

# STOPPING NSW'S CREEPING PERIL

A community call for action on weeds



*Bitou bush.  
A threat to 158 species.  
One of hundreds of weeds  
imperilling NSW's wildlife.*



**invasive**  
species council

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## A community call for action on weeds

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The Invasive Species Council is a national conservation group formed in 2002 to campaign for stronger laws, policies and programs to keep Australian biodiversity safe from weeds, feral animals and other invaders.

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# STOPPING NSW'S CREEPING PERIL

The following groups support the reforms outlined here



Australian Association of Bush Regenerators



Bird Observation & Conservation Australia



Bundara Bushcare Group



North Coast Environment Council



North East Forest Alliance

Oatley Flora and Fauna Conservation Society



Colo Committee



Quinkana Palaeontological Research

Razorback Environment Protection Society



Friends of Lane Cove National Park



Gloucester Shire Council



Sweetwater Action Group



Sydney Weeds Committees



Total Environment Centre

The Weed Society of New South Wales



Lake Macquarie Coastal & Wetlands Alliance



## Summary

Often pretty, sometimes useful, weeds can lurk benignly in gardens or paddocks for years or decades. But when the opportunity arises, fences and property boundaries are no barrier to their escape and invasion of the Australian bush. Those that flourish can do great damage, eliminating wildlife habitat, and destroying woodlands and wetlands.

Weed invasion imperils almost half of NSW's threatened biodiversity, more than any other threat besides land clearing. It is also the most costly natural resource management problem for farmers. There are enormous environmental and economic benefits in preventing and controlling plant invasions, and much more to be lost if we don't.

The groups endorsing this reform plan say it is time to stop the flow of new invasive plants into NSW, and to deal more effectively with the damage already being done to the environment and agriculture. The reforms are essential to achieve NSW's State Plan target of a reduction in the impact of invasive species by 2015. They include:

- Restricting new plant introductions to those assessed as low risk.
- Eradicating new invaders where feasible and preventing the spread of others into new areas.
- Controlling weeds to protect the environment and economy.
- Requiring a duty of care and implementing the 'polluter pays' principle.
- Using federal laws to address nationally significant weed threats.
- Increasing the priority of weed management to adapt to climate change.

- Developing governance arrangements that reflect the priority of weed threats for both the environment and agriculture, and provide for regional authority to implement weed plans.
- Providing resources sufficient to achieve priority outcomes.
- Supporting research and educational programs.

### Recommendation 1

**Restrict introductions to low-risk plants and manage other species on the basis of risk assessment**

- **New species:** Adopt a permitted list approach, requiring risk assessment of all new non-indigenous species not on a permitted list and allowing the sale and movement only of low-risk plants.
- **New varieties:** Apply risk assessment to new varieties of already introduced species to prevent the introduction of more invasive cultivars and hybrids or to limit the potential for combination with existing varieties to increase invasive risk.
- **Existing introductions:** Apply risk assessment to already-introduced species as basis for determining their status: regulatory (eg. prohibited, restricted, permitted) and management (eg. subject to eradication, containment, threat reduction, no control).
- **Risk assessment protocols:** Use protocols that are rapid, scientifically valid and precautionary. Facilitate public nomination of species for risk assessment.

### Recommendation 2

**Eradicate weeds where feasible and prevent spread into new areas**



***Lantana, a scourge across more than 4 million hectares of eastern Australia, is a threat to more than a thousand native plant species.***

Photo: Joaquim Alves Gaspar  
<http://commons.wikimedia.org/wiki/File:LantanaFlowerLeaves.jpg>

- **Eradication:** Eradicate emerging or sleeper weeds where feasible, ensuring a timely response to maximise feasibility and limit costs.
- **Containment:** Direct weed control and regulation to contain the spread of weeds into new areas.
- **Development standards:** Develop enforceable standards for urban planning and development that limit the potential for weed spread, eg. restrict use of invasive species in

landscaping, reduce disturbance factors, and retain native vegetation.

### Recommendation 3

**Control weeds in a prioritised way to protect biodiversity and the economy**

- **Prioritisation:** Support the development of regional weed plans that focus control efforts on the highest priority biodiversity and economic outcomes, determined according to a transparent method. Ensure that control

efforts are supported with sufficient long-term funding and expertise to maximise effectiveness.

## Recommendation 4

### Require a duty of care and implement the 'polluter pays' principle

- **Duty of care:** Develop more rigorous duty of care provisions in law, requiring everyone to take reasonable and practicable measures to prevent unsafe introductions and weed spread.
- **Polluter pays:** Develop legal mechanisms, such as bonds and levies, by which those responsible for weed introductions and escapes are required to pay for or contribute to weed eradication and control.
- **Enforcement:** Promote compliance with weed laws and weed plans across all tenures by enforcing laws and providing technical and other support. Ensure that weed laws apply equally to all land managers, whether private or public.
- **Disclosure of weed status:** Require a weed inspection report for land sales to ensure potential buyers are aware of weed problems and to promote weed control to improve property values.

## Recommendation 5

### Use federal laws to address nationally significant weed threats

- **Federal environment laws:** List and regulate nationally significant weeds under the *Environment Protection and Biodiversity Conservation Act 1999* in categories that define national priorities for eradication, containment and control.
- **Federal biosecurity:** Strengthen biosecurity processes to restrict the importation of threats

to biodiversity and require risk assessment of new varieties of existing introductions. Develop funding arrangements for eradication of new incursions of nationally significant environmental weeds.

- **National weed protocol:** Develop a national protocol through the Council of Australian Governments to prevent the deliberate spread of weeds, and harmonise state/territory and federal laws.

## Recommendation 6

### Address weed threats as a priority measure for climate change adaptation

- **Climate change adaptation:** Adaptation programs should focus on weed management as a priority adaptation: (i) Reduce weed threats to support the capacity of native species to adapt to climate change; (ii) Manage invaders or potential invaders likely to benefit under climate change; (iii) Prevent new introductions, ensuring that responses to climate change such as cultivation of biofuels do not worsen invasive species problems.

