



Australian Government

Weed management



Managing for biodiversity in the rangelands

Tony Grice and Tara Martin

Contents



This paper is a summary of the report prepared for the Australian Government Department of the Environment and Heritage by the CRC for Australian Weed Management.

Grice, A. C. and Martin, T.G. 2005. The management of weeds and their impact on biodiversity in the rangelands. The CRC for Australian Weed Management. Townsville.

Copyright and disclaimers

© Commonwealth of Australia 2006

Information contained in this publication may be copied or reproduced for study, research, information or educational purposes, subject to inclusion of an acknowledgement of the source.

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Australian Government or the Minister for the Environment and Heritage.

While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

This project was funded by the Natural Heritage Trust (NHT) and was managed by the Department of the Environment and Heritage (DEH).

ISBN: 0642551243

Acknowledgements

The following people are acknowledged for providing information and comments on material presented in this report: Nora Brandli, Delphine Bentley, Yvonne Buckley, Greg Campbell, Shane Campbell, Richard Carter, Mike Cole, Stuart Cowell, Kendrick Cox, Steve Csurhes, Simone Grounds, Kerrie Jocusmsen, Mic Julien, Annie Keys, Sarah Legge, Sandy Lloyd, Philip Maher, Cam McDonald, Rachel McFadyen, John Morley, Juanita Movigliatti, Stewart Noble, Dane Panetta, John Pitt, John Thorp, Anita Smyth, Helen Spafford-Jacob, Rieks van Klinken, Joe Vitelli, Craig Walton, Annemarie Watt, Michael Weston and Jenny White.

Images provided by:

Abyss Diving Pty Ltd, p23 photo 2. Department of the Environment and Heritage, p26 photo 2. Rebecca Coventry, p24 photo 2. ©CSIRO, p4 photo 2, p18. ©CSIRO Land and Water, p22 photo 1, p24 photo 1, p27, p28 photo 1. Peter Martin, p6. Sue McIntyre, p30 photo 2, inside back cover photo 2. Leonie McMahon, p37 photo 1. Colin G. Wilson, front cover, p1, p2, p4 photo 1, p5, p7, p15, p19, p20, p21, p22 photo 2, p23 photo 1, p24 photo 1, p26 photo 1, p28 photo 2, p29, p30 photo 1, p31, p32, p33, p34, p37 photo 2, p39, p40, inside back cover photo 1, back cover photo 1, back cover photo 2.

Design: See-Saw Illustration and Design

Editing and publication coordination: Econnect Communication

Abstract	2
Introduction	3
Defining the term 'weed'	6
Weeds of the Australian rangelands	7
Identifying weeds	14
The impact of weeds on biodiversity	17
Reducing the impact of weeds on biodiversity	21
The four phases of invasion	21
Prevention	22
Eradication	23
Containment	25
Control	26
Weed management strategies	32
Investment in weed management	33
A checklist for weed management best practice	35
Recommendations	37
Further information	40

Abstract

Introduction



Australia's rangelands cover a huge area of the Australian landmass, estimated at the time of writing to be about 70 per cent (6 million km²) of the continent. Land use and land tenure in the rangelands varies considerably. Pastoralism, mostly on leasehold land, is the most extensive land use, with over half of the rangelands used specifically for livestock production. Land tenure is diverse, with thirteen different tenures in the rangelands. Indigenous land occupies 16 per cent, conservation reserves and national parks cover seven per cent, unassigned state-owned Crown Land occupies around 13 per cent and non-indigenous freehold approximately eight per cent.

Weed invasions pose a major threat to Australian rangeland ecosystems. They threaten both individual native species and communities of native plants and animals, and they alter important ecological processes. More than 640 non-native naturalised plant species are found in the Australian rangelands and 14 per cent of these pose a serious threat to rangeland biodiversity.

Total expenditure on weeds in the rangelands between 1997 and 2004 is estimated at \$80 million. The majority of weed funding in rangelands is spent on Weeds of National Significance (WONS). Some species that pose a great threat to biodiversity but have production benefits, such as buffel grass (*Cenchrus ciliaris*), have not been nominated by states and territories as potential WONS.

Strategies to manage problems caused by weeds aim to prevent, eradicate, contain or control the weeds. It is unlikely, however, that any rangeland weed problem can be solved with one-off treatments using a single technique. Rather, a strategic approach that effectively integrates available techniques is required. Integrated weed management combines chemical, mechanical, biological, and fire control options—the combination used depends on the biology of the weed(s) and the circumstances under which it is growing.

Each control technique has potential side effects for native flora and fauna. Clearly, a particular weed management regime must produce a better outcome for biodiversity than the weed invasion itself.

In this paper, we consider the threats to the biodiversity of Australian rangelands from invasive, non-native plant species. We identify the regions where the threat is greatest and provide advice about integrated weed management strategies.

We discuss weed management techniques in light of the diverse tenures and land uses, and the extensiveness of the rangelands. We provide a checklist for evaluating projects that address rangeland weed problems relevant to environmental or biodiversity management. Management recommendations for reducing the impacts of existing weed problems and minimising the risk of new weed problems arising are also included.

This paper is part of a series of related publications on Managing for Biodiversity in the Rangelands, intended to provide government agencies, land managers and others with relevant information on protecting biodiversity in the rangelands.

Rangelands support diverse and rich communities of plants and animals that are culturally, socially, ecologically and economically significant at national and international levels. Like many ecosystems across the world, Australian rangelands are threatened by invasions of pest plants and animals. Pest plant species—broadly called weeds—have an extensive impact, threatening individual native species and communities of native plants and animals, and altering the ecological processes upon which these communities depend.

Weeds have enormous consequences for the Australian continent. In 1994, the annual national economic impact of weeds was estimated at \$3,554 – 4,532 million based on the cost of weed control and, more significantly for the rangelands, the value of lost production. While these figures are substantial, they are underestimated as they do not take into account the cost of losses in biodiversity, ecosystem function, or cultural value caused by weed invasions.

Weeds have a significant impact on the biodiversity of Australian rangelands. The rangelands have a high level of biodiversity; they include 53 of the 85 Interim Biogeographic Regions of Australia (IBRA), and five of Australia's 15 biodiversity hotspots. A hotspot is an area rich in plant and animal species, particularly many endemic species, which is under immediate threat from impacts such as land clearing, development pressures, salinity, weeds and feral animals. Five of Australia's 15 hotspots occur in the rangelands: 1) Einasleigh and Desert Uplands, 2) Brigalow North and South, 13) Carnarvon Basin, 14) Hamersley/Pilbara and 15) North Kimberley. The rangelands support 67 per cent of Australia's reptiles, 62 per cent of birds, 47 per cent of frogs, 33 per cent of mammals, and a diverse (and not fully known) range of invertebrates.

In this paper, we consider the threats to the biodiversity of Australian rangelands from weeds. We identify the weed management techniques that will be most effective given the diverse tenures and land uses, and the extensiveness of the rangelands.