

**PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY
BIENNIAL CONFERENCE**

Official publication of The Australian Rangeland Society

Copyright and Photocopying

© The Australian Rangeland Society 2012. 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

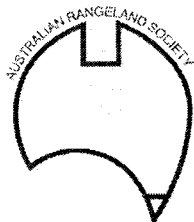
The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

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

VEGETATION COMMUNITY CHANGE AND ITS EFFECT ON BIRD POPULATIONS

Stephen Clipperton

NSW Agriculture, PMB 19, Trangie, NSW, 2823

INTRODUCTION

Birds are a particularly interesting vertebrate group in which to study. They are both visual and vocal in their habits which make them easy to view, and they are attractive to observe. Birds are also sensitive to habitat change and this is evident in the decline of our woodland birds across many areas of inland New South Wales. According to Robinson & Traill (1996), this decline has been mainly due to clearing and a gradual reduction in woodland area. If this is correct, what happens to bird populations when the reverse occurs, and a gradual increase in woody cover takes place over time?

Due to a number of factors since European settlement, an encroachment of woody endemic shrubs has occurred over many regions of semi-arid New South Wales. Little is known as to the effect this change has had on bird populations in western New South Wales. Schmidt, (1979) postulates that "there is no doubt that changes have occurred ... in relative proportions of species and in total abundances" of bird populations. To at least partially address these gaps in our knowledge, a small study was set up to compare bird populations in an open-woodland habitat with that of a nearby shrub-woodland habitat. The study was undertaken in a region of western New South Wales that has been affected by shrub encroachment.

MATERIALS AND METHODS

The study was conducted on the property "Yarrowonga", 20 km south-east of Cobar in western New South Wales. The study area vegetation was a woodland dominated by Poplar Box *Eucalyptus populnea*. The shrub layer, when present, was dominated by Turpentine *Eremophila sturtii*, Narrow leaved hophbush *Dodonea attenuata* and Budda *Eremophila mitchellii*. The pasture layer included perennial species such as Mulga Oats *Monochather paradoxa*, Mulga Mitchell *Thyridolepis mitchelliana* and Common Bottlewashers *Enneapogon avenaceus*, along with assorted annual herbage.

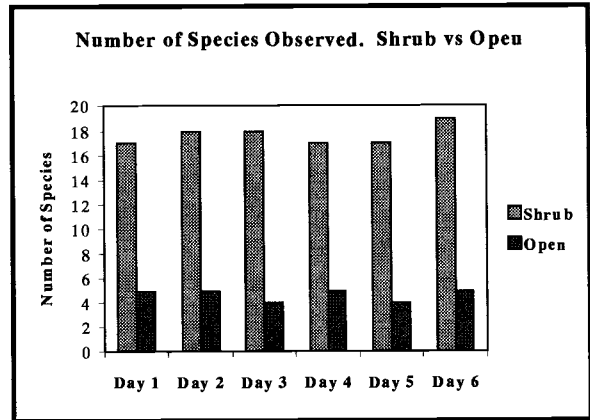
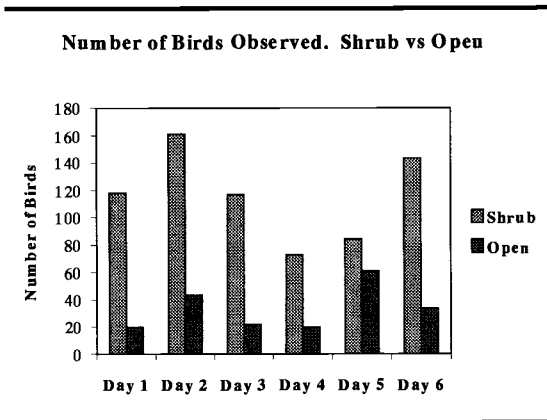
Suitable study sites of open-woodland and also shrub-woodland habitats were located within short drives of each other. At each site 60 × 200m long strip transects were set up and replicated three times, thus giving a total area of 36 000 m² or 3.6 hectares for each treatment (habitat). These were set up with the use of a compass and marked with wooden pegs. The transects were measured and marked every 50m with additional wooden pegs. Each 50m block was censused for five minutes, twenty minutes for each transect. The census took place at 8:00am each day, with the first transect censused for each day alternating between habitats. The census period was for six consecutive days.

The **strip transect censusing method**, (Harden *et al.*, 1985) was chosen for this study. This method was chosen because of its suitability to the nature of the vegetation and the time constraints involved. Suggested problems facing this method are **movement of birds** (double counting), **cryptic behaviour of birds** and **attraction or repulsion** to the observer (Pyke *et al.*, 1984). According to Harden *et al.*, (1985) the use of different strip widths and census duration resulted in generally consistent trends in the abundance of birds and of species.

