

**Parkinsonia National Strategic Plan  
Progress Review  
(2008 –2009)**



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on behalf of the **National Prickle Bush Management Group**  
and its partner agencies and organisations

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# Contents

Executive summary	3
Introduction	4
Performance against strategic plan	
Strategy 2.1: Coordinate management	6
Strategy 2.2: Containment	9
Strategy 2.3: Active control	13
Strategy 2.4: Eradicate and prevent spread	15
Conclusion	19
Appendix 1: Acknowledgements	20
Appendix 2: Parkinsonia distribution and management actions	21
Appendix 3: National Prickle Bush Management Group members	22
Appendix 4: Parkinsonia related scientific papers published in 2008–09	23
Appendix 5: Budget	24

## Executive summary

Parkinsonia (*Parkinsonia aculeata*) is one of the worst weed threats to the environmental and agricultural values of Australia's rangelands. The National Prickle Bush Management Group (NPBMG) and its representative agencies and organisations are implementing a national parkinsonia strategy, which is based on a zonal management approach.

Coordinated action is continuing in every state and territory where parkinsonia is present. Twelve natural resource management (NRM) groups are now actively managing parkinsonia at specific sites and across broad areas, with an estimated 100,000 ha of infestations under treatment.

With improved coordination, eradication aims have progressed in South Australia, New South Wales, the lower Lake Eyre Basin, Cape York and parts of the Northern Territory. All known infestations in both New South Wales and South Australia have been controlled and are subject to ongoing monitoring.

Catchment-scale programs have been particularly impressive in the Barkly (Northern Territory), Sandover (Northern Territory), Roper (Northern Territory) and Desert Channels (Queensland) catchments. Surveys, mapping, education activities and coordinated control is yielding benefits and showcasing best practice weed management.

Changing priorities associated with Caring for Our Country has seen greater emphasis placed on reducing the threat of parkinsonia to wetlands and other areas of high conservation value. Both Southern Gulf Catchments Ltd and Cape York communities in Queensland have commenced work to restore and protect such areas.

Lead agencies in each state and territory have supported strategy implementation through legislative and policy support, planning, extension, coordination assistance and provision of technical knowledge to projects. Ecological and control research priorities have largely been completed and the outcomes are now being used for complementary studies into landscape modelling.

The search for biological control agents has continued with native range surveys in Central and South America. This work is coming to fruition with the listing of the most promising agents including a stem-boring moth and a defoliating caterpillar. Host-specificity testing is expected to commence in 2010.

A Parkinsonia Dieback Workshop series was held in the Victoria River District, and Katherine and Barkly regions of the Northern Territory. Eighty participants were trained in establishing trials, mapping and monitoring. As a result, over 60 trial sites have been established to assess the spread and effectiveness of naturally occurring root pathogens.

A major National Strategy Review Workshop was held in Broken Hill (New South Wales) to review the national strategic plan. The review outcomes will provide guidance regarding the future management of parkinsonia in Australia.

## **Introduction**

The aim of this report is to outline progress made during 2008–09 to achieve the vision and goals of the Parkinsonia National Strategic Plan. The report is based on an evaluation of national actions and achievements and includes a discussion of current challenges and future priorities.

## **History and impact of parkinsonia in Australia**

Parkinsonia (*Parkinsonia aculeata*) is a thorny shrub or small tree native to the Americas. It was introduced in the late 1800s for ornamental and shade purposes but has become one of Australia's worst weeds. Dense impenetrable thickets form in association with wetlands, floodplains, tropical savanna, woodlands and plains.

Parkinsonia is now geographically widespread across Australia, with infestations encompassing 3.3 million ha at varying densities and sparse occurrences over an even greater area. Major infestations occur across parts of Queensland, the Northern Territory and Western Australia; isolated infestations occur in New South Wales and South Australia. Parkinsonia has potential to invade up to 70% of Australia's mainland.

To address the problem, the Parkinsonia National Strategic Plan was developed in 2001. The vision of this strategy is that 'parkinsonia is confined and environmental, economic and social impacts are reduced to a minimum'. This vision has been progressed through a national zonal approach with four primary goals:

1. Parkinsonia management is coordinated and maintained at a national level.
2. Zone A infestations (containment zone) are reduced.
3. Zone B infestations (active control zone) are minimised.
4. Zone C infestations (eradication zone) are eradicated and new introductions of parkinsonia are prevented.

National coordination commenced in December 2001 with the formation of the National Prickle Bush Management Group (NPBMG). This group, comprising representatives from Queensland, Northern Territory, Western Australia, New South Wales and South Australia, oversees implementation of the Parkinsonia National Strategic Plan as well as plans for two other Weeds of National Significance (WONS)—namely mesquite and prickly acacia. A full-time National Coordinator has been employed since April 2002.

During 2008–09 major initiatives commenced or continued in relation to strategic control, surveys and mapping, biological control and dieback investigations, ecological modelling, extension, strategy review and coordination efforts.

## **Progress to date**

Between 2001 and 2008, significant progress has been made at regional, state, territory and national levels. Major successes include:

- formation of the NPBMG to facilitate national action in December 2001
- continued active involvement of all key states and territories in national strategic plan implementation including the formation of the New South Wales Prickle Bush Working Group to facilitate action in that state
- development and implementation of a National Communication and Extension Plan to highlight key messages to target groups
- publication of extension products to promote awareness and early detection

