WEEDS OF NATIONAL SIGNIFICANCE

PRICKLY ACACIA

(*Acacia nilotica*)

Strategic Plan

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Supporting information about the National 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, their management committees and copies of the strategy.

This strategy was developed under the leadership of the Dept of Natural Resources, Queensland with full cooperation of all the States and Territories of Australia.

Comments and constructive criticism are welcomed as an aid to improving the process and future revisions of this strategy.

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CONTENTS

EXECUTIVE SUMMARY **1**

THE CHALLENGE **2**

1 BACKGROUND **3**
1.1 The biology of prickly acacia 3
1.2 History of spread 3
1.3 A weed of national significance 4
1.4 Legislative controls 5
1.5 Control to date 5
1.6 Principles underlying the plan 6
1.7 Process Followed 6
1.8 Relevance to other strategies 6

2 STRATEGIC PLAN **8**
2.1 Prevent spread 8
2.2 Reduce impact 9
2.3 Harness national commitment 11
2.4 Co-ordinate management 13

3 MONITORING AND EVALUATION **14**

4 STAKEHOLDER RESPONSIBILITIES **15**

5 ADDITIONAL READING **16**

6 GLOSSARY **17**

Appendix 1 Map of the Prickly Acacia Containment Line **18**

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EXECUTIVE SUMMARY

Prickly acacia (*Acacia nilotica* subsp. *indica*) is one of northern Australia's worst weeds. It is a woody shrub/tree that aggressively replaces grasslands with thorny thickets. It costs primary production over $5 million per annum by decreasing pasture production and hindering mustering. Over 6 million hectares of arid and semi-arid Queensland are infested to date. It has potential to infest 50 million hectares of grasslands in Queensland, Northern Territory and Western Australia. This strategy was developed after extensive community consultation. The major challenges for prickly acacia are prevention of seed spread, managing extensive infestations and ensuring follow up treatment in infested areas.

The vision of the strategy is that:

Prickly acacia is confined and its impacts reduced to a minimum.

The strategy aims to deliver four desired outcomes.

1 Prickly acacia is prevented from spreading.

- Prevent long and short distance movement by stock
- Prohibit trade and distribution across Australia
- Develop and maintain early detection and eradication mechanisms
- Maintain a national containment line
- Use enforcement as a management tool.

2 The adverse impacts of established prickly acacia infestations are minimised.

- Foster regional and local containment planning
- Promote the integration of prickly acacia management
- Identify economic impacts, incentives and disincentives
- Refine and adopt best practice management
- Improve integrated management
- Introduce and improve the impact of biocontrol agents.

3 National commitment to prickly acacia is maintained.

- Adopt a community approach to planning and management
- Maximise the availability and use of resources
- Develop maps of prickly acacia.

4 Prickly acacia management is co-ordinated at a national level.

- Manage implementation of plan
- Monitor implementation of plan
- Coordinate communication on the plan.

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The extent to which these outcomes are met will be evaluated as part of a five-year cycle of review and will determine the success of this strategic plan.

THE CHALLENGE

Prickly acacia (*Acacia nilotica* ssp*. indica*) is one of Australia's worst weeds. It has received national attention because of its impacts on the northern Mitchell Grass Downs of Queensland, where it is replacing a grass community with an impenetrable thorny shrub land.

Prickly acacia is a woody shrub/tree, introduced from India and Pakistan. Imported into Australia as an ornamental and shade tree in the 1900's this plant was also touted as a valuable fodder and shade tree from the 1920's to 1960's. It has progressed to be a major weed and is known to infest over 6,000,000 ha of arid and semi-arid Queensland, with small infestations in three other states. Most of Australia, north of approximately latitude 32^{o}S, (except for South Australia, coastal NSW and southeast Queensland) appears to be climatically suitable for prickly acacia and must be considered as potentially under threat from this weed.

Annual costs of $5 million per year are estimated for the grazing industry due to reduced production and increases in management costs. The industry now sees that the impact of this species significantly outweighs the benefits gained from shade and drought fodder.
The environmental cost of prickly acacia has not been well quantified. The Mitchell Grass Downs bio-region is known, however, to be home to twenty-five rare and threatened animal species and two endangered plant communities and this community is seriously altered in infested areas. Unless effective and efficient management is implemented and maintained, prickly acacia will continue to impact adversely on the biological diversity, agriculture, tourism, other industries and potential Aboriginal land use across northern Australia.

Prickly acacia is easily dispersed by stock or humans and large new infestations can rapidly arise after good seasons. Once established the economic and control costs are high. As with all weeds the cheapest control option is prevention and more work is required on protocols and procedures to prevent spread.

Substantial progress has been made on the control of prickly acacia. It can be managed with a combination of chemical and mechanical control. Introduced biological agents have not had a noticeable impact to date. Costs of control may be significant when measured against land value. The challenge is to find economically feasible management practices that will be adopted by land managers. All control measures require follow up due to the regeneration from the large seed bank.

Implementation of the Prickly Acacia Strategic Plan will result in containing the spread of prickly acacia and minimising the impact of established infestations to Australia.

