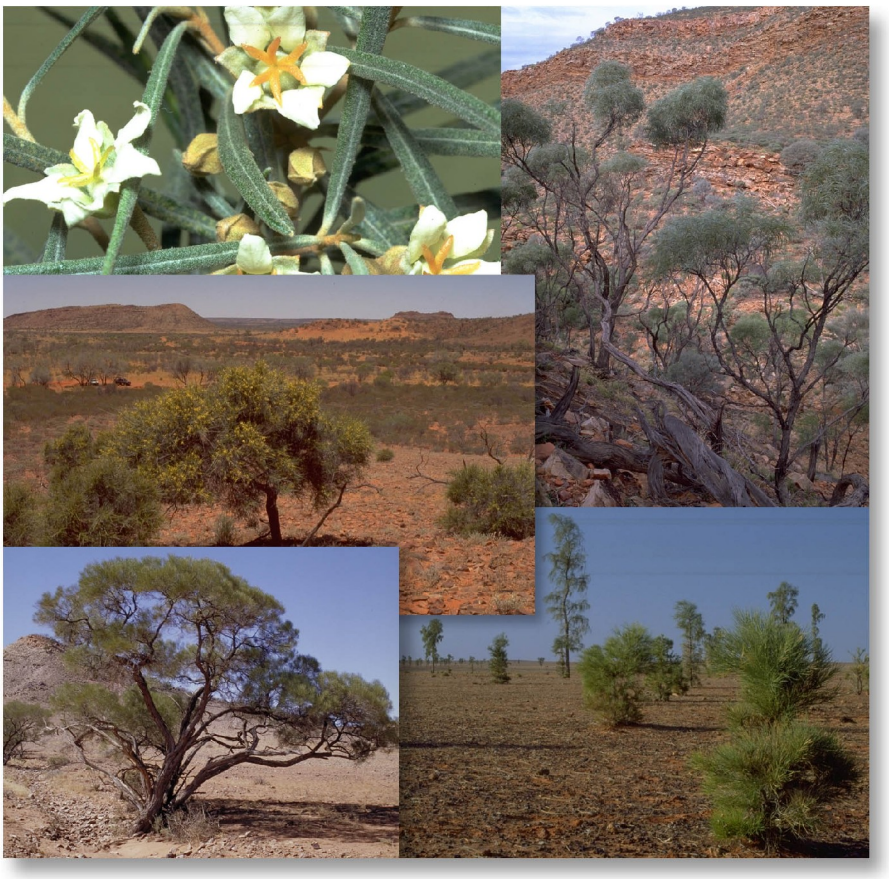
# Recovery plan for threatened Acacias and *Ricinocarpos gloria-medii* in central Australia, 2005-2010.



Northern Territory Government
Department of Infrastructure, Planning and Environment

**Title: Recovery plan for threatened Acacias and *Ricinocarpos gloria-medii* in central Australia, 2005-2010.**



*Citation*

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*Cover photographs and credits*

Species clockwise from top left: *Ricinocarpos gloria-medii* (Alan Morrison), *Acacia undoolyana* (David Albrecht), *Acacia peuce*, *Acacia latzii* (David Albrecht), *Acacia pickardii* (Connie Spencer).

Cover design by Mark Harris.

## Foreword

The Northern Territory's Department of Infrastructure, Planning and Environment obtained funding from the Commonwealth Department of Heritage and Environment to produce this recovery plan. Recovery Plans delineate, justify and schedule management actions necessary to support the recovery of threatened species. The attainment of objectives and the provision of funds necessary to implement actions is subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities.

Approved Recovery Plans are subject to modification as dictated by new findings, changes in species' status and completion of recovery actions.

Information in this Plan is accurate as at 14 June 2005.

## Acknowledgements

This plan was prepared with support from the Natural Heritage Trust. Input into the content of the plan was received from David Albrecht, Tony Bowland, Angus Duguid, Colleen O'Malley, Connie Spencer, Peter Latz, Tim Collins, Annie Bond, Wendy Stubbs, Martin O'Leary, Peter Copley and staff at the Queensland Herbarium.

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## Abbreviations

| | |
|---|---|
| APS | Australian Plant Society, a non-profit, independent, incorporated community organisation with members throughout Australia. that encourages the growing, propagating, preservation and conservation of Australian plants. |
| ASDP | Alice Springs Desert Park, a Northern Territory government run park that displays plants and animals in typical central Australian settings |
| CLC | Central Land Council, a statutory authority representing Aboriginal people in the southern Northern Territory under the *Aboriginal Land Rights (Northern Territory) Act 1976*. It also has functions under the *Native Title Act 1993* and the *Pastoral Land Act 1992* |
| CLMA | Central Land Management Association |
| CR | Conservation Reserve |
| DEHSA | Department for Environment and Heritage, South Australia |
| DIPE | Department of Infrastructure, Planning and Environment, Northern Territory |
| EPA | Environment Protection Agency, Queensland |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999, Commonwealth Government Legislation |
| MCCR | Mac Clark Conservation Reserve |
| NP | National Park |
| NT | Northern Territory |
| OPBG | Olive Pink Botanic Garden, a 16 ha arid zone gardens in Alice Springs that displays over 300 species of central Australian plants and is administered by a voluntary Board of Trustees. |
| PWSNT | Parks and Wildlife Service, Alice Springs, Northern Territory, a service within DIPE |
| QLD | Queensland |
| RCD | Rabbit Calcivirus Disease |
| SA | South Australia |
| TSN | Threatened Species Network, a joint program between the Federal government's Natural Heritage Trust and the World Wide Fund for Nature, that is a national network developed to involve the community in conservation programs for threatened species |

# Summary


### Conservation Status

This Recovery Plan covers a group of five threatened plant species with small, disjunct populations in arid Australia. The species are: *Acacia latzii*, *Acacia peuce*, *Acacia pickardii*, *Acacia undoolyana* (Mimosaceae) and *Ricinocarpos gloria-medii* (Euphorbiaceae). All species are endemic to Australia and have a conservation status of Vulnerable under the EPBC Act 1999. All species occur in the NT, whereas two of the acacias are also in northern SA and *Acacia peuce* occurs in QLD.

### Distribution, Habitat Requirements and Threats

*Acacia peuce* occurs as three highly disjunct populations, two in QLD and one in the NT, all of which fringe the Simpson Desert. Like *A. peuce, Acacia pickardii* occurs as scattered, isolated populations around the edge of the Simpson Desert. This species is confined to residual stony rise and hill habitats in the southern NT and northern SA. *Acacia undoolyana* and *Ricinocarpos gloria-medii* are each restricted to quartzite and sandstone ranges in the MacDonnell Ranges bioregion of the NT. *Acacia latzii* occurs on low breakaway hill country in the Finke bioregion in southern NT and northern SA.

The threats currently faced by most species are minor; however, small population number and size and disjunct distributions place each species at risk from stochastic processes. Potential threats to the species covered in this plan include fire, weed invasion and herbivory.

### Recovery Plan Objectives

***Overall objective***

To improve (or at least maintain) the current conservation status of all species covered in this plan.

***Specific objectives***

- Fill gaps in knowledge of distribution.
- Maintain or increase habitat quality and extent of occurrence.
- Understand critical ecological attributes including fire response, life history characteristics, and reproductive- and seed biology
- Implement *ex-situ* conservation measures that ensure representative sampling of each species' genetic diversity.
- Define management units for species with widely spaced populations.
- Incorporate traditional ecological knowledge and management practice into recovery planning.
- Inform and involve the community and all stakeholders in the recovery process.

***Recovery criteria***

- The distribution limits and number of populations of all species is understood.
- Habitat quality and extent is maintained or increased.
- Adequate knowledge of the influence of fire and other ecological processes on the persistence of each species is available.
- Seeds from populations of each species are held in properly maintained *ex-situ* storage facilities.
- The genetic structure of populations of species with widespread ranges is understood.
- Indigenous knowledge relating to phenology, threatening processes, cultural significance, and medicinal and nutritional plant use is properly incorporated into recovery programs.
- Community and stakeholder based networks are maintained and enhanced.

***Actions Needed***

1. Carry out targeted surveys for additional populations of *Acacia latzii* and *Acacia pickardii* in the NT and SA.
2. Establish formal protection for significant populations of *Acacia pickardii* and *Acacia latzii* and a Queensland population of *Acacia peuce*.
3. Carry out population and habitat monitoring at selected sites.
4. Implement management strategies for key threatening processes as required.
5. Undertake ecological research on fire ecology, reproductive biology, seed dormancy and germination cues, and soil seedbank dynamics.
6. Collect and store seeds from all populations in recognised seed-banks.
7. Assess genetic population structure of *Acacia latzii, A. peuce, and A. pickardii*.
8. Engage indigenous ecologists to provide input into the recovery process.
9. Carry out community education and ensure all stakeholders are informed of progress with recovery efforts.

