

**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.



The Australian Rangeland Society

DEVELOPING AND IMPLEMENTING POLICY FOR FIRE MANAGEMENT OF INVASIVE NATIVE SCRUB IN NEW SOUTH WALES

P.Droulers and K. Kneipp
Western CMA, PO Box 342, Bourke, NSW 2840

Abstract

Invasive native scrub (INS) has caused major changes to landscapes in Western NSW with adverse effects on pastoral production and aspects of biodiversity. The reduction in the incidence of fires since European settlement has contributed to these changes. The priority for managing INS is to maintain open areas and reduce further increase of invasive native species density. Effective management of INS will result in a mosaic of native vegetation types in the landscape creating a diversity of habitats. The control of INS has benefits for production and the environment with improved native groundcover and soil stability. The management of total grazing pressure (TGP) before and after burning is crucial to achieving improved environmental and production outcomes.

The most cost effective way to manage INS is the control of seedling germination events with fire. Mass seedling germinations occur following prolonged high rainfall events and there is a limited window of opportunity to manage the seedlings. Seedlings of many invasive native species are susceptible to fire with almost one hundred percent kill rate when they are less than thirty centimetres in height. The kill rate with fire dramatically decreases with plants above thirty centimetres and negligible above fifty centimetres height. Although fire has limitations in managing INS it is considered to be the only realistic tool to manage seedlings at a landscape scale.

Effective policy is required to ensure that appropriate fire regimes are encouraged and that balanced environmental outcomes are achieved. This paper discusses how these policies are implemented in NSW and the optimal fire management to maintain mosaic landscapes with the control of INS.

Key Message: Effective policy is required to allow management burning of Invasive Native Scrub seedlings to maintain a landscape mosaic in Western NSW.

INTRODUCTION

Native vegetation in Western NSW has significantly changed since settlement. The cause of this change is attributed to a complex combination of seasonal and management factors. Some of the major causes include inappropriate grazing management and feral animals. Another of the major causes is an altered fire regime. The frequency of fires has decreased in the rangelands since settlement, contributing to a change in the vegetation structure over time.

Some native tree and shrub species have created dense thickets that do not self thin (DNR Science and Information Board, 2005). These species are known as invasive native scrub. The prolific regeneration of INS has altered vegetation structure over vast areas of the landscape.

Burning is clearing within the meaning of the Native Vegetation Act 2003 and management of INS with burning requires assessment. INS management with burning must improve or maintain environmental outcomes to be approved in a Property Vegetation Plan (PVP).

INVASIVE NATIVE SPECIES WITHIN THE PROPERTY VEGETATION PLAN (PVP) FRAMEWORK

To assess clearing for an INS PVP the vegetation to be managed must be listed as an invasive native species and be acting invasively. The clearing must also be for the purpose of re-establishing native vegetation or allowing the natural regeneration of native species, primarily the understorey grass community.

To ensure clearing improves or maintains environmental outcomes the INS PVP specifies:

- the clearing does not result in soil surface disturbance; and
- clearing does not result in the introduction into the cleared area of any non-native vegetation; and
- clearing of non-invasive native species is to the minimum extent necessary to clear the invasive native species.

BENEFITS AND LIMITATIONS OF FIRE

Some of the benefits of using management burning to control INS include:

- Cost effective management of the vegetation community and landscape in a condition which prevents encroachment
- Reduction of the density of established INS (restoring the balance)
- Effective depletion of the INS seedbank and reduction of the density of INS seedlings
- Increased long-term forage production through suitable post burn management,

There are several factors to be considered when using management burning to control INS including:

- A combination of treatment options may be required.
- A short-term loss in forage production but if nothing is done the cost will be much higher in the future
- The low mortality rate of some species
- Conditions must be right for a burn and there must be sufficient fuel to carry a fire.
- Limited implementation. Due to the cost of resources of carrying out a burn and the lost production over several years, limited areas are burnt - usually a maximum of 10% on properties

SEASONAL CONDITIONS AND INS RESPONSE

Mass germinations of INS occur when there is a prolonged rainfall event followed by suitable growing conditions for the seedlings. Episodic rainfall also promotes vigorous growth of other grass and herbage. The large fuel load (grass and herbage) provides an ideal opportunity to control the seedling INS with fire. Unfortunately the young seedling INS often goes unnoticed until the opportunity to burn has passed.

Table 1 Rainfall totals for selected towns in Western NSW during 2010

Town	2010 Rainfall (mls)	Annual Average Rainfall (mls)	Fraction of average
Broken Hill	540	255	212%
Brewarrina	722	415	174%
Cobar	685	402	170%
Wanaaring	594	279	212%
Walgett	815	479	170%

Table 1 illustrates the rainfall at several towns across Western NSW in 2010. The required conditions of prolonged high soil moisture were met for a mass germination of INS. The above-average rainfall and subsequent pasture growth also provided an opportunity to control the seedling INS. Opportunities to burn INS in Western NSW are generally limited to when there are favourable seasonal conditions. Generally if the grass biomass is over 2000 kg/ha and the wind speed is greater than 7 kph, an effective burn can be achieved (Kerle, 2008). If the opportunity is missed it may be several years before another opportunity to burn can be realised. Once the opportunity to burn has passed the mortality rate of the INS cohort in the subsequent fire decreases.