1 BACKGROUND

Prickly acacia is a weed of national significance (WONS) because it is a woody shrub that forms thickets that impact on primary industry and biodiversity. It threatens a major extensive native ecosystem, the Mitchell Grass Downs and has the potential to spread over most of northern Australia. Prickly acacia is easily spread, shows a wide adaptability to climate and results in significant changes in ecosystem composition. Large infestations of prickly acacia are currently found only in Queensland, however, it poses a potential risk to 50 million hectares of Australia's native grassland ecosystems.

Prickly acacia may be confused with native acacia species, the genus has over 500 species in Australia. Unfortunately the common name is also used for some of these species. Native acacia's include *A. farnesiana* (known as mimosa bush, mimosa or prickly acacia) and *A. paradoxa* (kangaroo thorn). Similar looking woody weeds, also weeds of national significance, are *Prosopis* spp. (mesquites) and *Parkinsonia aculeata* (parkinsonia).

1.1 The biology of prickly acacia

Prickly acacia, *Acacia nilotica* ssp*. indica*, is a thorny leguminous shrub or small tree that grows to 5 metres. The umbrella shapes of the tree and the pods are characteristic features. The young shrubs form dense thorny thickets. While mature trees are usually single stemmed, with spreading branches which lose most of their thorns. Leaves are finely divided and fern-like, with four to ten pairs of leaf branches and ten to twenty pairs of narrow green leaflets on each branch. Pairs of stout thorns, usually 5-10cm long, grow at the base of the leaves.

Golden-yellow, ball-shaped flowers, about 1cm across, grow on the stems with two to six flowers per group. Pods are 10-15 cm or longer, flat, with narrow constrictions between the seeds. The pods turn gray when ripe. One medium sized tree can produce 175 000 viable seeds per year. Seeds can remain viable in soil up to 15 years, although less than 5% of seed is viable after 2 years (Figure 1).

Stock, particularly cattle, is the main agents for dispersing prickly acacia seed. Water is the second most likely means of dispersal, generally as a result of flooding. Seed germination is affected by soil type and water regime. Prickly acacia prefers cracking clays and loam soils due to their high water holding capacity.

1.2 History of spread

Prickly acacia was first recorded in Australia growing in New South Wales in 1803. It was not spread widely until after 1900 when it was grown extensively as a shade and ornamental tree in the Bowen and Rockhampton districts of Queensland. Initial spread was by broadcasting seeds from horseback and by deliberate planting of seedlings. The Department of Agriculture and Stock recommended it in 1926 as a suitable shade tree for sheep production in western Queensland. It was subsequently widely planted around homesteads, bore drains and dams during the second quarter of this century, not only for shade but also for fodder, because of the protein rich pods and leaves.

The wool crash of the 1970's saw a change from stocking sheep to cattle in Queensland. The slump in cattle prices during the 1970's in turn led to high stocking rates which may have been significant in providing large numbers of cattle as dispersal agents. This, and the series of wet years during the 1950's and again in the 1970's promoted massive invasion of prickly acacia throughout the northern Mitchell Grass Downs and the establishment of dense thorn veldts, particularly along bore drains.

Distribution

Prickly acacia is now distributed from Cooktown in Queensland's north to the New South Wales border and from Bowen on the east Queensland coast to the Barkly Tableland and Arnhem Land in the Northern Territory. The major infestation includes 6,000,000 hectares of the northern Mitchell Grass Downs of Queensland (Appendix 1). The heaviest infestations occur along bore drains, water courses and drainage lines. Infestations spread from here onto the extensive rangelands.

The potential distribution of prickly acacia in Australia has been predicted using CLIMEX from the ecoclimatic characteristics of the areas of Pakistan and India where prickly

acacia is native (Figure 2). All areas north of latitude 32°S (except for South Australia, coastal NSW and south-east Queensland) appears to be climatically suitable for prickly acacia and must be considered as potentially under threat by this weed. This potential distribution includes over 50 million hectares of Australia's native grassland ecosystems.

