

WEEDS OF NATIONAL SIGNIFICANCE

Parkinsonia

(*Parkinsonia aculeata* L.)

strategic plan 2012–17

This publication is produced as part of the Weeds of National Significance initiative, a joint initiative between the Commonwealth of Australia and each of the Australian states and territories.

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An unpublished draft of the revised strategic plan has guided national coordination of this Weed of National Significance for the past two years. Before publishing the revised plan, the Australian Weeds Committee altered it because some actions had been completed, and then agreed to trial a uniform monitoring, evaluation, reporting and improvement (MERI) template for all phase-3 Weeds of National Significance.

Supporting information about the Australian Weeds Strategy, Weeds of National Significance and progress to date may be found at www.weeds.org.au, where links and downloads provide contact details for all species and copies of the strategy. Comments and constructive criticism are welcome as an aid to improving the process and future revisions of this strategy.

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The national distribution and management zone map was developed by Nathan March and Moya Calvert (Queensland Department of Agriculture, Fisheries and Forestry) based on the contributions of the NPBMG, lead state and territory agencies, and consultation with stakeholders.

Summary

Parkinsonia (*Parkinsonia aculeata*) is one of Australia's worst weeds. It is a shrub or small tree that aggressively invades rangelands and replaces them with dense thorny thickets. It is a particular threat to the wetlands and riparian floodplains of northern Australia.

Parkinsonia is well established in many parts of Queensland, Western Australia and the Northern Territory, with at least 3.3 million hectares affected. Isolated infestations and occurrences also occur in New South Wales and South Australia. In 1999, parkinsonia was designated a Weed of National Significance in recognition of the need for coordinated effort to reduce its current and potential impacts.

An initial strategy was published in 2001, and despite the size of the problem, significant progress has been made towards reducing both the geographic range and impact of the weed. National reviews have since identified gaps associated with the control, planning, coordination, best-practice adoption, spread prevention and research aspects that require strengthening.

This strategic plan has been developed with consideration for the previous program achievements, research progress and new aspirations.

This strategic plan has three goals and their associated objectives:

- 1 Protect clean areas and eradicate outlier infestations
 - Protect clean areas and promote early detection of new infestations.
 - Eradicate isolated and scattered infestations.
- 2 Minimise impacts of parkinsonia on productivity and natural assets
 - Implement catchment-scale community-based control programs.
 - Protect and restore high-value environmental and cultural sites.
 - Increase adoption of best-practice and integrated management practices.
 - Support biological control initiatives.
- 3 Maintain and enhance national commitment to manage parkinsonia
 - Coordinate and evaluate implementation of the strategy.
 - Increase awareness of the parkinsonia threat.
 - Maintain legislative support for parkinsonia management.
 - Develop and use national mapping tools.

All stakeholders share a responsibility for implementing and monitoring the strategic actions to ensure the effective management of parkinsonia continues.

Vision

Parkinsonia is confined and its impacts reduced to a minimum
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1 The challenge

Parkinsonia (*Parkinsonia aculeata*) has serious impacts on the agricultural and environmental values of Australia's rangelands. Infestations already encompass more than 3.3 million hectares, with sparse occurrences over a much larger area.

The impacts of parkinsonia on productive grazing systems are significant, with high-density infestations dramatically reducing pasture production and hindering station management. The environmental impacts have not been adequately assessed, but parkinsonia is known to seriously alter habitat structure and reduce biodiversity. Wetlands and riparian floodplains are particularly vulnerable to invasion. Dense infestations may also limit access and be detrimental to the cultural values of important sites.

Given the widespread range of the weed, risk assessment and modelling are needed to determine which catchments and regions are most at risk from invasion and where impacts will be greatest. This will help determine appropriate management goals and prioritise investments from a regional to national scale.

As parkinsonia is readily dispersed by water movement, a catchment-based approach is also required, including coordinated and collaborative efforts involving landholders, community groups, local government and agencies. This strategy supports a catchment approach through a national zoning system that aligns infestation characteristics, control feasibility, invasion risk and stakeholder aspirations.

Control and management options are now available to help land managers address most infestation situations, but these options have not yet been collated into a national best-practice manual. Further research is also required to identify and establish biological control agents, while investigations are continuing into naturally occurring dieback pathogens.

Implementation of this strategy requires improvements to stakeholder engagement through extension, planning and control programs. This will safeguard large areas of Australia from invasion, encourage broadscale management activities and improve management practices for people containing parkinsonia.

2 Background

Parkinsonia is one of northern Australia's worst weeds. It has received national attention because of its impacts on sensitive riparian ecosystems where it can form impenetrable thickets, but also because of its impacts on productive grazing systems.

Parkinsonia may be confused with several other weedy trees, such as *Acacia nilotica* subsp. *indica* (prickly acacia) and *Prosopis* spp. (mesquites) both of which are Weeds of National Significance, and some native species (e.g. *Acacia farnesiana*, commonly known as mimosa).

2.1 The biology of parkinsonia

Parkinsonia is a hairless, leguminous shrub or small tree growing to about 8 m high. Its main distinguishing features are the two rows of tiny, oval leaflets on the edges of a flattened leaf stalk. The branches are armed with sharp spines 7–12 mm long. Parkinsonia has green bark, which means the plant is able to photosynthesise even after complete defoliation resulting from drought or grazing. Flowers are predominantly yellow, fragrant and with 5 petals, each on a long, slender, drooping stalk. Seeds are oval, hard, about 15 mm long and borne in straw-coloured pods 5–10 cm long that are constricted between the seeds.

Parkinsonia is fast growing and, in ideal conditions, produces seeds in its second or third summer (Figure 1). Large trees can produce at least 2500 seeds per square metre of projected canopy, although production varies considerably between trees, seasons, sites and tree density. Most pods mature and fall off the tree in mid-to-late summer.

Pods are unpalatable but float, so most seed dispersal is by water. Unless moved by water, seeds can accumulate under parent trees, resulting in dense seed banks. However, seeds can also be moved in mud by livestock or human activity. The extremely hard seed coat provides a physical dormancy that is broken by hot, wet conditions. Most seeds will lose dormancy and germinate under field conditions within a year, although it can take much longer in microclimates such as under dense grass cover or parent trees where temperatures are buffered.

Recruitment rates for new seedlings are usually very low because seedlings are susceptible to desiccation through lack of follow-up rain, inundation, competition, browsing, fire, frost and failure to reach the soil surface. High recruitment events can occur, but are typically restricted to small areas where the seed bank is high and where recruitment conditions are ideal. As a consequence, parkinsonia populations are frequently scattered. However, extensive populations do occur in some wetlands or flood plains where seeds are widely dispersed by water and ideal recruitment conditions are widespread.

Available evidence suggests that parkinsonia plants rarely live longer than 20 years in Australia. All life stages are prone to a wide range of mortality factors including fire, severe frosts and prolonged inundation. However, perhaps the most dramatic and widespread mortality factor is dieback, which is caused by one or more soil-borne pathogens that ultimately kill individual plants and sometimes entire populations.