## Recommendation 7

### Develop governance arrangements that reflect the priority of weed threats for both the environment and agriculture, and provide for regional authority to implement weed plans

- **Joint management across agencies:** Develop a cross-agency invasive species unit, involving representatives from agencies with environmental, agricultural and land management responsibilities.
- **Environmental and agricultural regulatory authority:** Provide authority to both the environment and primary industries ministers for regulation of weeds relevant to their

portfolio responsibilities.

- **Legal jurisdiction with environmental expertise:** Transfer jurisdiction for weed laws to the Land and Environment Court.
- **Capacity to implement regional weed plans:** Establish regional authorities based on the composition of current regional weed committees, and provide them with the legal, technical and resource capacity to oversee implementation of weed plans.
- **Weed management as core business:** Make weed control a reportable core business of all regulatory authorities with land management responsibility, with standardised weed mapping and reporting systems.

## Recommendation 8

### Provide resources needed to achieve priority outcomes

- **Needs assessment:** Undertake a 'standards of weed cover' assessment to establish the levels of funding necessary to deliver effective weed management in different NSW regions.
- **Funding model:** Develop a funding model for weed management by which to determine a fair level of contribution from landholders, governments and industries/businesses. This should include a reasonable contribution from the industries responsible for weed introductions.
- **Prioritisation:** Develop a prioritisation process to ensure that resources are transparently directed to where they are most needed and most effective, including a strong focus on prevention and eradication.
- **Capacity:** Strengthen the capacity of local governments and communities to undertake weed control that contributes to state and regional goals by providing sufficient

long-term funding, training and technical support.

- **Skills development:** Develop a program for skills development in weed management and bush regeneration for community volunteers and the unemployed involved in weed programs.

## Recommendation 9

### Support research into weed ecology and management

- **Research centre:** Federal and state/territory governments co-fund a national weeds research program that addresses national environmental research priorities, links researchers and provides policy advice.
- **Research funding:** The NSW Government develop a priority list of research projects and dedicate a proportion of weed management programs to priority research questions.

## Recommendation 10

### Develop educational programs that provide land managers with information to make weed-wise decisions

- **Labelling:** Require labelling of garden plants as a condition of sale – to include taxonomic identification, natural distribution, invasive status and any precautions that should be taken. This should be a national scheme.
- **Community education:** Undertake education programs to alert landholders and land managers to their responsibilities for weed control and about how to control particular weed priorities.

## Introduction

There must have been plenty of them about, growing up quietly and inoffensively, with nobody taking any particular notice of them ... and so the one in our garden continued its growth peacefully, as did thousands like it in neglected spots all over the world . . . it was some little time later that the first one picked up its roots and walked.

John Wyndham, *The Day of the Triffids*

Often pretty, sometimes useful, they can lurk benignly in gardens or paddocks for years or decades. But for the wild at heart, when the opportunity arises, fences and property boundaries are no barriers. Picked up by bird, beast or breeze, wafted on water or dumped by gardeners, they escape and set their roots in the Australian bush.

Those that flourish can do great damage. They don't prey on wildlife, but they eliminate wildlife habitat. They don't bulldoze woodlands or excavate wetlands, but they can just as surely destroy them. Out of place and out of control, weeds are a huge and growing threat to NSW.

Weeds are what is known as a 'wicked' problem: complex with no total solutions, engendering value conflicts, requiring multiple actions now to prevent damage that might not manifest until far in the future.

There are enormous environmental and economic benefits in preventing and controlling plant invasions, and much more to be lost if we don't. This is widely accepted but often ignored when it comes to government policies and programs.

The groups endorsing this reform plan say it is time to stop the flow of new invasive weeds into NSW, and to deal with the damage already being caused. Looming climate change increases this imperative. It can be done much better, and here we outline how.



Once sold widely, blue trumpet vine (*Thunbergia grandiflora*) is a serious environmental weed.

Photo: Photo: Badly Drawn Dad  
<http://www.flickr.com/photos/dhedwards/2812916770/>

### Seeking action, not just words

The NSW Government's natural resource management target for invasive species is 'by 2015 there is a reduction in the impact of invasive species'. This is meant to be achieved through the NSW Invasive Species Plan 2008-2015, with the four goals shown (boxed right). However, based on current trends the target probably won't be met.<sup>1</sup>

As conservationists, researchers, bush regenerators, funders and doers of weed control, the groups who endorse this reform plan are committed to achieving the four goals and believe that the goals can be achieved if accorded priority commensurate with the scale of the problems.

We need to avoid the fate of many plans and strategies – laudable in principle, but missing in action. This will require new approaches, building on what already works effectively and reforming what is not. It will require more resources, with the benefits far outweighing the additional costs.



Variegated thistle. Photo: Matthew Baker

### NSW Invasive Species Plan 2008-2015

#### GOAL 1: EXCLUDE – PREVENT THE ESTABLISHMENT OF NEW INVASIVE SPECIES

**Challenge:** The most effective way to minimise the impacts of invasive species is to prevent their initial incursion. The challenge is to identify species, thoroughly assess potential invasiveness and implement effective barriers to prevent their establishment.

#### GOAL 2: ERADICATE OR CONTAIN – ELIMINATE OR PREVENT THE SPREAD OF NEW INVASIVE SPECIES

**Challenge:** Invasive species have the ability to establish in new areas rapidly and successful control often corresponds directly with timely and rapid response. The challenge is to develop and deploy effective and efficient ways to eradicate or contain an introduced species before it becomes widespread.

#### GOAL 3: EFFECTIVELY MANAGE – REDUCE THE IMPACTS OF WIDESPREAD INVASIVE SPECIES

**Challenge:** Many invasive species are already widely established in NSW. The challenge is to manage or control these species to reduce their impact where benefits of control are greatest.

#### GOAL 4: CAPACITY – ENSURE NSW HAS THE ABILITY AND COMMITMENT TO MANAGE INVASIVE SPECIES

**Challenge:** Invasive species have very real and imminent implications for NSW's economy, environment and social well-being. The challenge is for NSW to have the knowledge, skills, resources and systems to address the impact of invasive species.