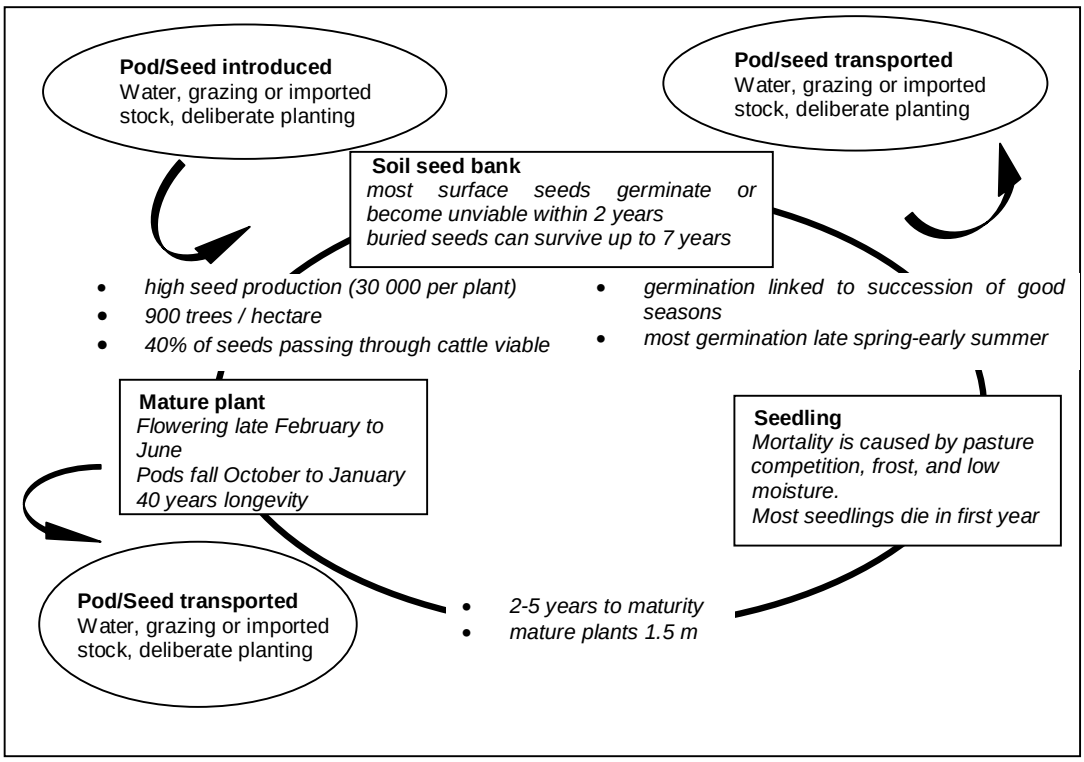

Figure 1. The life cycle of prickly acacia.

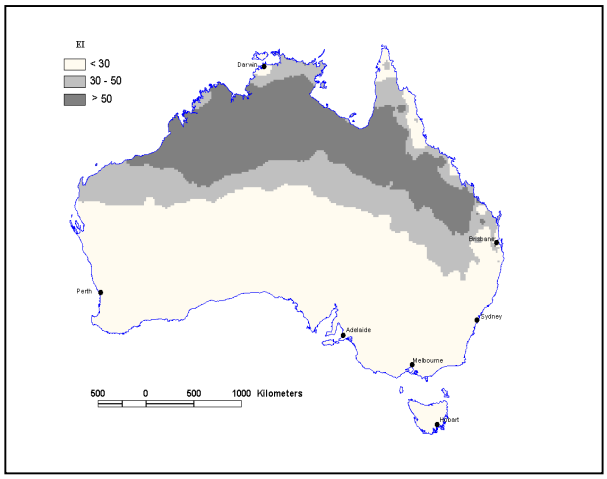

Figure 2. Potential distribution of prickly acacia.
(Data is splined from a CLIMEX prediction. EI = Ecoclimatic index: EI<30 potential for permanent population low, EI>50 potential very high).

1.3 A weed of national significance

Prickly acacia currently impacts on a range of land uses as summarized below.

Environmental:

- Potential to replace the Mitchell Grass Downs (area of 320,000 km^2) with a thorny scrub-land similar to the African thorn veldt
- Threatens 25 rare and vulnerable animals including the Julia Creek Dunnart (*Sminthopsis douglasi*), a form of the long-tailed planigale (*Planigale ingrami*) and two skink species
- Prickly acacia infestations result in dramatic changes to species diversity of birds and reptiles reflecting the decrease in grass cover, increased bare ground and increase in perching sites.

Primary Production:

- Reduced pasture production resulting in reduction in cattle/wool production estimated at between $2.4 M and $5 M per year
- Increased difficulty and expense of mustering stock estimated at $0.4 M per year
- Impeded movement and access to water
- Water loss from and maintenance of bore drains
- Exacerbates and accelerates soil erosion
- Control costs to primary industry estimated at between $1.4 M and $4 M per year

- Some property values have been decreased by as much as 20% due to heavy infestations of prickly acacia across the property.

Tourism:

- The Mitchell Grass Downs are one of the worlds unique grass landscapes. The value of the outback tourism industry is increasing, infestations reduce the natural attraction of the outback and the unique downs landscape.

Benefits:

- Landholders receive net benefits from prickly acacia at low densities and during poor seasons. This is in the form of nutrition for stock, shade and shelter resulting in increased lamb survival.

1.4 Legislative controls

Prickly acacia has declared status in 4 states.

- Queensland: Plants are to be destroyed (P2 area) and populations to be reduced (P3 area).
- Northern Territory: Class A - noxious weed to be eradicated and Class C - introduction of species prevented.
- Western Australia: P1/P2 - must not be introduced and eradicated if found.
- New South Wales: W1/P - notifiable weed. This applies to a minority of local government areas.

Prickly acacia is not declared in other states, and so it may currently be grown, traded or distributed from these states. National declaration would be required to ensure that this does not occur.

This species is also regulated by Commonwealth agencies. The Australian Quarantine and Inspection Service (AQIS) prohibits the introduction of prickly acacia as nursery stock or seed into Australia. The Environment Protection and Biodiversity Conservation Act 1999 overseen by Environment Australia (EA) may result in prickly acacia becoming a key threatening process or its listing in regulations controlling non-native species.

1.5 Control to date

Prickly acacia was declared as a noxious plant in Queensland in 1957, but despite extensive control efforts the weed is well established. In all states, the control of a declared plant is the responsibility of the landholder and many landholders are actively attempting to combat this species.

