



University of Kentucky  
UKnowledge

---

International Grassland Congress Proceedings

XXI International Grassland Congress / VIII  
International Rangeland Congress

---

## Conserving Temperate Grasslands in Australia: Historical Constraints, Future Possibilities

Louise Gilfedder

*Department of Primary Industries and Water, Australia*

Ian Lunt

*Charles Sturt University, Australia*

John Morgan

*La Trobe University, Australia*

Richard J. Williams

*CSIRO, Australia*

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/21/20-1/12>

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

---

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact [UKnowledge@lsv.uky.edu](mailto:UKnowledge@lsv.uky.edu).

## Conserving temperate grasslands in Australia : historical constraints , future possibilities

Louise Gilfedder<sup>1</sup> , Ian Lunt<sup>2</sup> , John Morgan<sup>3</sup> , Richard J . Williams<sup>4</sup>

<sup>1</sup> Dept . Primary Industries & Water , GPO Box 44 Hobart Tasmania 7001 . Australia . Louise .Gilfedder@ dpiw .tas .gov . au

<sup>2</sup> Charles Sturt University , PO Box 789 , Albury , NSW 2640 , Australia .

<sup>3</sup> Department of Botany , La Trobe University , Bundoora Victoria 3086 . Australia .

<sup>4</sup> CSIRO Sustainable Ecosystems PMB 44 Winnellie NT 0822 . Australia

**Key words** : climate change , fragmentation , grazing , incentives , resilience

Temperate grasslands in Australia occur in the southern , temperate per-humid sections of the continent . The dominant grass species are tussock-forming , and occur from sea level to alpine regions . The grasslands *sensu strictu* have a relatively small area , but they form a floristic continuum with temperate grassy woodlands ; for the purposes of this paper , we will consider both . We review the biogeography of temperate grasslands , the history of land use and land use change , conservation status , and illustrate the potential impacts of climate change on temperate grasslands , and propose national and international mechanisms by which conservation outcomes may be enhanced .

Australia's temperate grasslands are tussock grasslands , consisting of a mix of C3 genera ( *Poa* , *Austrodanthonia* , *Austrostipa* ) and a widespread C4 grass *Themeda triandra* . There are numerous species of dicot herbs (forbs) , and few woody species . Grasslands and grassy woodlands tend to occur on the more fertile soils , of moderate to heavy texture . Lighter textured soils with poorer nutrient status tend to be dominated by sclerophyllous , woody species , rather than grasses . The current distribution of grasslands and grassy woodlands is highly fragmented , and the ground layer composition of both grasslands and grassy woodlands has been highly modified due to 200 years of European land use-mainly grazing of domestic livestock on native and exotic pastures , and clearing for cropping . Considerable research has been devoted to understanding the biotic and abiotic drivers of pattern and process in Australia's temperate grasslands . In particular , recent effort has been devoted to understanding drivers of richness , herb functional type diversity ; C3-C4 grass dominance ; ecological states and transitions between states .

Temperate grasslands and grassy woodlands are one of Australia's most under-represented biomes in the national conservation estate , with one notable exception-alpine and subalpine grasslands , which are well-represented in Australia's reserve system . Grazing and cropping were undoubtedly a very important resource in the economic development of Australia in 19<sup>th</sup> century , as it underpinned a successful livestock industry , and will continue to be in the 21<sup>st</sup> century . European agricultural landuse has changed grazing and fire regimes profoundly . This change in disturbance regime has had significant impact in terms of species/ functional groups , land condition and ecological function . The regime change has had impacts across all tropic levels-plants , invertebrates and vertebrates . This , and fragmentation , is the fundamental context within which conservation management-both challenges and opportunities-must be seen . What is left behind is what we have to work with-so questions become what conservation significance do these remnants have , is there resilience in the conservation system , how can we enhance the values and resilience , and what pathways and mechanisms might there be to achieve this-public and private .

A framework for examining conservation imperatives and management options in Australian ecosystems has been developed recently by Lunt *et al* . (2007) . This has shown that , with respect to temperate grasslands and grassy woodlands , management history drives state , and that state may be variously sensitive to variation in management inputs . The key conservation issues are therefore the sensitivity of grassland biota to grazing management (removal ; reduction ; tactical increase or introduction to achieve conservation aims) , the degree to which grazing impacts are reversible , and how sensitive landscapes are to manipulation of stock numbers . Removal of stock can have positive , neutral or negative conservation impacts . Neutral impacts are probably the norm , which gives managers flexibility .

In addition to a limited supply of high quality conservation lands , there are a number of major threatening processes : further fragmentation , pest invasions (plant ; animal) , altered fire regimes , increasing grazing pressure , climate change and water development which will affect grasslands via changes to temperature and rainfall , and via elevated CO<sub>2</sub> . However , changes in the global economy as a result of climate change may present options for conservation management including land and incentives and indeed cash payments to enable managing for optimal carbon sequestration . We outline emerging opportunities for this type of conservation action . e . g . though approaches being developed by multi-partner private-public partnerships .

### Reference

Lunt ID , Eldridge DJ , Morgan JW , Witt GB . 2007 . A framework to predict the effects of livestock grazing and grazing exclusion on conservation values in natural ecosystems in Australia . *Australian Journal of Botany* 55 , 401-415 .