



**THREAT ABATEMENT ADVICE
FOR ECOSYSTEM DEGRADATION, HABITAT LOSS AND SPECIES DECLINE
IN ARID AND SEMI-ARID AUSTRALIA DUE TO THE INVASION OF BUFFEL
GRASS (*Cenchrus ciliaris* AND *C. pennisetiformis*)**

This threat abatement advice reflects the best available information at the time of development (October 2014)

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To provide information updates please email weeds@environment.gov.au

Purpose

The purpose of this threat abatement advice is to identify key actions and research to abate the threat of ecosystem degradation, habitat loss and species decline in arid and semi-arid Australia due to the invasion of buffel grass (*Cenchrus ciliaris* and *C. pennisetiformis*¹). Buffel grass comprises a suite of species and ecotypes native to Africa, Western and Southern Asia that are now rapidly colonising arid ecosystems in Australia. Abatement of this threat can help ensure the conservation of biodiversity assets including threatened species and ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Ramsar sites and properties on the World Heritage List. Other significant assets such as Indigenous cultural sites, state and territory listed assets and remnant vegetation would also be better protected.

This advice provides information and guidance for stakeholders at national, state, regional and local levels. It suggests on-ground activities that can be implemented by local communities, natural resource management groups or interested individuals such as landholders. It also suggests actions that can be undertaken by government agencies, local councils, research organisations, industry bodies or non-government organisations.

The intention of this advice is to highlight those actions considered through consultation to be of highest priority and which may be feasible, rather than to comprehensively list all actions which may abate the threat and impacts posed by buffel grass. Relevant groups or individuals may determine their capacity to undertake the abatement activities included in this advice. The Australian Government acknowledges the complexity of dealing with this threat, as many pastoralists in rangeland Australia still value buffel grass for its production and economic values.

¹ This advice includes *Cenchrus pennisetiformis* (Cloncurry, white or slender buffel grass) on the basis that it may become a greater threat than *C. ciliaris* in southern Australia. Other *Cenchrus* species with potentially major impacts in Western Australia include *C. setiger* (birdwood), *C. echinatus* (burrgrass) and *C. biflorus* (Gallon's curse).

Description of the threat

Buffel grass species are high-biomass tussock grasses that are generally long-lived, deep-rooted and able to out-compete native vegetation. They can flower and fruit rapidly following rainfall for prolonged periods and produce a large amount of seed which disperses easily. They can be tolerant to drought, fire and grazing and can naturalise on a wide range of soil types and landscapes.

Because of these qualities, buffel grass is important to many rangeland pastoralists. Unfortunately, it can impact directly on biodiversity values, for example through competition, and indirectly through increasing the frequency and intensity of fires. These hotter fires can affect groundcover vegetation (including bush foods important to Indigenous communities) and carry into the canopy of keystone arid zone trees such as river red gums (*Eucalyptus camaldulensis*), corkwoods (*Hakea* species) and beefwoods (*Grevillea striata*) with flow-on effects to other plants and animals. They can also increase the risk of damage to infrastructure and cultural sites.

When buffel grass is dense it can dominate light and space, reducing opportunities for native vegetation establishment. Even at lower densities buffel grass may reduce soil nitrogen, exhaust the mineral pool and inhibit plant regeneration and growth through competition and allelopathic suppression. Buffel grass can aggressively colonise riparian habitats, displacing native vegetation. Infestation of water points such as soakages and rock holes can impede access to sites of Indigenous cultural significance. Buffel grass is considered a 'transformer weed' of the Australian rangelands due to its ability to transform the basic attributes of habitats. Many consider it to be the most debilitating weed of natural ecosystems in arid and semi-arid Australia where it can directly or indirectly displace and threaten a large number of native and endemic plants and animals.

Detail on buffel grass biology, growing conditions, establishment and spread can be sourced from items in the resources section of this document.

Outside of arid and semi-arid Australia, other high biomass and flammable introduced grasses, including gamba grass (*Andropogon gayanus*) and perennial mission grass (*Cenchrus polystachios*), have been listed under the EPBC Act as part of a key threatening process in northern Australia. A [threat abatement plan](#) has been prepared for this key threatening process.