**Estimated costs of recovery (in $1000s)**

| Actions | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|---|
| 1 | - | 30.0 | 15.0 | - | - | 45.0 |
| 2 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 25.0 |
| 3 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 175.0 |
| 4 | - | - | 75.0 | 75.0 | 75.0 | 225.0 |
| 5 | 55.0 | 55.0 | 55.0 | 55.0 | - | 220.0 |
| 6 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 25.0 |
| 7 | | 20.0 | 20.0 | | | 40.0 |
| 8 | 22.0 | 11.5 | 12.0 | - | - | 45.5 |
| 9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 5.0 |
| **Total** | **123.0** | **162.5** | **223.0** | **176.0** | **121.0** | **805.5** |

# Introduction and General Requirements

### Species Description

This Recovery Plan covers a group of five threatened plants (Table 1), each characterised by a limited number of small populations with disjunct distributions in arid Australia. The species are: *Acacia latzii*, *Acacia peuce*, *Acacia pickardii*, *Acacia undoolyana* (Mimosaceae) and *Ricinocarpos gloria-medii* (Euphorbiaceae).

*Acacia latzii* is a shrub or small tree that grows to 5m high and has thick rough bark. *Acacia peuce* is an erect tree that grows up to 18m, and has grey-brown, fibrous bark. *Acacia pickardii* is a shrub or small tree that grows to 5m high and has spiney stipules on the stems at the base of its leaves. *Acacia undoolyana* is a small tree that generally grows to 6m high (rarely to 11m) and has rough, greyish-brown bark. The final species, *Ricinocarpos gloria-medii*, is a shrub that grows to 2m high and has narrow leaves with a covering of star-shaped hairs and attractive white flowers.

### Conservation Status

Information on the conservation status of each species is given in Table 1. All species are endemic to Australia and have a global and national conservation status of Vulnerable under the EPBC Act 1999. All species occur in the NT, whereas two of the acacias are also in northern SA and *Acacia peuce* occurs in QLD.

**Table 1.** National and state/territory status of the plant species covered in the Recovery Plan.

| Species | Region* | | | |
|---|---|---|---|---|
| | Australia | NT | SA | QLD |
| *Acacia latzii* | vulnerable | vulnerable | rare | - |
| *Acacia peuce* | vulnerable | endangered | - | vulnerable |
| *Acacia pickardii* | vulnerable | vulnerable | rare | - |
| *Acacia undoolyana* | vulnerable | vulnerable | - | - |
| *Ricinocarpos gloria-medii* | vulnerable | vulnerable | - | - |

* Relevant legislation: Commonwealth of Australia (EPBC Act 1999); NT (section 29, *Territory Parks and Wildlife Conservation Act, 2000*); SA (*National Parks and Wildlife Act 1972*, amended September 2000); QLD (*Wildlife Conservation (Specially Protected Fauna) Notice 1999*).

**International Obligations**

None of the five plant species covered in this Recovery Plan is listed in the Appendices of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) or other international treaties. As a consequence, implementation of Australia's responsibilities under various international treaties is not affected by this plan.

**Affected Interests**

The species covered in this Recovery Plan are known from conservation reserves managed by the NT government, pastoral leases, an Aboriginal-owned pastoral lease (Tempe Downs Station), a pastoral lease under land claim, Aboriginal freehold land, a tourism lease, and a stock route (crown land). All affected interests will be involved in the implementation of this plan to some degree. State/Territory government agencies will be involved in recovery actions and will play an important role in the plan's implementation. Recovery actions undertaken on Aboriginal land will be carried out in consultation with the CLC and

other relevant Aboriginal organisations and communities. Employment of traditional owners in recovery actions will be undertaken whenever possible. Recovery actions on pastoral leases will be undertaken in consultation with property managers. Where feasible, pastoralists will be encouraged to play an increased role in management of some remnant populations. The Alice Springs branch of APS has been actively monitoring *Acacia latzii* populations in the Bacon Ranges for the last 12 years, with initial support from PWSNT. The monitoring program is likely to continue in association with TSN and with on-going cooperation from the pastoral lessee.

**Role and interests of indigenous people**

The recent shift towards the joint management of conservation lands in the NT opens up unprecedented opportunities for the involvement of Aboriginal people in many aspects of conservation management. DIPE is currently working towards the inclusion of traditional owners, other indigenous people with detailed traditional knowledge, and young indigenous apprentices to guide and assist with the development and implementation of joint management procedure. This process of engagement will facilitate the incorporation of indigenous knowledge (especially in relation to phenology, threatening processes, and medicinal and nutritional plant use) and conservation priorities into species recovery programs.

**Social and economic impacts**

The implementation of the recovery plan is unlikely to result in any significant adverse social and economic impacts. Implementation of the actions developed in this plan will be on a small scale that will not significantly alter existing land uses.

Some positive social and economic impacts are likely to arise from implementation of this recovery plan. These include the incorporation of indigenous knowledge into recovery programs, employment opportunities for Aboriginal people, and development and training of Aboriginal ranger groups.

**Rationale for the multispecies approach to the recovery plan**

The species covered in this Recovery Plan are endemic to arid central Australia and are similar in three respects as detailed below. 1. All species occur as small, disjunct populations and are thus at risk from stochastic processes. 2. All species face a similar suite of threatening processes (Table 2). 3. The species are poorly understood in terms of their general biology and critical life history processes.

**Table 2.** Potential threats faced by the species covered by this recovery plan.

| Threats | Species | | | | |
|---|---|---|---|---|---|
| | *Acacia latzii* | *Acacia peuce* | *Acacia pickardii* | *Acacia undoolyana* | *Ricinocarpos gloria-medii* |
| Fire | ✔ | ✔ | | ✔ | |
| Weed invasion | ✔ | | | ✔ | |
| Grazing/browsing and/or trampling by cattle | ✔ | ✔ | ✔ | | |
| Grazing/browsing by rabbits | ✔ | ✔ | ✔ | ✔ | ✔ |
| Lightning strikes | | ✔ | | | |
| Timber cutting | | ✔ | | | |
| Road construction | | | ✔ | | |
| Stochastic biotic processes (e.g. sudden and intense pathogen or insect attack) | ✔ | ✔ | ✔ | ✔ | ✔ |

*Distribution and Habitat*

The species covered in this plan are all endemic to arid central Australia (Figure 1). All have a restricted distribution pattern and are characterised by populations that are disjunct, limited in area, and surrounded by areas of apparently suitable habitat. *Acacia peuce* and *Acacia pickardii* both occur as scattered populations around the edge of the Simpson Desert. *Acacia undoolyana* and *Ricinocarpos gloria-medii* are restricted to quartzite and sandstone ranges in the MacDonnell Ranges bioregion. *Acacia latzii,* occurs on low flat-top hill and high plateau country in two widely spaced sites within the Finke bioregion.

*Climate*

The climate within the arid zone of central Australia is characterised by low, unpredictable rainfall, high-ranging temperatures, and high evaporation rates (Table 3). Maximum daily temperature during summer regularly exceeds 40$^{\circ}$C and winter nights are cold with frosts often occurring between late May and early September.

Rainfall in the arid zone is extremely variable in terms of spatial and temporal distribution and intensity (Deveson 1980, Table 3). This variability is of fundamental ecological importance to the growth and reproductive and regenerative success of many arid zone plants (Whitford 2002).

**Table 3.** Climatic statistics for the study area.

| Locality | Mean annual rainfall (mm) | Rainfall variability^ | Mean daily max temp January (°C) | Mean daily max temp July (°C) |
|---|---|---|---|---|
| Alice Springs* | 283 | moderate to high (1.0–1.25) | 36.1 | 19.6 |
| Finke | 189 | very high (1.5–2.0) | 37.5 | 19.9 |
| Birdsville | 169 | very high (1.5–2.0) | 38.8 | 20.8 |
| Boulia | 264 | high (1.25–1.5) | 38.5 | 22.8 |

All data obtained from Bureau of Meteorology internet site, 2004 (http://www.bom.gov.au/climate/averages)

*Alice Springs data is an average of Alice Springs airport and post office.

^Variability = (90p–10p)/50p. 90p, 50p, 10p = annual 90$^{th}$, 50$^{th}$ and 10$^{th}$ rainfall percentiles respectively.

*Threatening Processes*

The occurrence of a species as a series of small, disjunct populations presents a number of inherent threats to its long-term persistence because of the increased likelihood of extinction through stochastic disturbance events (Buist *et al.* 2002). A number of more specific population size-related problems have also been identified, all of which are potentially of relevance to each of the focus species covered in this plan. For example seed production may decrease with decreasing population size, and further, lower seed output can result in an increased impact of seed predation on reproductive success. Inbreeding may also occur; leading to lower genetic variation that in turn can result in both a reduced ability to adapt to changed environmental conditions and an inability to resist disease (Buist *et al.* 2002).