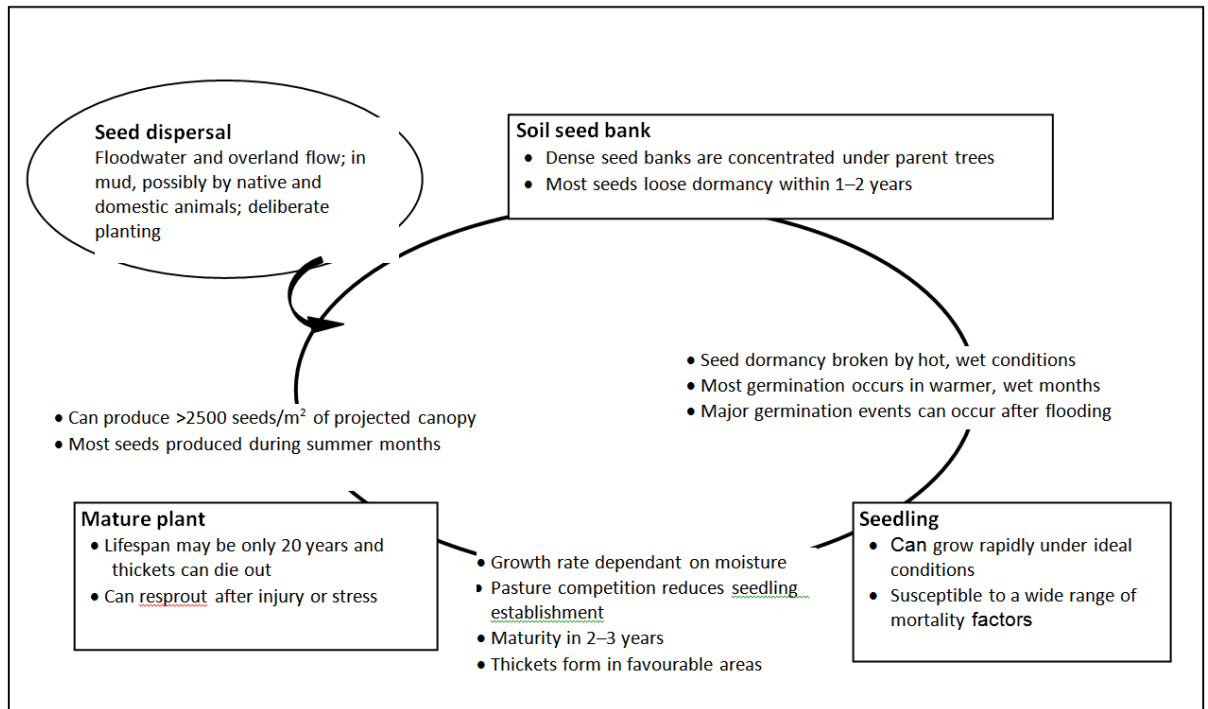


Figure 1 Life cycle of parkinsonia

2.2 History of spread

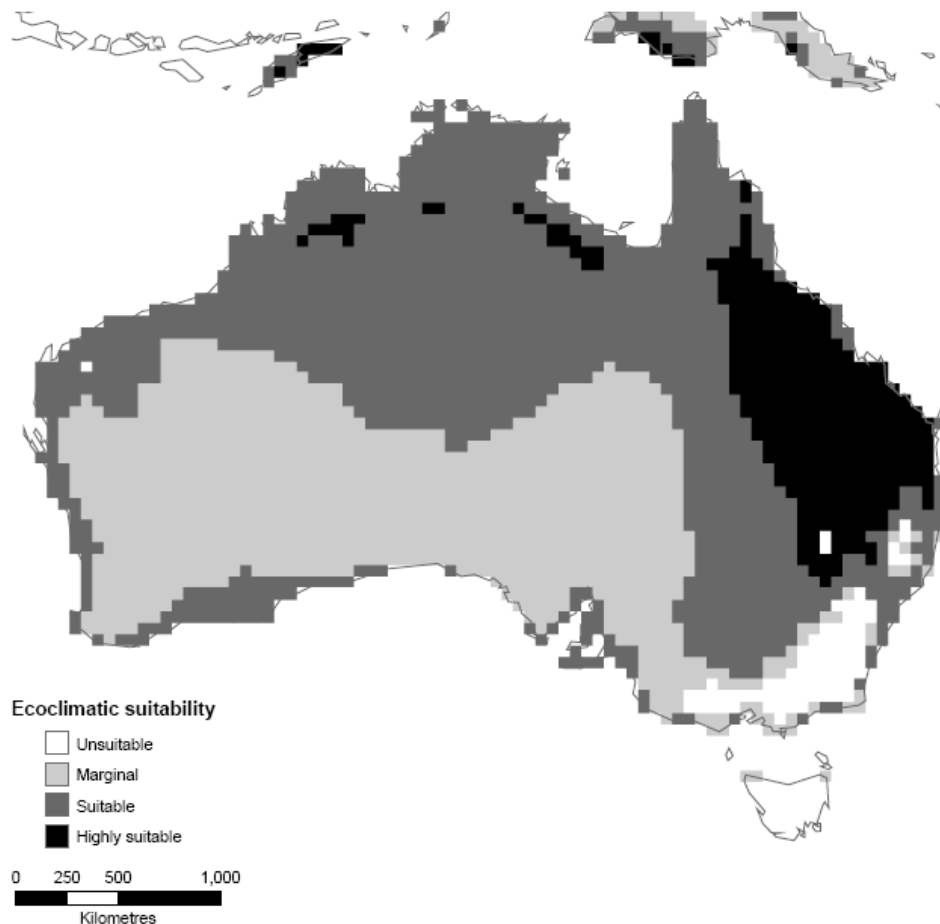
Parkinsonia is native to North America (United States and Mexico), Central America and South America. It was probably established in towns in northern Australia in the late 1800s because by the early 1900s it was already considered to be invasive there. It was planted as an ornamental or shade tree around homesteads, bores and dams, and quickly spread.

Estimations using 50 km × 50 km grid cells indicate that parkinsonia now occurs on 3.3 million hectares of land, although densities are mostly very low throughout most grid cells. Most of the dense infestations occur across semi-arid and semi-humid Australia, especially in central and north Queensland, the Barkly region of the Northern Territory, and the Kimberley and Pilbara regions of Western Australia. These dense infestations are typically associated with flood-outs, water infrastructure, watercourses, and the edges of seasonally flooded fresh-water wetlands.

The potential distribution of parkinsonia in Australia has been predicted using CLIMEX¹ (Figure 2). This confirms that much of northern and eastern Australia is climatically suitable for parkinsonia, and that conditions are ideal in central Queensland. However, within these areas, suitable habitat is restricted by several factors including soil moisture, fire regimes and land use.

¹

Simulation modelling system developed by CSIRO based on climate



Source: CSIRO. Data is splined from a CLIMEX climate prediction.

Figure 2 Potential distribution of parkinsonia in Australia

2.3 Summary of impacts

Although parkinsonia is one of Australia's most widespread weeds, many infestations are sparse. However, infestations may be locally dense where conditions are favourable. Impacts are most significant for wetlands and riparian floodplains where infestations may extend at high densities over hundreds of hectares.

Infestations usually first establish along watercourses or in association with historical plantings. These sites may eventually become impenetrable and dramatically impact pastoral production through loss of pasture, increased difficulty and expense of mustering, and impeded stock access to water. The current and potential economic impacts of parkinsonia have not been thoroughly analysed in Australia.

Parkinsonia may transform wetlands and other suitable habitat into dense thickets. The environmental consequences have not been adequately studied in Australia but are likely to include structural changes to habitat, increased bare ground and erosion, a decline in biodiversity and provision of a refuge for feral animals. Dense infestations may also limit access to land for traditional purposes and be detrimental to the cultural values of the land.

2.4 Control history

While some states and territories had incentives such as herbicide subsidies at various times, the control of parkinsonia was generally locally based and ad hoc until the 1990s when better local government, regional and jurisdictional weed management planning was initiated. From late 2001, national strategy implementation focused on the threat of parkinsonia across Australia. Further impetus was gained as a result of improved ecological knowledge and the provision, through research, of a range of integrated control options.

Since 2002, a number of broadscale programs have had some success in controlling several regional and cross-regional infestations. Outcomes have been particularly significant where government funding initiatives have complemented landholder, community group and local government aspirations.

Of note is the Desert Channels Queensland-led control program from 2002 to 2005 involving northern Lake Eyre river systems. Infestations totalling 300 000 hectares and occurrences along 500 km of watercourses were controlled through a collaborative landholder effort. External funding of \$300 000 was complemented by over \$1 million in in-kind contributions. Desert Channels Queensland has continued to address parkinsonia infestations at strategic locations through regional investments.

Similar success has been achieved through the community efforts of the Dalrymple Landcare Committee (upper Burdekin catchments, Queensland), Roper River Landcare Group (Roper River catchment, Northern Territory) and Barkly Landcare and Conservation Association (Georgina River catchment, Northern Territory). These programs have been assisted by government at different levels, and supported through aerial surveys and mapping, extension campaigns, control training and best-practice field days.

More recently, systematic control has been occurring in various parts of New South Wales and South Australia. Nearly all sites are being actively managed, with the aim of eradication where possible. There has also been an increasing focus on controlling infestations that are threatening or impacting high conservation areas. Although there are regional variations, anecdotal information suggests a moderate increase in control activities by landholders across Australia.

