

Australian Weeds Strategy

A national strategy for weed management
in Australia

Natural Resource Management Ministerial Council

Developed by the Australian Weeds Committee

Natural Resource Management Ministerial Council

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Summary

Australian Weeds Strategy Vision: *Australia's economic, environmental and social assets are secure from the impacts of weeds.*

Australian Weeds Strategy Mission: *To provide guidance for national leadership so all Australians can work together against the serious impact of weeds.*

Weeds have major economic, environmental and social impacts in Australia, causing damage to natural landscapes, agricultural lands, waterways and coastal areas. Weeds impact severely on agriculture by competing with production, contaminating produce and poisoning livestock. Weeds also impact on biodiversity by out-competing native plants and degrading habitat. Weeds, along with other invasive species, now arguably pose one of the most significant threats to biodiversity. Some weeds cause severe allergic reactions in people, contributing significantly to Australia's health care costs. Weeds also interfere with recreational activities on the water and in the bush. It is estimated that the agricultural cost of weeds to Australia is in the vicinity of \$4 billion per annum. The cost to nature conservation and landscape amenity is thought to be of a similar magnitude.

The previous National Weeds Strategy made considerable progress in weed management. Despite the gains, the problem remains significant for Australia. There are also growing threats from factors such as climate change, limitations to chemical and herbicide use, and increasing international trade and travel.

Australia spends considerable time and money each year in combating weed problems and protecting ecosystems and primary production on private and public land. Weed problems are complex, with multiple causes, and efforts to reduce their impacts must be coordinated across all sections of society.

The Australian Weeds Strategy provides a framework to establish consistent guidance for all parties, and identifies priorities for weed management across the nation with the aim of minimising the impact of weeds on Australia's environmental, economic and social assets. The Australian Weeds Strategy emphasises the importance of preventing new weeds from establishing and the need to respond quickly to incursions.

The Australian Weeds Strategy is a vital part of Australia's integrated approach to national biosecurity, and complements other existing and new national strategies, such as those for terrestrial vertebrate pests and marine pests. The Australian Weeds Strategy is based on seven key principles:

1. Weed management is an essential and integral part of the sustainable management of natural resources for the benefit of the economy, the environment, human health and amenity.
2. Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.
3. Good science underpins the effective development, monitoring and review of weed management strategies.
4. Prioritisation of and investment in weed management must be informed by a risk management approach.

5. Prevention and early intervention are the most cost-effective techniques for managing weeds.
6. Weed management requires coordination among all levels of government in partnership with industry, land and water managers and the community, regardless of tenure.
7. Building capacity across government, industry, land and water managers and the community is fundamental to effective weed management.

The Australian Weeds Strategy identifies the following goals and objectives to realise its vision:

Goal 1: Prevent new weed problems

- 1.1 Prevent the introduction into Australia of new plant species with weed potential.
- 1.2 Ensure early detection of, and rapid action against, new weeds.
- 1.3 Reduce the spread of weeds to new areas within Australia.
- 1.4 Implement weed risk management practices to respond to climate change.

Goal 2: Reduce the impact of existing priority weed problems

- 2.1 Identify and prioritise weeds and weed management problems and determine their causes.
- 2.2 Implement coordinated and cost-effective solutions for priority weeds and weed problems.
- 2.3 Develop approaches to managing weeds based on the protection of values and assets.

Goal 3: Enhance Australia's capacity and commitment to solve weed problems

- 3.1 Raise awareness and motivation among Australians to strengthen their commitment to act on weed problems.
- 3.2 Build Australia's capacity to address weed problems and improve weed management.
- 3.3 Manage weeds within consistent policy, legislative and planning frameworks.
- 3.4 Monitor and evaluate the progress of Australia's weed management effort.

These objectives will be implemented through strategic actions with outcomes to measure progress.

1. Introduction

1.1 Context and purpose

The 1997 release of the National Weeds Strategy provided a national framework to reduce the economic, environmental and social impact of weeds. The National Weeds Strategy achieved many of its objectives; however, there have since been changes to the institutions, legislation, policies and programmes that support weed management in the broader context of natural resource management in Australia. In response to these changes, the Australian Weeds Committee has undertaken this revision, with the Australian Weeds Strategy (the Strategy) replacing the previous National Weeds Strategy.

The Strategy addresses the prevention of new weed problems (see Case Study 1), the abatement of existing problems (see Case Study 2), and the enhancement of our capacity to combat such problems (see Case Study 3). The Strategy recognises that weed management is essential to the sustainable management of natural resources, the economy, the environment, human health and amenity and requires an integrated whole-of-government and community-wide approach.

The Strategy provides a national framework to guide and complement state, territory, regional and local government strategies and industry initiatives that are ultimately translated into strategic on-the-ground actions to manage weed problems and protect assets. The Strategy complements national and state legislative controls, including implementation of Australia's international obligations to protect biodiversity and plant health status.