<sup>1</sup> NSW Government (2010).

## The need for reform

Along with invasive animals, land clearing and fire, weeds are one of the top threats to NSW's biodiversity.<sup>2</sup> They eliminate native plants, destroy wildlife habitat and compromise ecosystem processes such as fire and nutrient cycles. Weeds also undermine ecosystem services and cause enormous agricultural losses, wasting at least one in eight dollars of potential revenue.<sup>3</sup>

Weed invasion imperils at least 341 species (mostly plants) and 64 ecological communities listed as threatened in NSW.<sup>8</sup> Threatening 40% of the listed species and 89% of the endangered ecological communities, weeds rank second after land clearing as a threat.

But weeds are a far greater threat than even these figures suggest. There has never been a comprehensive assessment of their impacts, but one weed alone – bitou bush (*Chrysanthemoides monilifera rotundata*) – is known to threaten 158 native plant species.<sup>9</sup> Lantana (*Lantana camara*), a scourge over 4 million hectares in eastern Australia, threatens 1322 plant species and 158 animal species, including 10% of all NSW's listed threatened species.<sup>10</sup>

Lantana and bitou bush were both deliberately introduced, as were more than two-thirds of Australia's weeds.<sup>11</sup> Such follies are not confined to the past. Despite the enormous costs to our environment and economy, the deliberate spread of weeds continues. Fewer than 20% of NSW's environmental weeds are banned from sale in all or part of the state. While thousands of people labour mightily (and mostly voluntarily) to remove weeds from bushland, the same weeds are often being planted in local gardens.

The 26,000 exotic plant species in Australia



Cape Ivy. Photo: Andrew Cox

### Wicked weed stats for NSW

- **At least 1650 exotic plant species have become established in the wild.<sup>4</sup>**
- **Weeds make up about 25% of the total NSW flora and more than 20% of the flora in each region.<sup>5</sup>**
- **Since colonisation, an average 7.5 exotic species have established in the wild each year.**
- **About 340 weeds have significant impacts on the environment.<sup>6</sup> Most were deliberately introduced.**
- **More than 26,000 exotic plant species in Australia as well as thousands of native plants not indigenous to NSW can legally be sold and planted in NSW.<sup>7</sup> Just 43 weed species are banned from sale across the entire state, and another 30 in some part of NSW.**

(about 10% of the world's total plant species) include thousands of existing and potential invaders, and all but a few dozen can be planted in NSW without any legal constraints. These days we can't willy-nilly bulldoze native bushland or dump garbage and pollution there, but we are perfectly free to plant weeds in our gardens or paddocks that will just as surely destroy it decades in the future.



Blackberry (*Rubus fruticosus* species aggregate) is one of Australia's Weeds of National Significance, a threat to more than 20 threatened species and ecological communities in NSW. Photo: Matthew Baker

### Environmental costs of NSW weeds

**Threatened biodiversity:** Impacting at least 341 species (49% plant species and 23% animal species) listed as threatened and 64 (89%) ecological communities listed as endangered in NSW.<sup>12</sup> Weeds threaten plant species and ecological communities mostly by competition, and animal species mostly by habitat degradation.

**Threatening processes:** Lantana, bitou bush, Scotch broom, vines and scramblers, and exotic perennial grasses (in all, covering about 80 environmental weed species) are listed as NSW key threatening processes; escaped garden plants are a federal key threatening process.

**National parks:** The most common threat, affecting 91% of park area, a 'high to severe' threat for 48% of the total area.<sup>13</sup>

### Economic costs of NSW weeds

**Agriculture:** \$1.2 billion in lost production and control costs on NSW farms.<sup>14</sup> Weeds are the most costly natural resource management problem for NSW farmers: 78% suffer production losses and 32% report increased fire risk due to weeds. Average expenditure on weeds on NSW farms in 2006-07 was \$11,000.<sup>15</sup>

**State government expenditure:** About \$27 million (2009-10).<sup>16</sup>

**Local government expenditure:** \$20-30 million.

**Bush regenerators:** About \$4 million worth of voluntary labour.<sup>17</sup>

**Other:** Uncosted impacts on health (eg. allergies and respiratory illness<sup>18</sup>), loss of ecosystem services, increased fire risk (due to invasion of flammable weeds and increased biomass).

2 Coutts-Smith and Downey (2006).

3 The gross value of agriculture in 2004-05 was \$8.6 billion (NSW Government nd) and losses/costs due to weeds an estimated \$1.2 billion (NSW Farmers Association nd).

4 John Hosking, NSW Department of Industry & Innovation (pers. comm.)

5 Department of Environment Climate Change and Water (2009).

6 Department of Environment Climate Change and Water (2009); Downey et al. (2010).

7 There are an estimated 26,242 exotic plant species in Australia – most cultivated (Randall 2007) – and 73 species are banned from sale in at least some part of NSW.

8 Coutts-Smith and Downey (2006).

9 Department of Environment and Conservation (2006).

10 The National Lantana Management Group (2009).

11 Groves et al. (2005); Cook and Dias (2006).

12 Coutts-Smith and Downey (2006).

13 Department of Environment and Conservation (2005).

14 NSW Farmers Association (nd).

15 NSW Farmers Association (nd).

16 This is calculated as follows: (i) \$8.5 million in grants to local government (NSW Government 2009-10 budget); (ii) \$16.5 million for weed control in national parks – about half of the \$33 million budget for controlling invasive species in national parks; (iii) \$2 million granted to Catchment Management Authorities (30% of budget allocated to invasive species control by CMAs).

17 Sydney Weeds Committees (2009).

18 Sinden et al. (2004).

It doesn't make environmental or economic sense to allow such risky behaviours. Just because we can't precisely predict consequences or put a cost to environmental damage, and just because damage can take decades to manifest, does not make it any less serious. With lax laws we guarantee multiplying weed threats – as if we didn't already have enough.

Many weeds are at an early stage of invasion. But because they are a low priority, we are missing many opportunities to eradicate or control them before they become entrenched and spread much further. This short-sightedness will leave our children and grandchildren with an even bigger weed mess.