- production of national distribution and potential distribution maps
- development and publication of photo density standards to assist community and agency mapping
- national research and ecological modelling workshops were held to collate best practice and predict landscape invasion
- publication of the *Parkinsonia national case studies manual* in 2004 with continued distribution to landholders and advisory officers
- nationally strategic surveys completed to aid delimitation in the Pilbara and Ord areas (Western Australia); Cape York, Cape River, and Lake Eyre Basin (Queensland); Georgina, Sandover and Roper Rivers plus Gulf coastline (Northern Territory); Narran and Moonie Rivers, Bourke Shire and Broken Hill (New South Wales); lower Diamantina River, Cooper Creek, Warburton Creek and other sites (South Australia)
- community-based control at over 50 sites nationally, including catchment-scale control in the Georgina River (Northern Territory/Queensland)
- completion of initial native range surveys to identify potential biological control agents in Central America
- monitoring and quantification of the impacts of biological control agents previously released in Australia
- identification of pathogens causing dieback of parkinsonia across parts of northern Australia and implementation of community-based trials to assess impacts
- ecology of parkinsonia collated and published based on field studies in the Pilbara (Western Australia), Kimberley (Western Australia), Victoria River District (Northern Territory), Barkly (Northern Territory), Alice Springs (Northern Territory) and Central Queensland
- increased planning and involvement of regional natural resource management (NRM) groups especially Southern Gulf Catchments Ltd, Desert Channels Queensland Inc, South West NRM, Burnett Mary NRM, Lower Murray Darling Catchment Management Authority (CMA), Western CMA, Western Australia Rangelands NRM and Northern Territory NRM Board
- major trials into mechanical control and effectiveness of fire have yielded valuable information to help landholders apply these management tools
- eradication projects have continued in western New South Wales, South Australia rangelands and Cape York and the mid to lower Lake Eyre Basin in Queensland
- active control and containment at over 50 sites across Australia, including northern and western Queensland, Barkly (Northern Territory), Victoria River District (Northern Territory), Kimberley (Western Australia) and Pilbara (Western Australia)
- development of the National Priority Action Framework to guide stakeholders managing parkinsonia
- collation of national achievements and development of revised actions through the National Strategy Review Workshops of 2006 and 2008.

## **Strategy 2.1: Coordinate management**

### **Desired outcome: Parkinsonia management is coordinated and maintained at a national level**

The coordination of parkinsonia management has increased the efficiency and effectiveness of efforts across most of the weed's geographic range. Key coordination aspects during the reporting period included: effective national management, national mapping and zonal management approaches, monitoring and evaluation, national awareness and legislative support.

#### **Effective national management**

Formed in December 2001, the NPBMG remains the key driver for the implementation of the Parkinsonia National Strategic Plan. Coordination occurs through a concurrent process with two other WONS (mesquite and prickly acacia), which threaten similar geographic areas of Australia.

Active support to the NPBMG has continued through agency and community representatives from Queensland, Northern Territory, Western Australia, New South Wales and South Australia.

A key action of the group in 2008–09 was the National Strategy Review Workshop held in Broken Hill. The workshop included an update of state and territory achievements, research outcomes and direction, case studies and review of strategy implementation. Two Australian Weeds Committee (AWC) representatives and the National Weeds Facilitator led the review process with outcomes to be made available later in 2009.



**Figure 1.** Members of the NPBMG with National Weeds Facilitator John Thorp (far left) and AWC reviewer Dr John Virtue (far right) at Broken Hill. Absent were Alice Beilby and Dr Rieks van Klinken.

The NPBMG also held three teleconferences to progress various aspects of strategy implementation and to address a range of priority issues. In addition to these, the Chairperson and National Coordinator have participated in key events such as WONS meetings. Two key changes to NPBMG membership included formal acceptance of Mark Tarrant as the new Natural Resources, Environment, The Arts and Sport (Northern Territory) representative and the resignation of Damian Collopy as a Department of Agriculture and Food (DAF), Western Australia representative.

The NPBMG has continued to ensure a national network exists for improved collaboration at all levels, sharing of best practice knowledge and progressing strategic actions. In particular, the National Priority Action Framework for parkinsonia was updated in late 2008.

Research continues to be a strong focus of the NPBMG's efforts and a subgroup (Queensland Primary Industries and Fisheries' Tropical Weeds Research Centre, CSIRO, The University of Queensland and the National Coordinator) has met via teleconference several times to identify research gaps, collate and prioritise potential projects and source potential funding investors. Some of these priorities have been presented to key industry forums, including the Northern Beef Industry Committee, and in meetings with Meat and Livestock Australia.

In addition to the efforts of the NPBMG, collaborative partnerships and coordination are assisting parkinsonia management across states, territories and regions. Twelve regional NRM groups are actively managing parkinsonia either directly or indirectly through other stakeholders. The motivation of regional NRM groups to parkinsonia management varies widely due to differing natural resource management priorities, which do not always correspond with the distribution, density or threat of parkinsonia. The lower capacity of rangeland-based regional NRM groups also potentially limits the number of projects each group may deliver.

Regional or catchment-scale approaches and planning are present in the following areas:

- Western Australia (Pilbara and Kimberley)
- Northern Territory (Victoria River District, Roper River catchment, Barkly region and Gulf region)
- Queensland (southern Gulf, Desert Channels, Cape York, North Queensland Dry Tropics, Fitzroy Basin, Burnett–Mary and south-western regions).
- New South Wales (Western and Lower Murray Darling CMAs, and Narran and Moonie River catchments)
- South Australia (Arid Lands region).

### **National mapping and zonal management approaches**

It is estimated that 3.3 million ha of low to high density parkinsonia infestations occur in Australia. The large areas affected by sparse occurrences of the weed are not included in this figure.

The national distribution and management actions map (see Appendix 2) was updated in February 2009. The National Coordinator provided revisions to the map based on data from lead agencies in each state and territory as well as local and regional stakeholders. To gain consistent WONS mapping there has been a loss of density data and this has been detrimental to the display of parkinsonia national management zones. Attention to this aspect and possible map redevelopment will need to be considered.

The national map remains a key tool to assist various stakeholders with project development, assessment of priorities and planning. The zonal approach has been reviewed by the NPBMG and requires further discussion due to perceived deficiencies relating to application and evaluation.

## **Monitoring and evaluation**

Monitoring and evaluation of national strategy implementation is primarily occurring through annual reporting, NPBMG meetings and project management processes. The performance indicators in the Parkinsonia National Strategic Plan have been recognised by the NPBMG as requiring revision.

## **National awareness**

A national awareness program has continued with an emphasis on identification, threat and impacts. The National Communication and Extension Plan, last updated in August 2007, provides a framework for a range of activities, product development and key events. However, most awareness outputs are largely opportunistic due to a range of factors, including:

- the geographic distribution of parkinsonia (especially over remote regions)
- competition for attention with other weeds and NRM issues
- and a lack of specialist extension support.