The lack of detailed biological and/or demographic information relating to these vulnerable species currently precludes a thorough account of more specific threats to their long-term persistence. However, it is possible to extrapolate from related studies that have identified threatening processes in operation throughout the arid zone. Based on these studies, three processes, namely fire, weed invasion and herbivory are considered here as potential threats to the species covered in this plan. The details of each are provided below.

*Fire*

Fire has for some time been recognised as a potential hazard to local population persistence in both threatened (e.g. *Acacia undoolyana, Acacia peuce*) and widespread (e.g. *Acacia aneura*) fire-sensitive central Australian shrub species (see Latz 1995). Little is known, however, in terms of the actual mechanisms involved in fire-related species decline (certainly no detailed studies exist for any of the species covered in this report). Two models (each of which may be attributed to multiple authors e.g. Griffin and Friedel 1984, Bowman *et al*. 1994, Latz 1995) have currency in the arid zone literature and may apply to these particular species. The first describes a fire-mediated shift in site quality and predicts the localised extinction of species through fire-induced habitat (especially soil) change. The second concerns the fire-mediated extinction of species through the death of fire sensitive adult plants, the interruption of seed-bank replenishment, and the subsequent prevention of regeneration. Central to each of these models is the criterion that species under threat are intolerant of repeated firing – an assumption currently held for each of these vulnerable species.

*Weed invasion*

At present *Cenchrus ciliaris* (buffel grass) – one of central Australia's worst environmental weeds – is concentrated in depositional habitats in the arid zone from which these threatened species are largely absent. There is, however, some indication that this highly invasive species has the ability to dominate habitats

where it currently does not occur, or where it occurs only as a minor component of the flora. Buffel grass is known to directly (e.g. through resource competition) and indirectly (though altered fire regimes) negatively affect native flora and fauna in a range of habitat types (e.g. see Clarke *et. al.* 2005). Given this, it is regarded here that the continued spread and establishment of buffel grass as a ground- and even structural-dominant (given the demonstrated flow-on effects of its presence on fire sensitive shrub species) into novel habitats is a likely probability. In this event, buffel grass invasion will possibly represent one of the greatest threats to at least some of these threatened species in future years. Most susceptible to this threat are *Acacia undoolyana* and *Ricinocarpos gloria-medii*, given that buffel grass already exists in the habitat of these species.

*Grazing/browsing and trampling by cattle*

While cattle grazing/browsing has been identified as a major disturbance and potential threat to a range of species and habitats Australia-wide, its actual impacts are often difficult to establish as a result of a number of methodological constraints on the comparative analysis of grazed and ungrazed areas (see Vesk and Westoby 2001). Although existing data are somewhat equivocal, it is regarded here that grazing should not be overlooked as an important threatening process at least to three of the species covered in this plan. A precautionary approach with regard to cattle grazing in threatened species habitat is therefore recommended. This approach should include the setting aside of further substantial areas of threatened species habitat in grazing-free situations. In addition, effort should be directed towards the prevention of damage caused by large feral herbivores (primarily camels and donkeys), which can occur in large numbers in the arid zone. Species most at risk from this threat are *Acacia peuce* and *Acacia pickardii* given their proximity to the Simpson Desert where feral animals currently occur largely unchecked.

*Browsing by rabbits*

Browsing by rabbits and possibly damage to plants resulting from burrowing activity of rabbits is a potential threat faced by all five species. However, the significant decline in rabbit numbers since the introduction of RCD into central Australia in the mid-1990s may have reduced the impact of this threat for the moment.

*Other threats*

Mortality from lightning strikes and timber cutting is confined to *Acacia peuce*. Road construction and realignment is a threat to populations of *Acacia pickardii* that occur along the Birdsville track in north-east South Australia.

# Species Information

## 1. *Acacia latzii* Maslin

(common names: Tjilpi Wattle, Peter Latz Wattle)

### Description

*Acacia latzii* is a shrub or small, bushy tree that grows to 5m high and has thick rough bark. The branchlets are slightly resinous and have a sparse covering of appressed hairs. The leaves (phyllodes) are grey-green, narrow and are typically 50-100mm long by 2-4mm wide. The leaves are also sparsely covered with indistinct appressed hairs and have a single gland (1-4mm) above the base of the blade. The globular flower heads are yellow, about 4mm in diameter, and are resinous. Flowering has been recorded from April to October and in December and January. Fruiting pods grow to 150mm long by 5mm wide. Fruiting has been recorded from May to November.

### Distribution

The species is endemic to the Finke bioregion, where it is restricted to two areas about 200km apart, one in the Bacon Range to the south-east of Alice Springs and the other in the Beddome Range -straddling the NT-SA border (Figure 2).

Populations within the Bacon Range occur on Henbury and Tempe Downs pastoral leases and cover a total area of roughly 40km$^2$. Populations within the Beddome Ranges are scattered across an area of roughly 220km$^2$ on the Umbeara (NT), New Crown (NT) and Tieyon (SA) pastoral leases. During recent flora surveys of the Finke bioregion - further outlying stands were located in both areas (Neave *et. al.* 2004). It is possible therefore that the distribution of this species may extend beyond currently known range limits, especially in difficult to access areas.

**Biology and Ecology**

*Acacia latzii* usually occurs on low hills characterised by skeletal soils and occasional steep gullies. These hills are most often mesas or buttes, comprising a hard silcrete cap and slopes of clay, siltstone and shale, which are sometimes quite saline. The species also occurs along small, rocky watercourses associated with hill footslopes especially in the Bacon Range.

*Acacia latzii* is relatively slow growing and long lived. All populations consist mostly of adult plants and successful regeneration events are infrequent and depend upon unusually high rainfall events (Australian Plant Society unpublished data, White *et al.* 2000). While the species is known to flower routinely after rains, very few of these events have led to seed-set in the time since monitoring began at Henbury pastoral lease (Threatened Species Network 2001). Seedling establishment was observed at the Henbury population in 2002, however the majority of these recruits have since died, with only approximately 50 remaining in two adjacent locations at last count in January 2005 (Colleen O'Malley personal communication 2005). Prior to this event, it is estimated that seedling recruitment had not occurred at the Henbury populations since the exceptionally high rainfall periods of 1974 and the 1980s. Some senescence of mature plants has been recorded at Henbury, but populations are not considered to be drastically decreasing in terms of area or number of individuals.

**Habitat critical to the survival of the species**

As a result of the rarity of this species, all locations where *Acacia latzii* occurs are considered to contain critical habitat for its survival. These locations are mapped in Figure 2.

**Known and potential threatening processes**

Potential threats to *A. latzii* include inappropriate fire regimes, invasion by buffel grass, trampling of and grazing on seedlings by cattle, and browsing by rabbits and possibly donkeys (Threatened Species Network 2001, Neave *et al.* 2004,

Colleen O'Malley personal communication 2005). The infrequent success of reproduction and recruitment events of *A. latzii* exacerbates the population-level impacts of threatening processes.

Historically, rabbits were considered to be a major threat to the species through browsing of seedlings and root pruning of some older plants. Rabbit numbers have fallen significantly in recent years with the introduction of RCD into central Australia. Browsing by rabbits is therefore now considered to be only a minor threat while numbers remain low, especially given that there is ongoing rabbit management at the Henbury monitoring sites.

The presence of buffel grass within the Henbury populations of *A. latzii* may be considered a threat given this species' propensity to outcompete native herbs and shrub seedlings and to increase the risk of wildfire. Evidence indicates that in the absence of buffel grass, fire occurrence at the *A. latzii* sites is likely to be rare. It is expected however that the continued invasion of buffel grass will likely dramatically alter this situation, given that this species has elsewhere been known to increase both the frequency and the intensity of fire (Butler and Fairfax 2003, Franks 2002). However, countering these concerns is the view that buffel grass is unlikely to invade *A. latzii* populations away from creeklines (Colleen O'Malley personal communication 2005).

**Areas and populations under threat**

Both populations are considered to be under threat. The incidence of buffel grass may be higher in the Bacon Range; however, it may be more obvious here than in the Beddome Range because of easier accessibility. The remoteness of the Beddome Range means that access in the event of wildfire will be very difficult.

**Existing conservation measures**

The species is not known from any conservation reserves (White *et al.* 2000). Two small populations on Henbury pastoral lease have been fenced from rabbits and cattle since 1993. Since then, regular monitoring of these and adjacent

unfenced control-sites has been carried out by the APS in conjunction with TSN. Henbury was chosen as the most suitable monitoring location because of its proximity to Alice Springs. Data collected during monitoring include rainfall, flowering, seeding, disturbance and recruitment events. While no actual conservation measures are in place at the Beddome Range site, current lease holders of New Crown Station are aware of the occurrence of *Acacia latzii* there and have an appreciation of its status as a threatened species.