1.2 Achievements

The National Weeds Strategy provided a strategic framework for managing weeds at a national level, which has led to improved coordination and integration of weed management efforts nationally. Major achievements include:

- national agreement on cost-sharing arrangements and action on the priority National Weed Eradication Programmes
- development of the list of Weeds of National Significance, which identifies the nationally agreed priority plant species for control and management; a national management strategy was subsequently developed for each species and significant progress has been made
- establishment of guidelines and principles to promote consistency in state and territory weed legislation
- development of weed management strategies for all states and territories
- establishment of weed management policy documentation, coordinating bodies and legislation in all states and territories
- development of the Weed Risk Assessment system
- implementation of preventative screening systems for proposed new imports of plants at the border and in one state

- marked increases in the understanding of weeds and in the aggregate skill in weed management across Australia
- strengthening of the coordination between industry and administrative bodies in weed management efforts, including significant programmes

Detailed information on achievements under the National Weeds Strategy is available on the Weeds Australia website at <www.weeds.org.au>.

Weed Management Principles

The Australian Weeds Strategy is based on the following key principles:

1. Weed management is an essential and integral part of the sustainable management of natural resources for the benefit of the economy, the environment, human health and amenity.
2. Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.
3. Good science underpins the effective development, monitoring and review of weed management strategies.
4. Prioritisation of and investment in weed management must be informed by a risk management approach.
5. Prevention and early intervention are the most cost-effective techniques for managing weeds.
6. Weed management requires coordination among all levels of government in partnership with industry, land and water managers and the community, regardless of tenure.
7. Building capacity across government, industry, land and water managers and the community is fundamental to effective weed management.

1.3 About weeds

Definition: For the purposes of the Australian Weeds Strategy, a weed is considered pragmatically as a plant that requires some form of action to reduce its harmful effects on the economy, the environment, human health and amenity.

Weeds are among the most significant and costly environmental threats in Australia. Of the 2700 species of introduced plants now established, 429 have been declared noxious or are under some form of legislative control in Australia.ⁱ Due in part to changes in land and water use, many of these introduced plants have spread and are causing harmful impacts that class them as weeds. Once established, weeds pose an ongoing challenge to government, industry and the community.

There are two types of invasion: introduction of exotic plants and movement by native species into new areas in response to changed land and water use and management practices. All Australian states and territories have experienced native plant invasions. For example, in Victoria, around 200 species have naturalised outside their native range,ⁱⁱ while in Western Australia 90 species are similarly recorded.ⁱⁱⁱ

Case Study 1: Eradication of kochia in Western Australia

Kochia (*Bassia scoparia*) is a large, fast-growing annual weed of cereal crops and pastures in warmer regions of the world that is also grown as a salt-tolerant forage plant. It was introduced into the Western Australian wheat belt in 1990 as a forage plant and to revegetate salt-affected land, but soon began to spread and become invasive.

Scientific advice was important in defining the threat posed by kochia, which was rapidly recognised as significant for other wheat-producing areas in Australia with similar climates. Consequently, management of kochia became a national priority, and in 1992 a combined national/state-funded eradication programme commenced.

Fortunately, eradicating kochia proved to be relatively uncomplicated. The majority of infestations were small and of low density. Furthermore, kochia was susceptible to control treatments (herbicides, grazing, burning and mechanical removal) and plants ceased to be seen two years after treatment began. The last sightings of kochia in Western Australia were in March 2000.

The kochia eradication program was exceptional in many respects, with several biological and management aspects working in favour of a successful outcome. These included detailed knowledge of the original introduction sites, early and well-resourced official intervention, the plant's largely conspicuous nature and long vegetative period with limited seed dormancy, and the fact that there were fences around most planting sites, which prevented spread.

1.4 Weed spread pathways

1.4.1 International

New weeds enter Australia legally, illegally or inadvertently. The risk of entry is minimised by Australia's border quarantine arrangements. Nevertheless, weeds are spread internationally, whether deliberately through Internet purchasing, or as contaminants through trade, travel and illegal activities.

1.4.2 Domestic

Within Australia, weed spread is a major issue. Constraints on the movement of plant material, and of goods potentially contaminated by weeds or weed seeds, are generally limited. In agriculture, the pathways for spread include transported livestock and fodder, contaminated crop and pasture seeds, deliberate introductions of new species, and contaminated machinery such as harvesters and recreational vehicles (including boats, which can spread water weeds). Introduced plants are sometimes distributed for use or commercial purposes before their potential impacts as environmental weeds are fully understood. Another significant cause of weed spread is inappropriate use and disposal of green waste, which includes garden waste and inadequately composted mulches. The nursery, landscaping and gardening industries are also important pathways for the introduction and spread of weeds.

1.4.3 Environmental conditions favouring weeds

Weeds are successful at spreading and establishing in new areas because, by their very nature, they respond to changes more quickly and effectively than other species. Causes of change include biotic factors such as introduced pathogens or pollinators; natural physical phenomena such as storm damage, fire and floods; and human-related factors such as vegetation clearance and changing land-use patterns.

