



Invasion of native plant communities by exotic perennial grasses as a key threatening process – *an overview*

The NSW Scientific Committee, an independent body of scientists, has made a Final Determination to list the “Invasion of native plant communities by exotic perennial grasses” as a Key Threatening Process under the *Threatened Species Conservation Act 1995* (TSC Act).

1. Why is the ‘Invasion of native plant communities by exotic perennial grasses’ a threat to biodiversity?

Since 1788, many perennial grass species have been introduced to Australia. Some species have adverse impacts on biodiversity by invading native plant communities and displacing native species. Some exotic perennial grasses are recognised as weeds. For example, the Commonwealth Government has listed serrated tussock and Chilean needlegrass as two of 20 Weeds of National Significance. In NSW, these species and pampas grass, giant Parramatta grass, African lovegrass and giant rat's tail grass have been listed as noxious weeds for parts of NSW under the *Noxious Weeds Act 1993*¹.

2. What are ‘exotic perennial grasses’?

Exotic perennial grasses are those that are not native to NSW and have a life-span of more than one growing season. More than a hundred species of exotic perennial grasses occur in New South Wales. A relatively small number of these perennial grasses threaten native plant communities, and it is these species which are of concern. Exotic perennial grasses of special concern include *Hyparrhenia hirta* (Coolatai grass), *Cortaderia* spp. (pampas grasses), *Sporobolus fertilis* (giant Parramatta grass), *Nassella neesiana* (Chilean needlegrass), *Nassella trichotoma* (serrated tussock) and invasive forms of *Eragrostis curvula* (African lovegrass). Some other perennial grasses that may invade native plant communities (in alphabetical order) include *Agrostis capillaris* (browntop bent), *Andropogon virginicus* (whisky grass), *Cenchrus ciliaris* (buffel grass), *Chloris gayana* (Rhodes grass), *Ehrharta erecta* (panic veldtgrass), *Melinis minutiflora* (molasses grass), *Panicum repens* (torpedo grass), *Paspalum urvillei* (Vasey grass), *Pennisetum clandestinum* (kikuyu), *Phalaris aquatica* (phalaris), *Setaria sphacelata* (South African pigeon grass), *Sporobolus natalensis* (giant rat's tail grass) and *Urochloa mutica* (Para grass). Refer to Table 1 for further information.

¹ For further information on noxious weeds contact your local council or NSW Agriculture. The NSW Agriculture website provides information on noxious weeds (www.agric.nsw.gov.au).

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3. What are the impacts of some exotic perennial grasses on biodiversity?

Increasing evidence that some perennial grass species have significant adverse impacts on biodiversity has led to the listing of “Invasion of native plant communities by exotic perennial grasses” as a key threatening process. A few examples follow:

- Coolatai grass grows vigorously, forming an almost complete monoculture and replacing native grass and wildflower species. It tolerates drought, heavy grazing and many herbicides. It has invaded large areas of grassy woodlands and native pastures in north-west NSW and is spreading rapidly in other regions.
- Chilean needlegrass has several features which give it a competitive advantage over many native species, such as its ability to produce a large, long-living seed bank, high survival of seedlings, tolerance to drought and effective animal-borne and water-borne dispersal mechanisms for seeds.
- Serrated tussock infests more than a million hectares in southern Australia, but has the potential to spread over a much larger area. It invades native grasslands, grassy woodlands, dry forests and rocky shrublands. Serrated tussock forms large tussocks with individual plants capable of producing more than 10,000 seeds annually. Some seeds remain viable in the soil for more than 10 years. Mature plants droop across the ground smothering other species.
- Pampas grass readily tolerates saline conditions, salt spray, drought, periodic inundation, severe frosts and strong winds. It can grow in a wide range of soil conditions and light conditions, from shaded areas through to full sunlight. Pampas grass is an aggressive coloniser and can form dense stands which prevent other plants from growing. Individual flower heads produce more than 100,000 seeds, and wind may disperse seed for several kilometres.
- Perennial grasses, such as perennial veldtgrass, pampas grass, Coolatai grass and buffel grass, produce large amounts of plant matter that dries quickly and causes fuel loads to increase. This fuel results in fire regimes that favour the spread of these perennial grasses. Hotter and more frequent fires may lead to changes in the structure of the vegetation and in some cases to local extinctions of certain plant and animal species.
- Species such as Coolatai grass, Chilean needlegrass, serrated tussock, and invasive forms of African lovegrass are undesirable in pasture because of their low palatability to stock or low nutritional value at certain times of the year.
- On Montague Island, the proliferation of kikuyu interferes with the nesting of adult fairy penguins. Kikuyu forms dense mats across the surface of the ground and blocks the burrow entrances. Consequently, some chicks die of starvation.
- In certain situations, phalaris spread from pastures, drainage ditches and road verges into adjacent native vegetation. Dense stands of phalaris can smother native ground plants and reduce the growth of young shrubs and trees.