The need to prevent spread into vulnerable river systems lead QDNR to undertake a strategic control program for prickly acacia. The SWEEP program has spent $2.2M on control of outlying or strategic infestations from 1995/96 to 1998/99. The program operates in partnership with landholders and local governments, 25% of funds supplied by landholders, and assists with initial control work where there is a wide community benefit. A prickly acacia containment line (PACL) was established in 1999. Inside the line, integrated control to minimize impact is proposed. Labour barter days, are very effective in reducing infestations (see box).

Management

Chemical and mechanical methods, pasture management and in some situations fire can be used in an integrated control program for prickly acacia. All methods may be effective in particular situations depending on: the infestation density, landform, resources, area covered and the management objectives (Mackey *et al.* 1996). Costs range from $2 to $100 per hectare. All programs require several years of follow-up that may increase the cost several fold. The long-term costs make control of large dense infestations uneconomic in some situations. This is accentuated when there are poor financial returns from primary industries. Timing is also very important for control as some low rainfall seasons may lead to natural mortality while other seasons result in major seedling recruitment. Diuron has successfully controlled the densest infestations along bore drains, in dams and borrows pits. Infestations in creek lines and along natural waterbodies are more difficult to control. Heavy infestations away from water bodies can be successfully mechanically pulled.

Biological control is considered the most cost effective management method for dense areas of many weeds. The seed feeding insect, *Bruchidius sahlbergi* was released and attacks the seed in the pod but to date this agent has not had significant impacts on prickly acacia in the field. A suite of biological agents is currently being tested.

Barter days tackle prickly acacia

The Upper Landsborough Group in northwest Queensland has adopted the principle of lending your neighbour a hand on a large scale. The group includes 36 properties and 750,000 hectares south of Hughenden. These properties form the northern catchment of the Lake Eyre Basin.

They meet each month for the purpose of a cooperative prickly acacia control day. The group has set a goal of eradicating prickly acacia within the group's area by 2006.

Mr. Ian McClymont, Chairperson of the group said "To meet this goal, the group has a labour barter day each month, where landholders share their time, experience and skills to control prickly acacia on a property within the group. The first day was held in October 1996 and only three members turned up for spraying. However, participation levels have gone from strength to strength with some control days now having to be split between two properties to accommodate the large number of volunteers."

"Natural Resources SWEEP funding has assisted the group tackle some of their large, dense infestations using mechanical chaining. The benefits of working together have been numerous for the group, from making the task less daunting to lifting the community spirit in general. What is really encouraging is that many landholders within the group that don't have a prickly acacia problem are pitching in to help properties that do"

With an annual budget of less than $90,000 made up mostly of man-hours worked, the group ran 16 barter days involving work on 9 properties in the 1998/99 financial year. In the life of the project significant decreases in prickly acacia have been recorded on 11 properties, including some properties are now completely free of this weed".

As well as on-ground work this group has been important in selling the message that "Freedom from Prickly Acacia" is possible with the use of best practice and a community working together.

1.6 Principles underlying the plan

This plan is based on the recognition and acceptance of the National Weeds Strategy principles:

1. Weed management is an essential and integral part of the sustainable management of natural resources and the environment, and requires an integrated, multidisciplinary approach.
2. Prevention and early intervention are the most cost-effective techniques that can be employed against weeds.
3. Successful weed management requires a coordinated national approach that involves all levels of government in establishing appropriate legislative, educational and coordination frameworks in partnership with industry, landholders and the community.
4. The primary responsibility for weed management rests with landholders/land managers but collective action is necessary where the problem transcends the capacity of the individual landholder/land manager to address it adequately.

1.7 Process Followed

The National Prickly Acacia Strategy is the product of a stakeholder workshop held in Charters Towers in March 1999. This workshop revised and updated a strategy first drafted in November 1997. The draft document was the basis of a Commonwealth Natural Heritage Trust project proposal in 1997/98. This project funded work on the containment line, extension and the development of an adaptive management research program. This strategy takes in account feedback from over forty stakeholders who commented on drafts as well as input from the management group and interested parties.

The Prickly Acacia Management Group (PAMG) was formed after a meeting in Muttaburra in May 1998. Its membership consists of representatives of industry, landcare, local government, conservation, landholders, government agencies and researchers. The group's mission is "To provide leadership and guidance to explore, identify and utilise all available and potential resources for the management of prickly acacia (a weed of national significance) to achieve sustainable land use". This group will oversee the implementation of the national strategy.

1.8 Relevance to other strategies

The Prickly Acacia Strategic Plan has been established to provide a framework for

coordinated management of the plant across the country. To date most infestations of this plant are limited to Queensland but prickly acacia has the potential to spread to other states. The strategy is linked to other national and state resource plans, strategies and groups already involved in prickly acacia management at regional and local levels.

Scope Scale	Natural Resource Management	Pest Management	Weed Species Management
National	National Strategy for Conservation of Australia's Biological Diversity National Strategy for Ecological Sustainable Development	National Weeds Strategy	Prickly Acacia Strategic Plan
State	Qld Biodiversity and Natural Resource Management Strategy Forest Policy, River, Estuary and Wetland policies	Queensland Weed Strategy Northern Territory Weed Management Strategy WA Weeds Strategy	Queensland Prickly Acacia Management Plan
Regional	Regional NRM Plans	Regional Pest Management Strategies	Prickly Acacia Containment Line
Catchment	Catchment Management Strategies	ICM Pest Management Strategies	
Local	Landcare and Roadside Conservation Plans	Local Government Pest Management Plans (Qld.)	
Property	Property Management Plans	Property Pest Management Plans	

2 STRATEGIC PLAN

VISION

Prickly acacia is confined and its impacts reduced to a minimum.