Buffel grass and legislation in Australia

Commonwealth legislation

[Ecosystem degradation, habitat loss and species decline in arid and semi-arid Australia due to the invasion of buffel grass \(*Cenchrus ciliaris* and *C. pennisetiformis*\)](#) was nominated as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Threatened Species Scientific Committee considered the nomination in 2012 and 2013 and noted that this threat is recognised in the overarching key threatening process 'Novel biota and their impact on biodiversity' and therefore will not be listed as a separate key threatening process. The

Committee recommended the development of a specific threat abatement advice to address the threat.

[Novel biota and their impact on biodiversity](#) is listed as a key threatening process under the EPBC Act. Novel biota refers to organisms that are new to an ecosystem, and the scope of this broader key threatening process covers all invasive species including weeds. It is eligible for listing because:

- it could cause native species to become eligible for listing as threatened under the EPBC Act, and
- it adversely affects the population numbers, habitat quality and geographic distribution of listed threatened species and ecological communities through predation, herbivory, competition, mortality and habitat loss and degradation.

State/territory legislation

The South Australian Government has declared buffel grass [a weed under the *Natural Resources Management Act 2004*](#).

In New South Wales it is included in the key threatening process listed under the *Threatened Species Conservation Act 1995*, [Invasion of native plant communities by exotic perennial grasses](#).

Threat abatement actions

This threat abatement advice aims to provide information and guidance to abate the threat of ecosystem degradation, habitat loss and species decline in arid and semi-arid Australia due to the invasion of buffel grass (*Cenchrus ciliaris* and *C. pennisetiformis*). To most efficiently use available resources, it is necessary to identify the important ecosystems, habitats and species that need protecting. For the purposes of the Australian Government, these are the biodiversity assets listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). There may also be Indigenous cultural sites and state/territory, regional and/or local biodiversity assets that should be identified to help prioritise management activities.

To manage the threat, improving our understanding of the extent, spread pathways and impacts of buffel grass is essential, as is the design of tools, systems and guidelines to help protect areas containing high priority biodiversity assets. All stakeholders will need to work together to implement coordinated, cost-effective on-ground management strategies. This should include habitat restoration, monitoring and reporting on the effectiveness of management programmes where resources allow. Raising awareness of the impacts of buffel grass among stakeholders and building capability to implement solutions will improve the likelihood of successful abatement of the threat. Some actions that have been identified through consultation as being most relevant and necessary are listed below.

Actions

Responsible parties:

- Australian Government through coordination, communication, funding and policy development
- State and territory governments through coordination, communication, funding and policy development
- Land managers – includes all managers of land from national to local scale, indigenous groups, councils, Natural Resource Management groups, pastoralists.
- Research organisations.
- Industry groups – includes the pastoral and tourism industries and any other relevant industry.

General/overarching actions	Responsible parties
Implement the 2015 Australian Weeds Strategy.	Australian Government / state and territory governments / land managers
Implement priority actions in state and territory strategies related to asset protection and weed management.	State and territory governments
Establish, maintain and participate in a national buffel grass taskforce to coordinate management at a national level.	Australian Government / state and territory governments / land managers / industry groups

1. Prevent further introductions of buffel grass	
Work with the Invasive Plants and Animals Committee to encourage state and territory weed declarations for <i>Cenchrus ciliaris</i> , <i>C. pennisetiformis</i> and any new varieties or strains of buffel grass.	Australian Government / state and territory governments
Seek national restriction of the development, introduction, release, sale, movement and propagation of <i>Cenchrus ciliaris</i> , <i>C. pennisetiformis</i> and any new varieties or strains of buffel grass.	Australian Government / state and territory governments
Investigate harmonisation of legislation, strategies and procedures for monitoring and surveillance of inter/intra-jurisdictional invasion pathways and management of outbreaks.	Australian Government / state and territory governments
Prevent the introduction and development of new genetic material (including closely related species that may hybridise with buffel grass) which would increase the invasive potential of existing buffel grass populations.	Australian Government / state and territory governments
2. Guide and support relevant buffel grass research	
Improve knowledge of national buffel grass distribution and potential future distribution using a standardised mapping methodology.	Australian Government / state and territory governments / research organisations
Increase understanding of the extent and impact of buffel grass infestations.	Australian Government / state and territory governments / research organisations