**Ex-situ propagation**

A small number of plants have been successfully propagated and grown at ASDP and OPBG. Seedlings have also been propagated for sale through the OPBG growers group. A store of seed is kept at ASDP, though in uncontrolled conditions, and as such should not be regarded as an adequate form of *ex situ* conservation.

**Biodiversity benefits**

*Acacia latzii* is a structural dominant of the sites where it occurs and as such adequate protection of this species including control of threatening processes will benefit a diversity of plant and animal species that occupy the same habitat.

## 2. *Acacia peuce* F.Muell.

(common names: Waddy Wood, Casuarina Wattle)

**Description**

*Acacia peuce* is an erect tree that grows up to 18m, and has grey-brown, fibrous bark. The foliage has a drooping, needle-like appearance. The flower heads are globular, pale yellow and often inconspicuous. The fruits are a distinguishing feature of the species in that they are particularly large and flattened (to 20cm long and 5cm wide), and are papery and twisted when dry. Flowering, which is dependent on exceptionally high rainfall events, has been recorded between October and March. Fruiting has been recorded between December and June.

**Distribution**

*Acacia peuce* populations occur in three highly disjunct areas on the fringe of the Simpson Desert (Figure 3). One of these occurs in south-east NT on Andado pastoral lease and the MCCR in the Simpson-Strzelecki Dunefields bioregion. The other two occur in south-west Queensland in the vicinity of Birdsville (Channel Country bioregion) and Boulia (Channel Country and Mitchell Grass Downs bioregions).

Andado/MCCR is the smallest and most isolated of the three *A. peuce* populations. It has a geographic range of around 20km and occupies an area of about 10km$^2$ (1000ha) (Chuk 1982, Bowland and Clifford 2002). This population is contained mostly within the MCCR. The MCCR was established in 1977 and covers an area of 3042ha, which encompasses about 80% of the population. Formerly, an area of 475ha within the MCCR was fenced from large herbivores, providing protection to about 43% of the local *A. peuce* population. However, an additional nine stands was fenced in 2004. While recruitment events are clearly rare, this population does have a variable age structure that is characterised mainly by secondary juvenile and mature plants. Seedling emergence has recently been recorded at this population and PWSNT will monitor the fate of these seedlings over time. Given that stand replacement is ongoing this population is considered to be demographically healthy.

The Birdsville population is centred about 15km north-west of the town on Roseberth pastoral lease. It consists of many discontinuous stands covering a total area of about 50 km$^2$. The population is considered to be in a senescent condition, made up mostly of older trees with only a small amount of regeneration (Jon Luly personal communication 2003). Deveson (1980), described the average condition of trees as fair, noting predation or degeneration of leaf tips, a lack of trees with a well-developed or spreading canopy, a high proportion of

senescent trees, and infestation by larvae of longhorn beetles (family Cerembycidae) on smaller trees.

The Boulia population occurs mainly on the Montague Downs and Marion Downs pastoral leases to the south of the town of Boulia. It is, by far, the largest of the three *A. peuce* populations, being spread over an area of about 900km$^2$ plus a few outlying trees. It is also the only population considered to be thriving and increasing in size (Deveson 1980, Jon Luly personal communication 2003). The population contains various age classes with recruitment regularly occurring after high rainfall events. Population expansion appears to be assisted by the spread of seed along drainage lines.

The relative good health and high level of regeneration in the Boulia population coincides with three environmental factors. First, this population is on a sandplain associated with drainage systems and therefore the soil may be more conducive to root penetration than other populations (Jon Luly personal communication 2003). Second, the Boulia region receives a higher and more regular annual rainfall than Andado and Birdsville. Third, the area receives added water as a result of being located within drainage systems of the Channel Country bioregion.

**Biology and Ecology**

The Andado/MCCR and Birdsville populations occur on the fringe of the Simpson Desert dunefields on remnant stony pediments, alluvial pediplains and, rarely, on adjacent sand dunes (Deveson 1980). The Boulia population, in contrast, occurs just off the Simpson Desert fringe in the Channel Country that is associated with the alluvial plains of the Georgina, Hamilton and Burke Rivers.

The species is slow growing. Seedling emergence and establishment occur only periodically and are reliant on exceptionally high rainfall events with winter rainfall being implicated as being of particular importance. Individuals can resprout vegetatively after mechanical damage (Deveson 1980, Jon Luly personal

communication 2003) though they are apparently incapable of surviving fire events.

**Habitat critical to the survival of the species**

As a consequence of the restricted distribution of the species, all locations that support *Acacia peuce* populations are considered to be critical habitat.

**Known and potential threatening processes**

*Wildfire*

Fire is a possible threat to parts of the Andado population, especially in the more grassy areas that lack a dense gibber cover to inhibit fuel build-up. In 1976, a wildfire burnt in the northern-most stand and killed most of the trees (about 177 individuals). Areas that are fenced off from cattle are considered to be at increased risk following periods of high rainfall that enables the build-up of groundcover fuel-loads. There is no record of fire having occurred within the Boulia population. However, like the fenced areas of Andado, it is at greater risk from wildfire following periods of high rainfall. The Birdsville population is considered to be under only minor threat from wildfire as a consequence of it being associated with a relatively bare and rocky landscape (John Luly personal communication 2003).

*Lightning strikes*

Lightning strikes occasionally impact *A. peuce* trees at the Andado/MCCR population and are considered to be a major cause of mortality of mature trees in this population (Bowland 2003). Ongoing monitoring is being carried out to determine whether threat abatement measures such as the installation of lightning conductors are required. No records of mortality as a result of lightning are available for either the Boulia or Birdsville populations.

*Grazing and trampling by cattle*

The Andado population has historically been heavily used by cattle as a result of both its proximity to watering points and being the only available source of shade. A major watering point for cattle known as “north bore” was located on the western boundary of the MCCR, a location that is close to the largest stand of *A. peuce.* Numerous cattle pads traverse the area as a result of cattle movement between grazing areas and “north bore”. In addition, cattle congregate at the base of trees in search of shade. The consequences of cattle activity include browsing and trampling of seedlings and saplings, soil compaction and loss, root exposure, and bark damage (Bowland and Heywood 2002). To alleviate some of the impact of cattle activity, “north bore” was closed by the lessee in 2004 and alternative watering points established outside the boundary of MCCR. Approximately 43% of the population has been fenced off from cattle since 1977 and this area is now considered to be in good condition. An additional nine stands were fenced off in 2004. However, these areas will need careful wildfire management when groundcover fuel-loads build up after high rainfall events.

Cattle impact within the Birdsville population is not significant and no waterpoints exist near the major stands (John Luly personal communication 2003). Landholders at all three of the above areas are aware of the significance of the species and are keen to manage it accordingly.

*Timber cutting*

*Acacia peuce* has historically been cut for fencing timber at all three populations. However, this practice is now rare and therefore represents only a minor threat. Luly (personal communication 2003), reported limited signs of cutting at the Boulia population, but also noted that the trees had since re-sprouted. Deveson (1980) reported that *A. peuce* has been cut extensively for fencing and yard and shed building. However, as mentioned above, all landholders are now aware of the significance of the species and accordingly restrict timber harvesting.

**Areas and populations under threat**

Only the Boulia population is increasing in both area and number of individuals. However, the long-term future of this population is not secure as a formal conservation agreement does not exist.

**Existing conservation measures**

A significant portion of the NT population of *A. peuce* occurs within a conservation reserve, MCCR, which is an excision from the Andado pastoral lease that has been set up especially for conservation of the species. The reserve was established in 1977 and covers an area of 3042ha, which encompasses about 80% of the population. The NT government manages *Acacia peuce* under a Species Management Program. The management program includes prescriptions for the management of cattle, fire, lightning strikes, and habitat fragmentation. In addition, a framework for research and monitoring is included.

***Ex situ* propagation**

The species has been successfully propagated and grown at the ASDP and OPBG and has been occasionally sold-on to retail nurseries and at local plant sales run by the OPBG's growers group. A store of *A. peuce* seed, from the Andado population, is also kept at the Park though in uncontrolled conditions and as such should not be regarded as an adequate form of *ex situ* conservation.

**Biodiversity benefits.**

The Andado/MCCR population occurs within a botanically important area classified as a 'Site of Botanical Significance' (White *et al.* 2000). Other significant plants at the site include *Bergia occultipetala, Eleocharis papillosa* and *Ptilotus aristatus var. eichlerianus* (White *et al*. 2000).