Climate change may alter the potential range of some weeds. In Australia, the generally warming climate could allow tropical weed species to extend further south, temperate species to retreat to the south, and summer growing species to become more prevalent in the southern regions.

For reasons that are not entirely understood, some plants spread rapidly after being localised to a particular area for many years. Plants with a potential to spread in this way are called 'sleeper weeds'. Early action to remove these plants is highly effective in preventing serious weed problems.

There are a large number of potential weeds in Australian gardens. Private gardens contain over 4000 plant species with weed potential, while botanic gardens hold approximately 5000 species of plants with weed potential.^{iv} The likelihood that any particular plant will become a weed is difficult to predict; however, the Commonwealth Scientific and Industrial Research Organisation has estimated that an average of 10 plant species establish in Australia each year, 70 per cent of which are likely to have escaped from private or public (botanic) gardens.^v

2. The impacts of weeds in Australia

Weeds impact Australia's economy and environment, as well as human health and amenity. Directly or indirectly, all Australians are affected by weeds. For example, landholders and other land and water managers incur material and labour costs to control weeds and these costs may be passed on to the Australian public through higher prices for produce. Weed control also imposes great demands on government resources for public land and water management. Weeds may also harbour organisms that are harmful to native and/or economically important plants.

2.1 Economy

Weeds reduce the quantity and quality of Australia's agricultural, horticultural and forestry products, which affects both industry and consumers. It is estimated that the cost to the Australian economy from the agricultural impacts of weeds is in the vicinity of \$4 billion per annum.^{vi} This estimate includes the direct costs of weed control and the losses from reduction in yield and contamination of agricultural products by weeds. The economic impact of weeds on nature conservation, tourism and landscape amenity, although not quantified, is thought to be of a similar magnitude. For example, it is estimated that at least \$19.6 million is spent on weed control in conservation areas annually.^{vii}

Weeds also have indirect economic costs, such as when they cause allergic reactions and poison animals, reduce fisheries as a result of in-stream invasions, and harbour feral animals and other pests that compete with domestic animals.

2.2 Environment

Weeds can displace native plant species, harbour pests and diseases and create fuel loads for fire. Weeds therefore affect the structure and function of land-based and aquatic ecosystems, and impact negatively on fauna and flora. Weeds pose a threat to the integrity of nationally and globally significant sites, such as listed Ramsar wetlands, cultural heritage sites and declared World Heritage areas. National parks and nature reserves, multi-use forest lands, and agricultural and grazing land also require ongoing weed control and monitoring. Paradoxically, some economically important plants, particularly some rangeland pasture species, are also serious environmental weeds.

2.3 Human health and amenity

Many weeds affect human and animal health, causing allergies, dermatitis, asthma and other respiratory problems, and poisoning.

Weeds are detrimental to the community's enjoyment and amenity in many ways. For example, weeds can clog waterways, which prevents boating and water sports, increases the risk of drowning and destroys fishing spots. Weeds form impenetrable thickets that hamper cultural activities, including food collection, recreational vehicle use and enjoyment of the bush. Weeds also lower the aesthetic value of the Australian landscape.

Weeds create high fuel loads that cause greater bushfire intensity, resulting in increased losses of homes, rural infrastructure and biodiversity.

Case Study 2: Beating bridal creeper using its own worst enemies

Bridal creeper (*Asparagus asparagoides*) is one of southern Australia's worst weeds and a Weed of National Significance. It invades and smothers native vegetation and threatens rare species. Conventional control methods using herbicides and physical removal are difficult and expensive to implement. Efforts to find biological control agents started in 1998, when researchers from the Commonwealth Scientific and Industrial Research Organisation travelled to South Africa to investigate bridal creeper in its native range. Three potential agents were identified and carefully tested to confirm that they were host-specific and safe for release: the leafhopper *Zygina* sp., the rust fungus *Puccinia myrsiphylli* and the leaf beetle *Crioceris* sp.

Since 2002, the Commonwealth Scientific and Industrial Research Organisation, in collaboration with state agencies, has taken a leading role in the national distribution of leafhoppers and rust fungus, with financial assistance from the Natural Heritage Trust. The community has enthusiastically embraced the biological control methods and established over 2000 release sites. Schools across the country have been involved in rearing and releasing leafhoppers on local infestations, while community groups have created their own innovative methods to redistribute the rust spores from nursery sites. These community efforts are significantly aiding the natural spread of the agents. The biological control of bridal creeper has been so successful that emphasis has started to shift to managing regeneration of native vegetation on previously infested sites.

3. Managing the weed problem – roles and responsibilities

3.1 Overview

Australia has obligations to honour international treaties and contribute to global environmental and trade initiatives. It is committed under international conventions to protect its biodiversity and define its plant pest status. International conventions to which Australia is a signatory include the Convention on Biological Diversity, the International Plant Protection Convention, the Ramsar Convention on Wetlands and the World Heritage Convention. Australia also has national, state, territory and regional laws and policies. National policies include the National Biosecurity Strategy (being developed) and the National Strategy for the Conservation of Australia's Biological Diversity. For more information on the national and international context for the Strategy, see Appendix 1.