2.1 Prevent spread

Desired outcome

Prickly acacia is prevented from spreading.

Background

Prickly acacia's current wide distribution is the product of its deliberate planting as a fodder and shade plant for stock. Once prickly acacia occurs in an area it is possible to stop some forms of deliberate spread. The main dispersal vector of prickly acacia seed is livestock that have fed on pods. Stock moved by road transport, is the most important mechanism for long distance dispersal. Any attempts to control and contain the weed locally or regionally must address the problems posed by stock movement.

Prickly acacia should be declared under legislation to prevent its trade and distribution and where necessary to support control of new or other infestations in all states. This authority must be available to ensure that the goal of preventing spread is achieved, although, enforcement should be used as a last resort. The primary emphasis of the plan is on encouraging landholders through involvement to provide ownership of the issues and consequent outcomes (see Strategy 2.3.3).

A key component of preventing the impacts of prickly acacia is early detection of plants in areas outside the PACL. Vast areas of Australia are at risk. It is important that those areas are prioritised and regular surveys carried out. Assistance is needed from the industries and communities of central and northern Australia to prevent spread and to detect new infestations. A wide range of education and awareness activities will be required. These include protocols to reduce seed spread, better management of water bodies such as borrow pits and bore drains and more effective awareness campaigns. When new infestations are detected in Queensland, QDNR currently has the resources to respond but this needs to be maintained and made available in other States.

The role of the PACL is to prevent the spread of prickly acacia into the Lake Eyre basin, the Gulf catchment and other river systems in north and central Australia. The PACL consists of five 'islands' of 'core' prickly acacia areas that stretch from Barcaldine north to Hughenden and west to Winton and Julia Creek. All prickly acacia outside the PACL is targeted for removal in the long term. Landholder efforts are being supported in Queensland by the SWEEP program with 66 projects to date. Small infestations on grazing land in South Australia have been suppressed in the past and this should occur in other states if they occur.

Strategy	Actions	Responsibility	Rank
2.1.1 Prevent long and short distance movement by stock	Develop a code of practice for minimising the dispersal of prickly acacia through stock transport. A code will: • Ensure weed seed reduction before dispatch or acceptance of livestock from prickly acacia areas. System proposed includes vendor declarations • Establish washdown and holding facilities, particularly at sale-yards • Survey meat works as high risk sites for prickly acacia establishment • Develop a "prickly bush" QA system which emphasises self-regulation and recognition of properties that employ such practices.	State agencies, industry groups, landholders	1
	Develop and implement prickly acacia education and awareness activities for property owners, stock agents and stock transporters	State agencies, local government, landholders, industry	1
	Use risk assessment to determine how and where prickly acacia is most likely to spread based on its potential for long distance movement by stock	State agencies	2
	Develop monitoring tools to detect new infestations at the property level	State agencies, landholders	2

Strategy	Actions	Responsibility	Rank
2.1.2 **Prohibit trade and distribution across Australia**	Declare prickly acacia to prohibit propagation, trade and distribution in all States and Territories	Legislative agency in each State and Territory, Nursery industry, EA	1
2.1.3 **Develop and maintain early detection and eradication mechanisms**	Implement education and awareness activities specific to: mining, tourism, defence, pastoral industry, environmentally significant areas, landcare facilitators, government staff, and regular communications for the general public	State/ federal agencies, local government, industry/community groups, PAMG	1
	Develop and implement an early detection mechanism and implement regular surveys	State agencies, PAMG, local govt.	1
	Determine how and where prickly acacia is likely to spread	State agencies, CSIRO	2
	Establish state-based procedures for receiving and responding to reports of prickly acacia (including voucher specimens in state herbaria) and maintain an early eradication capacity	State agencies, local government, EA	3
2.1.4 **Maintain a national containment line**	Document the national containment line and make available to general public and review	QDNR, PAMG	1
	Regularly review the national containment line	PAMG, QDNR	1
	Provide criteria for determining areas inside and outside the prickly acacia containment line	QDNR, PAMG	2
	Eradicate prickly acacia outside the containment line: (A) Initial control (B) Follow-up	QDNR, NSWAg, NTDPIF, PIRSA, Landholders	2
2.1.5 **Use enforcement as a management tool**	Utilise support available from co-operative landholders in encouraging others to meet their eradication responsibilities	Local governments, LCMC and Landcare groups	1
	Manage eradication using project planning on an appropriate scale, incorporating long term landholder responsibilities into each project	State agencies, local government	2
	Increase landholder awareness of their current responsibilities under legislation.	State agencies, local government	3
	Utilise notices where necessary to ensure control aimed at eradication is achieved.	Local government & state agencies	3

2.2 Reduce impact

Desired outcome

The adverse impacts of established prickly acacia infestations are minimised.