*Acacia peuce* is a structural dominant of the sites where it occurs and as such adequate protection of this species including control of threatening processes will benefit a diversity of plant and animal species that occupy the same habitat. For example, *Acacia peuce* trees at MCCR and surrounding areas of Anadado Station provide nesting habitat for a range of birds especially raptors (wedge-tailed eagle, *Aquila audax*; letter-winged kite, *Elanus scriptus*; brown falcon, *Falco berigora*).

## 3*. Acacia pickardii* Tindale

(common names: Birds Nest Wattle, Pickard's Wattle)

**Description**

*Acacia pickardii* is a shrub or small tree that grows to 5m high. Spiney stipules grow on the stems at the base of the leaves. Galls commonly grow on the leaves of this species and can be confused for fruit by inexperienced observers. The flower heads are globular. The species is a member of the *Acacia victoriae* group (Maslin 1992), and is distinguished by the presence of sharp cylindrical leaves that are sharpest on younger, palatable growth. Flowering events, while uncommon, have been recorded between August and November. Fruiting is very rare (only one or two collections of pods exist) and the species is thought to reproduce mainly by root suckering.

**Distribution**

*Acacia pickardii* occurs in isolated populations on residual stony rises and hills that are scattered along the fringes of the Simpson Desert in the NT and SA (Figure 4). The NT populations are known from three distinct locations in the Simpson-Strzelecki Dunefields bioregion. Two locations are on pastoral leases; Hubbard Hill on Andado Station (adjacent to MCCR), and 10km east of the homestead on Numery Station. The other population is on the Allitra Tableland (Pmere Nyente Aboriginal Land Trust).

The Andado population contains the largest number of individuals of the three NT populations. The main stand is estimated to contain at least a few thousand plants, while the remainder of that population consists of a handful of outlying plants (Mike Heywood personal communication 2003). The Allitra Tableland population consists of about six clumps of *A. pickardii* each containing 20 or 30 plants (Connie Spencer personal communication 2003). The Numery population represents the northern- and western-most range limit for the species. It is relatively small, consisting of about 50 plants spread over an area of about 0.5km$^2$ (Peter Latz personal communication 2003).

In South Australia, the species is known from three locations (Figure 4). These locations are to the north and south of Mt Gason (in the vicinity of the Birdsville track) and an area north of Lake Etamunbanie on Pandie Pandie pastoral lease (Whibley 1980, Australia's Virtual Herbarium 2003). All locations are in the Channel Country bioregion.

The populations of *A. pickardii* in the Mt Gason region are scattered along the Birdsville Track as far as 12km north and 37km south of Mt Gason. The largest of these, which occurs on Goyder Lagoon pastoral lease, comprises about 250 plants over an area of 30ha. A nearby population of about 100 plants occurs on Kanowana Pastoral Lease. Both these sites are on Clifton Hills Station. The most southerly populations in the Mt Gason region occur on Koonanie pastoral lease (Cowarie Station). This site represents the known southern range limit for the species. A further population of about 50 plants has been recorded adjacent to an abandoned road workers camp, south of Mt Gason.

The Pandie Pandie population, which represents the known eastern range limit for the species, occurs about 150km north-east of Mt Gason (Figure 4). It extends for almost 1km on the footslopes of a low tableland and on an adjacent dune commencing about 3km north of Caves Dam on the track to Claypan Dam

(Davies 1995). Cattle tracks, dung and browsing of ground stratum were apparent within this population. Regeneration was also observed.

**Biology and Ecology**

*Acacia pickardii* typically grows on gibber-covered sandplains and stony rises and low hills, including mesas and tablelands, and adjacent flats. Typical soil types include sand over clay, loamy sands, and light clays with a rocky surface (Whibley 1980, Davies 1995, White *et al*. 2000). The species usually forms a low woodland or low open-woodland associated with an understorey dominated by either open chenopod-shrubland or open-grassland. (Whibley 1980, Davies 1995).

Foliage (especially that on young and palatable growth) of *A. pickardii* is very prickly, offering some protection from grazing/browsing (Jon Luly personal communication 2003). The canopy structure of *A. pickardii* plants provides ideal habitat for some bird species that commonly use *A. pickardii* for nesting.

Galls are common on the species and are produced by thrips that feed on foliage and cause the leaves to curl or roll and often produce a structure that looks like a fruiting pod. *Acacia pickardii* is thought to be the sole host of the thrip *Onychothrips zygus* (Mound *et al.* 1996).

Records of the species producing seed are rare. The species regenerates predominantly by root suckering, usually in response to disturbance.

**Habitat critical to the survival of the species**

As a result of the restricted distribution of the species, all areas where the species occurs are considered to represent critical habitat.

**Known and potential threatening processes**

Numerous potential threats to the species have been identified (Davies 1995, Peter Latz personal communication 2004). These threats are browsing by rabbits, bulldozing during road construction/maintenance, and disturbance by cattle.

**Areas and populations under threat**

No population is currently threatened by rabbits. However, if rabbit populations recover from RCD in the future this situation may change. The threat from road maintenance applies only to roadside stands in the Mt Gason area. The threat from cattle includes browsing and soil disturbance and has been observed at the Pandie Pandie population only.

**Existing conservation measures**

The species is not known from any conservation reserves. However, part of the population on Goyder Lagoon pastoral lease has been fenced to exclude rabbits and cattle since the early 1980s by SA National Parks and Wildlife. This area has been subject to occasional monitoring since that time (Davies 1995). PWSNT ranger staff examine the population adjacent to MCCR during regular visits (2-3 times per year) and the condition of plants is visually assessed.

***Ex situ* propagation**

The species has not been propagated at ASDP as a result of the lack of seeding events.

**Biodiversity benefits**

Both the Andado and Allitra Tableland populations occur within botanically important areas classified as ‘Sites of Botanical Significance’ (SOBS) by the NT government. The Andado SOBS site is particularly important in that it incorporates the only known NT population of *Acacia peuce* as well as other

significant plants including *Bergia occultipetala, Eleocharis papillosa* and *Ptilotus aristatus var. eichlerianus* (White *et al*. 2000).

The role that *A. pickardii* fills as the sole host of the thrip *Onychothrips zygus* (Mound *et al.* 1996) and its use as nesting sites by small passerine birds indicates the species is of importance in those ecosystems where it occurs.

## 4. *Acacia undoolyana* G.J. Leach

(common names: Undoolya Wattle)

**Description**

*Acacia undoolyana* is a small tree that generally grows to 6m high (rarely to 11m) and has rough, greyish-brown bark. The phyllodes of this species are typically sickle-shaped, silvery when fresh, have conspicuous yellowish margins and are typically 15-22cm long by 6-12mm wide. The flowers occur in dense rod-like spikes and fruiting pods grow to 5-11cm by 2-3mm wide. Flowering typically occurs between June and September and fruiting typically occurs between August and October.

**Distribution**

The species occurs as four populations within the eastern section of the MacDonnell Ranges bioregion (Figure 5). Populations occur on a conservation reserve, three pastoral leases, a tourism lease and a stock route (Table 4). The majority of the species' distribution is on Undoolya Station.

The largest population consists of multiple patches extending over an area of 17 km (east to west) by 8 km (north to south) and includes N'Dhala Gorge Nature Park and two pastoral leases (Undoolya Station and Loves Creek Station). The Vee Gorge population is at the western end of the known distribution and is relatively small in area. It occurs on Undoolya Station. This population is named after a distinctive gorge located about 3 km to the north-east of Corroboree Rock

Conservation Reserve. The Ross River Homestead population is at the eastern end of the known distribution. This population consists mainly of sparse, young trees. The entire population is located on a tourism lease. The Arumbera population occurs on ranges of Arumbera Sandstone which run along the south side of the Ross River Highway. It is located on two pastoral leases (Undoolya Station and The Gardens Station) and a stock route.

**Table 4.** Land tenure of the four populations of *Acacia undoolyana* (based on Duguid and Schunke 1998).

| Tenure type | Population (area in ha) | | | | Area (ha) |
|---|---|---|---|---|---|
| | N'dhala | Vee Gorge | Ross River Homestead | Arumbera | |
| Conservation reserve | 195 | | | | 195 |
| Pastoral lease | 1046 | 50 | | 69 | 1165 |
| Pastoral lease (land claim)* | 113 | | | | 113 |
| Tourism lease | | | 37 | | 37 |
| Stock route (crown land) | | | | 37 | 37 |
| Total area (ha) | 1354 | 50 | 37 | 106 | 1547 |

* Pastoral lease is under claim under the Commonwealth Aboriginal Land rights Act.

**Biology and Ecology**

*Acacia undoolyana* is relatively slow growing and long lived, in the context of central Australian Acacias, being thought to reach ages exceeding 100 years. In the wild, the species is assumed to be slow to reach reproductive maturity (at least 10 years), and produces seed only in years of favourable rainfall. By contrast, when grown under irrigation in cultivation, *A. undoolyana* can reach reproductive maturity in a few years and may seed in most years.