Product distribution primarily utilised the existing national product series (brochures, posters, display banners and national case studies manuals) but also state- and territory-based fact sheets. The national parkinsonia awareness product range has been redeveloped but had not been reprinted at time of reporting.

Due to its successful use as an identification tool, another 100 acrylic prickly bush seed pod mounts were produced and are being distributed to key regions, including South Australia's Arid Lands and Western Australia's Pilbara and Kimberley regions.

### *Workshops and field days*

Awareness of the threat and identification of parkinsonia was featured during local and regional field days and workshops. The key events included:

- Parkinsonia Dieback Workshop series in the Victoria River District, and Katherine and Barkly regions (Northern Territory)
- Kowanyama Weeds Forum, Cape York Queensland—presentation of parkinsonia threat, impacts and best practice control
- Rural land officers group meeting at Winton Queensland—presentation of parkinsonia threat and best practice control
- Northern Beef Industry Committee meeting—presentation of parkinsonia threat, impacts and strategic priorities
- Training of Wild River rangers undertaking control of parkinsonia in the Normanton area (Queensland).

Evaluation of awareness outcomes is currently inadequate at a national scale. Following successful grazier surveys for mesquite and prickly acacia in north-western Queensland, grazier surveys for parkinsonia may be worthwhile.

## **Legislative support**

Parkinsonia is declared in all states and territories and landholders are required to either control, destroy, restrict movement and/or prevent trade. Critical to eradication aims, parkinsonia is declared as follows:

- New South Wales—category W1 (presence must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed)
- South Australia—notifiable throughout the state, and plants must be destroyed

- Western Australia—some districts are declared P2 (eradicate).

No strengthening of legislation is required at this stage of national strategy implementation.

### **Strategy 2.2: Containment**

**Desired outcome: Zone A infestations (containment zone) are reduced**

Capacity building and the development of management tools are two priorities for the management of core infestations found in Zone A. This is occurring through three primary means:

- biological control investigations
- integrated management research
- catchment-scale planning and implementation of projects.

#### **Biological control research<sup>1</sup>**

Native-range surveying was reinitiated by CSIRO in 2002 with 198 sites in 12 countries surveyed to date. Some sites have been visited more than once, giving a total of 332 survey events.

One hundred and fifty herbivore species have been recorded from parkinsonia, some of which are unidentified or undescribed. Natural enemies were found to be rarely abundant or damaging and surveying is incomplete in South America. An interim 'top ten' list of promising agents has been developed with detailed studies into two of those to date.

The stem-boring moth (*Ofatulena luminosa*) from Mexico may be host-specific; affected branches rarely flower or pod. The defoliating caterpillar (*Eureupithecia cisplatensis*) is a looper caterpillar from Argentina and causes impressive damage to the leaves of plants.



**Figure 2.** The stem-boring moth (*Ofatulena luminosa*) is one of the promising agents being studied for biological control. (Image: CSIRO)

Actions to further biological control investigations include: continued testing of the two most promising insects; finalise surveying in South America; finalise listing of priority insects; and sourcing of funding for screening and possible release.

Three insects—two seed beetles (*Penthobruchus germani* and *Mimosetes ulkii*) and a leaf bug (*Rhinacloa callicrates*)—have previously been introduced as biological control

<sup>1</sup> Update based on presentation notes provided by Dr Rieks van Klinken, CSIRO.

agents against parkinsonia. None appear to have a significant impact, although seed damage by *P. germaini* was initially high in some areas.

### **Natural dieback research<sup>2</sup>**

A natural dieback phenomenon has been widely observed across the Australian distribution of parkinsonia. Research to identify the causal agents was initiated by Barkly Landcare and Conservation Association, and carried out by The University of Queensland (UQ). Dr Vic Galea and Naomi Diplock (UQ) coordinated the collection of dieback samples from across Northern Australia in 2005–07, with root borne pathogens *Lasiodiplodia theobromae*, *Fusicoccum dimidiatum* and *Fusarium* sp. identified as the likely causal agents. Further laboratory studies in 2006–08 determined that seedlings are also susceptible to dieback.

There has been a focus on further studies while concurrently fostering the cross-regional establishment of parkinsonia dieback trials. During the past year, the following actions have occurred:

- Masters student Ruey Toh has examined the virulence of fungal isolates collected from across northern Australia. These isolates (200 in total) have been taken from dieback-affected parkinsonia plants, and have been evaluated for their potential to be used as a biocontrol agent against parkinsonia seed (in soil). At least 10 aggressive isolates have been identified, four of which show great promise for further development.
- PhD student Naomi Diplock has researched the use of fungi as biocontrol agents against adult parkinsonia trees. These studies concentrated on the development of inoculation methods for field application and involved both glasshouse and field trials. A major outcome has been the successful establishment of a significant dieback event in a field population of parkinsonia at Hayfield station in the Northern Territory. Naomi has also assisted in the development of a capsule form of inoculum, which can be placed in tree stems to induce dieback.
- Masters student Eunice Wong has extended the research on inoculation methods in parkinsonia plants. The findings were that sealing the inoculation holes in trees improved the infection success rate.
- During April and May 2009, three workshops were held in the Northern Territory to extend knowledge about parkinsonia dieback and its potential to be developed into a biocontrol strategy in the near future. Participants were trained in the methods for establishing and assessing trials on their own locations, and provided with inoculum kits required to infect parkinsonia trees. The trials are now approaching their first assessment point.
- Masters student Siti Aani conducted molecular identification research on some of the key fungal isolates in the parkinsonia dieback collection to establish their true identity.

The expansion of community-based field trials, coupled with complementary research, is required to maximise the potential application of dieback agents to help manage parkinsonia.

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<sup>2</sup> Update based on information provided by Dr Vic Galea, The University of Queensland.