2.5 Control methods

Research into parkinsonia control began as early as the 1950s. The first recommended control agent was 1% 2,4,5-T in diesel. This was the standard control method for infestations on properties and government reserves until the early 1990s, although some landholders also used fire and mechanical control. As the problem became more serious, government officers inspected outbreaks and advised on control methods. Research on chemical and biological control methods began in the early 1980s and continues today.

Chemical and mechanical methods, grazing management and fire can be used in an integrated control program for parkinsonia. Effective herbicides are currently available for a range of application methods, including foliar spraying (both ground and aerial), ground and aerial application of residual chemicals, and basal bark and cut-stump techniques. Parkinsonia is also readily killed using a range of mechanical techniques, although it is most successful if plants are cut at least 20 cm below the ground to prevent reshooting.

Fire can cause high mortalities, although results can depend on the season and intensity of burning. All control methods may be effective in particular situations, depending on the density, landform, economics/resources, area covered and the management objectives. However, the typically large seed banks, when coinciding with ideal recruitment conditions, can result in worsening of the problem if there is no follow-up control.

Biological control is potentially the most cost-effective management method. Three biocontrol agents have been released: two seed-feeding beetles (*Penthobruchus germani* and *Mimosestes ulkei*) and a sap-sucking bug (*Rhinacloa callicrates*). Further agents are being assessed for release in the near future. Only *P. germani* has become widely established and, although it is often abundant, seed predation rates are generally low and it probably causes little population-level impacts. The potential for manipulating naturally occurring dieback is currently being assessed.

The Parkinsonia national case studies manual (Deveze 2004) provides a range of case studies to guide land managers who are controlling parkinsonia. A best-practice manual needs to be compiled to incorporate the ecological studies, integrated control research and dieback investigations undertaken since 2000.

2.6 Socioeconomic factors affecting management decisions

Parkinsonia is principally a rangeland weed—an invader of pastoral properties, reserves and traditional land in generally low population areas of northern Australia and parts of southern Australia. The ability of properties to effectively and consistently control parkinsonia and other weeds in the rangelands is driven by key elements such as stock prices, property viability, agency pest management initiatives, climate, resourcing and the knowledge, attitudes, skills and aspirations of the land managers.

Poor stock prices (including fluctuations in the live cattle export trade) and extended drought conditions can both have an adverse impact on the capacity of land managers to expend finances for weed management. Conversely, very high rainfall over two or more years may result in mass establishment of parkinsonia that is beyond the capacity of land managers to contain within the short term.

Many land managers recognise the threat of parkinsonia but perceptions of its potential long-term impacts have been clouded by irregular and poorly understood dieback episodes. Studies into the cause of parkinsonia dieback are continuing. This knowledge, combined with ecological modelling, may be critical in determining areas most threatened by parkinsonia.

Most major control successes are characterised by collaborative efforts by property syndicates at a catchment or subcatchment scale. External resourcing is a catalyst for group-based aspirations and subsequently drives landscape-level coordinated control programs.

Achieving changes to the attitudes and aspirations of land managers is reliant on effective extension delivery. However, direct extension services by agencies in some rangeland regions have declined, but have been partly balanced by indirect services (internet) and an increasing role and capacity of regional natural resource management groups (e.g. catchment management authorities).

Effective extension services are critical to awareness, early detection and best-practice adoption and should be considered necessary complementary actions to on-ground control.

In particular, property-based extension campaigns need to be considered where eradication is the desired outcome.

2.7 Legislative controls

The Australian Quarantine and Inspection Service (now Biosecurity Australia), through the Quarantine Proclamation 1998, prohibits the introduction into Australia of parkinsonia as nursery stock, plant parts or seed.

The management of parkinsonia within Australia is supported by legislation at a state and territory level (Table 1). In addition, several jurisdictions have developed policies, guidelines and strategic frameworks to help implement legislation.

Table 1 Legislation related to parkinsonia

Jurisdiction	Legislation	Declaration	Action
Australian Capital Territory	<i>Pest Plants and Animals Act 2005</i>	C4	Propagation and supply is prohibited
New South Wales	<i>Noxious Weeds Act 1993</i>	C2	Must be notified to local control authority Must be eradicated and the land kept free of the plant Cannot sell or move the plant or plant material
Northern Territory	<i>Weeds Management Act 2001</i>	Class B and Class C	Class B—growth and spread to be controlled Class C—not to be introduced into the Territory
Queensland	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>	Class 2	Must not introduce, keep, release, supply or transport Landowner is required to take reasonable steps to keep land free of, or to control, parkinsonia
South Australia	<i>Natural Resource Management Act 2004</i>	Class 1C(i) Category 1 whole of state	Prohibits movement of plants and sale of plants. Requires notification of plants and owner to take action to destroy or control. Allows natural resource management agencies to recover costs from adjacent landholder for roadside control
Tasmania	<i>Weed Management Act 1999</i>	Not declared	
Victoria	<i>Catchment and Land Protection Act 1994</i>	Restricted weed	Must not buy, sell, possess for sale, display, plant, propagate, deposit on land, bring into or transport around Victoria
Western Australia	<i>Agricultural and Related Resources Protection Act 1976</i> <i>Plant Diseases Act 1914</i> The legislative arrangements are currently in a transition from the <i>Agriculture and Related Resources Protection Act 1976</i> to the <i>Biosecurity and Agriculture Management Act 2007</i> (BAM Act)	P2 for the municipal districts of Ashburton, Carnarvon, Coolgardie, Cue, Dundas, East Pilbara, Exmouth, City of Kalgoorlie-Boulder, Laverton, Leonora, Meekatharra, Menzies, Mt Magnet, Murchison, Ngaanyatjaraku, Port Headland, Roebourne, Sandstone, Shark Bay, Upper Gascoyne, Wiluna, Yalgoo P4 for the municipal districts of Broome, Derby – West Kimberley, Halls Creek and Wyndham-East Kimberley	P1—prohibits sale, trade and movement P2—eradicate existing and new infestations P4—prevent spread

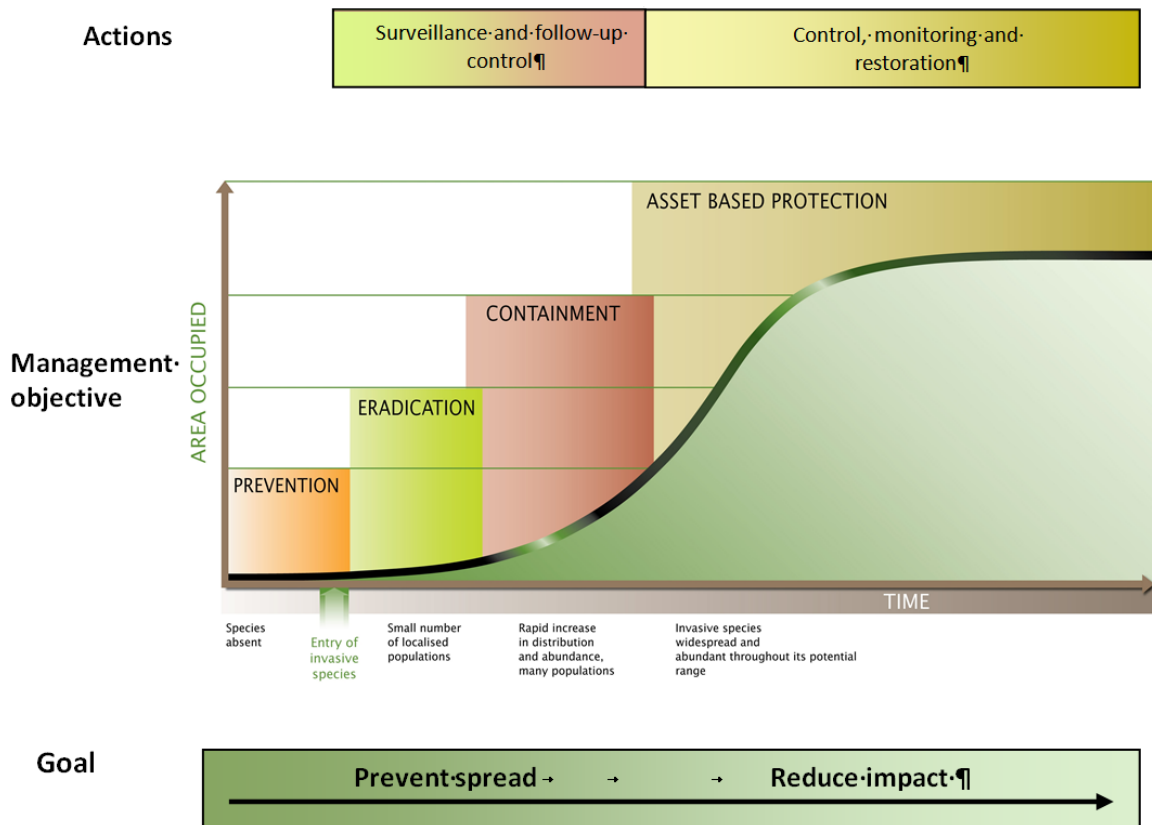
2.8 Principles underpinning the plan

This strategic plan is based on the seven key principles outlined in the Australian Weeds Strategy (NRMMC 2007):