## What needs to change

Overall, the weed threat in NSW is increasing, due to new weeds emerging and existing weeds proliferating. To achieve the 2015 target of a reduced weed threat, what needs to change?

### 1. Prevent new threats, including interactions with climate change

- Restrict new introductions to species assessed as low risk and prohibit the release of new varieties of existing introductions that would increase the risk of invasion.
- Eradicate newly established and sleeper weeds where feasible.

- Undertake weed management as a high-priority aspect of adapting to climate change.

### 2. Control existing weed threats

- Stop the deliberate spread of weed species.
- Recognise weed control as an essential service, and provide sufficient funding and institutional strength to tackle weed threats.
- Require and support land managers in both urban and rural areas to exercise a duty of care in preventing and controlling weed spread.
- Support research to fully assess weed impacts and develop effective management approaches.
- Develop educational programs, including plant labeling, to assist gardeners to make sustainable choices.
- Use best practice bush regeneration techniques to remove weeds from natural areas to avoid damage to biodiversity, soils and waterways.

Weed invasion is a big and growing problem, but much can be achieved. We need a new mindset about weeds, with weed prevention and control treated as an essential service on a par with other regulated activities such as protection of water supply, community health and road safety.



**Bridal creeper is rampant in Australian bushland, but uncommon in its native South African range.**

Photo: Matthew Baker

## Why weeds are biological victors

Humans give many weed species a passport to plant heaven: they liberate them from natural pathogens and predators, and plant them in large numbers in lots of habitats, sometimes selecting or breeding them for high productivity and wide tolerances.

The defensive chemicals some weeds produce may be extra powerful in their new environment because native plant-eaters have not evolved with them.

Many weed species are more successful in their introduced range than in their native range. For example, bridal creeper (*Asparagus asparagoides*) is rampant in Australian bushland, but uncommon in its native South African range.

## How weeds destroy our natural heritage

**Weeds compete with and eliminate native species and change ecosystem structure and function.**

- **Smotherers:** Exotic vines such as cat's claw (*Macfadyena unguis-cati*), Madeira vine (*Anredera cordifolia*) and kudzu (*Puearia lobata*) blanket native plants; sometimes the sheer weight of vines causes trees to collapse.
- **Gap grabbers:** Many weeds are fast germinators and can quickly fill gaps created by drought, fire, storms or clearing. Serrated tussock (*Nassella trichotoma*) colonises spaces in grasslands created by drought; lantana (*Lantana camara*) claims rainforest clearings.

- **Light hoggers:** Dense-leaved weeds such as willows (*Salix* spp.) and bitou bush (*Chrysanthemoides monilifera rotundata*) can shade out other plants and prevent growth.
- **Swampers:** Vigorous weeds like coolatai grass (*Hyparrhenia hirta*), lantana and camphor laurel (*Cinnamomum camphora*) can form vast monocultures, excluding all other species. Whole forests of camphor laurel are forming in some places.
- **Water chokers:** Aquatic weeds like alligator weed (*Alternanthera philoxeroides*) and cabomba (*Cabomba caroliniana*) fill creeks with a dense mass of stems and leaves, depleting oxygen and killing fish and other life.
- **Fire fuelers:** Large perennial grass invaders such as molasses grass (*Melinis minutiflora*) and shrubs like gorse (*Ulex europaeus*) can add flammable biomass to an environment, fueling more intense fires that favour the spread of these weeds and kill other species.
- **Ecosystem engineers:** Weeds can physically transform ecosystems, willows (*Salix* spp.) affecting stream hydrology, invasive pasture grasses changing fire cycles, marram grass (*Ammophila arenaria*) and bitou bush altering sand dune dynamics. Dominating weeds can greatly simplify habitat structures.
- **Pest harbours:** Blackberries (*Rubus* spp.) and gorse provide haven for rabbits and foxes.



## State regulation & policy

There is an accepted hierarchy of effectiveness (including cost-effectiveness) in dealing with weeds:

**Prevention > eradication > control > management of entrenched threats**

Current approaches tend to take the converse of this hierarchy, with most policies and government programs directed to a proportion of well-established weed threats. There needs to be more focus on systematically preventing future weed problems, undertaking long-term, effective control of weeds threatening biodiversity and requiring all land managers to exercise responsibility.

### Recommendation 1

**Restrict introductions to low-risk plants and manage other species on the basis of risk assessment**

*Turn the tap off before you mop up the spill: The development of a list of permitted, non-invasive taxa ... could represent the most effective and timely response to the immediate threat posed by thousands of potentially invasive and unrestricted plant species.*

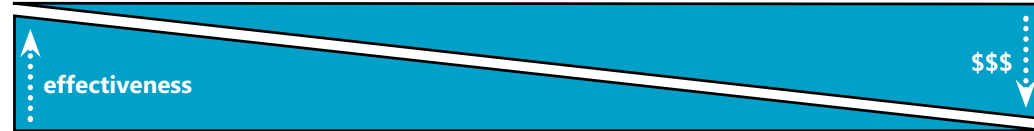
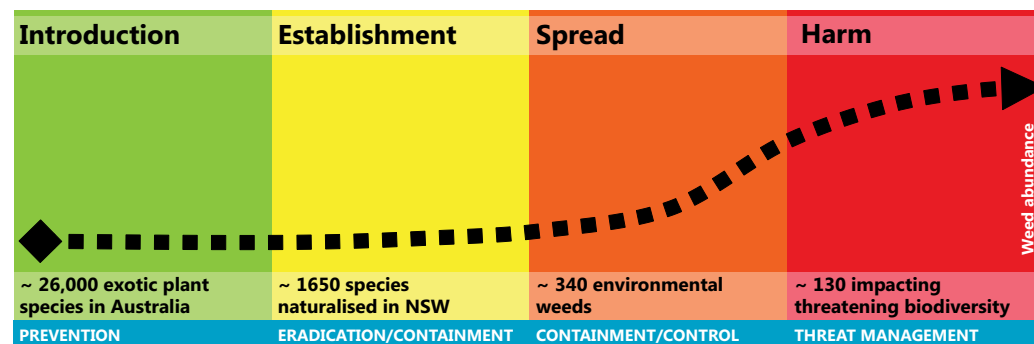
– Steve Csurhes, Rod Randall, Christian Goninon, Alice Beilby, Stephen Johnson and John Weiss, state government weed policy officers.<sup>19</sup>

The only feasible way to prevent new weed problems is to assess the weed risk of plants proposed for introduction into new areas, and permit the sale and movement only of those that present a low risk. This approach already operates for proposed new introductions to Australia and Western Australia. It involves identifying a permitted (white) list of species and prohibiting or requiring risk assessment of species not on that list.