## **Integrated management research**

During 2008–09, current ecological and management knowledge was synthesised and published as *Parkinsonia aculeata* L. in *The biology of Australian weeds* series. The article is based on long-running (2000–07) study sites representing all parkinsonia-related climate regions and habitats across Australia. Some of the more recent findings and conclusions were:<sup>3</sup>

- Very few seedlings have established at study sites. Typically, two seedlings per 10,000 seeds with highest being Kununurra at one seedling per 1000 seeds. Some sites had virtually no establishment over six years.
- Establishment requires the right conditions in the right place over 12 months. This rarely occurs in most sites even with lots of seeds present.
- Probability of survival increased with tree size but decreased with time, possibly due to dieback.
- Fertility (seeds/tree/year) was only substantial on largest trees and consistently declined over time at all research sites.
- Australia's Climex modelling prediction was revised using new data.
- Landscape modelling was developed at a regional scale for the Desert Channels region to examine suitability, susceptibility and consequences. There is now scope to extend and test the model in other regions.

Research sites were set up in the most vigorous and healthy parkinsonia infestations with expectations these sites would continue to increase in density; however, most have declined. Dieback, frost damage, macropod grazing of seedlings and flooding are likely causes.

The *Parkinsonia national case studies manual* (2004) remains a valuable reference document to help land managers determine the most appropriate methods of control. However, there may be scope to update the manual with new ecological and best practice control information.

## **Catchment-scale approaches**

Within the core infestation zone (Zone A), community motivation varies and generally follows the priority assigned by the regional NRM group and/or lead agency. Active control of core infestation areas is often as high as that in eradication zones as there is already a recognition of current and potential impacts. Key examples of on-ground control outcomes for Zone A are detailed below.

### *Kimberley, Western Australia*

The Kimberley Zone Control Authority maintained a 100% chemical subsidy for parkinsonia control with a limit of \$3000 per pastoral lease. Several strategically located properties took advantage of the support and have implemented control programs. One property has eradicated all known plants. DAF Western Australia have conducted a survey of Sturt Creek and continue to provide best practice information to land managers including copies of the *Parkinsonia national case studies manual*.

### *Victoria River District, Northern Territory*

A Parkinsonia Dieback Workshop series was coordinated through the Caring for Our Country project 'Building Capacity to Establish a Parkinsonia Dieback Biological Model'.

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<sup>3</sup> Update based on presentation notes provided by Dr Rieks van Klinken CSIRO

The project received \$199,750 and was administered by the Victoria River District Conservation Association. One of the three workshops was held on Delamere Station with a significant number of local and regional stakeholders in attendance. The workshop trained participants in setting up trial sites with 60 sites now established on pastoral lands, Indigenous lands, defence lands, national parks and mining leases.



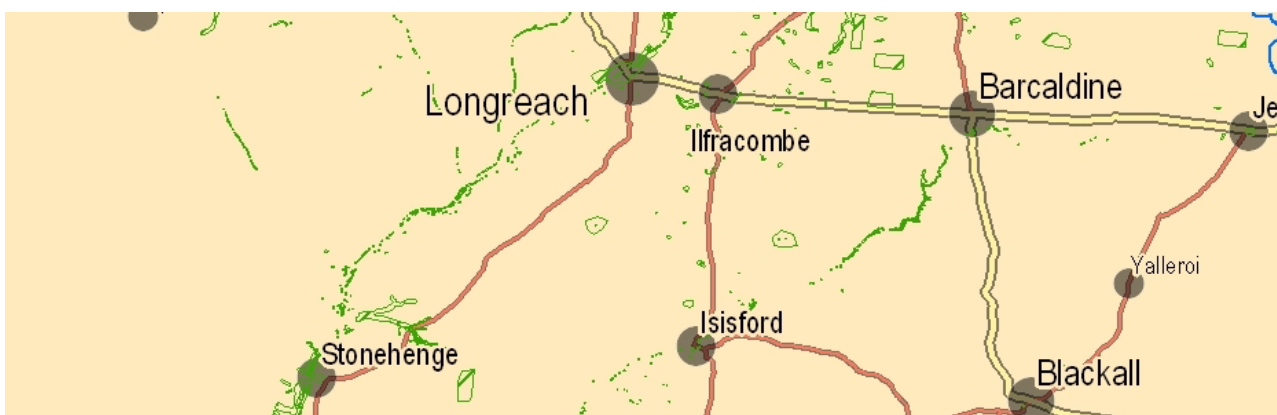
**Figures 3 and 4.** The Parkinsonia Dieback Workshop kit and tools (left) with a trial being established during the workshop (right). (Images: Dr Vic Galea, UQ)

The Victoria River District Conservation Association also undertook mechanical control trials for parkinsonia with a Department of Agriculture, Fisheries and Forestry (DAFF) Natural Resource Innovation Grant of \$125,000. The trials showed the use of cutter-bars to be very effective, while mulching was expensive and led to high regrowth.

Both projects (dieback and mechanical trials) are assisting landholders of the Victoria River District with best practice tools and/or information for the better management of parkinsonia.

#### *Desert Channels, Queensland*

Control works have been carried out on the Alice River from Isisford to Barcardine. Through the Cross-Catchments Weeds and Feral Animals Initiative, \$140,000 has been provided to 16 properties via devolved grants. To complement control, Desert Channels Queensland Inc conducted an aerial survey of a 381 km stretch of the river system. An additional two property-based projects were funded (\$11,500) with Queensland Government Pest Offensive support.



**Figure 5.** A section of the Desert Channels Queensland parkinsonia map based on aerial and ground survey data collated over several years.

### *Central Queensland*

Two significant projects have been coordinated through Central Highlands Regional Resources Use Planning Cooperative (CHRRUP). One project involving six landholders treated parkinsonia along Wolfgang Creek near Clermont. A second project involving seven landholders, and funded by CHRRUP with the Fitzroy Basin Association, treated infestations along Medway and Billaboo Creeks near Bogantungan.

### *Southern Gulf catchments, Queensland*

Projects were managed by Southern Gulf Catchments Ltd for the control of parkinsonia in the valuable wetlands of the lower Gulf plains. Southern Gulf Catchments Ltd received Queensland Government Pest Offensive funding of \$58,000 to conduct projects on five properties in the lower Gulf and one on the Yappar River.