The species is restricted to sandstone and quartzite hills, occurring mostly on steep, rocky south facing slopes and gullies with skeletal soils. It occasionally grows on the plateaux and crests of north facing slopes. *Acacia undoolyana* is capable of resprouting from the base and from underground stems following wildfires and other forms of disturbance; however, the species is currently classified as fire sensitive given its likely inability to survive repeated intense wildfires.

*Acacia undoolyana* is the dominant species in some vegetation associations where it forms an open shrubland or woodland (Pitts *et al.* 1995). In other areas it is present as sparsely scattered juveniles in vegetation dominated by *Triodia* species (spinifex). *Acacia undoolyana* is also found as isolated trees and small patches in mulga (*Acacia aneura*) shrubland.

**Habitat critical to the survival of the species**

Pitts *et al.* (1995) mapped known and potential habitat of this species. Potential habitat was determined by mapping all areas within the study area that contained the ecological characteristics of existing *A. undoolyana* habitats. This resulted in an additional 19km$^2$ being determined as suitable habitat.

The Vee Gorge and sections of the N'Dhala populations are considered to be of highest conservation importance as a result of the maturity of trees present there. Therefore, the locations of both populations should be considered as habitat critical for the survival of the species.

**Known and potential threatening processes**

*Wildfire*

Unfavourable fire regimes may represent a threat to the persistence of *A. undoolyana*. The species is known to regenerate from seed following fires in mature stands, though frequent hot fires can potentially progressively remove the species from an area when juveniles are killed before reaching reproductive

maturity (Latz *et al.* 1989). Spinifex hummock grasses (*Triodia* spp.) are the major source of fuel, in and adjacent to most stands of *A. undoolyana*. Mapping by Pitts *et al.* (1995) found that spinifex occurred in 93% of survey sites containing *A. undoolyana*. This mapping also showed that the great majority of potential habitat for the species contains spinifex.

*Weeds*

Weeds are a threat to populations of *A. undoolyana* as a result of changes in fire regimes (intensity, frequency, timing) caused by weed invasion. Buffel grass is the main weed species in the area, occurring profusely in the major river valleys within the geographic range of *A. undoolyana*. Buffel grass also occurs in abundance in some of the minor creeks and valley floors at the foot of hill ranges, sometimes in association with *A. undoolyana*. Couch grass (*Cynodon dactylon*) also occurs in major drainage lines and in some areas prone to inundation. The species contributes to increased fuel loads, but to a lesser extent than buffel grass.

**Areas and populations under threat**

All populations of *A. undoolyana* are likely to be affected by an increased frequency of wildfire in the long term and, therefore, are considered under threat.

**Existing conservation measures**

*Acacia undoolyana* occurs in a conservation reserve, N'Dhala Gorge Nature Park.

***Ex situ* propagation**

The species has been successfully propagated and grown at the ASDP, OPBG and Frances Smith Memorial Park (Alice Springs) and has also been sold-on to retail nurseries and at OPBG plant sales. No substantial seed store currently exists for this species.

**Biodiversity benefits**

*Acacia undoolyana* is the dominant species in some vegetation associations where it occurs and as such its adequate protection, including control of threatening processes, will benefit a diversity of plant and animal species. In particular, implementation of effective fire management within the range of *A. undoolyana* will have benefits for a wide diversity of fire sensitive species including *Ricinocarpos gloria-medii*.

## 5. *Ricinocarpos gloria-medii* J.H. Willis

(common names: Glory of the Centre)

**Description**

*Ricinocarpos gloria-medii* is a shrub that grows to 2m high and is erect or spreading in form. The leaves are narrow with a covering of stellate (star-shaped) hairs. The leaf margins are strongly revolute. Flowers are white or cream. The capsule is white-tomentose with star shaped hairs. Flowering has been recorded from May to October. Fruiting occurs from July to October.

**Distribution**

*Ricinocarpos gloria-medii* is endemic to the MacDonnell Ranges bioregion of the NT. This species is known from five separate populations, three of which are within conservation reserves (Figure 6). The species distribution is predominantly in the East MacDonnell Ranges (including Trephina Gorge Nature Park and N'Dhala Gorge Nature Park). However, there is one population in the West MacDonnell Ranges NP in the Simpson's Gap area. The five populations have been mapped by Soos *et al*. (1987) and Pitts *et al*. (1995) who estimated the total area occupied by this species to be less than 400ha. The latitudinal range is 20km and the longitudinal range is 81km.

**Biology and Ecology**

*Ricinocarpos gloria-medii* occurs on quartzite or sandstone hills; in deep gullies and well-shaded areas on south facing slopes. The slopes are generally very steep, sometimes up to 60 degrees. Sites often contain a large amount of rock outcropping, which likely provides protection from fire. Another important habitat characteristic appears to be the ability of an area to collect additional water (Soos *et al*., 1987). *Ricinocarpos gloria-medii* is sometimes associated with *A. undoolyana*.

**Habitat critical to the survival of the species**

All locations where *R. gloria-medii* is found are considered to support habitat critical to its survival.

**Known and potential threatening processes**

No known threatening processes have been identified for this species. Fire may be a threatening process; however, no detailed information is available on its fire ecology and the species occupies fire protected environments.

**Areas and populations under threat**

Given that no potential or actual threatening processes have been positively identified, it is not possible to list areas or populations under threat.

**Existing conservation measures**

The species is known from three conservation reserves in the MacDonnell Ranges: N'Dhala Gorge Nature Park, Trephina Gorge Nature Park and West MacDonnell NP.

***Ex situ* propagation**

The species has been successfully propagated and grown at the ASDP and has also been sold-on to retail nurseries (Tim Collins personal communication 2003). However, further sale of seed of this species to retail nurseries is considered

undesirable because of the risk of mixing genetic material from the disjunct populations in the vicinity of Alice Springs. No substantial seed store currently exists for this species.

## Recovery Objectives and Criteria

***Overall objective***

To improve (or at least maintain) the current conservation status of all species covered in this plan (currently all species are listed as vulnerable).

***Specific objectives***

- Fill gaps in knowledge of distribution.
- Maintain or increase habitat quality and extent.
- Understand critical ecological attributes including fire response, life history characteristics, and reproductive and seed biology
- Implement *ex-situ* conservation measures that ensure representative sampling of each species' genetic diversity.
- Gather information on intraspecific genetic variation for species with widely spaced populations.
- Incorporate traditional ecological knowledge and management practice into recovery planning.
- Inform and involve the community and all stakeholders in the recovery process.

**Table 5. Relationships between specific objectives, recovery criteria, and actions.**

| Specific objectives | | Recovery criteria | | Actions |
|---|---|---|---|---|
| Fill gaps in knowledge of distribution. | ⇔ | The distribution limits and number of populations of all species is understood. | ⇔ | 1. Carry out targeted surveys for additional populations of *Acacia latzii* and *Acacia pickardii* in the NT and SA. |
| Maintain or increase habitat quality and extent of occurrence. . | ⇔ | Habitat quality and extent is maintained or increased. | ⇔ | 2. Establish formal protection for significant populations of *Acacia pickardii* and *Acacia latzii* and a Queensland population of *Acacia peuce*.<br>3. Carry out population and habitat monitoring at selected sites.<br>4. Implement management strategies for key threatening processes as required. |
| Understand critical ecological attributes including the fire response, life history characteristics, and reproductive and seed biology | ⇔ | Adequate knowledge of the influence of fire and other ecological processes on the persistence of each species is available. | ⇔ | 5. Undertake ecological research on fire ecology, reproductive biology, seed dormancy and germination cues, and soil seedbank dynamics. |
| Implement *ex-situ* conservation | ⇔ | Seeds from populations of | ⇔ | 6. Collect and store seeds from all populations in |

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| | | | | |
|---|---|---|---|---|
| measures that ensure representative sampling of each species' genetic diversity. | | each species are held *ex-situ*. | | recognised seed-banks. |
| Define management units for species with widely spaced populations. | ⇔ | The genetic structure of populations of species with widespread ranges is understood. | ⇔ | 7. Assess genetic population structure of *Acacia latzii, A. peuce, and A. pickardii*. |
| Incorporate traditional ecological knowledge and management practice into recovery planning | ⇔ | Indigenous knowledge relating to phenology, threatening processes, and medicinal and nutritional plant use is properly incorporated into recovery programs. | ⇔ | 8. Engage indigenous ecologists to provide input into the recovery process. |
| Inform and involve the community and all stakeholders in the recovery process. | ⇔ | Community and stakeholder based networks are maintained and enhanced. | ⇔ | 9. Carry out community education and ensure all stakeholders are informed of progress with recovery efforts. |

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## Recovery Actions

**Action 1. Carry out targeted surveys for additional populations of *Acacia latzii* and *Acacia pickardii* in the NT and SA.**

**Aim**

To search for additional populations of the two species, *A. latzii* and *A. pickardii*, the distribution of which has not been adequately sampled.