- 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.
- Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.
- Good science underpins the effective development, monitoring and review of weed management strategies.
- Prioritisation of, and investment in, weed management must be informed by a risk management approach.
- Prevention and early intervention are the most cost-effective techniques for managing weeds.
- Weed management requires coordination among all levels of government in partnership with industry, land and water managers, and the community, regardless of tenure.
- Building capacity across government, industry, land and water managers, and the community is fundamental to effective weed management.

The WoNS initiative establishes national priorities and facilitates action where there is a significant national or cross-jurisdictional benefit to be gained. These strategic plans do not specifically address resourcing; however, they aim to identify efficiencies and ensure existing resources can be allocated to achieve the most strategic management outcomes.

Effective broadscale management of Weeds of National Significance and other weeds requires an integrated approach that includes prevention and eradication programs, establishment and implementation of management zones, and the protection of key environmental, social and economic assets in areas where the weeds are already widespread (Figure 3).



Source: Modified from Hobbs & Humphries (1995) and DPI (2010).

Figure 3 Stages of weed invasion with corresponding goals, management objectives and actions at each stage

2.8.1 The national program—progress to date

The original parkinsonia strategy was published in 2001 and was quickly followed by the formation of the National Prickle Bush Management Group (NPBMG; December 2001) and appointment of a National Prickle Bush Coordinator (April 2002). Each year since 2001, the NPBMG has monitored and reviewed the implementation of the national strategic plan (in addition to plans for mesquite and prickly acacia), and participated in major reviews of the strategy during 2006–10.

Strategy implementation initially focused on community-based strategic control programs, best-practice adoption, national mapping, and education and awareness. New initiatives in eradication projects, biological control and remote sensing have occurred in latter years.

In 2009, The Natural Resource Management Ministerial Council (Resolution 15.7, 21 May 2009) endorsed a three-phased approach to national management of WoNS species (Appendix 1). In August 2010, a panel from the Australian Weeds Committee and the NPBMG reviewed the national strategy to assess progress against goals and objectives, identify gaps and new actions for future management.

Some of the key achievements identified by the review included:

- effective control of all known infestations in South Australia and New South Wales, progressing to eradication

- greater understanding of parkinsonia biology, ecology and control options, including dieback
- national mapping of current distribution and management zones (Appendix 2)
- increased community awareness of the threats posed by parkinsonia
- significant advances in key catchments, including reducing risks of southerly spread in central and eastern Australia.

The review also recognised that there were several barriers and challenges to achieving effective management of parkinsonia, including:

- difficulties in achieving stakeholder engagement for the need to manage parkinsonia
- widespread distribution across Australia of many small populations
- reliance on Australian Government funds for long-term eradication
- lack of economic and ecological data on the benefits of control
- limited effectiveness of existing biocontrol agents.

With these challenges in mind, the review recognised the need for ongoing national coordination of parkinsonia management, with a particular focus on:

- achieving effective, long-term local/regional containment/eradication through a sustained compliance–incentives mix (particularly to maintain gains made from past multi-stakeholder investments)
- developing a robust and informative monitoring system of on-ground activities
- quantifying the impacts of parkinsonia and the benefits of control
- establishing governance arrangements that include capacity for the NPBMG to provide input into the nationally strategic value of funding applications that include management of prickly bush WoNS
- revising eradication, containment and ongoing management zones across Australia, including reviewing containment lines
- developing and distributing new biocontrol agents
- producing a best-practice manual
- engaging with landholders across Australia to identify and eradicate small stands of parkinsonia.

In August 2010, the NPBMG held a national workshop to identify new actions required to maintain the benefits derived from national coordination and to limit the impacts of parkinsonia in Australia. A draft strategy, linking strategic actions with intermediate to long-term program objectives, was produced.

To finalise this document, comments were sought from targeted agency, industry and community stakeholders. The draft strategy was also available for public comment via the Weeds Australia website.²

²

www.weeds.org.au

2.9 Relevance to other strategies

The Parkinsonia Strategic Plan 2012–17 has been developed to provide a framework for coordinated management of parkinsonia across the country. Complementary links can be found in a range of existing resource management initiatives at all jurisdictional levels, as shown in Table 2.

Table 2 Strategies and plans for the management of parkinsonia

Scale	Natural resource management	Pest management	Weed species management
National	<i>Environment Protection and Biodiversity Conservation Act 1999</i> National Strategy for the Conservation of Australia's Biological Diversity 2010 Native Vegetation Policy 2001 National Strategy for Ecologically Sustainable Development 1992	Australian Weeds Strategy 2007 Weeds of National Significance <i>Biological Control Act 1984</i> Caring for our Country Business Plan	Weeds of National Significance strategy
State	State biodiversity and natural resource management strategies	State and territory agency pest management plans	New South Wales Prickle Bush Strategy Northern Territory Parkinsonia Guideline Queensland Parkinsonia Guideline
Regional	Regional natural resource management plans	Regional pest management strategies	Specific weed control plans
Catchment	Regional and catchment management strategies	Regional pest management strategies	Regional species plans
Local	Landcare plans	Local government pest management plans (Queensland)	Local weed control plans
Property	Property management plans National park management plans	Property pest management plans National park weed management strategies	Property weed management plans

3 Strategic goals

Revised actions to confine parkinsonia and reduce its impacts to a minimum are described in Sections 3.1–3.3.

3.1 Goal 1: Protect clean areas and eradicate outlier infestations

Objectives are to:

- protect clean areas and promote early detection of new infestations
- eradicate isolated and scattered infestations.

The actions to achieve goal 1 of the strategic plan, and the action level and responsible partners for each action, are shown in Table 3.

Table 3 Actions to achieve goal 1 of the Parkinsonia Strategic Plan 2012–17

Strategic actions	Actions	Action level ^a	Responsibility
1.1 Control infestations in eradication zones	Encourage eradication objectives for NSW, SA and within the eradication zones in Qld, NT and WA	2	State and territory lead agencies, regional groups, landholders
	Encourage follow-up inspections and control of all infestation sites within NSW and SA, and eradication zones in Qld, NT and WA, and monitor for seedling germination	2	State and territory lead agencies, landholders
	Encourage the development and use of databases, registers or similar systems for maintaining consistent site records for eradication zones at either a site, regional, state or territory level	2	State and territory lead agencies, regional groups, local government
	Evaluate progress of eradication objectives at a site, regional, state and territory level, and review zoning	2	State and territory lead agencies, regional groups
1.2 Develop and maintain early detection and eradication mechanisms	Use ecological modelling to determine and prioritise areas at risk of invasion	2	Research organisations, state and territory lead agencies, regional groups
	Maintain parkinsonia-free areas through awareness, identification training, monitoring and early detection	1	State and territory lead agencies, regional groups, local government
	Promote awareness of vectors that spread parkinsonia, especially the role of water movement through flooding	2	State and territory lead agencies, regional groups, local government
	Identify, record and implement surveys of high-risk areas, especially following major flood events and/or as periodically required	2	State and territory lead agencies, regional groups, local government
	Encourage reporting of suspected outbreaks and ensure processes are in place for identification, rapid response, delimitation and control planning	1	State and territory lead agencies, regional groups, local government

Strategic actions	Actions	Action level ^a	Responsibility
1.3 Facilitate buffer zone implementation to safeguard catchments threatened by parkinsonia	Encourage implementation through surveys, strategic management or buffer zones to protect catchments at risk of invasion	1	State and territory lead agencies, regional groups, local government
<p>a The Australian Weeds Committee (AWC) applied three action levels that reflect jurisdictional commitment to implementing actions: Level 1 = Highly beneficial as a national action that is critical to success of the WoNS revised strategic plan and all relevant AWC jurisdictions have committed resources to implementing this action. OR Highly beneficial to a particular jurisdiction and the responsible party/ies have committed resources to implement this action. Level 2 = Highly beneficial at national and/or jurisdictional level, but implementation will be subject to resource availability and investment priorities. Level 3 = Desirable and still beneficial to improving uptake and efficiency of on-ground action, but not critical to success.</p>			

3.2 Goal 2: Minimise impacts of parkinsonia on productivity and natural assets

Objectives are to:

- implement catchment-scale, community-based control programs
- protect and restore high-value environmental and cultural sites
- adopt best-practice and integrated management practices
- support biological control initiatives.