In addition, Regional Investment Strategy funding of \$24,750 matched by the landholder saw one property's parkinsonia fully treated. Southern Gulf Catchments Ltd has developed a regional threat abatement plan for parkinsonia, which identifies priority areas for control.

In addition, Carpentaria Shire Council received Queensland Government Pest Offensive funding of around \$100,000, which has controlled prickly bush (including parkinsonia) infestations on roadsides, council reserves around Normanton and Karumba, and some properties.

The Department of Main Roads has also invested significant funds (\$302,650 during 2008–09) into the management of parkinsonia and other weeds in the road reserve. Nearly all roadside infestations have been treated as well as a number of historical 'borrow pits'.

## **Strategy 2.3: Active control**

### **Desired outcome: Zone B infestations (active control zone) are minimised**

Zone B infestations are active control zones where integrated management and coordinated control has potential to provide on-ground outcomes at a sub-catchment or catchment scale. A major reduction of infestation area is achievable in these zones if community and agency commitment is complemented by adequate planning and coordination.

Zone B infestations have been delineated in the Pilbara region of Western Australia; the Katherine, Gulf and Barkly regions of the Northern Territory; and the Northern Territory–Queensland border area of north-western Queensland. Further delineation of Zone B infestations is required in Queensland and this will likely occur with strategy redevelopment. The key outcomes associated with Zone B infestations during 2008–09 were:

### **Northern Territory**

#### *Georgina River catchment*

The successful Georgina River catchment parkinsonia program is currently being developed into a performance story report. The Barkly Landcare and Conservation Association has led strategic management of parkinsonia with the support of Natural Resources, Environment, The Arts and Sport and 12 pastoral properties over 3.5 million

ha. An aerial survey has been undertaken—47.5 helicopter hours identified 159,000 ha of infestation comprising 2247 infestation points and 53 km of infestation lines are recorded.

The survey outcomes form the basis for planning and coordination with 10 parkinsonia management plans have been developed. The 'Strategic Management of *Parkinsonia aculeata* in the Georgina River Catchment Northern Territory' project has been funded by the National Landcare Program (NLP) Sustainable Practices—total funding \$306,613 (\$152,603 NLP funded, \$77,810 in-kind, \$76,200 cash contribution).

#### *Roper River catchment*

The Caring for Our Country project 'Managing Priority Weeds in Key Areas of the Roper River Catchment – Continuation' is being managed by Roper River Landcare Group. The project builds on previous projects and involves four Indigenous ranger groups targeting four WONS and seven other Northern Territory declared weed species. Its aim is to reduce infestations by 50%. As part of the project, parkinsonia was eradicated from Hodgson Downs Station. Weed distribution data has been collected and collated on a spatial database. The project, with a total budget of \$569,368 (including \$228,000 funding), is due for completion in December 2009.

#### *Sturt Plateau*

The Sturt Plateau is a strategic geographic region, being part of the divide between the eastward (to the Gulf of Carpentaria) and westward (to the Joseph Bonaparte Gulf) flowing watersheds.

Two key activities occurred during 2008–09. Firstly, the NLP-funded project 'Protection of Conservation and Production Values of the Sturt Plateau' was led by the Sturt Plateau Best Practice Control Group. It contributed to parkinsonia management through surveying, mapping and control of priority weeds, which included the discovery of two new infestations. A total of 24,876 km<sup>2</sup> were surveyed. Secondly, one of the Parkinsonia Dieback Workshops was held on Hayfield Station and enabled the training of participants to establish dieback trials. Participants were able to fly over an earlier initiated trial site and view the successful spread of dieback.



**Figures 6 and 7.** Parkinsonia dieback is spreading at a wetland trial site (left), which was the focus of a field day in April 2009. (Images: Dr Vic Galea, UQ)

### **Western Australia**

#### *Pilbara region*

Control work has continued through the support of \$290,000 from Rangelands NRM (2007–09) for the DeGrey Parkinsonia Group. The project encompassed over 600 days

labour by station staff contracted to do control work along 350 km of the Oakover, Nullagine, Shaw and DeGrey Rivers. Kill rates were very good, although there is concern at a couple of sites regarding efficacy.

## **Queensland**

### *North-west Queensland–Northern Territory border region*

Desert Channels Queensland Inc has actively implemented parkinsonia control programs in the Boulia area of north-western Queensland. This complements the work undertaken by Barkly Landcare and Conservation Association in the Georgina River catchment and safeguards large areas of the Lake Eyre Basin from invasion.

Control of parkinsonia in the Gulf portion of the Queensland Zone B infestations has been minimal, with no collaborative programs currently operating. However, this may change with the recent formation of a Wild Rivers ranger team based in Burketown.

## **Best practice promotion**

Best practice promotion continued mainly through project management processes and only occasional extension events were held in 2008–09. Various extension products continue to be distributed widely including the *Parkinsonia national case studies manual*. Likewise, very little information is available on the level and rate of best practice adoption due to limited extension evaluation for parkinsonia.

## **Strategy 2.4: Eradicate and prevent spread**

### **Desired outcome: Zone C infestations (eradication zone) are eradicated and new introductions of Parkinsonia are prevented**

Zone C infestations are areas where continuous control activities can potentially achieve eradication at catchment, regional, state or territory scales. The national strategy identifies on-ground strategic control, surveys and mapping, regular inspections and monitoring as being critical to eradication. Surveys are required both as a means of delineating known infestations but also as an early detection mechanism.

Areas of Australia deemed as an eradication zone for parkinsonia include: South Australia, New South Wales, Western Australia (excluding the Kimberley and Pilbara), the Darwin and Alice Springs regions Northern Territory, southern and south-western Queensland, Cape York and parts of coastal Queensland. Eradication progress is as follows:

### **South Australia**

Isolated parkinsonia infestations and occurrences are present in the Arid Lands NRM region of South Australia. All known sites are under active management with the Arid Lands NRM Board providing regional coordination.

Two new plants were found and treated in the Woomera area while undertaking control of mesquite in 2008–09. Opportunistic monitoring and follow-up control treatment is occurring at other known sites. The recent development of a prickly bush register for South Australia will help ensure appropriate actions and follow-up of all sites.