3.1.1 National

The Australian Weeds Committee provides a mechanism for identifying and resolving weed issues at the national level. The Committee facilitates coordination between the Australian Government and the states and territories and with other agencies and groups participating in the Australian Weeds Strategy. All levels of Australian government are represented on the Committee.

The Committee provides advice to the Natural Resource Management Ministerial Council on weeds issues. Its other major roles include planning, coordinating and monitoring the implementation of the Strategy; building linkages between key stakeholders; identifying potential and emerging weed problems; implementing consistent approaches to weed management; and developing a communications strategy for increasing the profile of weed issues.

3.1.2 Australian Government

The Australian Government is responsible for international border protection, including regulating the import and export of plant material. It manages Commonwealth lands, such as defence establishments and Commonwealth national parks, and administers the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), including protecting matters of National Environmental Significance such as listed threatened species and ecological communities and wetlands of international significance. The Australian Government also has an interest in the development and implementation of measures and programs to control weeds identified under the auspices of the Strategy and other national policies and plans.

The EPBC Act and the *Quarantine Act 1908* regulate the import of live animals and plants into Australia. The Australian Government administers both acts with the cooperation of the states and territories.

Under the EPBC Act, only species that appear on a list of approved species may be imported live into Australia. Any decision to amend the list to add a species can only be made after the potential impacts on the environment of the proposed amendment have been thoroughly assessed. However, as Biosecurity Australia's current weed risk assessment adequately evaluates the potential environmental risk of exotic plant species, the EPBC Act's live import list is taken to include any plant species allowed to be imported under the Quarantine Act. This means that a proposed new plant import is assessed once, not twice.

The Permitted Seeds List under the Quarantine Act ensures that the minimum number of invasive plant species is legally imported into Australia. Any species not on the list must undergo a weed risk assessment. The illegal importation of weeds thus entails a deliberate action to bring seeds or plant material to Australia. Failure to comply with legislative requirements may result in heavy fines or terms of imprisonment.

3.1.3 State and territory governments

State and territory governments encourage responsible weed management by providing a suitable institutional and legislative framework, developing and implementing effective policies and programmes, and providing positive support through financial incentives and assistance schemes as well as appropriate standards and regulations.

State and territory governments support weed management through weed programmes, enforcement of weed controls, research and awareness and educational activities. They are also responsible for managing weeds on public lands, which constitute more than 25 per cent of the area of some states and territories.

States and territories governments regulate the spread and control of targeted weed species, and assign responsibilities for control. By 2005, all states and territories had implemented measures to prevent the sale and trade of a range of weeds, including the Weeds of National Significance.

3.1.4 Local government

In some states, local governments are responsible for planning, coordinating and monitoring noxious weed control. Local governments also support community weed management programmes.

3.1.5 Natural resource management regional bodies

Natural resource management regional bodies participate in planning, coordinating and monitoring weed management as part of broader natural resource management programs. In some states, natural resource management bodies implement regulatory programs.

Since 2000, Australian governments have been working together to develop a region-based approach to identify and act on priority natural resource management issues. This has led to the establishment of 56 natural resource management regions covering all of Australia.

Each natural resource management region has developed a plan that uses local knowledge and the best available science to guide prioritised action to improve natural resource management on a regional scale. The plans consider the environmental, social and economic impacts of natural resource decisions in which stakeholders will invest to achieve targets and ensure the best outcomes.

3.1.6 Industry

Weeds have a major economic impact on industries such as agriculture, livestock, forestry, horticulture, nursery, landscaping, fishing, aquaculture, transport and tourism. The cost of weeds to agricultural industries alone has been estimated at \$4 billion per year, attributed to the cost of control and lost production. Many industries are now taking the initiative in promoting policies, guidelines, standards and activities to manage weeds, detect new weeds and prevent the spread of weeds. Industry organisations assist their members to understand the weed problem and to implement best practices for controlling and minimising weed

spread. In turn, industry should see a reduction in future weed-related costs and enhanced profitability and sustainability.

Case Study 3: Role of the nursery and garden industry in reducing the spread of invasive garden plants

With the increasing focus on the impact that invasive garden species have on the environment and agriculture, the nursery and garden industry and its customers are frequently targeted for education and awareness strategies.

The difficulty is that ‘customers’ include not only gardeners, but also a diverse range of people with differing needs, knowledge and skills. This varied consumer base must be taken into account when developing education and awareness strategies. People need to be influenced at the point where they make decisions about their gardens and the plants they use in them – the garden centre, supermarket or hardware business.

The experience from outdoor water conservation highlights the potential for the nursery and garden industry to play an important role in educating and influencing the behaviour of householders. Existing programmes such as Western Australia’s Water Corporation’s ‘Water Wise Accredited Garden Centres’ and Nursery & Garden Industry Australia Limited’s ‘Wise about Water’ program demonstrate the industry’s commitment to take on this vital role and the significant benefits of industry involvement in garden-focused environmental education.