Promote and support research comparing the productivity of native pasture grasses with buffel grass in different landscapes and seasons e.g. pasture rundown, decline in nutritional value and cattle productivity over the long term.	State and territory governments / research organisations / industry groups
Promote and support research on buffel grass biology and management, including biological control. Focus particularly on the development of optimal techniques for excluding, limiting or removing buffel grass from areas containing biodiversity assets.	State and territory governments / research organisations / industry groups
Promote and support research into limiting the competitive advantage of buffel grass over undisturbed native vegetation.	State and territory governments / research organisations / industry groups
Develop tools, systems and guidelines for effective management of buffel grass and protection of assets, including early detection, eradication where feasible and restoration of areas once buffel is removed.	State and territory governments / research organisations / industry groups
Promote and support research to identify species that buffel grass threatens with extinction in the wild and the timeframe within which extinction could occur. This will provide critical information about which species need to be considered for in-situ and ex-situ conservation efforts.	Australian Government / state and territory governments / research organisations
3. Identify and prioritise key assets and areas for strategic management	
Identify and prioritise geographic areas requiring protection, based on the presence of biodiversity and Indigenous cultural assets and the current level of threat from buffel grass in combination with other	Australian Government / state and territory

threats.	governments / land managers
4. Reduce the establishment and spread of buffel grass, particularly into areas containing biodiversity assets	
Promote information on weed spread prevention to Traditional Owners, pastoralists, the mining and petroleum sector, tourists, managers of transport corridors and other land users i.e. promote vehicle, fodder, stock and plant hygiene. Develop guidelines for roadworks around communities for reducing the risk of buffel grass spread.	State and territory governments / land managers / industry groups
Encourage/undertake early, persistent eradication where this is still feasible.	State and territory governments / land managers / industry groups
Implement state, territory and regional priorities related to invasive species or to the recovery of threatened species and ecological communities where the impacts of buffel grass pose a threat.	State and territory governments / land managers / industry groups
Minimise the spread of buffel grass by natural means, especially water.	Land managers / industry groups
Identify and prioritise areas for exclusion, elimination or control of buffel grass across Australia and prioritise invasion pathways for surveillance and control.	State and territory governments / land managers / industry groups
Keep buffel grass out of conservation reserves and Indigenous Protected Areas where it is absent or sparse, prioritising areas where there is a significant risk of incursion and where important biodiversity or	State and territory governments / land

Indigenous cultural assets are/would be threatened by buffel grass.	managers
5. Support and facilitate coordinated on-ground management in high-priority areas	
Develop guidelines to minimise the inadvertent spread of buffel grass by human activity and stock movements. Implement recommended actions, particularly in areas of high conservation value.	State and territory governments / land managers
Destroy and monitor outliers, new incursions and infestations threatening biodiversity and Indigenous cultural assets.	State and territory governments / land managers
Contain populations of buffel grass that cannot be eradicated to protect biodiversity and Indigenous cultural assets.	State and territory governments / land managers
Implement relevant actions in national and state/territory recovery plans.	Australian Government / state and territory governments / land managers
Implement relevant actions in conservation advices for ecological communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .	Australian Government / state and territory governments / land managers
Conduct ex-situ protection of threatened flora and fauna species through the National Seed Bank , Australian Seed Bank Partnership , zoos and wildlife sanctuaries.	Australian Government / state and territory governments