With continued commitment from state and regional stakeholders, the eradication of parkinsonia from South Australia is feasible within the short term.

### **New South Wales**

The latest parkinsonia discovery in New South Wales was of about 10,000 plants on the Barwon River, just downstream from where the river ceases to be part of the New South Wales–Queensland border. The infestation will be treated later in 2009 by Castlereagh-Macquarie County Council.

Further follow-up control work has occurred at other known sites. In particular, Don Mackenzie (Bourke Shire Council) has reinspected Toorale Station and found new seedlings and regrowth. This station was recently purchased by the New South Wales Government for water management/conservation purposes.

Until 2003, parkinsonia in New South Wales was thought to be restricted to isolated plants in the Broken Hill area. Major infestations of parkinsonia were found in the Narran and Moonie River catchments of western New South Wales in 2003–04 and in Bourke Shire. The New South Wales Prickle Bush Working Group (coordinated by New South Wales Department of Primary Industries) continues to implement a state action plan for parkinsonia. The group met at Broken Hill in June 2009 to review the status of parkinsonia and mesquite.

With continued commitment from state and regional stakeholders, the eradication of parkinsonia from New South Wales is feasible within the short to medium term.

### **Northern Territory**

#### *Alice Springs region*

A Barkly Landcare and Conservation Association project 'Parkinsonia Management in the Southern Barkly Riparian Habitats' is ongoing. It involves the control of parkinsonia in the Sandover River catchment.

The project was supported by two Northern Territory agencies and involved an Indigenous ranger group and two pastoral properties. Total funding was \$128,200 (\$90,000 funded, \$38,200 in-kind). Strategic control has also occurred on Indigenous land about 250 km north-west of Alice Springs, but several other sites still require management.

#### *Darwin region*

Isolated plants occur in the Darwin region and the re-emergence of an infestation associated with the Adelaide River has come to the attention of Natural Resources, Environment, The Arts and Sport. This site will be the focus of possible future control efforts.

The feasibility of eradication within Zone C areas of the Northern Territory may be possible over the long term, but is difficult to assess at this stage of strategy implementation. Lower perceived risk of parkinsonia invasion, or lower priority for parkinsonia control, conflicts with national eradication zone classification in the Alice Springs and Darwin regions.

### **Queensland**

Eradication in many Zone C areas of western Queensland is possible over the medium to long term with continued community-based control efforts and agency support. A perpetual monitoring program and vigilance will be required to reduce the risk of re-establishment from upstream seed sources, especially in the Lake Eyre Basin. The eradication of parkinsonia from Cape York is technically feasible but restricted by multiple factors at this stage. Further details related to specific regions are provided below.

### *Cape York*

Small to medium-sized infestations occur on floodplains in the Pormpuraaw and Aurukun areas of Cape York. These infestations have been aerially mapped, providing the basis for community-based control efforts in current and past years.

A major on-ground control program occurred in late 2008 with 25 ha of high density parkinsonia controlled on Aurukun wetlands. As part of the program led by Cape York Weeds and Feral Animals Program, Aurukun community members were mentored in control methods and best practice. There is a need for increased capacity building, coordination and continuity of resourcing to ensure parkinsonia's eradication from Cape York.



**Figures 8 and 9.** Cape York wetlands under threat of parkinsonia (left) are the focus of control (right) by Aurukun community members and the Cape York Weeds and Feral Animals Program team.

### *Desert Channels and Lake Eyre Basin*

Desert Channels Queensland Inc is coordinating control programs at key sites in support of the national eradication zone for parkinsonia. In recent years properties have been engaged in the Boulia and Windorah area. In 2008–09 eradication zone aims progressed through control of outlying infestations south of Urandangi on the Georgina River. Funding was through the Queensland Government Pest Offensive with Desert Channels Queensland Inc and landholder contributions. Control efforts in these catchments will protect environmentally significant wetlands and the lower Lake Eyre Basin from invasion.

### *Warrego and Bulloo catchments*

Isolated parkinsonia occurrences are present in the Warrego and Bulloo River catchments. These catchments have been the focus of aerial and ground surveys, with most infestations thought to be identified and delineated. During 2008–09, coordinated control activities involving Queensland Primary Industries and Fisheries (part of the Department of Employment, Economic Development and Innovation), the local

government and landholders occurred for small-scale occurrences of <100 plants close to the Paroo River near Wyandra.

### *South East Queensland*

Isolated occurrences of parkinsonia are present in parts of South East Queensland but there is limited feedback on the status or management of these sites. A small number of parkinsonia trees in the Mundubbera area have been mapped by the North Burnett Regional Council and received basal bark treatment.

### **Western Australia**

Three small infestation sites have previously been identified in the Gascoyne region (Zone C) and were targeted for control. No update on the status of these sites is available.

### **Surveys of high risk areas**

Local, regional and state/territory surveys have been identified as a priority of strategy implementation. Major aerial and/or ground-based surveys have to date occurred in:

- South Australia—lower Diamantina River, Cooper Creek, Warburton Creek and site-specific surveys across the Arid Lands NRM region
- New South Wales—Narran and Moonie River catchments, plus site-specific surveys in the Broken Hill and Bourke districts
- Western Australia—Pilbara region, including Yule River
- Northern Territory—Georgina, Sandover and Roper River catchments, plus all coastline areas (in association with surveys for *Mimosa pigra* and rubber vine)
- Queensland—Pormpuraaw and Aurukun areas of Cape York, Cape River catchment, all major rivers in upper Lake Eyre Basin (Georgina, Diamantina, Thomson and Cooper).

The identification of national targets for surveying is an ongoing priority of the NPBMG. The landscape modelling work of CSIRO may also provide a valuable tool to identify areas most at risk.

## **Conclusion**

Major progress against all four goals of the Parkinsonia National Strategic Plan have been achieved during 2008–09. The on-ground success is evident in all states and territories with most infestations under effective control in New South Wales and South Australia. Many projects, such as those in the Roper River catchment and Aurukun area of Cape York, are protecting and/or restoring wetland biodiversity values.