The Nursery & Garden Industry NSW & ACT Limited’s ‘Grow Me Instead’ programme has been very successful in highlighting the importance of industry and local government partnerships in identifying and targeting key invasive garden species on a regional scale. Through daily contact with customers and stakeholders who are making decisions and seeking advice about their gardens, the industry is in a unique position to educate the community about responsible plant choice and to promote appropriate care and maintenance to reduce the spread of invasive garden species and to better manage plants already in gardens.

3.1.7 Research and development

Even with the strongest quarantine procedures, new weed invasions and weed problems will continue to occur in Australia. Similarly, existing weed problems will not disappear in the short- to medium-term, even if there were unlimited resources and immediate implementation of the best management systems available. Therefore, strong input from research is essential to ensure that solutions are tailored to Australia’s unique weed problems.

Australia is fortunate in having a capable and innovative weeds research base that covers areas such as risk assessment, biological controls, impact quantification and new control techniques. Research into weeds is being undertaken and financed by all levels of government, tertiary education institutions, industry bodies and private companies. There is an ongoing need to strengthen and improve Australia’s collaborative research and development capabilities to address weed problems and threats into the future.

3.1.8 Communities and individuals

There are some 4000 community-based groups in Australia, including Landcare, Coastcare and ‘Friends of’ groups that are strategically combating weed problems, and many undertake coordinated activities to address priority issues.

3.2 Managing weeds at all levels

Effective weed management is necessary at all levels in Australia. Significant weed problems exist at the national, state, territory, regional and individual landowners' level.

The Strategy provides a nested hierarchy of weed management strategies and actions. Strategies to manage weeds do or can exist at the state and territory, regional, local government and landowner levels. A parallel set of strategies does or can exist for weed species, starting at the national level with the strategies for the Weeds of National Significance.

Stakeholders need to be aware of the various strategies and be able to determine which ones affect them.

4. Implementation

The implementation of the Strategy will begin with the development of an operational plan. The plan will detail the allocation of time and resources and identify lead agencies and their responsibilities to ensure that the goals of the Strategy are achieved.

4.1 Raising awareness of the pathways for weed spread: the National Weed Awareness Action Plan

The National Weed Awareness Action Plan focuses on improving awareness as a prerequisite to achieving acceptable long-term management of weeds. Increased awareness depends on participation by landowners, land managers, industry, the wider community and local, state and Australian governments. The goal is a targeted, well-resourced and consistent national weed awareness program that increases community and whole-of-government understanding of the weed crisis.

4.2 Preventing weed spread: the National Weed Spread Prevention Action Plan

A National Weed Spread Prevention Action Plan (currently being developed) will establish a framework to prevent weed spread. The draft objectives are to identify and address all pathways for weed spread; achieve national consistency in weed spread prevention; minimise the spread of weeds by human agency; and meet the requirements of the Strategy.

4.3 Priority weeds and Weeds of National Significance

The Weeds of National Significance are nationally agreed priority plant species for control and management. Species are selected based on their high rankings for invasiveness, potential to spread, and impact on socioeconomic and environmental assets.

There are currently 20 Weeds of National Significance: alligator weed, athel pine, bitou bush/boneseed, blackberry, bridal creeper, cabomba, Chilean needle grass, gorse, hymenachne, lantana, mesquite, mimosa, parkinsonia, parthenium weed, pond apple, prickly acacia, rubber vine, salvinia, serrated tussock and willows.

5. Goal 1 – Prevent new weed problems

Weeds have major negative impacts on the economy, the environment, human health and amenity. Prevention of a weed problem is the most cost-effective action possible. Many weeds are products of unwise and unintentional plant introductions, but if new weeds are discovered before they are well established, eradication is possible. The goal is to intervene in the early stages of the process by preventing the introduction and early spread of new weeds into and within Australia and by acting quickly against recently introduced weeds before they have significant detrimental effects.

Since complete prevention is often impossible in practice, a risk management approach is needed: to *identify* potential risks, *assess* their degree of risk and feasibility of management, determine priorities and implement arrangements to *manage* them within practical constraints. A risk management approach for weeds is supported by knowledge of:

- which plants are potential weeds and what assets they threaten
- ways in which weeds are transported to new areas ('pathways')
- environmental conditions that favour some plants becoming weed problems

Table 2 outlines the objectives, strategic actions and outcomes for Goal 1.