The actions to achieve goal 2 of the strategic plan, and the action level and responsible partners for each action, are shown in Table 4.

Table 4 Actions to achieve goal 2 of the Parkinsonia Strategic Plan 2012–17

Strategic actions	Actions	Action level ^a	Responsibility
2.1 Use broadscale approaches to parkinsonia management	Prioritise catchments and regions for strategic control and develop appropriate actions and/or management regimes	2	State and territory lead agencies
	Encourage and support subcatchment, catchment and regional-scale community management of parkinsonia	1	State and territory lead agencies, regional groups, local government
	Promote community and government case studies of parkinsonia management at different scales	2	State and territory lead agencies, regional groups, local government
	Promote, maintain and/or establish infestation-free areas within the containment zone	3	State and territory lead agencies, regional groups, local government
2.2 Protect and restore high-value environmental and cultural sites	Encourage the implementation of on-ground control projects and restoration of high conservation sites (e.g. wetlands) and culturally significant areas threatened and/or impacted by parkinsonia	2	State and territory lead agencies, regional groups, traditional owners, local government
2.3 Promote the integration of parkinsonia management	Develop and/or promote integrated weed management to maximise benefits of parkinsonia control	1	State and territory lead agencies, regional groups, industry groups
	Encourage targeted awareness programs for stakeholders that incorporate cultural and property management practices such as fire	1	State and territory lead agencies, regional groups, community groups, traditional owners, local government
	Include parkinsonia management in pest management field days, workshops, demonstrations and control training to facilitate best-practice adoption	2	State and territory lead agencies, regional groups, community groups, traditional owners, local government
	Publish a national best-practice manual to include recent outcomes from ecology research, control trials, fire studies, and biological control and dieback investigations (to supplement the	2	State and territory lead agencies

Strategic actions	Actions	Action level ^a	Responsibility
	<i>Parkinsonia national case studies manual</i> [Deveze 2004]		
2.4 Identify economic and ecological impacts	Quantify the economic and ecological impacts of parkinsonia	3	State and territory lead agencies, industry groups
	Determine the benefits and costs of parkinsonia control for best-practice management	3	State and territory lead agencies, industry groups
2.5 Facilitate a planned approach to achieving effective parkinsonia management	Incorporate parkinsonia management in: <ul style="list-style-type: none"> property and subcatchment plans local government and agency pest management plans natural resource management and catchment strategies biodiversity strategies state and territory plans 	1	State and territory lead agencies, regional groups, community groups, local government, landholders
	Clearly identify parkinsonia infestations that occur in eradication zones in relevant pest management plans and action accordingly	2	State and territory lead agencies, regional groups, community groups, local government
2.6 Introduce and improve the impact of introduced biological control agents	Introduce, assess and distribute new biological control agents	1	Research organisations
	Determine impacts of new biological control agents and inter-relationships between them and other control options	2	Research organisations
2.7 Improve the impact of naturally occurring biological control agents	Investigate the effectiveness of dieback (fungal) agents as biological agents	1	Research organisations
	Facilitate and monitor community/industry-based research trials of dieback agents in priority regions	2	Research organisations
	Encourage the application of biological control (dieback agents) as part of an integrated approach to parkinsonia management	2	University of Queensland, state and territory lead agencies, regional groups

- a The Australian Weeds Committee (AWC) applied three action levels that reflect jurisdictional commitment to implementing actions:
Level 1 = Highly beneficial as a national action that is critical to success of the WoNS revised strategic plan and all relevant AWC jurisdictions have committed resources to implementing this action.
OR
Highly beneficial to a particular jurisdiction and the responsible party/ies have committed resources to implement this action.
Level 2 = Highly beneficial at national and/or jurisdictional level, but implementation will be subject to resource availability and investment priorities.
Level 3 = Desirable and still beneficial to improving uptake and efficiency of on-ground action, but not critical to success.

3.3 Goal 3: Maintain and enhance national commitment to manage parkinsonia

Objectives are to:

- coordinate implementation of the strategy
- monitor and evaluate implementation of the strategy
- increase awareness of the parkinsonia threat
- maintain and use legislative tools
- use national distribution data for planning and prioritisation.

The actions to achieve goal 3 of the strategic plan, and the action level and responsible partners for each action, are shown in Table 5.

Table 5 Actions to achieve goal 3 of the Parkinsonia Strategic Plan 2012–17

Strategic actions	Actions	Action level ^a	Responsibility
3.1 Manage implementation of the plan	Maintain effective national coordination and implementation arrangements including inter-jurisdictional collaboration	1	State and territory lead agencies, NPBMG with national coordinator
3.2 Monitor and evaluate implementation of the strategy	Collate strategy milestones and report on progress annually to AWC and key stakeholders	1	State and territory lead agencies
	Develop and implement a monitoring, evaluation, reporting and improvement plan	1	State and territory agencies
	Collate strategic milestones and report on progress annually to key stakeholders using a monitoring, evaluation, reporting and improvement plan	1	Regional groups, state and territory lead agencies, NPBMG, national coordinator
3.3 Coordinate communication about the strategy	Conduct communication activities to ensure awareness of the plan, priority actions and achievements	1	State and territory agencies, national coordinator
	Ensure links with other relevant WoNS strategies and other plans to maximise awareness	1	State and territory lead agencies, national coordinator
3.4 Seek support and resources for strategy delivery	Undertake research for: <ul style="list-style-type: none"> • risk assessment • environmental and agricultural impacts • management tools • biological control • dieback investigations • mapping technologies 	2	Research organisations
	Facilitate collaborative partnerships to improve parkinsonia coordination and control outcomes	1	State and territory lead agencies
	Undertake joint actions where appropriate with other WoNS strategies	2	State and territory lead agencies

Strategic actions	Actions	Action level ^a	Responsibility
3.5 Increase education and awareness of parkinsonia in Australia	Promote awareness of the threat and impacts of parkinsonia	1	National coordinator, NPBMG, state and territory lead agencies, regional groups, local government
	Direct awareness campaigns to target groups in high-risk regions	1	National coordinator, , state and territory lead agencies, regional groups, local government
	Distribute identification materials for parkinsonia and joint products with mesquite, prickly acacia and other WoNS	1	National coordinator, state and territory lead agencies, regional groups
3.6 Maintain an appropriate legislative framework for management of parkinsonia	Maintain declaration of prickly acacia to prevent trade and distribution in all states and territories	1	Australian Government, state and territory lead agencies
	Increase policy support for nationally strategic actions	2	Australian Government, state and territory agencies
	Promote landholder awareness of their responsibilities under legislation	2	Local government, state and territory agencies
	Encourage the use of enforcement where necessary to complement eradication objectives, protect control investments and/or restore environmental and cultural assets	2	Local government, state and territory lead agencies
3.7 Develop maps of parkinsonia distribution and management zones	Maintain and update national distribution and density maps	1	State and territory lead agencies, national coordinator, NPBMG
	Develop distribution and density maps at appropriate scales for project management, planning, resource prioritisation and reporting	3	Regional groups, local government, state and territory lead agencies
	Develop, delineate and publish national management zones incorporating eradication, active management and containment	1	State and territory lead agencies, national coordinator, NPBMG
	Review national management zones including community, industry and government submissions to amend zoning	2	State and territory lead agencies
	Determine nationally consistent data attributes to evaluate progress in parkinsonia management in each zone	3	State and territory lead agencies, NPBMG
	Monitor long-term changes in distribution and density including invasion trends, dieback and control activity outcomes	3	CSIRO, University of Queensland, state and territory lead agencies

NPBMG = National Prickle Bush Management Group; WoNS = Weeds of National Significance

a The Australian Weeds Committee (AWC) applied three action levels that reflect jurisdictional commitment to implementing actions:

Level 1 = Highly beneficial as a national action that is critical to success of the WoNS revised strategic plan and all relevant AWC jurisdictions have committed resources to implementing this action.