All introductions of non-indigenous plants should be assessed for weed risk. This includes plants native to Australia but proposed for planting outside their natural range. Native weeds like golden wreath wattle (*Acacia saligna*) can be just as invasive as exotic weeds. Assessment should also apply to new varieties of existing introductions that could increase the weed risk.

There should also be assessment of existing introductions as the basis for determining management approaches to limit their threat to biodiversity or the economy.

- **New species:** Adopt a permitted list approach, requiring risk assessment of all new non-indigenous species not on a permitted list and allowing the sale and movement only of low-risk plants.
- **New varieties:** Apply risk assessment to new varieties of already introduced species to prevent the introduction of more invasive cultivars and hybrids or to limit the potential for combination with existing varieties to increase invasive risk.
- **Existing introductions:** Apply risk assessment to already-introduced species as the basis for determining their status: regulatory (eg. prohibited, restricted, permitted) and management (eg. subject to eradication, containment, threat reduction, no control).
- **Risk assessment protocols:** Use protocols that are rapid, scientifically valid and precautionary. Facilitate public nomination of species for risk assessment.



### Recommendation 2

**Eradicate weeds where feasible and prevent spread into new areas**

*Tomorrow's weeds are already here.*

– Tim Low, *Feral Future*<sup>26</sup>

Given the difficulties and costliness of weed regulation, it is highly worthwhile to eradicate potential weeds or those with limited spread, where feasible. But there are currently no state or national eradication programs for weeds in NSW. Removing weeds or potential weeds from the landscape is also important in the face of climate change, which will provide opportunities for new weeds. Where a weed is too well-entrenched for eradication, it may be possible to contain it by preventing its release in new areas and eradicating outlying populations.

When controlling weeds in natural areas, care must be taken to ensure that best practice bush regeneration techniques are used to avoid damage to biodiversity, soils and waterways.

- **Eradication:** Eradicate emerging or sleeper weeds where feasible, ensuring a timely response to maximise feasibility and limit costs.
- **Containment:** Direct weed control and regulation to contain the spread of weeds into new areas.
- **Development standards:** Develop enforceable standards for urban planning and development that limit the potential for weed spread, eg. restrict use of invasive species in landscaping, reduce disturbance factors, and retain native vegetation.

<sup>19</sup> Csurhes et al. (2006).

<sup>26</sup> Low (1999).

It seems remarkable that I can be fined several hundred dollars for littering, an act of environmental vandalism that can be fixed in ten seconds and generally causes no lasting damage, but those responsible for introducing plants and animals that pollute the nation forever and cost the Australian economy millions get off 'scott free'.

– Professor Hugh Possingham, Director of Ecology Centre, University of Queensland.

## Recommendation 3

### Control weeds in a prioritised way to protect biodiversity and the economy

Protection of NSW's biodiversity requires sustained weed control. With resources that will always be limited, it is vital to direct effort to the highest priorities, ensuring that the most effective methods are used and outcomes are monitored. Otherwise efforts can be poorly directed or wasted.

- **Prioritisation:** Support the development of regional weed plans that focus control efforts on the highest priority biodiversity and economic outcomes, determined according to a transparent method. Ensure that control efforts are supported with sufficient long-term funding and expertise to maximise effectiveness.

## Recommendation 4

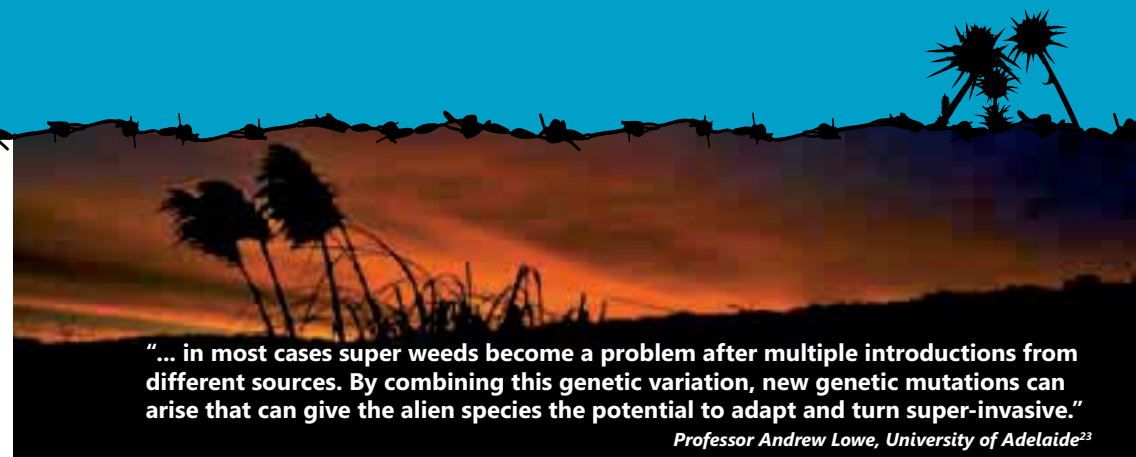
### Require a duty of care and implement the 'polluter pays' principle

Currently, taxpayers and private and public land managers are bearing the costs of weed 'biopollution'. Because many introductions are irreversible, it is important to cultivate a strong duty of care to prevent unsafe plantings and weed spread. It is only fair that those responsible for unsafe introductions and escapes should be required to contribute to eradication or control.