Table 1: Goal 1 – Prevent new weed problems

Objective	Strategic action	Outcome
1.1 Prevent the introduction into Australia of new plant species with weed potential.	1.1.1 Identify pathways for weed invasion and assess the risk of introduction of new weeds.	<ul style="list-style-type: none"> Pathways for weed invasion into Australia are identified and levels of risk assessed.
	1.1.2 Maintain, review and update import and release protocols to maximise protection against weed threats.	<ul style="list-style-type: none"> New species with weed potential are not released in Australia.
	1.1.3 Continue to strengthen border and pre-border controls in response to the pathways analysis and risk assessment.	<ul style="list-style-type: none"> New species with weed potential do not enter via identified pathways.
1.2 Ensure early detection of, and rapid action against, new weeds.	1.2.1 Establish a nationally coordinated weed alert and early warning system that includes effective surveillance mechanisms.	<ul style="list-style-type: none"> Weeds are detected at an early stage of establishment.
	1.2.2 Develop and implement a nationally agreed weed response plan for eradication or containment.	<ul style="list-style-type: none"> New weed incursions are identified and addressed.
	1.2.3 Governments, regional bodies and industry develop contingency plans for action against new weed infestations.	<ul style="list-style-type: none"> Organisations have response plans in place.
	1.2.4 Establish core capacities at the state and national levels for responding to significant weed incursions.	<ul style="list-style-type: none"> Incursions are responded to rapidly.
	1.2.5 Enhance the ability of Australian herbaria to rapidly and accurately identify new introduced species.	<ul style="list-style-type: none"> Weeds are rapidly and accurately identified.
	1.2.6 Identify, detect and manage sleeper weeds.	<ul style="list-style-type: none"> Sleeper weeds are prevented from developing into major problems.
1.3 Reduce the spread of weeds to new areas within Australia.	1.3.1 Identify pathways and assess the risk for the spread of weeds within Australia.	<ul style="list-style-type: none"> Pathways for weed spread within Australia are identified and assessed for risk.
	1.3.2 Develop and implement a national weed spread prevention plan that includes effective measures to prevent legal weed spread between jurisdictions.	<ul style="list-style-type: none"> Weed spread to new areas is minimised.
1.4 Implement weed risk management practices to respond to climate change.	1.4.1 Assess the risk of new weed problems arising from climate change and promote awareness of potential impacts.	<ul style="list-style-type: none"> Decision makers are aware of weed problems that may result from climate change. Planning and management strategies incorporate the

		<p>potential of new weed problems caused by climate change.</p> <ul style="list-style-type: none"> • Weed problems arising from climate change are reduced.
	1.4.2 Monitor and respond to other biological, environmental, social and land-use changes that may contribute to weed spread.	<ul style="list-style-type: none"> • Weed risks and problems are identified and mitigation strategies promoted.
	1.4.3 Assess and respond to threats from new weed genotypes.	<ul style="list-style-type: none"> • Weed problems are identified and mitigation strategies promoted.

6. Goal 2 – Reduce the impact of existing priority weed problems

While it is likely that Australia will never be totally free from the effects of weeds, much can be done to reduce the impacts of existing weeds, particularly those identified as priority weeds.

Goal 2 focuses on identifying and prioritising weed problems, implementing coordinated and cost-effective solutions, and developing approaches to weed management that are based on the protection of key values and assets. Table 2 outlines the objectives, strategic actions and outcomes for Goal 2.

Table 2: Goal 2 – Reduce the impact of existing priority weed problems

Objective	Strategic action	Outcome
2.1 Identify and prioritise weeds and weed management problems and determine their causes.	2.1.1 Conduct risk analyses to identify and prioritise weed species for action.	<ul style="list-style-type: none"> • Weed species are identified and prioritised according to their risk parameters for management action.
	2.1.2 Conduct risk and cause analyses to identify and prioritise weed management problems for action.	<ul style="list-style-type: none"> • Weed management problems and causes are identified and prioritised for action.
	2.1.3 Develop effective processes to resolve conflicts between economic and environmental interests.	<ul style="list-style-type: none"> • Conflicts between stakeholders concerning weed management issues are assessed and resolved.
2.2 Implement coordinated and cost-effective solutions for priority weeds and weed problems.	2.2.1 Develop and implement national plans for managing priority weeds and weed problems.	<ul style="list-style-type: none"> • Priority weeds and weed problems, including Weeds of National Significance, are subject to coordinated national action.
	2.2.2 Develop improved management practices and promote their adoption.	<ul style="list-style-type: none"> • Weed impacts are reduced through improved management practices.
2.3 Develop approaches to managing weeds based on the protection of values and assets.	2.3.1 Identify the threats posed by weeds to key cultural, environmental and production assets and values.	<ul style="list-style-type: none"> • Key assets and values under threat from weeds are identified and prioritised.
	2.3.2 Develop and implement site-based approaches to managing weed threats that protect key assets and values.	<ul style="list-style-type: none"> • Key assets and values are protected from weed impacts.
	2.3.3 Build community capacity for implementation of site-based plans for weed management.	<ul style="list-style-type: none"> • Communities actively protect their assets and values.
	2.3.4 Develop and promote best management practices that address weed threats and causes at the landscape level, and remediate the land.	<ul style="list-style-type: none"> • Communities manage weeds at a coordinated and whole-of-landscape level. • Assets are protected and restored.
	2.3.5 Develop and implement systems to integrate weed management into production and ecosystem management.	<ul style="list-style-type: none"> • Appropriate systems are adopted for sustainable land management.