The Parkinsonia Dieback Workshops and trials in the Northern Territory and the Kimberley region of Western Australia were a notable activity of the past year. The workshop series engaged and trained over 80 land managers while establishing field trials and equipping participants with mapping and monitoring skills. There is now an opportunity to further expand these trials across northern Australia.

The completion of most of the ecology and best practice control studies by CSIRO and Queensland Primary Industries and Fisheries' Tropical Weeds Research Centre provides a firm foundation and guidance for future management of parkinsonia. However, major gaps remain; research into other complementary fields, including biological control, dieback, landscape modelling and biodiversity impacts, needs to continue.

Best practice promotion and awareness activities have continued but evaluation activities to determine related outcomes are largely lacking. Likewise, levels of community-based control activities are also under reported. As a result, it is difficult to qualify or quantify the degree to which containment or active control goals are being achieved.

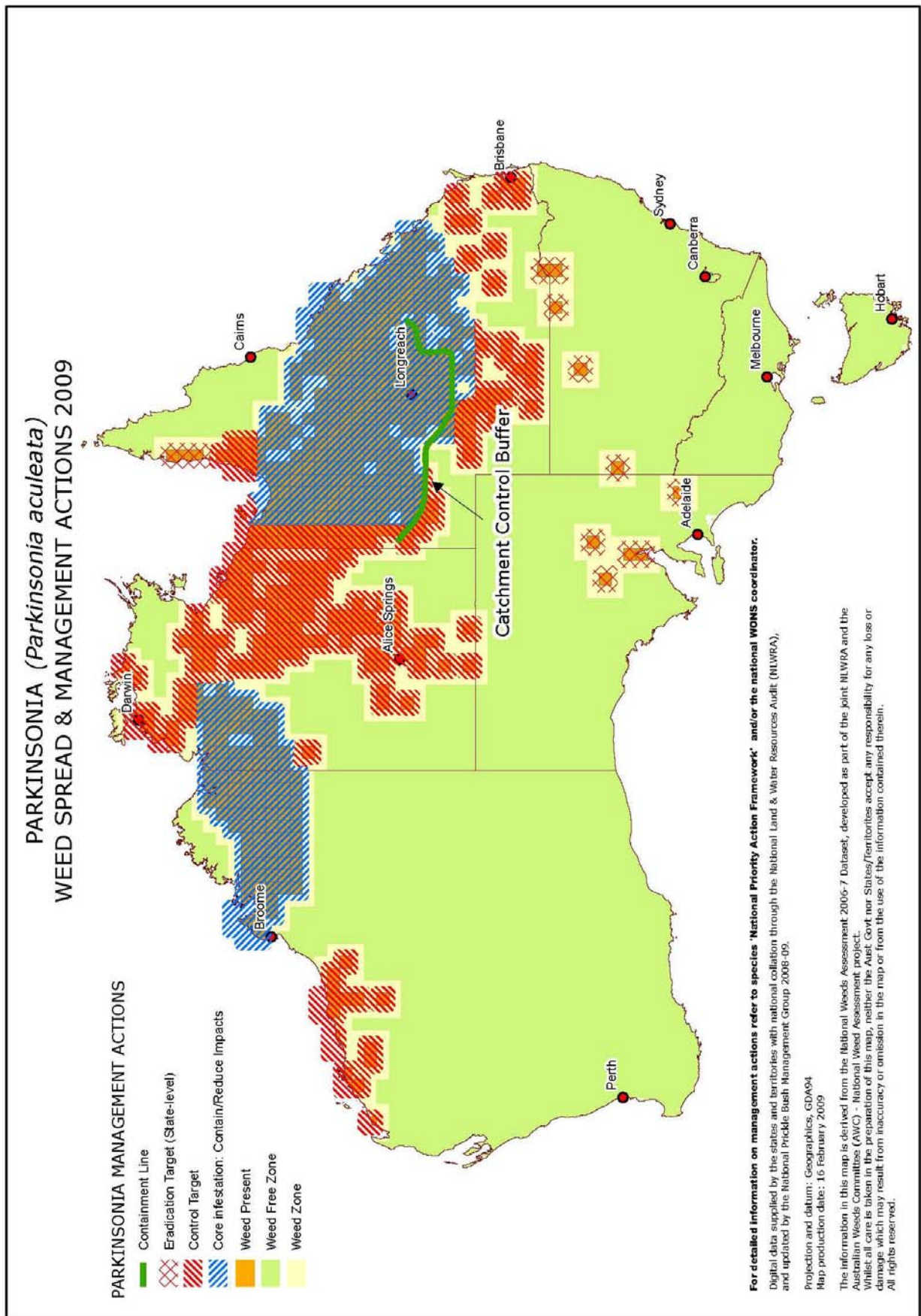
The national strategic plan review is nearing completion and will provide future direction for the management of parkinsonia in Australia. Regardless of the review's outcomes, ongoing collaboration and coordination at many levels will be required to maintain the outcomes and momentum achieved so far.

## **Appendix 1. Acknowledgements**

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- Louise Moloney
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- Dr Shane Campbell
- Charles Curry
- Jodie Sippel
- Alinta Orr
- Chris Brown
- Dr Vic Galea
- Barkly Landcare and Conservation Association.

## Appendix 2. Parkinsonia distribution and management actions



### Appendix 3. National Prickle Bush Management Group members 2008–09

<b>Name</b>	<b>Organisation or affiliation</b>
Ms Louise Moloney (Chair)	Queensland community representative Landholder
Mr Earl Sparkes	Queensland agency representative Department of Employment, Economic Development and Innovation
Mr Brett Carlsson	Queensland community representative Desert Channels Queensland Inc
Mr Mark Tarrant	Northern Territory agency representative Natural Resources, Environment, The Arts and Sport
Ms Alice Beilby	Northern Territory community/industry representative Savanna Solutions Pty Ltd
Mr Noel Wilson	Western Australia agency representative Department of Agriculture and Food
Mr Damian Collopy*	Western Australia agency representative Department of Agriculture and Food
Ms Linda Anderson	Western Australia community representative Pilbara Mesquite Management Committee
Mr Peter Gray	Agency representative New South Wales Department of Primary Industries
Ms. Deb Agnew	South Australia community representative South Australian Arid Lands Natural Resource Management Board
Dr Rieks Van Klinken	Research representative CSIRO
Dr Shane Campbell	Research representative Department of Employment, Economic Development and Innovation
Charles Curry <sup>#</sup>	Queensland community representative Southern Gulf Catchments Ltd

\* Resigned from the group in late 2008.