**Justification**

The distribution of *A. peuce*, *A. undoolyana*, and *R. gloria-medii* is relatively well known. In particular, detailed mapping has been carried out for the former two species. *Acacia peuce* is a tall, distinctive tree and additional significant populations are unlikely to be located with further survey. In contrast, recent flora surveys of the Finke bioregion revealed further outlying stands of *A. latzii* in both the Beddome and Bacon Ranges raising the possibility of still further populations. New populations of *A. pickardii* may also be located with further survey effort.

**Methods**

Additional surveys for *A. latzii* and *A. pickardii* will be carried out by experienced staff in the Finke and Simpson Strezlecki dunefields bioregions of NT and SA. Use of a helicopter may be required to access sites in the Beddome and Bacon Ranges.

**Stakeholders**

DIPE, DEHSA

**Costs ($1000s)**

One 7-10 day survey in each of NT and SA in year 2, and one 7-10 day survey in NT in year 3. Including these targeted surveys within more general botanical collection trips can reduce costs.

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| | 30.0 | 15.0 | | | 45.0 |

**Action 2. Establish formal protection for significant populations of *Acacia pickardii* and *Acacia latzii* and a Queensland population of *Acacia peuce*.**

**Aim**

To ensure that significant populations of *A. latzii* and *A. pickardii*, and one of the two QLD populations of *A. peuce* are adequately protected.

**Justification**

Not all of the species covered in this plan are protected either within the existing reserve system or as part of off-park conservation agreements. Although *A. undoolyana*, *Ricinocarpos gloria-medii*, and the NT population of *A. peuce* have significant proportions of some populations within the reserve system, this is not the case for the other two species and *A. peuce* in QLD. Adequate protection of populations of these species is essential for effective conservation management.

**Methods**

Avenues for effective protection of populations of *A. peuce* (QLD), *A. latzii* and *A. pickardii* should be pursued by government conservation agencies in the NT, SA and QLD. Inclusion of populations within either the formal reserve system or as part of off-park conservation agreements should be investigated. In the NT, provision exists for the NT government, after consultation with the relevant landowner, to declare areas of essential habitat under section 37 of the *Territory Parks and Wildlife Conservation Act 2000*. Section 73 of the Act allows the NT government to assist, co-operate in or enter into agreements relating to the management of Aboriginal land for wildlife conservation.

**Stakeholders**

DIPE, DEHSA, EPA, landowners, traditional custodians

**Costs ($1000s)**

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 25.0 |

**Action 3. Carry out population and habitat monitoring at selected sites.**

**Aim**

To ensure that significant populations of each species are monitored to detect any declines in population size, extent or condition. Assessment of grazing impacts will be included in the monitoring program for the three species negatively impacted by grazing/browsing (*A, latzii*, *A. peuce*, *A. pickardii*).

**Justification**

Although the threats faced by the five species covered in this plan are comparatively minor at this stage, a combination of small population size and disjunct distribution places each species at risk from stochastic processes. An effective long-term monitoring program is needed to ensure that declines in selected populations do not occur. Monitoring will enable an assessment of:

- trends in population size, extent, condition and dynamics in the presence and absence of grazing by herbivores;
- fire responses;
- recruitment success; and
- occurrence and persistence of other threatening processes.

**Methods**

The monitoring program will include existing monitoring sites, namely:

- *A. latzii* on Henbury pastoral lease, NT;

- *A. peuce* at the MCCR, NT;
- *A. pickardii* on Goyder Lagoon pastoral lease, SA;
- *A. undoolyana* at N'Dhala Gorge Nature Park, NT.

Additional monitoring should include the following species/sites:

- *A. latzii* in the Beddome Range, NT/SA;
- *A. peuce* at Boulia, QLD;
- *A. pickardii* on Andado Station, NT;
- *A. undoolyana* at an off-reserve site.

At this stage there is no immediate need for monitoring of *R. gloria-medii*. Although additional information on the population dynamics of the species is desirable, the absence of clearly identified threats means that monitoring is not a high priority especially given the limited resources available.

Monitoring will involve the establishment of replicate permanent sampling plots within each population. At populations with grazing impacts, 50% of plots should be fenced to exclude grazing pressure. Each plot should include up to 50 quadrats. All individuals of the species within the quadrats will be tagged, accurately mapped, and appropriate morphological measurements taken. Monitoring will be carried out on an annual basis and after all significant rainfall events. Monitoring will involve re-measuring each plant and assessing condition and reproductive state.

**Stakeholders**

DIPE, DEHSA, EPA, ASP, TSN, CLMA

**Costs ($1000s)**

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 175.0 |

**Action 4. Implement management strategies for key threatening processes as required.**

**Aim**

To manage populations of each species using an adaptive management approach that enables a response to threats as each is identified.

**Justification**

Effective management of the five species covered in this plan requires a more sound understanding of the ecology and threats faced by each species. Action 5 (below) has been developed to provide this information. Until this information is available, it is important to carry out adequate monitoring and to develop the capacity to respond to changes in existing conditions. For example, an increase in rabbit numbers may impact populations of both *A. latzii* and *A. pickardii*.

**Methods**

Management strategies will be developed and implemented following the outcomes of action 5. In particular, an understanding of the role of fire in the reproductive ecology of these species is essential before adequate fire management strategies can be developed and implemented.

**Stakeholders**

DIPE, DEHSA, EPA, CLMA, landowners

**Costs ($1000s)**

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| | | 75.0 | 75.0 | 75.0 | 225.0 |

**Action 5. Undertake ecological research on fire ecology, reproductive biology, seed dormancy and germination cues and soil seedbank dynamics.**

**Aim**

To progress understanding of the fire ecology, reproductive and seed biology, and soil seedbank dynamics of each of the species included in this report.

**Justification**

As stated above, detailed ecological research is a prerequisite for the proper management of each of these vulnerable species. The research program detailed below is designed to assist the formulation of species management strategies especially in relation to fire use and the amelioration of threatening processes such as weed invasion. Four main avenues of research are suggested and detailed below.

*Fire response studies*. Currently it is assumed that *A. latzii*, *A. peuce*, and *A. pickardii* are incapable of regeneration from protected buds following wildfire events and that post fire regeneration is consequently primarily dependent on recruitment from soil-stored seed. No attempts have been made however, to properly quantify the resprouting ability or the post-fire recruitment success of any of the species in spite of the relevance of this information to the development of fire management strategies. Research should therefore focus on understanding the influence of fire on the persistence of each of the five species in its current habitat.

*Reproductive ecology*. Some information is available on the flowering and seeding phenology of each species; however, more work is required such that adequate predictions can be made on the constraints on reproduction in the context of current and future threatening processes such as weed invasion, increased firing and climate change. An understanding of the vectors involved in

pollination and seed dispersal is important for the proper management of these species.

*Seed dormancy, germination and seedling establishment requirements*. Given that populations of each of the species included in this plan may require some form of active management, it is important that dormancy breaking requirements of soil-stored seed, especially in relation to fire, critical climatic factors, and resource availability, be properly understood. So that this goal may be achieved, research carried out as part of this recovery program should seek to identify cues and thresholds for seed dormancy and germination and the requirements for seedling establishment in each of these species.

*Seedbank studies*. While it is assumed that each of these five threatened species would have some form of a persistent soil seedbank, very little is currently known regarding the nature and dynamics of these *in situ* seed stores. Such information (especially as it relates to variation in seedbank longevity) is considered of vital importance for the management of fire sensitive species and of species confined to habitats worst affected by highly suppressive environmental weeds such as buffel grass.

**Methods**

Much of the research outlined above will be carried out as part of collaborative seed science studies in the NT between DIPE and the Royal Botanic Gardens (Kew) as part of the MSBP. This will involve both lab-based and on site experimental work in the investigation of aspects of the reproductive and seed biology of each of these species. Information relating to the fire response of each species would need to be obtained through a monitoring program involving opportunistic recordings of responses to uncontrolled wildfire events. This is because experimental burning would itself pose too much of a risk given the small size of each population.

**Stakeholders**

MSBP, DIPE, DEHSA, EPA

**Costs ($1000s)**

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| 55.0 | 55.0 | 55.0 | 55.0 | | 220.0 |

**Action 6. Collect and store seeds from all populations in recognised seed-banks.**

**Aim**

The *ex-situ* conservation of seeds such that a source of material for re-introduction or supplementation of wild populations is available should their conservation status decline in the future.