7. Goal 3 – Enhance Australia’s capacity and commitment to solve weed problems

Strengthening Australia’s capacity and commitment to solve weed problems is essential to ensure that appropriate action can take place. The challenge is to continue building community capacity.

Goal 3 focuses on raising awareness and motivation among Australians to ensure their commitment to act on weed problems, strengthen Australia’s capacity to address weed problems, manage weeds within consistent policy, legislative and planning frameworks and to monitor and evaluate the progress of Australia’s weed management effort. Table 3 outlines the objectives, strategic actions and outcomes for Goal 3.

Table 3: Goal 3 – Enhance Australia’s capacity and commitment to solve weed problems

Objective	Strategic action	Outcome
3.1 Raise awareness and motivation among Australians to strengthen their commitment to act on weed problems.	3.1.1 Develop and implement a national plan for communicating with stakeholders and engaging them in weed management.	<ul style="list-style-type: none"> Stakeholder base is increased and stakeholder awareness of and action on weed problems is improved.
	3.1.2 Develop and implement nationally consistent and targeted weed awareness activities.	<ul style="list-style-type: none"> Australians have a greater awareness of the impacts of weeds and are motivated to act. The National Weed Awareness Action Plan is implemented.
	3.1.3 Recognise and award community achievements in weed management.	<ul style="list-style-type: none"> Communities increase their weed management efforts.
	3.1.4 Develop and implement targeted incentive programmes.	<ul style="list-style-type: none"> Weed management efforts are increased.
	3.1.5 Develop and promote improved weed spread prevention practices among industries, public agencies and communities.	<ul style="list-style-type: none"> Industries, public agencies and communities adopt weed spread prevention practices.
3.2 Build Australia’s capacity to address weed problems and improve weed management.	3.2.1 Create opportunities for training and development in weed management skills.	<ul style="list-style-type: none"> Weed management is undertaken with increased skill and knowledge.
	3.2.2 Support the development of networks for community-based action.	<ul style="list-style-type: none"> Community-based action is widespread and effective.
	3.2.3 Prioritise weed research needs and identify and facilitate programmes to develop new approaches.	<ul style="list-style-type: none"> Research on weeds is undertaken based on priority needs. Improved weed management is achieved through increased knowledge and new techniques.
	3.2.4 Encourage funding of research that will provide the scientific basis to support weed management decisions.	<ul style="list-style-type: none"> Investment in weeds research increases.
	3.2.5 Strengthen collaboration between research institutions, industry and government on weed research issues.	<ul style="list-style-type: none"> Collaborative and coordinated weed research is undertaken across Australia.
	3.2.6 Provide ready access to high-quality weed identification and management information.	<ul style="list-style-type: none"> Decisions are based on the best information available.
	3.2.7 Identify and reduce barriers to adoption of best	<ul style="list-style-type: none"> Best practice weed management is adopted by all.

	practice weed management.	
3.3 Manage weeds within consistent policy, legislative and planning frameworks	3.3.1 Identify and address weed issues in natural resource, environmental, industry and development planning at all levels and implement action.	<ul style="list-style-type: none"> • Weed management is an integral part of natural resource, environmental, industry and development planning. • Sectoral conflicts in weed management are identified and resolved.
	3.3.2 Develop and promote consistent and complementary weed management plans and priorities.	<ul style="list-style-type: none"> • Weed management programmes are effectively targeted and coordinated. • All stakeholders are committed to a planned and coordinated approach.
	3.3.3 Establish nationally consistent legislation to address weed problems.	<ul style="list-style-type: none"> • Weeds legislation is nationally consistent.
	3.3.4 Develop and implement a uniform national weed categorisation system.	<ul style="list-style-type: none"> • Compliance is simplified. • Priority weed species are listed for appropriate management.
	3.3.5 Clearly define and communicate the weed management roles and responsibilities for all managers of public and private land.	<ul style="list-style-type: none"> • All land managers clearly understand and carry out their weed management responsibilities.
	3.3.6 Lead and coordinate implementation of the Strategy.	<ul style="list-style-type: none"> • The Strategy is effectively implemented through the Australian Weeds Committee.
3.4 Monitor and evaluate the progress of Australia's weed management effort.	3.4.1 Monitor and evaluate management of national priority weeds, including the Weeds of National Significance.	<ul style="list-style-type: none"> • Effectiveness of current strategies and their delivery is known • Approaches and strategies are reviewed
	3.4.2 Develop, implement and maintain regular and consistent monitoring of weed distribution, impacts and management.	<ul style="list-style-type: none"> • Information on weed distribution, impacts and management is readily available and used to improve management practices.
	3.4.3 Monitor and evaluate the efficiency, effectiveness and appropriateness of the Strategy.	<ul style="list-style-type: none"> • The Strategy is implemented and continuously improved.