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4. Which native ecological communities and species are threatened by exotic perennial grasses?

Several endangered ecological communities are threatened by exotic perennial grasses. Examples include the following:

- White Box Yellow Box Blakely's Red Gum woodland is threatened by Coolatai grass. Coolatai grass dominates large areas of pasture, roadsides, travelling stock routes and areas of remnant vegetation in the North Western Slopes, especially in the Manilla area north of Tamworth.
- Serrated tussock, African lovegrass and Chilean Needlegrass are a major threat to native grasslands, particularly the endangered communities 'Natural Temperate Grasslands of the Southern Tablelands of NSW and the ACT' and 'Bega Dry Grass Forest'.
- In the Sydney area, pampas grass threatens 'Duffys Forest Ecological Community'. Threatened species at risk include *Persoonia mollis* and the orchid *Microtis angusii*.

5. Aren't some exotic perennial grasses important pasture and horticultural species?

Perennial grasses such as phalaris are important components of pastures in many areas of the tablelands and higher rainfall areas of the western slopes. They are valued because of their productivity under grazing, and the amount and nutritional value of the herbage they produce. When grown in swards containing one or more complementary species, for example annual or perennial legumes, they also resist invasion by weed species such as vulpia and thistles.

Kikuyu is an important pasture species for dairy cattle in some coastal areas and is used widely as a lawn.

Pastures containing perennial grasses have important environmental benefits – in comparison with pastures and crops based on annual species they reduce deep drainage (groundwater recharge), and thereby reduce the development of dryland salinity. Pastures based on perennial grasses also have reduced the rates of soil acidification.

6. Has anyone else recognised 'Invasion of native plant communities by exotic perennial grasses' as a threat to biodiversity?

The Commonwealth Government has developed a list of Weeds of National Significance, which places serrated tussock and Chilean needlegrass among the 20 weeds of National Significance in Australia. National Strategies have been developed for both these weed species.

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In NSW, the following species are listed as noxious weeds for parts of NSW under the *NSW Noxious Weeds Act 1993*:

- pampas grass,
- African lovegrass,
- Chilean needlegrass,
- giant Parramatta grass, and
- giant rat's tail grass.

7. What is a 'Key Threatening Process'?

A key threatening process is a recognised threat to biodiversity. It is listed under the NSW Threatened Species Conservation Act 1995. No regulations or restrictions are triggered by the listing of a key threatening process.

For more information on key threatening processes, see the NPWS website:
www.nationalparks.nsw.gov.au/npws.nsf/Content/Key+threatening+processes

8. How does the listing of the key threatening process affect me?

The listing of the key threatening process does not directly affect private landholders. All current regulations regarding routine agricultural and horticultural activities remain in place.

The legislative framework relating to the development consent process under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) remains unchanged and this key threatening process will need to be considered in Assessments of Significance (under Section 5a of the EP&A Act). All current regulations regarding agricultural and horticultural activities remain in place and private landholders are not required to alter their current practices as a result of the final determination.

9. Will a threat abatement plan now be prepared?

Yes. After the Scientific Committee has made a final determination to list a key threatening process, the NPWS has 3 years to prepare a threat abatement plan. The purpose of a threat abatement plan is to manage and mitigate the adverse impacts of the threat on biodiversity. A threat abatement plan must also consider any social and/or economic consequences of the actions it specifies. Any adverse consequences of the plan must be minimised.