Background

Throughout the region in which prickly acacia has established, there are still large areas that are free of the weed or where infestations could become denser. A preventative approach is necessary in this region to protect those areas that are free or almost free of prickly acacia. This needs to be tackled locally on an appropriate scale (e.g. sub-catchment). Furthermore, any opportunities for co-ordinating activities to minimise the impact of established prickly acacia and other weds should be planned and implemented regionally or locally, provided consistency is maintained with larger scale plans (e.g. catchment plans).

Prickly acacia management should not be considered in isolation from other management activities in a property, region or catchment. Attention should be given to the total requirements of landscape restoration rather than for weed control *per se*. Prickly acacia management should be considered along with control and management of other weeds, including other woody weeds such as mimosa bush and mesquite. Further, weed management should be considered as part of property management planning and coordinated with other management activities

to maximize the benefits of control and seasonal fluctuations and minimising environmental impacts.

Most major populations of prickly acacia are on pastoral properties characterized by low returns per unit area. This represents a major challenge in developing economically effective long-term management practices. Landholders do receive benefits from prickly acacia at low density however, while 1 ha of prickly acacia yields 75kg of pods, 1 ha Mitchell grass yields 1-2000 kg grass per year. Prickly acacia impacts on biodiversity and tourism, ameliorating these effects should be taken into account when evaluating the returns from control programs. All stakeholders should consider that not containing prickly acacia will result in their grandchildren inheriting a thorny shrubland rather than the biologically unique Mitchell Grass Downs.

A wide range of control options is available for prickly acacia including mechanical and chemical control. The effectiveness of these methods needs continuous dissemination to landholders. Possible landholder complacency to the control of prickly acacia needs to be specifically targeted. At the same time landholder input to refining control methods and adapting them to local situations is essential to establish best practice management.

Integrated control has the potential to provide cost effective long-term control of prickly acacia. There are still information gaps in our understanding of the biology and ecology of prickly acacia. There is potential to improve the effectiveness of control methods for some such as riparian areas and some value in investigating uses of harvested trees. Biological control although not effective to date has the potential to target weaknesses in the lifecycle of the weed. Genetic studies have recently shown that prickly acacia in Australia is from the India/Pakistan region, so exploration and collection in this region is required.

Strategy	Actions	Responsibility	Rank
2.2.1 **Foster regional & local containment planning**	Incorporate prickly acacia management in: • landholder level property & sub-catchment plans • local government pest management plans • NRM & catchment strategies	State agencies, Catchment and regional strategy groups, local government, landholders	1
	Promote the establishment of clean areas within the regions of established prickly acacia via these plans	As above	2
	Develop and resource management plans for Government lands consistent with other plans	State and federal agencies	2
2.2.2 **Promote the integration of prickly acacia management**	Promote integrated weed management to maximize benefits of prickly acacia control (while also monitoring associated costs)	QDNR, industry groups	1
	Survey the health of the landscape and ecosystems and use as an indicator of success of prickly acacia management including reduction of impacts on threatened ecosystems.	QEPA, CSIRO, community groups, EA	2
	Incorporate prickly acacia management within overall weed management in property planning	Landholders	2
	Develop a weed planning module for use in the property planning process	State agencies	3
2.2.3 **Identify economic impacts, incentives and disincentives.**	Determine the benefits and costs of prickly acacia control for best practice management	QDNR, landholders	1
	Update data on the economic impact of prickly acacia	QDNR	1
	Assess the cost-benefit of SWEEP projects as an input to planning	QDNR, UQ	1
	Assess the economics of prickly acacia management at different spatial scales (sub-catchment, catchment, regional), including the assessment of SWEEP	QDNR, local government	2

Strategy	Actions	Responsibility	Rank
	Review, document and distribute information on current and potential incentives and disincentives • Potential "net" benefit of incentives • Impacts on land values/ rates • Forms of assistance available.	QDNR	2
	Facilitate removal of identified disincentives	QDNR, PAMG	2
	Review the use of lease conditions to facilitate prickly acacia control	QDNR	3
2.2.4 Refine and adopt best practice management	Publish best practice options for prickly acacia management	QDNR, PAMG	1
	Develop and implement extension and communication plans addressing established prickly acacia infestations	QDNR, PAMG	1
	Use adaptive management processes to refine best practice for different regions and types of infestations	QDNR, Landholder groups, PAMG	2
	Establish best practice demonstration sites and conduct training in management techniques	QDNR, Landcare	2
2.2.5 Improve integrated management practices	Improve understanding of prickly acacia biology and specific control methods as required to support integrated management	QDNR/CSIRO	1
	Investigate the impact of prickly acacia and its management on land sustainability (including biodiversity and water quality)	QDNR, QEPA, QPWS, community groups	1
	Develop best practice control for riparian and woodland areas and investigate the commercial processing of harvested prickly acacia	QDNR/CSIRO Private industry, local government	
	Investigate the spread of prickly acacia at a landscape level, including the impact of climate on seedling growth and seed spread	QDNR, CSIRO	1
2.2.6 Introduce and improve the impact of biocontrol agents	Conduct overseas searches for biocontrol agents based on - Genetic studies of prickly acacia and potential effectiveness of the agents	QDNR	1
	Maximise introduction and assessment of potential biocontrol agents	QDNR	2
	Determine impacts of introduced biological agents and interrelationships between them and other control options	QDNR	3

2.3 Harness national commitment

Desired outcome

National commitment to prickly acacia is maintained.