Applying the 'polluter pays' principle – that whoever causes environmental harm

should bear the costs of remediation – to weeds would drive much greater precaution. Mechanisms could include a requirement for bonds for the use of plants with a certain risk rating and a levy on the sale of non-indigenous species. It is also important to enforce weed laws and provide technical and other support so that land managers across all tenures are compelled and enabled to control weeds on their property.

- **Duty of care:** Develop more rigorous duty of care provisions in law, requiring everyone to take reasonable and practicable measures to prevent unsafe introductions and weed spread.
- **Polluter pays:** Develop legal mechanisms, such as bonds and levies, by which those responsible for weed introductions and escapes are required to pay for or contribute to weed eradication and control.
- **Enforcement:** Promote compliance with weed laws and weed plans across all tenures by enforcing laws and providing technical and other support. Ensure that weed laws apply equally to all land managers, whether private or public.
- **Disclosure of weed status:** Require a weed inspection report for land sales to ensure potential buyers are aware of weed problems and promote weed control to improve property values.



"... in most cases super weeds become a problem after multiple introductions from different sources. By combining this genetic variation, new genetic mutations can arise that can give the alien species the potential to adapt and turn super-invasive."

Professor Andrew Lowe, University of Adelaide<sup>23</sup>

## A stitch in time saves nine: prioritising prevention<sup>20</sup>

Among the greatest leaps forward for the Australian environment and agriculture was the 1997 reform of federal quarantine to require risk assessment of new exotic plants proposed for import into the country.

This has since prevented the importation of at least 1500 potential new invaders.<sup>21</sup> But if a potentially invasive plant species is already in Australia, it is not subject to federal risk assessment, and unless it is banned by particular states or territories it can be freely introduced into new areas (except in WA, which requires assessment of new introductions).

Due to lax laws, there are many thousands of invasive and potentially invasive plants that could cause damage over much larger areas than they currently do or become threats in the future.

Fewer than 200 weed species are currently regulated in some way in some part of NSW. All the other 26,000 or so exotic plant species in Australia can be freely sold and planted. This includes more than 3000 species already naturalised in Australia, and about 5000 species that are weedy overseas.

This permissive approach guarantees that new weeds will continue to establish.

The 'permitted list' system recommended here takes the opposite approach, banning all new introductions unless they are assessed as low risk.

It is the most feasible way to prevent new weed problems, and will save NSW taxpayers and landholders many millions of dollars in future.

## The invasive risks of new plant cultivars<sup>22</sup>

Plant breeders in Australia and overseas are developing new varieties of already weedy species to increase their productivity or tolerances (eg. of drought, frost, salinity). This is likely to exacerbate their weed threat. A kikuyu grass (*Pennisetum clandestinum*) breeding program, for example, is aiming to produce varieties that have shade and drought tolerance and better disease resistance.<sup>24</sup>

Kikuyu is an environmental weed, one of the exotic perennial grasses listed as a key threatening process in NSW, and a risk for at least 16 threatened species in NSW.<sup>25</sup> But because kikuyu is not declared noxious anywhere in Australia, new variants can be introduced without risk assessment.

New variants can also increase invasion risk by introducing greater genetic variability and facilitating reproduction.

In Australia, pampas grass (*Cortaderia selloana*) was not a major weed for decades because all the plants in gardens were female. When a new colour variant was imported, a hermaphrodite, pampas grass began setting seed and became a serious environmental weed.

Photo: Meyrick Ames  
Flickr <http://www.flickr.com/photos/meyrick/4149177949/>

<sup>20</sup> See Invasive Species Council (2009).

<sup>21</sup> Riddle et al. (2008). This includes species rejected and species requiring further evaluation. With no protocol for further evaluation, this amounts to at least a temporary refusal.

<sup>22</sup> See Booth (2009) for more information.

<sup>23</sup> See Booth (2009) for more information.

<sup>24</sup> Morris (2007).

<sup>25</sup> Coutts-Smith and Downey (2006).

## Federal laws & policy

Many weed problems are of national significance and require a national approach using federal environmental and biosecurity laws.

### Recommendation 5

Use federal laws to address nationally significant weed threats

Many invasive plants threaten nationally listed species and ecological communities, World Heritage Areas and Ramsar wetlands, and some are recognised as weeds of national significance or key threatening processes.

The Federal Government should use environmental laws to regulate weeds with the potential to have a significant impact on biodiversity, particularly where there are gaps in state regulation. The independent reviewer of federal environment laws recommended the Council of Australian Governments develops a national protocol to prevent the spread of weeds.<sup>27</sup>

The Federal Government should also act where there are benefits in a national approach. There should be national weed lists, a national labeling scheme for garden plants (see recommendation 10), national eradication and control programs, and a national research program (see recommendation 9). Biosecurity should be improved to limit imports of weeds that threaten biodiversity and new varieties of existing introductions that could exacerbate threats. Joint funding arrangements between governments for eradications of nationally significant incursions should apply for environmental weeds.

**Federal environment laws:** List and regulate nationally significant weeds under the *Environment Protection and Biodiversity Conservation Act 1999* in categories that define national priorities for eradication,



Habitat of the nationally vulnerable northern corroboree frog is threatened by blackberry invasion.

Photo: Creative Commons Licence  
<http://en.wikipedia.org/wiki/File:CorroboreeFrog.jpg>

containment and control.

**Federal biosecurity:** Strengthen biosecurity processes to restrict the importation of threats to biodiversity and require risk assessment of new varieties of existing introductions. Develop funding arrangements for eradication of new incursions of nationally significant environmental weeds.

**National weed protocol:** Develop a national protocol through the Council of Australian Governments to prevent the deliberate spread of weeds, and harmonise state/territory and federal laws.



Madreia vine (*Anredera cordifolia*) is a smothering weed that climbs trees and spreads along water courses.

### Reviewer of national environment laws says federal action needed on weeds

The 2009 independent review of the federal *Environment Protection and Biodiversity Conservation Act 1999* by Dr Allan Hawke<sup>28</sup> recognised that invasive species are one of the top threats to biodiversity, and that “the worst for Australia is yet to come with most invasive species having occupied only a portion of their potential range, and interactions with climate change likely to considerably worsen their impacts.”