OR

Highly beneficial to a particular jurisdiction and the responsible party/ies have committed resources to implement this action.

Level 2 = Highly beneficial at national and/or jurisdictional level, but implementation will be subject to resource availability and investment priorities.

Level 3 = Desirable and still beneficial to improving uptake and efficiency of on-ground action, but not critical to success.

- b The role of the national coordinator and taskforce ends on 30 June 2013.

4 Monitoring, evaluation, reporting and improvement framework

The Australian Weeds Strategy (NRMMC 2007) gives the Australian Weeds Committee (AWC) responsibility for monitoring and evaluating the management of national priority weeds, including WoNS. The AWC is therefore responsible for monitoring and reporting on progress under this strategic plan.

This strategic plan is subject to a five-year review; however, mechanisms must also be put in place to allow the goals and actions to be evaluated throughout this period. This enables ongoing assessment of progress towards intermediate and long-term outcomes, and, ultimately, helps to determine the effectiveness of individual actions. It also helps to identify program improvements, and provides evidence to stakeholders and funding bodies that they are getting value from their investment.

Individual jurisdictions and/or organisations responsible for weed management and conservation will need to develop their own monitoring strategies. They should, where possible, coordinate actions to implement this plan, and monitor and evaluate progress towards its goals in conjunction with existing state, regional or local plans. While individual actions should be monitored at the jurisdictional level, data or evidence collected as a part of state, regional and local activities or plans should be provided to the AWC and collated so that it can be assessed each year within the national context. This will help to build a comprehensive overview of the plan's delivery. Table 6 lists key evaluation questions that should be assessed by the AWC each year at the national level to ensure progress against strategy goals, and which should be used to provide the basis for an annual report to the AWC.

This monitoring, evaluation, reporting and improvement (MERI) framework lists the basic reporting information that should be collected for the life of the strategic plan—including during phase 3 delivery (see Appendix 1). This will ensure that sufficient data are collected to identify successes and failures, and provide the opportunity for improvement where outcomes are not being achieved. Annual MERI plans may be developed to follow activities in more detail.

Although performance indicators or other ways of measuring progress are not provided in this strategic plan, a scoring system could be appropriate.

A generic program logic model (Appendix 3) was developed by WoNS coordinators in 2010. This shows the relationship between strategic actions and the objectives and goals they achieve. The program logic is one way to communicate the links between activities, their intermediate and long-term outcomes, and the vision of the strategic plan.

Table 6 Suggested monitoring and evaluation questions to measure progress under the phase 3 WoNS Parkinsonia Strategic Plan 2012–17

WoNS:		Jurisdiction:	Date:
Goal	Key evaluation questions	Data or evidence required	Consider
1 Prevent new infestations from establishing	To what extent have new infestations been prevented from establishing?	1.1 National distribution data: Has the national distribution map been reviewed and/or updated? Has the Priority Management Action spreadsheet been updated?	<ul style="list-style-type: none"> • Are these documents publicly available? • Have stakeholders been advised of any changes? • Where is this data or information stored? • Does this information capture national priorities?
		1.2 New infestations: Number of new infestations recorded Percentage of known infestations actively controlled	<ul style="list-style-type: none"> • Are any new infestations occurring in areas identified as a high priority in the national strategy? • How were infestations detected (passive or active surveillance, community reporting etc.)? • Have high-risk pathways been adequately identified? • Have threats been minimised?
		1.3 Eradication and containment programs: Percentage of eradication and/or containment programs being maintained	<ul style="list-style-type: none"> • What percentage of programs identified in the national strategy are being actively managed? • Is there a plan in place for ongoing management? • How is progress being monitored and reported to stakeholders? <p>(Examples using case studies can be included)</p>
		1.4 Legislation: Legislation or policy changes for this species Legislative change has been identified by stakeholders	<ul style="list-style-type: none"> • What legislative changes have been made? • Are minimum requirements being maintained (e.g. ban on sale, trade, movement)? • Is control required throughout or in part of the jurisdiction? • Is compliance actively enforced?
			Score:

Table 6 *continued*

WoNS:		Jurisdiction:		Date:
Goal	Key evaluation questions	Data or evidence required	Consider	
2 Strategically manage existing infestations	To what extent is integrated weed management effectively managing core infestations?	2.1 Integrated weed management: Effectiveness of integrated weed management programs	<ul style="list-style-type: none"> Are existing tools providing adequate control of WoNS? Have new advances or technologies been developed and are they incorporated into best-practice management information? Are there barriers to adoption of best-practice management? Are research programs addressing any observed gaps (e.g. herbicide trials, biocontrol, restoration requirements post-control)? 	
	To what extent are assets being protected through strategic management?	2.2 Asset protection: Number of priority assets identified as 'at risk' from WoNS Percentage of priority assets being protected (e.g. assessed against relevant threat abatement plans) Percentage of state and regional invasive species plans that identify priority assets at risk from WoNS	<ul style="list-style-type: none"> Methods by which assets are being protected (e.g. targeted annual spray programs, high-risk pathway surveillance, strategic plans) Are long-term monitoring programs in place to detect change? To what extent is management leading to an improvement in asset condition? <p>(Response should include status report on progress towards asset-protection programs)</p>	
				Score:
3 Increase capability and commitment to manage WoNS	To what extent has the capability and commitment to manage WoNS increased?	3.1 Community engagement and awareness: What is the status of best-practice information? Are partnerships being maintained to ensure collaboration on WoNS? Number and type of media activities	<ul style="list-style-type: none"> Is best-practice information up to date and readily available? Is this information and/or advice being targeted to priority regions? Is training being delivered to meet the needs of weed managers (including the community)? Are networks and groups being supported (e.g. through dissemination of research outcomes, 	

Table 6 *continued*

WoNS:	Jurisdiction:	Date:	
Goal	Key evaluation questions	Data or evidence required	Consider
			<ul style="list-style-type: none"> funding opportunities, control options etc.)? Has awareness and engagement in WoNS management been raised effectively?
		3.2 Resourcing: From what sources are programs being funded?	<ul style="list-style-type: none"> Number of projects funded by Australian Government, jurisdictions, industry, etc.
		3.3 Policy and planning: Are the objectives of the strategy being integrated into Australian Government/state/regional plans, policies and programs? Has cross-border collaboration occurred?	<ul style="list-style-type: none"> How are priorities reflected in planning and policy approaches (e.g. weed risk assessments, invasive species plans, asset-protection plans, district plans, weed spread prevention activities, management programs, incentive programs, state working groups)? How are national priorities being maintained (e.g. containment lines, eradication targets, training and awareness raising, research projects)?
	Score:		
Continuous improvement	Are there any unexpected outcomes that have been identified through implementation of strategy?	Barriers: <ul style="list-style-type: none"> Have any other management issues or impediments been identified? 	

WoNS = Weeds of National Significance

Scoring:

- 1: Insufficient evidence to score
- 2: No progress has been made against this goal
- 3: Limited progress is being made against this goal
- 4: Reasonable progress is being made against this goal
- 5: Excellent progress is being made against this goal

5 Stakeholder responsibilities

Although landowners have primary responsibility for the control of parkinsonia on their land, relevant agencies share responsibility for the strategies and actions listed in Sections 3 and 4. The effective implementation of this strategy requires the involvement of a range of stakeholders. Stakeholders' responsibilities may vary between jurisdictions: some actions may be optional while others are prescribed by legislation. The successful achievement of strategic actions relies on the development and maintenance of partnerships between community, industry and government, and recognition of the roles of each stakeholder. In particular, while the National Prickle Bush Management Group provided oversight for the original strategy, future coordination arrangements will evolve to maintain and build on past achievements. The Australian Weeds Committee, at a national level, and various agencies at the state and territory level will continue to provide a leadership role. Suggested responsibilities for each group are listed below.