Background

Current and potential prickly acacia infestations cover very large areas of Australia and so management of this weed requires a co-ordinated community approach. The major planning processes currently operating are the development of regional, catchment and, in Queensland, local government pest management plans. These processes involve wide community representation and thus are a means of gaining community commitment, as well as incorporating prickly acacia management into a wider land sustainability framework. Reducing the impact of prickly acacia is an integral part of land sustainability, including management of natural vegetation, other aspects of biodiversity, tourism values and Aboriginal land values. Projects addressing these issues should include prickly acacia management.

The resources required to prevent prickly acacia spread and to minimise impact of established infestations in the long term are enormous. A cost of $55 million was estimated for a single treatment of all infested areas in Queensland. This did not include on-

going control costs. There is a need to ensure that all available resources are utilised and that all achievements and actions are documented as a measure of progress and success. This is also part of accountability requirements on government and private industry managers to ensure efficient use of resources. Approaches for funding should be co-ordinated to maximise potential success. In Queensland SWEEP projects have demonstrated that government supervised projects, including landholder contributions, can reduce infestations. These programs, however, are expensive and require on-going landholder commitment to follow-up. The "labour barter days" concept demonstrates that control programs do not have to be government managed but will require government support.

Information on the distribution of prickly acacia, including where control works have been completed, is critical to support planning. The degree of detail required will vary with the scale and purpose of the planning. QDNR has a system, PestInfo, which is being implemented and evaluated for community group use in Queensland. It will collate existing data on the present and historical distribution of prickly acacia and act as a means of tracking eradication efforts. It is also desirable to have a whole of Australia record of sites where prickly acacia has been detected and the action taken. Other methods of obtaining data, such as remote sensing and aerial techniques need to be developed and applied. Collection of landholder mapping data will significantly add to the current data set.

Strategy	Actions	Responsibility	Rank
2.3.1 Adopt a community approach to planning and management	Provide a map of catchments and regions at risk of prickly acacia invasion, including the impact of climate change to identified stakeholder groups	CSIRO, QDNR	1
	Incorporate prickly acacia prevention and management into regional catchment and local govt plans for all at risk areas and facilitate landholder involvement in planning processes	Community groups, local government	1
	Incorporate inter-agency and community group co-operation into extension and control projects across Australia	State and federal agencies	2
2.3.2 Maximise the availability and use of resources	Include stakeholder consultation in all project development (both ways between government and community)	All stakeholders	1
	Maintain the QDNR SWEEP program as a catalyst and co-ordinator for resources from participating stakeholders	QDNR	1
	Develop projects which access all appropriate components of NHT and other Government programs	QDNR	1
	Market the prickly acacia strategy and co-ordinate a planned approach to funding sources	Project coordinator, PAMG	1
	Assist groups to set realistic expectations and objectives, using technical and resource availability information	State agencies, landcare	2
	Utilise a project management process for all government and community activities - links to 2.4.3.	All stakeholders	2
	Document and promote project mechanisms	Project coordinator	3
2.3.3 Develop maps of prickly acacia	Make available prickly acacia distribution and density maps at the appropriate scales for stakeholders; regional, catchment or state	QDNR, local government, landholders	1
	Develop and implement a procedure for using community group/landholder input to mapping	QDNR, NTDPIF and AGWA	1
	Import data from other states into PestInfo.	QDNR, NTDPIF and AGWA	1
	Complete the implementation of PestInfo in Queensland	QDNR, local govt.	2
	Investigate new techniques for mapping density and new sites	CSIRO, QDNR	2

2.4 Co-ordinate management

Desired Outcome

Prickly acacia management is co-ordinated at a national level.

Background

To ensure that weeds of national significance are effectively managed the National Weeds Strategy outlines the need for the development, implementation and evaluation of a management program for each species.

The planning process outlined in the National Weed Strategy requires a number of actions. These are:

- The involvement of all stakeholders in developing and implementing the plan
- The integration of the plan with other existing, relevant land management programs at all levels
- The suitability, availability, requirements for, and integration of all available tools for control and awareness
- The utilization of coordinated community action as the delivery mechanism for implementation wherever appropriate
- The determination of an appropriate funding mechanism for the plan, including identification of the beneficiaries and their relative capacity to pay
- The establishment of performance objectives and methods for their evaluation.

This plan addresses these issues and will provide a tool in the ongoing coordinated management of prickly acacia in Australia.

Strategy	Actions	Responsibility	Rank
2.4.1 **Manage implementation of the plan**	Establish and maintain a prickly acacia management group and appoint a project coordinator	QDNR	1
2.4.2 **Monitor implementation of the plan**	Collate strategic plan milestones and report on progress annually to NWSEC, stakeholders and funding groups	Project coordinator	1
	Evaluate projects on outcomes not outputs	All stakeholders	1
2.4.3 **Coordinate communication about the plan**	Conduct communication activities to ensure awareness of the plan, opportunities and achievements • Ensure linkages with other WONS strategies and other plans to maximise awareness	Project coordinator	1

3 MONITORING AND EVALUATION

This strategic plan is subject to a 5-year review. The Prickly Acacia Management Group as a component of its quarterly meetings will monitor the implementation of the plan. Annual reports will be forwarded to the NWSEC and made available to interest groups in a cost efficient manner, possibly a web page. Monitoring will include review of actions outlined and undertaken by groups implementing plans:

- State weed strategies
- Queensland local government pest management plans
- Catchment management plans
- Project plans developed from the strategic plan.
- State of the Environment reporting processes.