The review found that the several thousand exotic plant species “represent a vast reservoir of potential future problems” and that their movement within Australia “is effectively unconstrained”. State and Territory responses to this problem are criticised as representing “a substantial failure of State and Territory based environmental regulation.”

The review has recommended that the Council of Australian Governments “develop criteria and management protocols for the movement of potentially damaging exotic species between States and Territories, working towards a list of ‘controlled’ species for which cost effective risk mitigation measures may be implemented.”

<sup>27</sup> Hawke (2009).

<sup>28</sup> Hawke (2009).



Alpine meadows will become more vulnerable to weed invasion under climate change.

Photo: Andrew Cox

## Weeds & climate change

The ultimate outcomes are expected to be declines in biodiversity favouring weed and pest species (a few native, most introduced) at the expense of the rich variety that has occurred naturally across Australia.

*The Garnaut Climate Change Review*<sup>29</sup>

Weed laws and policies should be designed within the context of rapid climate change, which is likely to make weed problems worse and native species more vulnerable to weed threats.<sup>30</sup>

In many cases, invasive species benefiting from climate change – spreading under more extreme weather events for example – may have greater impacts on biodiversity than climate itself.

### Recommendation 6 Address weed threats as a priority measure for climate change adaptation

- **Climate change adaptation:** Adaptation programs should focus on weed management as a priority adaptation:
  - (i) Reduce weed threats to support the capacity of native species to adapt to climate change.
  - (ii) Manage invaders or potential invaders likely to benefit under climate change.
  - (iii) Prevent new introductions, ensuring that responses to climate change such as cultivation of biofuels do not worsen invasive species problems.



Catsear (*Hypochoeris radicata*) and other weeds will be able to advance further into the alpine zone under warming.



Cat's claw creeper (*Macfadyena unguis-cati*) and other vines will spread with more violent storms.



Lippia (*Phyla canescens*) spreads under a combination of droughts and floods.



Highly flammable gorse (*Ulex ueropaeus*) both promotes fire and benefits from fire.



Fireweed (*Senecio madagascariensis*) is spreading upslope with warmer winters.



Water hyacinth (*Eichhornia crassipes*) can dominate waterways during droughts and spread in floods.

### Weeds as winners under climate change<sup>31</sup>

Rapid environmental change and disturbance under climate change is expected to create a weedier world. In many cases the impacts on biodiversity of invasive species thriving under warmer temperatures and more extreme events are likely to exceed the direct impacts of climate change.<sup>32</sup>

- Many weeds are likely to benefit under climate change, becoming more invasive and harmful – expanding their range under higher temperatures, spreading in floods, storms and fires, colonising bare ground in drought.
- Declining native species may be less able to adapt to climate change when under threat from weeds and climate refuges may be less secure, eg. if invading grasses increase fire risk.
- Some responses to climate change – eg. the production of weedy biofuels or hardier invasive pasture and garden plants – will increase the weed threat.

For photo credits, please see inside of page one.

29 Garnaut (2008).

30 Steffen et al. (2009).

31 See Invasive Species Council (2010a), Invasive Species Council

(2010b), CRC for Weed Management (2007).

32 Steffen et al. (2009).

## Governance

For effective weed management in NSW, governance arrangements should reflect the environmental and agricultural importance of weeds, promote cooperation and efficiency, and provide sufficient regional authority to implement weed plans.

Management and legal arrangements should reflect the fact that weeds are a very high environmental and agricultural priority. Currently, NSW's environmental agency has large landholder responsibilities for weed management but no authority to regulate movement and sale of environmental weeds. Joint governance between environmental and agricultural agencies should be fostered, with regulatory authority consistent with portfolio responsibilities.

As with other environmental matters, NSW weed laws should be enforced through the NSW Land and Environment Court, which has the expertise to understand the relative seriousness of breaches.

Governance structures should foster cross-tenure, landscape-scale weed management. Currently, there are no bodies with authority for overseeing weed management at a regional level.<sup>33</sup> With cross-sectoral and cross-tenure representation, regional weed committees have evolved over 20 years into dynamic forums for promoting cooperation and sharing expertise. Cooperation needs to be complemented by authority to implement regional weed plans, to ensure that effort is directed to priorities and outcomes are monitored.

### Recommendation 7

**Develop governance arrangements that reflect the priority of weed threats for both the environment and agriculture, and provide for regional authority to implement weed plans**

Criteria and options for reforming governance arrangements to recognise weeds as a high-priority environmental threat include:

- **Joint management across agencies:** Develop a cross-agency invasive species unit, involving representatives from agencies with environmental, agricultural and land management responsibilities.
- **Environmental and agricultural regulatory authority:** Provide authority to both the NSW environment and primary industries ministers for regulation of weeds relevant to their portfolio responsibilities.
- **Legal jurisdiction with environmental expertise:** Transfer jurisdiction for weed laws to the Land and Environment Court.

Options for improving regional cross-tenure weed management include:

- **Capacity to implement regional weed plans:** Establish regional authorities based on the composition of current regional weed committees, and provide them with the legal, technical and resource capacity to oversee implementation of weed plans.
- **Weed management as core business:** Make weed control a reportable core business of all regulatory authorities with land management responsibility, with standardised weed mapping and reporting systems.



**Parrot's feather (*Myriophyllum aquaticum*), a popular aquarium plant.**  
Photo: Nancy Loewenstein, flickr <http://www.invasive.org/browse/detail.cfm?imgnum=2132070>

Weeds for sale. Each of these very serious environmental weeds is still being sold.



**Japanese honeysuckle (*Lonicera japonica*).**  
Photo: Chuck Barger, flickr <http://www.invasive.org/browse/detail.cfm?imgnum=1150068>



**Glory lily (*Gloriosa superba*).**  
Photo: Images by Forest & Kim Starr

<sup>33</sup> Joint Northern Weed Advisory Committees (2009).