In preparing a threat abatement plan for exotic perennial grasses, the NPWS is likely to take the first step of consulting with:

- NSW Agriculture
- NSW Department of Infrastructure, Planning and Natural Resources
- the NSW Noxious Weeds Advisory Committee
- the agricultural and horticultural industries
- rural groups such as NSW Farmers' Association

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During the development of a threat abatement plan, methods to reduce the impact of the process will be discussed and there will be extensive consultation with stakeholders. The Threatened Species Social and Economic Advisory Committee will provide advice on the likely social and economic impacts of the proposed actions and the analysis of social and economic issues within the threat abatement plan.

10. How would a threat abatement plan affect private landholders and other interested groups?

In preparing the threat abatement plan and developing actions, the NPWS will work closely with NSW Agriculture and local control authorities to address the impacts of pasture weeds, such as serrated tussock, Chilean needlegrass, African lovegrass and Coolatai grass.

We will ensure a balanced and pragmatic management approach is adopted. There will be extensive consultation with the urban and rural community, agricultural industry bodies, the landscaping industry, state and local government agencies and other stakeholders.

Some perennial grasses have significant agricultural and/or environmental benefits. A threat abatement plan will not prevent the use of important agricultural grass species. However, it may recommend guidelines to minimise or prevent harm to native vegetation, particularly in areas of high conservation significance.

Actions that may be considered in a threat abatement plan include the following:

- development of best-practice guidelines for the use of specific perennial grasses
- Investigation of appropriate control and prevention techniques in different vegetation types. For example, many perennial grasses chiefly spread along roadsides and it is likely that unnecessary disturbance of verges and other management practices contribute to this spread. Actions to be considered may include the development of best practice guidelines for roadside maintenance by the RTA and local government.
- Public education campaigns to raise awareness of the impacts of invasive perennial grass species
- Encouragement of nurseries to limit sale of certain ornamental grass species and guidelines for use in landscaping activities
- Research and development of alternative species in certain circumstances.

Information developed within the Threat Abatement Plan would be available for incorporation into Regional Vegetation Management Plans, and other regional planning mechanisms.

11. What will happen to the continued growing of exotic pasture grasses?

Some exotic grasses provide valuable feed for livestock and have other beneficial attributes. For example, pastures that include a perennial grass species such as phalaris help reduce the rate of soil acidification and the development of dryland

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salinity. Consul lovegrass, a form of African lovegrass *Eragrostis curvula*, has been used to control spiny burrgrass (*Cenchrus incertus* and *C. longispinus*). The positive attributes of some perennial grass species will be a major consideration in the development of any future threat abatement plan.

The NPWS will consult extensively with industry and stakeholder groups to discuss ways to mitigate the impact of invasive perennial grasses on biodiversity without adversely affecting pasture production or other commercial uses.

A threat abatement plan will NOT stop the cultivation of agriculturally important perennial grasses but will attempt to ensure that their cultivation has minimal impacts on biodiversity.

12. Where can I get further information on the final determination?

All the determinations made by the NSW Scientific Committee can be viewed in full at NPWS offices, and on the NPWS website:
www.nationalparks.nsw.gov.au/npws.nsf/Content/List+of+Scientific+Committee+determinations

If you don't have web access, you can call the NPWS Information Centre on 1300 361 967 for a copy of the determination or for information on threatened species.

For information on noxious weeds and their control, see the NSW Agriculture website: www.agric.nsw.gov.au and click on the "pests, diseases and weeds" icon.

For information on weeds generally, including Weeds of National Significance, see the website of the National Weed Strategy: www.weeds.org.au

The following websites may also have useful information on weeds:
National Weedbuster Week: www.weedbuster.info
Weed Management CRC: www.weeds.crc.org.au

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**Table 1: Summary of the grasses listed on the Final Determination (in alphabetical order) and their attributes.
Please note: These species are examples only and the list is not exhaustive.**