A set of performance indicators for the plan includes the actions listed below:

- National declaration of prickly acacia
- Increased awareness of prickly acacia as a weed of national significance
- Clear understanding of the social, economic and biodiversity impacts of prickly acacia
- Increased delivery of extension material specific to target groups and sites
- Increases in surveys for isolated infestations
- Adoption of vendor declaration and hygiene protocols by industry and landholder groups
- Decrease in area of prickly acacia outside/inside the PACL resulting in realignment and reduction in the PACL area
- Eradication of all isolated infestations
- Increased resources for on-ground actions
- Increased action on prickly acacia at all levels- property, catchment and regional
- Progress on removal of disincentives for control
- Increased use of best management practices
- Increased surveys of the conservation status and health of Mitchell Grass Downs.

4 STAKEHOLDER RESPONSIBILITIES

Private landholders

To control prickly acacia on their own lands.

- Property management plans include prickly acacia control
- Implement best practice management
- On-property stock withholding periods to reduce movement of seed with stock
- Eradicate small or strategic infestations. To be aware of the potential for prickly acacia to spread onto their land
- Be able to identify woody weeds.

Department of Natural Resources

- Continuing to develop efficient, effective, and appropriate control techniques
- Providing extension and education services to both rural and urban communities
- Developing best practice management under adaptive management programs
- Support local government enforcement of controls of prickly acacia under the Act
- Liaising with community/industry groups/local governments to coordinate prickly acacia control
- Facilitate and coordinate prickly acacia eradication in areas outside the PACL.

Utility companies

- Develop protocols and washdown facilities
- Become involved in management plans in service regions.

Agribusiness Industry / Research and Development Corporations

- Support research on the species
- Endorse and implement protocols to prevent the spread of prickly acacia
- Act as conduits for information to producer groups.

Local Governments (Queensland)

To ensure impacts of prickly acacia are kept to a minimum throughout the local government area.

- Ensuring that pest management plans include strategic prickly acacia control activities
- Ensuring that strategic prickly acacia control is undertaken on all lands under the Councils control: stock-routes, road sides and town commons
- Map location and density
- Ensuring that all private landholders engage in strategic prickly acacia control activities
- Liaising with QDNR and community groups to undertake strategic prickly acacia control
- Administering and enforcing the provisions of the *Rural Land Protection Act,* including notices
- Recognize need for resource allocation on determined priorities for prickly acacia control
- Train other sections of Council on weed issues e.g. environmental health officers.

Other Government Departments in Queensland

- To assist in development of codes of practice and ensure uptake by Departmental staff
- To ensure prickly acacia control is undertaken on all State managed lands.

Other State and Territory government agencies

- To ensure awareness and early detection programs are put in place
- To eradicate isolated infestations when found.

Federal government departments and corporations

- Ensure quarantine controls on entry of prickly acacia (AQIS)
- To ensure uptake by Departmental staff to restrict movement of weeds (agencies that manage land and travel on non-government land)
- To ensure prickly acacia control is undertaken on all Federally managed lands (Defence, EA and other Commonwealth departments / corporations that manage land).
- Oversee and manage federal funds including National Heritage Trust and National Weed Program (EA, Agriculture, Forestry and Fisheries – Australia)

5 ADDITIONAL READING

Anon 1998 Prickly Acacia. Pest Fact PP9. Department of Natural Resources

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Mackey AP 1998 *Acacia nilotica* ssp. *indica* (Benth.) Brenan. The Biology of Australian Weeds, Vol. 2. (edited by Panetta FD, Groves RH and Shepherd RCH). RG and FJ Richardson.

Parsons WT and Cuthbertson EG 1992 Noxious Weeds of Australia. Inkata Press, Melbourne.

6 GLOSSARY

AQIS	Australian Quarantine and Inspection Service
AGWA	Agriculture Western Australia
CLIMEX	A simulation modeling system developed by CSIRO
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EA	Environment Australia
GIS	Geographical Information System
ICM	Integrated Catchment Management
LCMC	Landcare and Catchment Management Council (Queensland)
NHT	Natural Heritage Trust
NSWAg	New South Wales Agriculture
NRM	Natural Resource Management
NTDPIF	Northern Territory Department of Primary Industries and Fisheries
NWP	National Weed Program
NWSEC	National Weed Strategy Executive Committee
PACL	Prickly Acacia Containment Line
PAMG	Prickly Acacia Management Group
PestInfo	GIS based information system
PIRSA	Primary Industries and Resources South Australia
QA	Quality Assurance
QDNR	Queensland Department of Natural Resources
QDPI	Queensland Department of Primary Industries
QEPA	Queensland Environmental Protection Agency
QPWS	Queensland Parks and Wildlife Service
SWEEP	Strategic Weed Eradication and Education Program
UQ	University of Queensland
WONS	Weed of National Significance

Appendix 1 Map of the Prickly Acacia Containment Line