<sup>#</sup> Attended National Strategy Review Workshop in Broken Hill as proxy member in lieu of Brett Carlsson.

## Appendix 4. Parkinsonia-related scientific papers published in 2008–09

Provided by Dr Rieks van Klinken CSIRO

### Refereed journal publications

van Klinken, R.D., Lawson, B.E. and Zalucki, M.P. (in press). Predicting invasions in Australia by a Neotropical shrub under climate change: the challenge of novel climates and parameter estimation. *Global Ecology and Biogeography*

van Klinken, R.D., Campbell, S.D., Heard, T.A., McKenzie, J. and March, N. (2009) The Biology of Australian Weeds. *Parkinsonia aculeata* L. *Plant Protection Quarterly* 24, 100-117.

van Klinken, R.D., Lukitsch, B. and Cook, C. (2008). Interaction between seed dormancy-release mechanism, environment and seed bank strategy for a widely distributed perennial legume (*Parkinsonia aculeata*, Caesalpinaceae). *Annals of Botany* 102, 255-264.

van Klinken, R.D. and Flack, L. (2008). What limits predation rates by a specialist seed feeder? *Journal of Applied Ecology* 45, 1600-1611.

### Books and book chapters

van Klinken, R.D., Hoffmann, J.H., Zimmermann, H.G. and Roberts, A.P. (2009). *Prosopis* species (Leguminosae). *Biological Control of Tropical Weeds using Arthropods*, eds. R. Muniappan, G.V.P. Reddy and A. Raman, pp. 353-377. Cambridge University Press, Cambridge, UK.

### Edited proceedings (refereed)

Colasanti, R., van Klinken, R.D. and Buckley, Y. (2008). The dynamics of invasion as a function of landscape connectivity. Proceedings of the 16<sup>th</sup> Australian Weeds Conference, eds R.D. van Klinken, V.A. Osten, F.D. Panetta and J.C. Scanlan. (Queensland Weeds Society, Brisbane), pp. 130-2.

van Klinken, R.D., Leonie Seabrook, Carl Smith, Justin Ryan and Clive McAlpine. (2008). Using spatial models and a Bayesian belief network to predict risk of parkinsonia invasion at a landscape scale in northern Australia. Proceedings of the 16<sup>th</sup> Australian Weeds Conference, eds R.D. van Klinken, V.A. Osten, F.D. Panetta and J.C. Scanlan. (Queensland Weeds Society, Brisbane), p. 194.

Diplock, N., Galea, V., and van Klinken, R.D. (2008). Movement of dieback front through a stand of Parkinsonia – a time series study. Proceedings of the 16<sup>th</sup> Australian Weeds Conference, eds R.D. van Klinken, V.A. Osten, F.D. Panetta and J.C. Scanlan. (Queensland Weeds Society, Brisbane), p. 186.

Toh, R., Galea, V., Diplock, N. and van Klinken, R.D. (2008). Evaluation of fungal isolates for potential use as mycoherbicides for seedbank reduction of *Parkinsonia aculeata*. Proceedings of the 16<sup>th</sup> Australian Weeds Conference, eds R.D. van Klinken, V.A. Osten, F.D. Panetta and J.C. Scanlan. (Queensland Weeds Society, Brisbane), pp. 284-286.

Lawson, B.E., van Klinken, R.D. and Zalucki, M.P. (2008). Improving the agent selection, release and evaluation process: the role of bioclimatic modeling. Proceedings of the 16<sup>th</sup> Australian Weeds Conference, eds R.D. van Klinken, V.A. Osten, F.D. Panetta and J.C. Scanlan. (Queensland Weeds Society, Brisbane), pp. 510-512.

## Appendix 5. Budget

2008–09		Planned budget		Actual expenditure	
Employees & positions held	Recipient's contributions (without GST)	Funds paid by the Commonwealth (without GST)	Recipient's contributions expended (without GST)	Commonwealth funds expended (without GST)	
1.0 FTE National Coordinator @ AO6/4 (on-costed)		109,608		100,252.66	
Queensland in-kind support (salaries): management, admin. support, research officers	53,045		53,045		
Other contributions: NRM groups, state/territory and community support	55,335		55,335		
NPBMG 12 members @\$350/day x 10 days	42,000		42,000		
<b>A Total employment costs</b>	<b>150,380</b>	<b>109,608</b>	<b>150,380</b>	<b>100,252.66</b>	
Operating cost items	Recipient's contributions (without GST)	Funds paid by the Commonwealth (without GST)	Recipient's contributions expended (without GST)	Commonwealth funds expended (without GST)	
Coordinator travel		17,000		12,854.79	
4WD vehicle lease and minor repairs		25,000		20,260.54	
Telecommunications inc. phone & computer costs		5,000		2106.55	
Field equipment, training & minor operating		1,000		3824.15	
Postage & freight		700		499.19	
NPBMG meetings and coordination		15,721		2823.85	
National teleconferences		2,000		0	
In-kind support—office, facilities and equipment	14,200		14,200		
<b>B Total operating costs</b>	<b>14,200</b>	<b>66,421</b>	<b>14,200</b>	<b>42,369.07</b>	
<b>C Total cost (without GST) (A + B)</b>	<b>164,580</b>	<b>176,029</b>	<b>166,580</b>	<b>142,621.73</b>	
<b>D GST (10%)</b>	<b>16,458</b>	<b>17,603</b>	<b>16,658</b>	<b>14,262.17</b>	
<b>E Total cost (including GST)</b>	<b>181,038</b>	<b>193,632</b>	<b>183,238</b>	<b>156,883.90</b>	

Note: Coordination figures are split between prickly acacia, parkinsonia and mesquite.