Conduct in-situ protection of threatened flora and fauna species through conservation agreements, bush regeneration and buffel grass control activities (integrated approach).	Australian Government / state and territory governments / land managers
Improve management of remnant vegetation to help prevent the establishment of buffel grass.	Land managers
Support Traditional Owners, community groups and others that are effectively controlling buffel grass to search for, document and manage existing and new infestations of buffel grass.	State and territory governments / land managers
6. Raise awareness of the impacts of buffel grass	
Promote awareness of the impacts of buffel grass to Traditional Owners, land managers (including the mining and petroleum sector, managers of transport corridors), community groups, tourists, industry stakeholders and the general public and encourage their advocacy of the issue. Do so in a way that is relevant to the community and the local context, i.e. using culturally appropriate language and materials.	Australian Government / state and territory governments / land managers / industry groups
Inform land owners, users and managers of the urgent need to address buffel grass incursions immediately through determined and thorough mapping and treatment, particularly in riparian zones (once established, buffel grass is very difficult/impossible to control).	State and territory governments / land managers
Support land managers to identify threatened biodiversity and Indigenous cultural assets on their land and support the preparation and implementation of management plans for buffel grass and recovery of the asset.	State and territory governments / land managers
Promote awareness within the pastoral industry of the risks and costs associated with the use of buffel grass, including risk to life, property and tree fodder, depletion of soil nutrients, decline in buffel grass	Australian Government / state and territory governments / land

nutritional value over the long term and transformation of pastoral land to a buffel grass monoculture.	managers / industry groups
Promote awareness to policy-makers, decision-makers and others of the impacts of buffel grass on Traditional Owners and on their cultural practices.	Australian Government / state and territory governments / land managers / industry groups
7. Build capability among stakeholders to abate the threat	
Develop and maintain capability to detect and manage local infestations promptly.	State and territory governments / land managers / industry groups
Develop and promote integrated weed management to maximise benefits of buffel grass control.	State and territory governments / land managers / industry groups
Actively involve Traditional Owners, land managers and the community in buffel grass management.	Australian Government / state and territory governments / land managers / industry groups
Work collaboratively with stakeholders and Traditional Owners to expand and support positive actions in their progress to address the buffel grass threat.	Australian Government / state and territory governments / land

	managers / industry groups
Support community groups, Indigenous groups, land managers and other stakeholders that are effectively controlling buffel grass, share information on best practice management and promote success stories to other communities and stakeholders.	State and territory governments / land managers / industry groups
Ensure threat abatement methods and weed control operations do not themselves threaten biodiversity or Indigenous cultural assets.	State and territory governments / land managers / industry groups
8. Monitor, evaluate and report on the efficacy of management programmes	
Encourage monitoring and reporting at all levels to help with understanding the efficacy of programmes and to share success and areas for improvement.	State and territory governments / land managers / industry groups

Resources

Author	Year	Title or description	Further details
Biosecurity SA, Department of Primary Industries and Regions South Australia	2012	South Australia Buffel Grass Strategic Plan 2012–17: A plan to reduce the weed threat of buffel grass in South Australia	
Bonney S	2013	The effect of buffel grass (<i>Cenchrus ciliaris</i>) invasion on ant communities in central Australia	BSc (Hons) thesis, Charles Darwin University, Alice Springs.
Director of National Parks	2010	Uluru-Kata Tjuta National Park Management Plan 2010–2020	Acknowledges buffel grass as the most threatening weed in the park and includes relevant policies and actions.
Fensham RJ, Donald S and Dwyer JM	2013	Propagule pressure, not fire or cattle grazing, promotes invasion of buffel grass <i>Cenchrus ciliaris</i>	Journal of Applied Ecology 2013, 50, 138–146
Ferdinands K, Setterfield S, Clarkson J, Grice A and Friedel M	2010	Embedding economics in weed risk management to assess contentious plants	
Firn J, Martin T, Walters B, Hayes J, Nicol S, Chades I, and Carwardine J	2013	Priority threat management of invasive plant species in the Lake Eyre Basin	CSIRO Climate Adaptation Flagship Working paper No. 17 (CSIRO and Queensland University of Technology). http://www.csiro.au/organisation-structure/flagships/climate-adaptation-flagship/caf-working-papers