Scientific name	Common name	Biodiversity impacts	Adverse agricultural impacts	Current uses	Recognised weed	Reasons for introduction
<i>Agrostis capillaris</i>	Browntop bent	Displaces native vegetation	Considered a pasture weed	Turf		Probably as a turf species
<i>Andropogon virginicus</i>	Whisky grass	Bushland weed. Encroaches on native vegetation	Considered a pasture weed			Accidental as packing around whisky bottles
<i>Cenchrus ciliaris</i>	Buffel grass	Increases fire frequency and intensity. Displaces native vegetation and reduces fauna habitat.		Pasture in tropical and sub-tropical area		Pasture species and soil stabilisation
<i>Chloris gayana</i>	Rhodes grass	Replaces native vegetation at disturbed sites.		Pasture and soil stabilisation		Pasture species
<i>Cortaderia</i> spp.	Pampas grasses	Highly invasive, particularly of disturbed open sites. Changes the structure of vegetation community and fire regime. Has naturalised in dry coastal plains, heathlands, riparian areas, wetlands, eucalyptus forests and less frequently grasslands.			Listed as a noxious weed in NSW.	Garden plant of the 1970s. Planted for fodder, windbreaks and to stabilise soil.
<i>Ehrharta erecta</i>	Panic veldtgrass	Aggressive species which invades natural areas, including grassy woodlands, forests, heathlands and riparian areas		Harvested by pet owners to feed caged birds and guinea pigs.		Unsure – probably as an agricultural impurity.

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Scientific name	Common name	Biodiversity impacts	Adverse agricultural impacts	Current uses	Recognised weed	Reasons for introduction
<i>Eragrostis curvula</i>	African lovegrass	Invasive in disturbed areas, especially grasslands. Dominates the groundcover on low-nutrient soils. Has invaded heathlands, woodlands and grasslands in Victoria.	Mature plants of most forms are unpalatable to stock.	One form 'consul lovegrass' is used in agriculture for feed and to control spiny burr grass and blue heliotrope.	Noxious weed in NSW.	Used for pasture and soil stabilisation.
<i>Hyparrhenia hirta</i>	Coolatai grass	Highly invasive grass which replaces other species and is capable of invading relatively undisturbed vegetation. Rapidly spreading in many parts of NSW.	Reduces productivity of pastures as mature plants are unpalatable to stock. Generally considered undesirable but can perform well under heavy stocking pressure.			Introduced as a soil stabilising species.
<i>Melinis minutiflora</i>	Molasses grass			Fodder species.		Introduced for erosion control and fodder.
<i>Nassella neesiana</i>	Chilean needle grass	Highly invasive. Crowds out native plants, particularly in native grasslands, grassy woodlands and riparian areas.	Reduces agricultural production.		Listed as a Weed of National Significance. Noxious weed in 11 LGAs.	Accidental – probably as an agricultural impurity.

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Scientific name	Common name	Biodiversity impacts	Adverse agricultural impacts	Current uses	Recognised weed	Reasons for introduction
<i>Nassella trichotoma</i>	Serrated tussock	Highly invasive. Competes with and crowds out native species.	Reduces productivity of pastures. Unpalatable to livestock.		A Weed of National Significance. Noxious weed in parts of NSW.	Accidental – as an agricultural impurity.
<i>Panicum repens</i>	Torpedo grass	Invades bushland and disturbed sites in wet areas.				Unsure
<i>Paspalum urvillei</i>	Vasey grass	Invades bushland and disturbed sites.				Unsure
<i>Pennisetum clandestinum</i>	Kikuyu	Bushland, swamp and wetland weed. Replaces other species. Reduces fauna habitat.	Crop weed in some situations.	Common lawn and useful pasture species.	Described in Blood (2001).	Lawn, soil stabilisation and pasture species
<i>Phalaris aquatica</i>	Phalaris	Invasive to native grasslands, grassy woodlands, forests, wetlands and riverine environments. Increases risk of fire.	In certain situations can be toxic to stock.	Important pasture species. Used to reduce soil acidity and salinity.		Pasture species
<i>Sporobolus fertilis</i>	Giant Parramatta grass	Displaces native species and a fire hazard.	Reduces pasture productivity.		Noxious weed in NSW	Accidental - as an agricultural impurity
<i>Sporobolus natalensis</i>	Giant rat's tail grass	Displaces native species and a fire hazard.	Reduces pasture productivity.		Noxious weed in NSW	Accidental - as an agricultural impurity
<i>Urochloa mutica</i>	Para grass	Invades banks of streams and shallow water displacing native species.	Blocks irrigation channels. A weed of sugar cane.	Used as a pasture species.		Pasture species

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Relevant References:

- Anon (2001). *Weeds of National Significance Strategic Plan for Chilean Needle Grass (Nassella neesiana)*. National Weeds Strategy Executive Committee, Launceston.
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