

Restoring the prepastoral condition

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INTRODUCTION

A recent paper published in *Austral Ecology* 27, 121 – 131 by Henderson and Keith (2002) suggested that pastoral management had depleted forest understoreys by reducing the density and diversity of shrubs. The converse hypothesis, that exclusion of disturbance creates unnaturally shrubby understoreys is proposed here.

DISCUSSION

Implied prepastoral condition

The paper considered the hypothesis that pastoral management depleted the density and richness of shrubs. Less disturbed areas were compared with more disturbed areas. No details or discussion were given of the prepastoral condition to establish a benchmark against which pastoral management could be compared. The discussion canvassed the possibility that pastoral management had driven ecosystems to a “steady state unfavourable for elements of the prepastoral biota”. It suggested that prolific grasses and macropod grazing might interfere with shrub regeneration. The implied prepastoral condition was an environment without fire, supporting dense shrubby ecosystems and few macropods.

Alternative scenario

An alternative hypothesis is that pastoral management reduced the potential impacts resulting from the suppression of natural fires and cessation of Aboriginal burning. Pastoral management may have prevented the development of unnaturally dense shrub understoreys and a decline in the health of tree canopies.

The prepastoral condition must be considered before either hypothesis can be evaluated. Pastoralists sought and developed grassy woodlands and forests (Ryan *et al.* 1995, Lunt 1997, Benson and Redpath 1997, Jurskis 2000). They did not bother with shrubby forests because these had little or no grazing value. The extent of grassy forests has been greatly reduced (Lunt 1997), whereas shrubby forests are very well represented in reserves (Jurskis 2000). Low intensity fire resulting from lightning and Aboriginal burning was commonplace in prepastoral grassy forests (AUSLIG 1990, Lunt 1997).

Shrub development

The data presented for juvenile shrub densities did not appear to suggest a steady state unfavourable to shrub establishment. A logical interpretation of these data is that they represent shrub ‘invasion’ or a dynamic imbalance between, on one hand, trees and grasses adapted to a regime of relatively frequent, low intensity fire and, on the other, shrubs favoured by an infrequent high intensity fire regime. The presentation of the data seems to imply that the differences in both adult and juvenile shrub densities between more disturbed and less disturbed areas can be associated with the historical disturbance. However there was no correlation between adult and juvenile shrub densities. Logically, adult shrub densities would reflect the history of pastoral management, whereas juvenile shrub densities would reflect the recent history of exclusion of fire and grazing. Species with higher densities of juvenile than adult shrubs probably have a capacity to quickly take advantage of the exclusion of fire and grazing, and gain predominance in the new artificial ecosystem. The data suggest that *Acacia melanoxylon*, *Allocasuarina littoralis*, *Pittosporum undulatum* and *Synoum glandulosum* will quickly establish dense populations. *Exocarpos strictus* will probably respond more slowly.

The article stated that *Allocasuarina littoralis* behaved contrarily to its behaviour when fire is excluded for long periods. However the data presented for juveniles were entirely consistent with the findings of Lunt (1998) who reported the impact on a coastal woodland of long term fire exclusion. Lunt (1998) reported a continuing increase in the density of *Allocasuarina* and a continued decline in the density and health of eucalypts over 25 years of fire exclusion.

Fire Regimes

The association of fire exclusion with dense shrub layers, weed invasion, loss of rare plants and eucalypt dieback (Gleadow and Ashton 1981, Smith and Smith 1990, Lunt 1997, Lunt 1998, Jurskis 2000, Jurskis 2001) suggests an unnatural condition that would not have applied in the prepastoral situation. Furthermore, if dense shrub layers had been present at the time of settlement, pastoralists would not have been attracted to the forests. Nor could pastoralists have used fire to convert dense shrubby forests in south eastern Australia to open grassy forests.

Low intensity fires will not penetrate the dense shrubby forests because the ground layer is normally shady and moist and the shrubs are mostly green (Jurskis 2000). The inevitable high intensity fires, in forests that have developed a heavy shrub layer, damage the weakened eucalypt canopy and promote prolific shrub regeneration (for example, Wakefield 1970, Gleadow and Ashton 1981, Birk and Bridges 1989, Lunt 1998, Jurskis 2000, Jurskis 2001). The shrubs take advantage of the reduced canopy and fertile ash bed to gain predominance over the eucalypt trees and grasses.

Vegetation changes resulting from fire exclusion can eliminate opportunities for low intensity burning, whereas low intensity burning does not preclude the option of fire exclusion in the future (Jurskis 2000, Jurskis 2001). Low intensity fire regimes can conserve biodiversity in grassy eucalypt ecosystems (Lunt 1997, Lunt 1998, Benson and Redpath 1997). Extensive eucalypt dieback is occurring in these ecosystems as low intensity fire regimes become less prevalent and high intensity fire regimes consequently become more prevalent (Jurskis 2000, Jurskis 2001, Jurskis and Turner in press).

It is suggested that low intensity fire should be used in grassy ecosystems as a precautionary approach to management for conservation (Jurskis 2001). 'Restoration' of shrub understoreys should not be an objective of conservation management unless it can be convincingly demonstrated that these typified the prepastoral ecosystem.

ACKNOWLEDGEMENTS

Bob Bridges and John Turner constructively criticised a draft of this comment.

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