## Resources

Relative to the economic and ecological costs of other forms of environmental pollution, the costs of nonindigenous species are ... of particular concern because they are likely to be borne over very long time frames.

Resources dedicated to weed management should be commensurate with the level of threat and their costs to society. This will require more funding and more efficient, prioritised use of existing resources. The resulting environmental and economic benefits will far outweigh the costs, and prevent escalating costs in future.

### Recommendation 8

#### Provide resources needed to achieve priority outcomes

Effective weed management requires reliable, long-term funding and a skilled, well-supported workforce. The level of contribution by different funding sources – landholders, different levels of government and industry/businesses (including beneficiaries of weed control and sources of weed problems) – should be determined in a transparent and equitable way.

Resources should be directed to problems based on transparent methods of prioritisation and be sufficient to achieve high priority goals. To better match funding to needs, an approach similar to that of 'standards of fire cover' should be used: to determine what level of resources is needed to provide an acceptable degree of protection to a particular area or value.

Local governments are essential to weed control efforts, and have made great strides in developing effective techniques and harnessing local volunteers. Australia-wide, there are some 4000 community-based groups combating weed problems.<sup>35</sup>

David Lodge & colleagues, *Ecological Society of America*<sup>34</sup>

Hundreds of volunteer community groups contribute an estimated \$4 million worth of weed control on NSW public lands each year. Local governments and community groups need more support for their work where it contributes to regional and state goals.

- **Needs assessment:** Undertake a 'standards of weed cover' assessment to establish the levels of funding necessary to deliver effective weed management in different NSW regions.
- **Funding model:** Develop a funding model for weed management by which to determine a fair level of contribution from landholders, governments and industries/businesses. This should include a reasonable contribution from the industries responsible for weed introductions.
- **Prioritisation:** Develop a prioritisation process to ensure that resources are transparently directed to where they are most needed and most effective, including a strong focus on prevention and eradication.
- **Capacity:** Strengthen the capacity of local governments and communities to undertake weed control that contributes to state and regional goals by providing sufficient long-term funding, training and technical support.
- **Skills development:** Develop a program for skills development in weed management and bush regeneration for community volunteers and the unemployed involved in weed programs.



Photo: Joaquim Alves Gaspar, [http://commons.wikimedia.org/wiki/File:Spring\\_April\\_2010-3.jpg](http://commons.wikimedia.org/wiki/File:Spring_April_2010-3.jpg)

A serious agricultural and environmental weed, Paterson's curse (*Echium plantagineum*) was estimated to cost Australia's wool and meat industries \$125 million a year (in 2002).

### Funding weed management: turning hindsight into foresight

Despite weeds being the second largest threat to biodiversity and accounting for the loss of one in eight dollars of agricultural revenue, relatively little public money goes to weed management. The NSW government can spend more to build just 1 km of road than it does on weed management each year.<sup>36</sup>

Investment in weed management can bring very high returns. In particular, funding prevention and eradication can save many thousands to many millions of dollars annually per weed stopped. A Queensland modeling assessment found that preventing the spread of new invasive species can generate a mean benefit-cost ratio of \$32.<sup>37</sup>

We can turn hindsight into foresight by ensuring that costly weeds of the future are banned, eradicated or contained before they get away.

34 Lodge et al. (2006).

35 NRMCC (2006) estimated there were some 4000 community-based groups combating weed problems Australia wide.

36 Costs per kilometre of road building typically range from \$10 to

\$30 million/km (NSW Parliament 2009. Questions & Answers Paper No. 108). The government spends about \$27 million annually on weed management.

37 AEC Group (2006).

## Weed research & education

New garden plants should be treated less like exciting new products to brighten our lives and more like wild organisms harbouring the drive to escape.

– Tim Low, *Feral Future*<sup>39</sup>

**M**ore research is needed to improve weed control techniques and to shape better policies on invasive plants.

To make more responsible weed decisions, land managers need to know the risks of plants they use, their responsibilities for weed management and effective control techniques.

### Recommendation 9

#### Support research into weed ecology and management

Relative to the scale of the weed problem, very little funding goes to investigating impacts and developing more effective weed control and policies. A national research program is needed.

- **Research centre:** Federal and state/territory governments co-fund a national weeds research program that identifies and addresses national environmental research priorities, links researchers and provides policy advice.
- **Research funding:** The NSW Government develop a priority list of research projects and dedicate a proportion of weed management programs to priority research questions.

### Recommendation 10

#### Develop educational programs that provide land managers with information to make weed-wise decisions

— Many gardeners would be aghast if they knew what environmental horrors their gardens harboured. When we buy herbicides, we can read a label to find out what the

potential impacts are and how they should be used to avoid harm, but there is usually nothing about weed risks when people buy plants.

Many gardeners think they are doing a good thing for the environment when they buy a so-called 'native' plant, not knowing that some natives are amongst the worst of Australia's weeds. Many gardeners and land managers are also unaware of their responsibilities to manage weeds.

There is a great need for much better weed education.

- **Labeling:** Require labelling of garden plants as a condition of sale – to include taxonomic identification, natural distribution, invasive status and any precautions that should be taken. (Ideally, this would be a national scheme.)
- **Community education:** Undertake education programs to alert landholders and land managers to their responsibilities for weed control and about how to control particular weed priorities.



Volunteers remove weeds from Sydney Harbour National Park.

Photo: NPA/Dave Roe

### A dearth of funding for weed research

Basic information about the impacts of most weeds on biodiversity is lacking. The recent development of the NSW threat abatement plan for bitou bush saw the number of recognised at-risk species rise from six to 158.<sup>38</sup> Other than for a few significant weeds, there is virtually no research being conducted on weed impacts. Australia also needs much more research into effective methods of control.

But while weed problems worsen, weed research capacity has declined. Australia lost a vital part of its weed management capacity when the Australian Government did not renew funding for the Weeds Management Cooperative Research Centre in 2007. Now there is piecemeal funding, and no overall strategic national research program.



Photo: NPA/Nicky Hammond

<sup>38</sup> Department of Environment and Conservation (2006).  
<sup>39</sup> Low (1999).

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