RESULTS AND DISCUSSION

The results of the six days of censusing showed a significant difference between the two habitats. Of the total number of individuals counted, **683** were found in the shrub habitat and **212** were counted in the open habitat. Also, of the **33** species observed, all were recorded in the shrub habitat, but only **10** were recorded in the open habitat. The validity of the data was tested using the *Mann-Whitney U test* which performs a two sample rank test for the difference between two population medians. The test showed a significance level of difference at $p < 0.05$ when comparing the two habitats for total birds

observed and total species observed.



Figures 1 and 2. Bar graphs showing results for each day of the census. Shrub habitat vs open habitat.

Bar graphs show the number of individuals observed (**figure 1**) and the number of species observed (**figure 2**) for each day of the census. The results indicate that there is a significant difference in bird populations from open woodland to shrub-woodland. In their classic study on the subject, Robert and John Macarthur (1961) found that in any vegetation community, **bird species diversity** is highly related to **foliage height diversity**. They concluded that bird species diversity could be predicted from the height profile of foliage density.

The more vertical **strata** within the plant community, the greater the number of niches available for exploitation. These are manifested in nesting sites, foraging areas and territory with protection from predators. According to Cody (1985), from an evolutionary perspective, birds are quick to colonise a new habitat when it becomes available for whatever environmental reason. This evolution of habitat preference is determined by, and determines, the birds morphological structure, behavioural functions, and its ability to find food and shelter.

One important aspect of the findings of this study is the large number of small birds found in the shrub-habitat. These birds all belonged to the order **Passeriformes** or **passerines**. Twenty seven species out of the 33 observed were passerines. The remaining six species were 5 parrots and the Wedge-tailed eagle. Passerines are called **perching birds** because of their preference for living in tree or shrub habitats. The *Cambridge Encyclopedia of Ornithology* (1991), describes how small birds have high energy requirements and need a habitat that provides for this. They also require a living and foraging area that has shelter from predators and the weather. It must also provide a breeding area suitable for securing a mate, building a nest and raising young.

All the passerine species observed had a diet that consisted of insects, fruit, nectar, or some mix of these food items (Pizzey, 1983). The shrub habitat provided an ideal foraging space for these foods. The open habitat used in this study appears not to offer the same opportunities as the shrub habitat. Birds will often use a secure habitat like the shrub-woodland to rest and shelter while exploiting the adjacent grassland for food. The parrot species being granivorous seem to fit this example as many were seen in both shrub and open habitats.

CONCLUSION

The results of this study are consistent with earlier work by Macarthur, (1961) who showed that structure of a habitat is a major determining factor in bird species diversity and overall number of individuals. Although shrubs have always been a feature of semi-arid plant communities in New South Wales, the gradual encroachment of the woody shrubs into previously open areas is a function of changes in long-term management following European settlement. As habitats have changed from the removal of existing management inputs like fire, combined with modified grazing regimes, so will bird species follow and can be regarded as simply **tracking habitat change** (cf. Cody, 1985).

REFERENCES

- Cody, M.L. (1985). *Habitat Selection in Birds*. Academic Press, Inc. London.
- Harden, R.H., Muir, R.J., and Milledge, D.R. (1985). An evaluation of the Strip Transect Method for Censusing Bird Communities in Forests. *Aust. Wildl. Res.*, **13**, 1986, 203-11.
- Macarthur, R.H. and Macarthur, J.W. (1961) On bird species diversity. *Ecology* **42**, 594-598.
- Pizzey, G. (1983). *A Field Guide to the Birds of Australia*. Collins. Sydney.
- Pyke, G.H. and Recher, H.F. (1984) Censusing Australian birds: A summary of procedures and a scheme for standardisation of data presentation and storage. *In Methods of Censusing Birds in Australia*. (Ed. S. J. J. F. Davies) R. Australas. Ornithol. Union Rep. No. 7.
- Robinson, D. and Traill, B.J. (1996). Conserving the woodland birds in the wheat and sheep belts of southern Australia. R.A.O.U. (Birds Australia), Melbourne.
- The Cambridge Encyclopedia of Ornithology*. (1991). (Eds. M. Brooke and T. Birkhead). Cambridge University Press, Cambridge.
- Schmidt, B.L. (1978). Birds of the Cobar Region, New South Wales. *Australian Birds*, 12, No 4.

ACKNOWLEDGMENTS

I would like to thank Mr David Snelson for the use of areas on his property "Yarrowonga" for the purpose of the study. I would also like to thank Linda Clipperton for her assistance in site establishment and Mr Tony Grice for his assistance in bird species identification.