Friedel M, Bastin G, Brock C, Butler D, Clarke A, Eyre T, Fox J, Grice A, van Leeuwen S, Pitt J, Puckey H and Smyth A		Developing a research agenda for the distribution and rate of spread of buffel grass (<i>Cenchrus ciliaris</i>) and identification of landscapes and biodiversity assets at most risk from invasion	
Friedel M, Marshall N, van Klinken R and Grice A	2009	Quantifying costs and benefits of buffel grass	http://lwa.gov.au/node/2585
Friedel M, van Klinken R, Grice A and Marshall N	2009	Benefits and costs of buffel grass: Understanding perceptions can contribute to policy development	Land & Water Australia (based on the report <i>Quantifying costs and benefits of buffel grass</i>)
Friedel M, Puckey H, O'Malley C, Waycott M, Smyth A & Miller G	2006	Buffel grass: both friend and foe: An evaluation of the advantages and disadvantages of buffel grass use, and recommendations for future research	A report to the Desert Knowledge Cooperative Research Centre on the dispersal, impact and management of buffel grass (<i>Cenchrus ciliaris</i>) in desert Australia
Friedel MH, Grice AC, Marshall NA, van Klinken RD	2011	Reducing contention amongst organisations dealing with commercially valuable but invasive plants: The case of buffel grass	
Grice A, Friedel M, Marshall N and van Klinken R	2012	Tackling contentious invasive plant species: a case study of buffel grass in Australia	
Grice A, Friedel M, Setterfield S, Ferdinands K, Clarkson J, Rolfe J, MacLeod N	2011	Best Practice for Making Strategic Decisions About Invasive Plants of Commercial Value	

Marshall NA, Friedel M, van Klinken RD, Grice AC	2010	Considering the social dimension of invasive species: the case of buffel grass	
van Klinken R, Friedel M and Grice A	2006	Perennial pasture conflicts: is there a way through?	
Government of South Australia	2015	Declared Plant Policy – Buffel Grass (<i>Cenchrus ciliaris</i> and <i>C. pennisetiformis</i>)	
Government of the Northern Territory – Department of Land Resource Management		Buffel Grass Management Guide for Central Australia	
Marshall V, Ostendorf B and Lewis M	2013	Habitat suitability and susceptibility modelling for strategic control of invasive buffel grass, South Australia	Spatial Information Group, School of Earth and Environmental Sciences, The University of Adelaide
McKinney MA, Schlesinger CA and Pavey CR	2014	Foraging behaviour of the endangered Australian skink (<i>Liopholis slateri</i>)	Australian Journal of Zoology, 2014, 62, 477–482
Miller G, Friedel M, Adam P and Chewings V	2010	Ecological impacts of buffel grass (<i>Cenchrus ciliaris</i> L.) invasion in central Australia – does field evidence support a fire-invasion feedback?	The Rangeland Journal, 2010, 32, 353–365
Schlesinger C, White S and Muldoon S	2013	Spatial pattern and severity of fire in areas with and without buffel grass (<i>Cenchrus ciliaris</i>) and effects on native vegetation in central Australia	Austral Ecology 2013, 38, 831–840
Smyth A, Friedel M and O'Malley C	2009	The influence of buffel grass (<i>Cenchrus</i>	The Rangeland Journal, 2009, 31, 307–

		ciliaris) on biodiversity in an arid Australian landscape	320
Tschirner K, Read JL, Graham JK and Ward MJ	2012	Alinytjara Wilurara Buffel Grass Operational Strategy	Department of Environment, Water and Natural Resources, South Australia
Young L	2011	The effects of the invasive grass, <i>Cenchrus ciliaris</i> (buffel grass), on the habitat use and behaviour of birds in semi-arid Central Australia	BSc (Hons) thesis, Charles Darwin University, Alice Springs
Young L and Schlesinger C	2014	Habitat use and behaviour of birds in areas invaded by buffel grass (<i>Cenchrus ciliaris</i> L.) and in restored habitat	Wildlife Research, 2014, 41, 379–394
Australian Government		Species of National Environmental Significance	The Species of National Environmental Significance Database contains map summaries which provide general information on the distribution of species related to the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . Species covered by the database include threatened and migratory species.
Australian Government		Species Profile and Threats (SPRAT) Database (recovery plans adopted under the EPBC Act)	
Australian Government		Threatened species and ecological	

		communities – publications	
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