INS MORTALITY WITH FIRE

Studies have shown that up to 100% of most species can be killed if they are burnt when they are less than 30 cm in height. Depending on species the mortality rate can drop significantly if the plant height is greater than 30 cm. (Hodgkinson and Harrington, 1985)

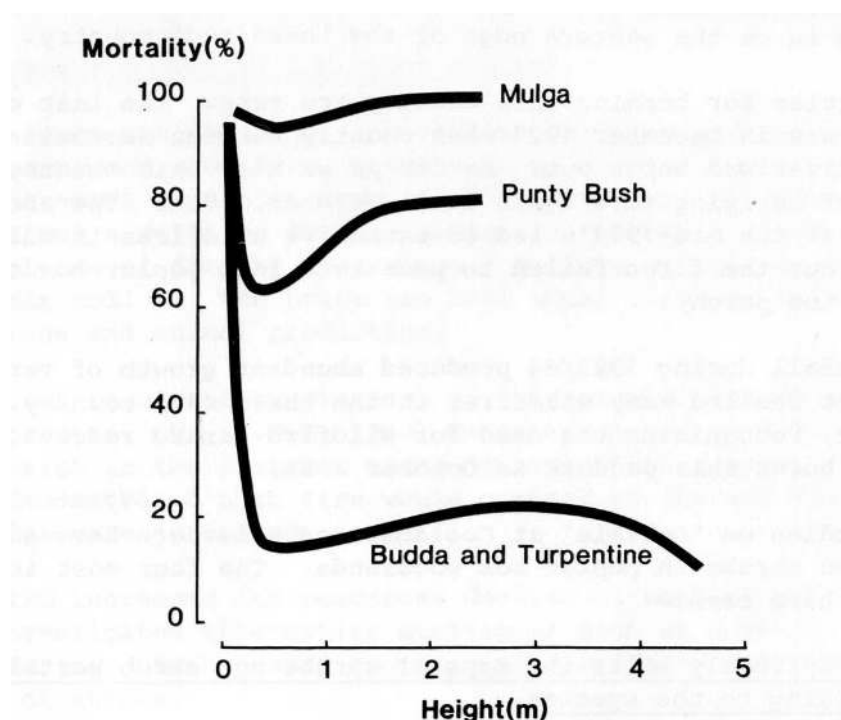


Figure 1. Post-fire mortality of mulga, punty bush, budda and turpentine, in relation to age of plant as reflected by plant height (Hodgkinson and Harrington, 1985)

POST BURN MANAGEMENT

Post burn management is critical to the effectiveness of the initial burn. The aim of post burn management is to encourage perennial component in the pasture which will:

- Improve moisture penetration & water holding capacity
- Maintain fertility of soil (improved nutrient cycle)
- Suppress shrubs (after most rainfall events)

If shrubs do establish, the chance of having adequate fuel to control them with fire are high if perennials are dominant. Grazing management requires a whole property perspective. This includes aspects of property development (improved fencing and water distribution), management strategies that ensure the enhancement of productive native grasslands and tactical management for paddock objectives. Tactical management is particularly important as it requires short-term adjustment of stock numbers and stock distribution between paddocks in response to changing conditions. Light stocking post-burn and destocking to allow seeding of desirable grasses are critical elements to successful management of INS with fire. Control of TGP is crucial to ensure appropriate post-burn grazing regimes owing to the high densities of feral goats and other herbivores across many areas of Western NSW (Kerle, 2008; Western CMA, 2012).

ENVIRONMENTAL OUTCOMES OF MANAGING INS WITH FIRE

The management of INS in accordance with a PVP can create a mosaic of vegetation types including open and dense areas of native vegetation across the landscape (Hassall & Associates et al, 2006). The mosaic of habitats is required to support threatened species and other native flora and fauna. A study of species richness by Ayers et al. (2001) showed individual species favoured different densities of INS. However, bird diversity has been found to be highest in landscapes with a range of vegetation types (INS Research Program Advisory Group 2010).

Soils of INS areas have soil surface crusting, less cover, increased acidity and lower biomass of soil microbes. Effective management of INS increases groundcover and soil stability (INS Research Program Advisory Group, 2010).

Fire is the most cost effective tool to manage INS (Kerle 2008). Management of INS with fire can maintain a balanced landscape and achieve positive environmental outcomes with the appropriate post burn management.

REFERENCES

Ayers, D., Melville, G., Bean, J., Beckers, D., Ellis, M., Mazzer, T. and Freudenberger, D. 2001. Woody Weeds, Biodiversity and Landscape Function in Western NSW. West 2000, Dubbo.

DNR Science and Information Board, 2004. *Clearing and thinning of native vegetation known as invasive native scrub under the Native Vegetation Act 2003*. Discussion Paper, NSW Department of Natural Resources.

Hassall & Associates, Briggs, S. and Norman, P., 2006. *Documenting the Science Behind the Invasive Native Scrub Tool*. A report prepared for the Central West Catchment Management Authority, Dubbo.

Hodgkinson, K and Harrington, G. 1985. The case for prescribed burning to control shrubs in eastern semi-arid woodlands. *The Rangeland Journal*, 7, 64-74.

INS Research Program Advisory Group, 2010. *Managing invasive native scrub to rehabilitate native pastures and open woodlands*. A Best Management Practice Guide for the Central West and Western Catchments, State of NSW.

Kerle, A. 2008. *Managing rangeland vegetation with fire: A literature review and recommendations*. Western Catchment Management Authority.