Private landowners

- Manage and control parkinsonia consistent with legislative requirements for their state or territory.
- Implement best-practice management.
- Undertake any necessary planning and mapping.
- Identify parkinsonia and other weeds threatening their property.
- Implement stock hygiene and other management practices to minimise parkinsonia spread.

Local governments

- Manage and control parkinsonia consistent with legislative requirements for their state or territory.
- Incorporate parkinsonia objectives in relevant pest management plans and monitor implementation.
- Administer and enforce legislation where applicable.
- Undertake surveying and mapping, particularly in relation to outlying parkinsonia infestations.
- Establish local management policies to contribute to strategic control, containment and/or asset protection objectives.
- Control parkinsonia on local government-managed or owned land.
- Facilitate the removal of urban plantings of parkinsonia.
- Source funding and/or contribute to strategic control programs.
- Develop and implement extension strategies to increase awareness of parkinsonia.

Natural resource management groups (e.g. catchment management authorities), community, conservation and other interest groups

- Contribute local and regional perspectives to parkinsonia management.
- Contribute to the development, implementation and/or review of local and regional pest management plans.
- Promote and contribute to local and regional containment and/or management programs in partnership with relevant stakeholders.
- Support and/or develop parkinsonia projects and funding submissions for control.
- Participate in local and regional mapping initiatives and contribute to state, territory and national map production.
- Promote awareness and best-practice management through event coordination and product distribution.

Primary industries (including producers and industry bodies associated with the grazing sector and relevant agricultural and herbicide industries)

- Promote and adopt best-practice management of parkinsonia.
- Identify gaps and issues associated with implementation of the parkinsonia strategic plan.
- Contribute to research and development of management practices to support industry members.

State and territory agencies

- Manage and control parkinsonia consistent with legislative requirements for their state or territory.
- Maintain appropriate legislation and policies to achieve state and territory-based objectives for managing parkinsonia.
- Coordinate parkinsonia control and management at a jurisdictional level to complement the management and delivery of the parkinsonia strategic plan.
- Work closely with local governments, communities and other stakeholders to prevent and minimise impacts of parkinsonia.
- Identify strategic management areas and associated objectives.
- Include the strategic control of parkinsonia on state lands in agency pest management plans and on-ground implementation and outcomes.
- Facilitate the inclusion of strategic parkinsonia management in pest management planning processes with secondary stakeholders.
- Source funding for strategic management programs and research.
- Implement monitoring and reporting protocols in line with the monitoring, evaluation, reporting and improvement plan and provide relevant information to the national taskforce and/or Australian Weeds Committee.
- Develop and implement communication and extension plans where appropriate.

- Facilitate state and territory-level mapping and contribute to national mapping initiatives.

Research institutions

- Address priority national strategic requirements through applied research.
- Identify research gaps and seek innovative solutions for the management of parkinsonia.
- Seek new and ongoing funding and support for research requirements.

Australian Government

- Ensure quarantine controls to prevent importation (Biosecurity Australia).
- Ensure access is available for appropriate and potential resources through funding initiatives such as Caring for our Country.
- Provide research support through CSIRO and the Commonwealth Weeds Research Group.
- Undertake strategic parkinsonia control on all Australian Government-managed lands.

Australian Weeds Committee

- Provides a mechanism for identifying and resolving weed issues at a national level.
- Facilitates coordination between the Australian Government, the states and territories and other agencies.
- Provides advice to the Natural Resource Management Ministerial Council on weeds issues.
- Plans, coordinate and monitors implementation of the Australian Weeds Strategy; builds links between key stakeholders; identifies potential and emerging weed problems; implements consistent approaches to weed management; and develops a communications strategy for increasing the profile of weed issues.
- Oversees implementation of the activities described in strategies in the Weeds of National Significance Program.

Appendix 1 The Weeds of National Significance initiative and its phases¹

In 2007, an independent review of the WoNS initiative concluded that the nationally strategic approach of WoNS was highly successful in leveraging consistent multijurisdictional activity on high-priority weed species. This initial review was followed by a detailed review of the inaugural WoNS species by the Australian Weeds Committee (AWC) in 2009–10. The AWC reviewed the implementation of the 20 WoNS national strategies and, in light of achievements for these 20 species, considered the capacity for national coordination of additional WoNS species.

Following the reviews, the Natural Resource Management Ministerial Council (Resolution 15.7, 21 May 2009) endorsed a three-phased approach to national management of WoNS species (Figure 4). This ‘phased approach’ aims to provide the most cost-effective use of limited ‘national coordination’ resources.

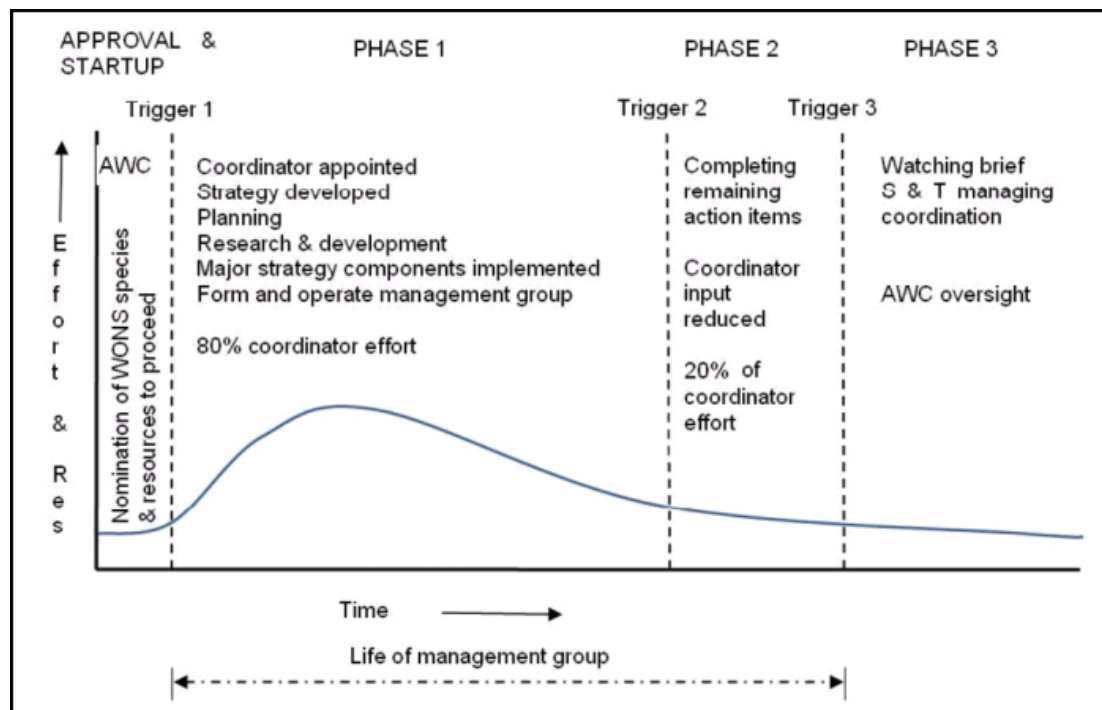


Figure 4 Australian Weed Committee diagrammatic representation of coordinator effort and resource use when implementing a Weeds of National Significance strategy

The phased approach recognises the need for reduced national coordination (‘phasing down’) of WoNS species that are under effective national management, and allows for further weed species to be nominated for consideration as additional WoNS. The AWC is implementing these reforms, and national coordination of the inaugural 20 WoNS species has already transitioned to phase 2 or 3, depending on the species. No species have yet been