Appendix 1: National and international context for the Australian Weeds Strategy

Jurisdiction	Relevant policy, legislative and planning frameworks
International	<ul style="list-style-type: none"> • Convention on Biological Diversity • Convention on Wetlands (Ramsar 1971) • World Heritage Convention • World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary Measures • International Plant Protection Convention
National	<ul style="list-style-type: none"> • <i>Environment Protection and Biodiversity Conservation Act 1999</i> • <i>Quarantine Act 1908</i> • Australian Biosecurity System for Primary Production and the Environment (AusBIOSEC) (being enhanced) • National Marine Incursion Response Plan • National Strategy for the Conservation of Australia's Biological Diversity • National Biodiversity and Climate Change Action Plan • National Strategy for Ecologically Sustainable Development • Weeds of National Significance Strategies • National Weed Awareness Action Plan • National Cooperative Approach to Integrated Coastal Zone Management • PLANTPLAN – Australian Emergency Plant Pest Response Plan • The National Post-Border Weed Risk Management Protocol
State/territory	<p>Victoria</p> <ul style="list-style-type: none"> • <i>Catchment and Land Protection Act 1994</i> • <i>Local Government Act 1989</i> • Victorian Pest Management: Weed Management Strategy <p>New South Wales</p> <ul style="list-style-type: none"> • <i>Noxious Weeds Act 1993</i> • New South Wales Weed Strategy <p>Queensland</p> <ul style="list-style-type: none"> • <i>Land Protection (Pest and Stock Route Management) Act 2002</i> • Land Protection (Pest and Stock Route Management) Regulation 2003 • Queensland Weeds Strategy <p>Northern Territory</p> <ul style="list-style-type: none"> • <i>Weeds Management Act 2001</i> • Northern Territory Weed Management Strategy <p>Western Australia</p> <ul style="list-style-type: none"> • <i>Agriculture and Related Resources Protection Act 1976</i> • <i>Plant Diseases Act 1989</i> • A Weed Plan for Western Australia • Western Australia Environmental Weed Strategy <p>South Australia</p> <ul style="list-style-type: none"> • <i>Natural Resources Management Act 2004</i> • Weed Strategy for South Australia

	<p>Tasmania</p> <ul style="list-style-type: none"> • <i>Weed Management Act 1999</i> • Tasmanian Weed Management Strategy <p>Australian Capital Territory</p> <ul style="list-style-type: none"> • <i>Pest Plants and Animals Act 2005</i> • Australian Capital Territory Weeds Strategy
Regional	<ul style="list-style-type: none"> • Regional Natural Resources Management plans • Regional Natural Resources Management weed or pest management plans
Local	<ul style="list-style-type: none"> • Local government weed or pest management plans and development plans

Glossary

Landscape level	A watershed, or series of interacting watersheds or other natural ecological units, within larger land and resource management planning areas. This term is used for conservation planning and is not associated with visual landscape management and viewscape management.
Natural resource management	The management of natural resources (e.g. land, water and biodiversity) in an integrated fashion recognising the values of both conservation and productive use of natural resources and striving to achieve sustainability in all resource use.
Pathways	The means by which contaminants move. Possible pathways include air, surface water, groundwater, plants, animals and humans).
Sleeper weeds	Sleeper weeds are those non-native plants that have naturalised, but are believed to have not yet reached their potential to form large and widespread populations in Australia, despite being naturalised for some years. They are regarded as having the potential to assume major significance as weeds due to environmental conditions or other factors. These plants may appear benign for many years then spread rapidly following certain natural events such as flood, fire, drought or climate change, or a change in land or water management, or on reaching a critical population level.
Weed	For the purposes of the Australian Weeds Strategy, a weed is considered pragmatically as a plant that requires some form of action to reduce its harmful effects on the economy, the environment, human health and amenity.
Weed incursion	An isolated population of a weed recently detected in an area, not known to be established, but expected to survive for the immediate future.

Notes

ⁱ Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers 2000, *Weeds of National Significance – Alligator Weed (Alternanthera philoxeroides) Strategic Plan*, National Weeds Strategy Executive Committee, Launceston.

ⁱⁱ Carr, G 2001, 'Australian plants as weeds in Victoria', *Plant Protection Quarterly* 16(3), 124–25.

ⁱⁱⁱ Keighery, G 1999, 'Predicting and preventing the West's environmental weeds of the next century', in AC Bishop, M Boersma and CD Barnes (eds), *Proceedings of the 12th Australian Weeds Conference*, Tasmanian Weed Society, Hobart, pp. 572–75.

^{iv} WWF-Australia September 2005, *Weed proofing Australia – making the new National Weed Strategy work*, WWF-Australia working paper.

^v Groves, RH, Boden, R and Lonsdale, WM 2005, *Jumping the garden fence: invasive garden plants in Australia and their environmental and agricultural impacts*, CSIRO report prepared for WWF-Australia, Sydney.

^{vi} Sinden, J, Jones, R, Hester, S, Odom, D, Kalisch, C, James, R and Cacho, O (2005, *The economic impact of weeds in Australia*, CRC for Australian Weed Management, Technical Series No. 8, Adelaide, p. 39.

^{vii} Ibid.