material from our website.

Form of Reference

The reference for this article should be in this general form;

Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite (*Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

Disclaimer

The Australian Rangeland Society and Editors cannot be held responsible for errors or any consequences arising from the use of information obtained in this article or in the Proceedings of the Australian Rangeland Society Biennial Conferences. The views and opinions expressed do not necessarily reflect those of the Australian Rangeland Society and Editors, neither does the publication of advertisements constitute any endorsement by the Australian Rangeland Society and Editors of the products advertised.



The Australian Rangeland Society

RELICT *MITIKA* WARRENS IN CENTRAL AUSTRALIA: IMPLICATIONS FOR FUTURE BIODIVERSITY AND LANDSCAPE FUNCTION

Jim Noble¹ and Bill Low²

¹ CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601

² W.A Low Ecological Services, PO Box 3130, Alice Springs, NT 0871

INTRODUCTION

Prior to European pastoral settlement in the semi-arid and arid hinterland of Australia around 140 years ago, the *mitika* or burrowing bettong (*Bettongia lesueur*) had the widest mainland distribution of any of the native mammals (Finlayson 1958). The species had virtually disappeared from semi-arid eastern Australia by the end of the 19th century however in central Australia, *mitika* appeared to have survived much longer and senior *Pitjantjatjara* can recall hunting them with their parents up until the early 1950s. Today, wild populations remain extant only on islands off the NW coast of West Australia. Recent studies in extensive mulga (*Acacia aneura*) communities across semi-arid Australia have provided clear evidence of their past occupation in the form of distinctive warrens characterised by semi-circular perimeter mounds surrounding a partially exposed 'lens' of calcrete. The tendency for most of these relict warrens to be located in a mid-slope position (Fig. 1) suggested that these 'lenses' resulted from vadose calcrete being precipitated following evaporation of groundwater moving down the slope (Noble *et al.* 2001). Because of this relationship between *mitika* warrens and calcrete, it was hypothesised that the highest warren densities were likely to be found in landscapes containing predominately calcareous soils. This paper briefly summarises results from field surveys undertaken across contrasting land systems in the core central Australian region, especially in land systems containing extensive pedogenic calcrete.

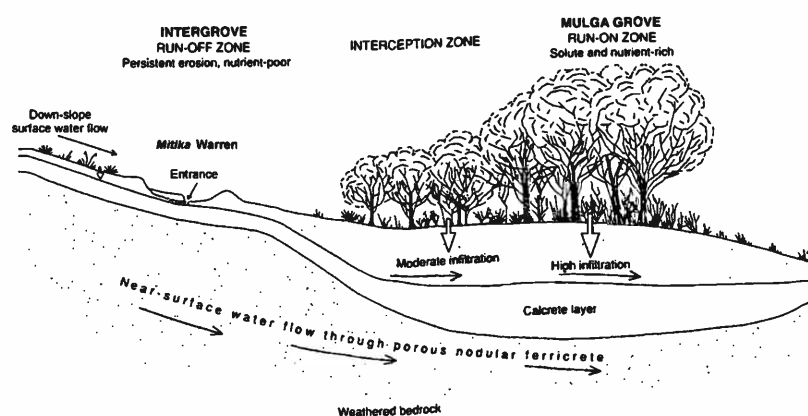


Figure 1. Topographic section of a banded mulga landscape showing the mid-slope position of a typical *mitika* warren (after Noble *et al.* 2001).

FIELD SURVEYS

The ability of the European rabbit (*Oryctolagus cuniculus*) to rapidly invade much of the Australian continent, particularly stony landscapes throughout the arid and semi-arid zones, was due to the availability of 'pre-fabricated' warrens produced by *mitika*. A major exercise involving the mapping and subsequent ripping of many of the warrens utilised by rabbits in the *Uluru-Kata Tjuta* National Park also provided a detailed insight into the putative distribution of *mitika* at a landscape scale prior to their local extinction. To further test the calcareous habitat x *mitika* warren hypothesis, several contrasting land systems were initially surveyed over a wide area. Subsequent surveys of *mitika* warrens in land systems selected on the basis of their contrasting geology were sampled for absolute density along replicate, randomly oriented transects using a wandering quarter technique. Warren

position (using a global positioning system), warren dimensions, class (rated on size, definition and presence/absence of a calcrete ‘lens’), habitat geology and associated vegetation were all recorded. Some representative data are shown in Table 1.

DISCUSSION AND CONCLUSIONS

Continuing field surveys in central Australia have clearly demonstrated that the distribution of relict *mitika* warrens, both at land system and landscape scales, is far from random. Like many of the perennial plants, *mitika* warrens exhibited contagious distributional patterns that, in turn were strongly influenced by local edaphic and hydrologic factors. Landscape function analyses undertaken in *Uluru-Kata Tjuta* National Park also underlined the fundamental role these warrens have played as obstruction elements trapping surface soil nutrients, organic matter and seeds and thereby enhancing local flora and subsequently fauna biodiversity. Soil inversion resulting in calcareous subsoil being deposited on the surface of the perimeter mound also led to the establishment of localised patches of highly palatable grasses, especially species of *Enneapogon* such as those found adjacent to *mitika* warrens on terraces at “Deep Well” Station SE of Alice Springs. Future rabbit control measures should utilise non-destructive techniques in order to maintain future integrity of these landscape features. Recent cross-cultural workshops (Gillen *et al.* 2000) have identified the high priority given by the *Muġitjulu* to the ultimate re-introduction of *mitika* into appropriate habitats. Hopefully the information gained from these studies can be utilised during the site selection process should such *mitika* re-introductions be undertaken in the future.

Table 1. *Mitika* warren data for contrasting land systems in central Australia.

Location	Land System	No. Sampled	Modal Class	Mean Diameter (m)	Mean Distance (m)	Absolute Density (100 sq m)
“Erlunda”	Lindavale	56	3	17.3	136.2	0.015
“Erlunda”	Ebenezer	15	4	20.3	153.4	0.004
“Deep Well”	Allua	24	4	17.0	62.0	0.026
Kata Tjuta N.P.	Gillen	14	2	21.9	not collected	n.c.
“Curtin Springs”	Lindavale	8	1	30.4	n.c.	n.c.
“Owen Springs”	Muller	7	2	15.0	447.8	< 0.001
Finke Gorge N.P.	Krichauff	6	2	14.0	n.c.	n.c.
“Mt Skinner”	Woola	5	2	26.7	n.c.	n.c.

REFERENCES

- Finlayson, H.H. (1958). On central Australian mammals (with notice of related species from adjacent tracts). Part III - the Potoroinae. *Rec. S. Aust. Mus.* 13: 235-302.
- Gillen, J.S., Hamilton, R., Low, W.A. and Creagh, C. (Eds) (2000). ‘Biodiversity and the Re-introduction of native fauna at *Uluru-Kata Tjuta* National Park.’ Bureau of Rural Sciences, Canberra.
- Noble, J.C., Gillen, J., Jacobson, G., Low, W.A., Miller, C. and *Muġitjulu* Community (2001). The potential for degradation of landscape function and cultural values following the extinction of *mitika* (*Bettongia lesueur*) in Central Australia. In ‘Land Degradation in Australia.’ (Ed. A. Conacher) pp. 71-89. Kluwer Scientific Publications, Dordrecht.