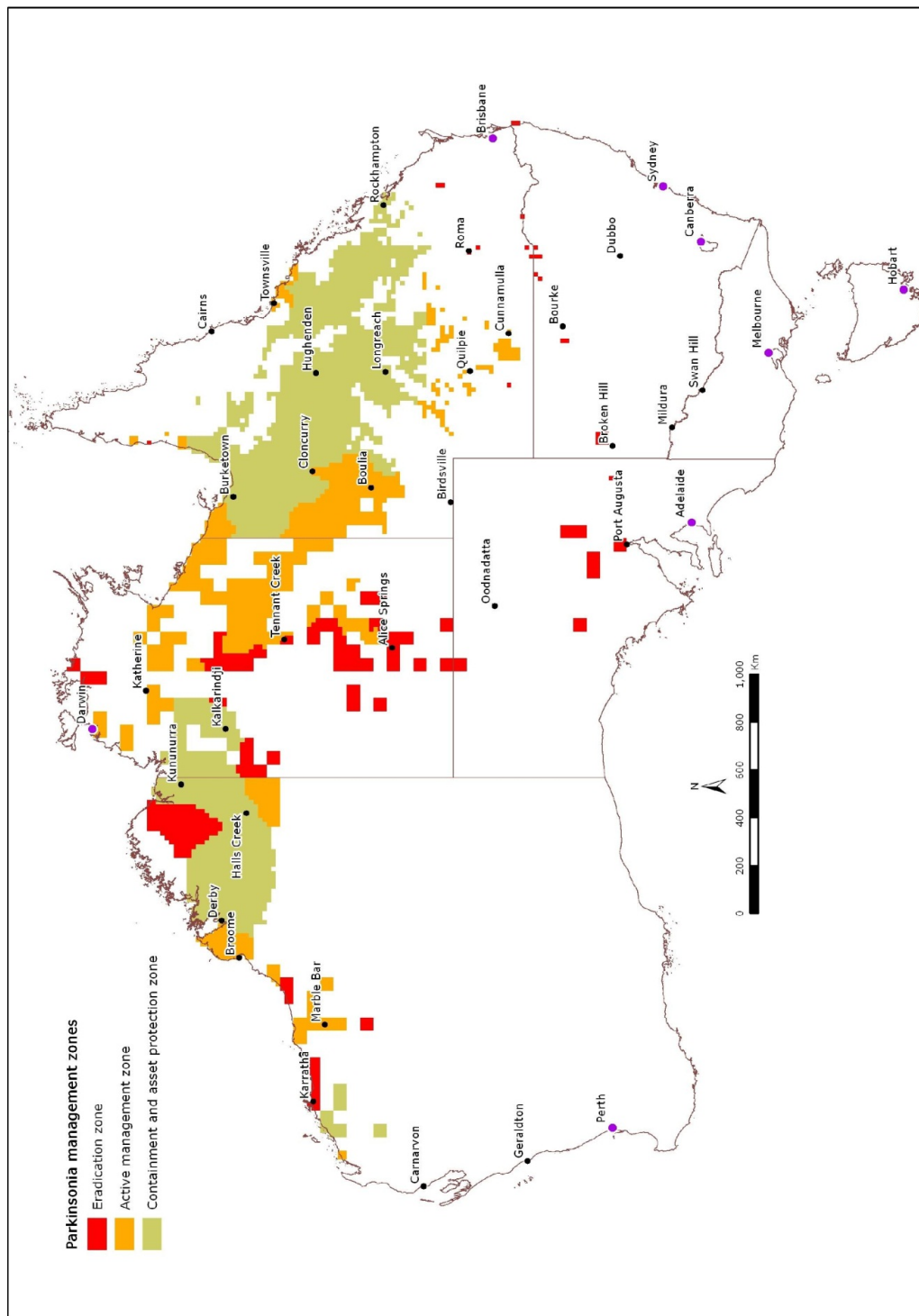
¹ Adapted from Thorp 2012, *Additional list of Weeds of National Significance*, <www.org.au/WoNS>.

removed from the WoNS list. The AWC is developing a protocol to guide future decisions about when this should occur on a case-by-case basis.

In 2010, jurisdictions nominated additional candidate WoNS species. These species were independently assessed, and the AWC endorsed 12 additional 'species' to be listed as WoNS. The AWC Chairman, Dr Jim Thompson, announced these additional plant species as WoNS on 20 April 2012. Additional information on the selection of these species and the phased approach is available on www.weeds.org.au/WONS.

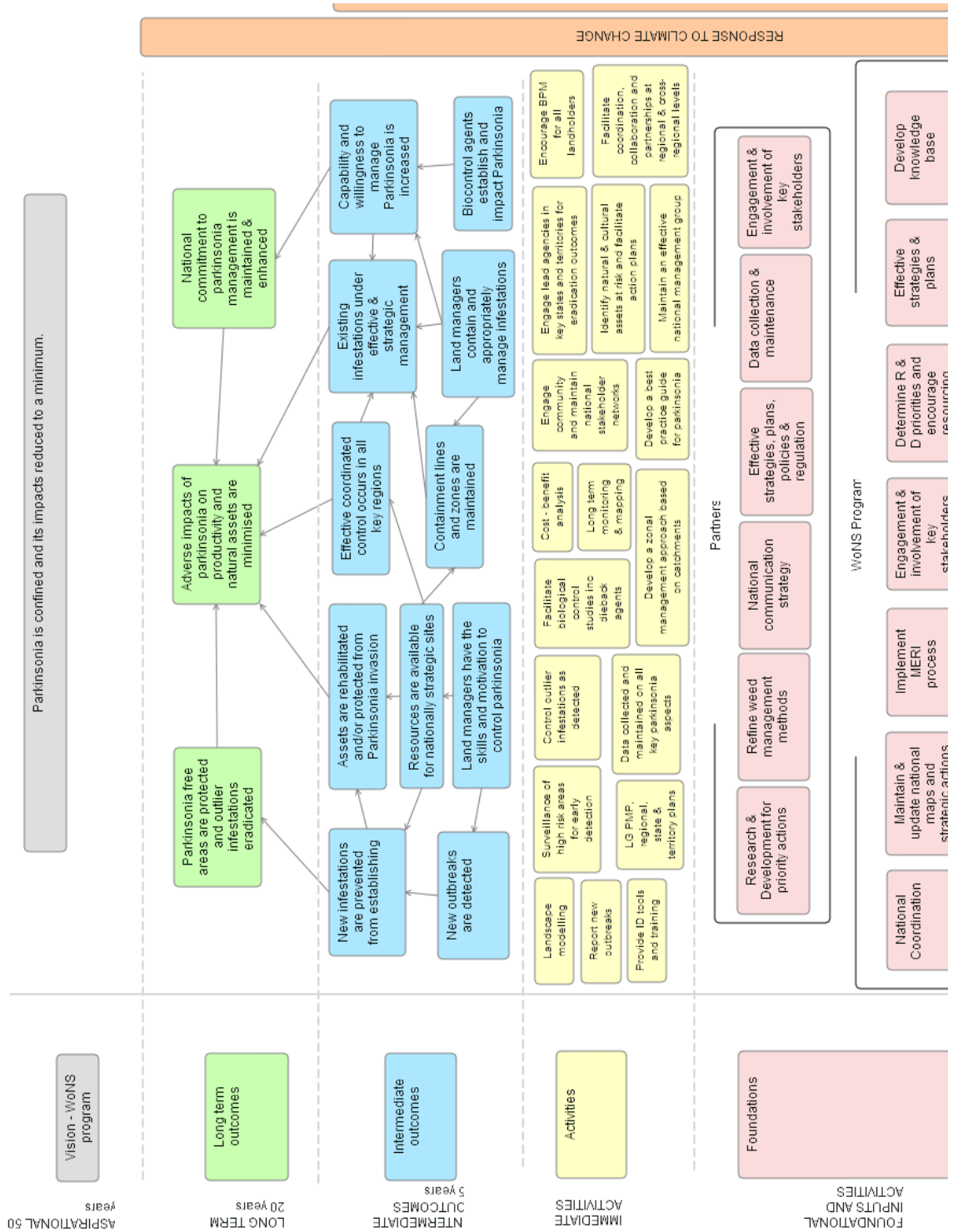
Appendix 2 National parkinsonia distribution and management zone map

The priority management actions for parkinsonia outlined in goals 1–3 of the strategic plan are reflected in the national weed spread and management map below.



Appendix 3 Program logic model for the parkinsonia strategic plan

WoNS Program Logic for Parkinsonia National Strategy



References and further reading

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