**Justification**

All of the five species covered in this plan are at risk of extinction from stochastic processes as a consequence of small population size. The potential impacts of small population size include a decline in seed production and an increased impact of seed predation on reproductive success. This risk is an inherent function of small population size irrespective of management actions carried out in the field. Therefore, it is imperative to have a source of genetic material in the form of a seed bank to be held in appropriate conditions for long term use. The seed bank may be needed in future for re-introduction or population enhancement.

**Methods**

The MSBP is an international collaborative plant conservation initiative staffed by the Seed Conservation Department of the Royal Botanic Gardens, England. A

major goal of the MSBP is the development of an effective *ex situ* conservation program for arid land plant diversity. Collaborative seed storage programs involving the Royal Botanic Gardens and each of the governments of the NT, SA, and QLD have been established. This process provides a great opportunity to establish a verified and well-documented seed collection of each of the species included in this plan as an insurance against extinction in the wild.

**Stakeholders**

MSSP, DIPE, EPA, DEHSA

Costs ($1000s)

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 25.0 |

**Action 7. Assess genetic population structure of *Acacia latzii, A. peuce, and A. pickardii*.**

**Aim**

To understand the degree of population-level genetic variation in species with populations that are widely spaced and that have been separated for long time periods.

**Justification**

Molecular analysis of population structure in *A. latzii, A. peuce,* and *A. pickardii* is necessary to understand whether populations within species should be treated as separated management units. Evidence of significant population differentiation will have important ramifications for the management of the species concerned.

**Methods**

Samples of individuals from each population of the three species will be collected in the field. Molecular analysis will be carried out in the laboratory.

**Stakeholders**

James Cook University, DIPE, DEHSA, EPA

Costs ($1000s)

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| | 20.0 | 20.0 | | | 40.0 |

**Action 8. Engage indigenous ecologists to provide input into the recovery process.**

**Aim**

To incorporate current indigenous knowledge into recovery actions for each species.

**Justification**

The recent shift towards the joint management of conservation lands in the NT opens up unprecedented opportunities for indigenous involvement in the creation and implementation of species recovery plans. A strong plant ecology knowledge-base still exists within the indigenous communities situated throughout arid NT, providing the opportunity to incorporate indigenous knowledge into recovery planning especially in relation to phenology, threatening processes, and medicinal and nutritional plant use.

**Methods**

Indigenous knowledge relating to phenology, threatening processes, and medicinal and nutritional plant use will be obtained where possible, and through proper channels of negotiation, will be incorporated into the recovery planning

process and, where appropriate, be made accessible to indigenous communities and the wider public.

**Stakeholders**

DIPE, CLC, Aboriginal communities.

Costs ($1000s)

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| 22.0 | 11.5 | 12.0 | - | - | 45.5 |

**Action 9. Carry out community education and ensure all stakeholders are informed of progress with recovery efforts.**

**Aim**

To improve the profile of all species within the community and to ensure that the community and all stakeholders are kept to up to date of recovery implementation and the results of ongoing research and monitoring.

**Justification**

Improved communication among stakeholders and promotion of these species within the general community is needed for several reasons. First, all species covered in this recovery plan have a relatively low public profile and generally occur in remote areas spread across three states/territories. In addition, populations occur on land with a range of tenures, but particularly pastoral lease. Therefore, there is a clear need to keep stakeholders informed of developments and to improve the public profile of each species.

**Methods**

This action will build on the considerable existing efforts of several NGOs, especially APS, TSN and OPBG. Information on the five species covered in this plan will continue to be provided to the community via media releases and preparing material for various newsletters and newsgroups. Information on research and management projects will be disseminated to stakeholders, and members of the APS and other NGOs will be included in activities as much as possible.

**Responsibilities**

TSN, DIPE, ASDP, OPBG, APS

Costs ($1000s)

| Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | Total |
|---|---|---|---|---|---|
| 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 5.0 |

# References


Australia's Virtual Herbarium. (2003). http://www.chah.gov.au/avh/

Bowland, A.E. (2003). Some aspects of Waddy Wood *Acacia peuce* (F. Muell.) ecology on the northwest fringe of the Simpson Desert, Australia. Unpublished manuscript.

Bowland, A.E. and Heywood, M. (2002). The impact of cattle activity on the Northern Territory *Acacia peuce* Waddy Wood population. Department of Infrastructure, Planning and Environment, Northern Territory Government. Unpublished report.

Bowland, A.E. and Clifford, B. (2002). Fragmentation of the Northern Territory *Acacia peuce* population and associated cattle watering points. Department of Infrastructure, Planning and Environment, Northern Territory Government. Unpublished report.

Bowman, D.M.J.S., Latz, P.K. and Panton, W.J. (1994). Pattern and change in an *Acacia aneura* shrubland and *Triodia* hummock grassland mosaic on rolling hills in central Australia. *Australian Journal of Botany*, **43:** 25–37.

Buist, M. L., Coates, D.J. and Yates, C.J. (2002). Rarity and threat in relation to the conservation of *Acacia* in Western Australia. *Conservation Science Western Australia*, **4:** 36-53.

Butler, D. W. and Fairfax, R. J. (2003). Buffel grass and fire in Gidgee and Brigalow woodland; a case study from central Queensland. *Ecological Management and Restoration* **4**: 120-125.

Chuk, M. (1982). The status and ecology of *Acacia peuce* in the Northern Territory Tech. Rpt. CCNT Vol. No. 2. Conservation Commission of the Northern Territory, Alice Springs.

Clarke, P.J., Latz, P.K. and Albrecht, D.E. (2005). Long-term changes in semi-arid vegetation: Invasion of an exotic perennial grass has larger effects than rainfall variability. *Journal of Vegetation Science* **16**: 237-248.

Davies, R. (1995). Threatened plant species management in the arid pastoral zone of South Australia. Department of Environment and Natural Resources, South Australian Government.

Deveson, E. (1980). An inventory of *Acacia peuce* (F.Meull) stands in Central Australia: Biogeography and ecology. M.Sc. Thesis. Australian National University.

Duguid, A. and Schunke, D. (1998). Final report on project no. 290 *Acacia undoolyana* (Undoolya Wattle) species recovery plan. A report to the Endangered Species program, Environment Australia.

Franks, A. J. (2002). The ecological consequences of buffel grass *Cenchrus ciliaris* establishment within remnant vegetation of Queensland. *Pacific Conservation Biology* **8**: 99-107.

Griffin, G. F. and Friedel, M. H. (1984). Effects of fire on central Australian rangelands. II. Changes in tree and shrub populations. *Australian Journal of Ecology* **9**: 395-403.

Latz, P. (1995). Bushfires and Bushtucker: Aboriginal Plant Use in Central Australia. IAD Press, Alice Springs, Northern Territory.

Latz, P.K., Kube, P.D. and Soos, A. (1989). Habitat, ecology and conservation of *Acacia undoolyana*. Technical Memorandum 89/1. Conservation Commission of the Northern Territory, Alice Springs.

Maslin, B.R. (1992). Acacia Miscellany 6. Review of *Acacia victoriae* and

related species (Leguminosae: Mimosoideae: Section *Phyllodineae*). *Nuytsia* **8 (2)**: 285-309

Mound, L.A., Crespi, B.J. and Kranz, B. (1996). Gall-inducing Thysanoptera (Phlaeothripidae) on Acacia Phyllodes in Australia: Host-plant relations and Keys to Genera and Species. Invertebrate Taxonomy, **10**: 1171-98.

Neave, H., Nano, C., Pavey, C., Moyses, M., Clifford, B., Cole, J., Harris, M. and Albrecht, D. (2004). A resource assessment towards a conservation strategy for the Finke Bioregion, NT. Department of Infrastructure, Planning and Environment, Northern Territory Government. Unpublished report.

Pitts, B., Schunke, D., and Parsons, D. (1995). Species recovery plan for *Acacia undoolyana* - recovery action 2.4: GIS analysis. Parks and Wildlife Commission of the Northern Territory

Soos, A., Latz, P. and Kube, P. (1987). Occurrence of two rare plant populations in the Eastern Macdonnell Ranges, technical memorandum no. 87/11. Parks and Wildlife Commission of the Northern Territory

Threatened Species Network. (2001). Latz's wattle seedlings found. *The Web* **May**: 5.

Vesk, P.A. and Westoby, M. (2001). Predicting plant species' responses to grazing. *Journal of Applied Ecology*, **38:** 897–909.

Whibley, D.J. (1980). Acacias of South Australia. Woolman, D.J. South Australia.

White,M., Albrecht,D., Duguid,A., Latz,P., and Hamilton,M. (2000). Plant species and sites of botanical significance in the southern bioregions of the Northern Territory; volume 1: significant vascular plants. A report to the Australian Heritage Commission from the Arid Lands Environment Centre. Alice Springs, Northern Territory of Australia.

Whitford, W.G. (2002). Ecology of desert systems. Academic Press. San Diego, California.

# Figures

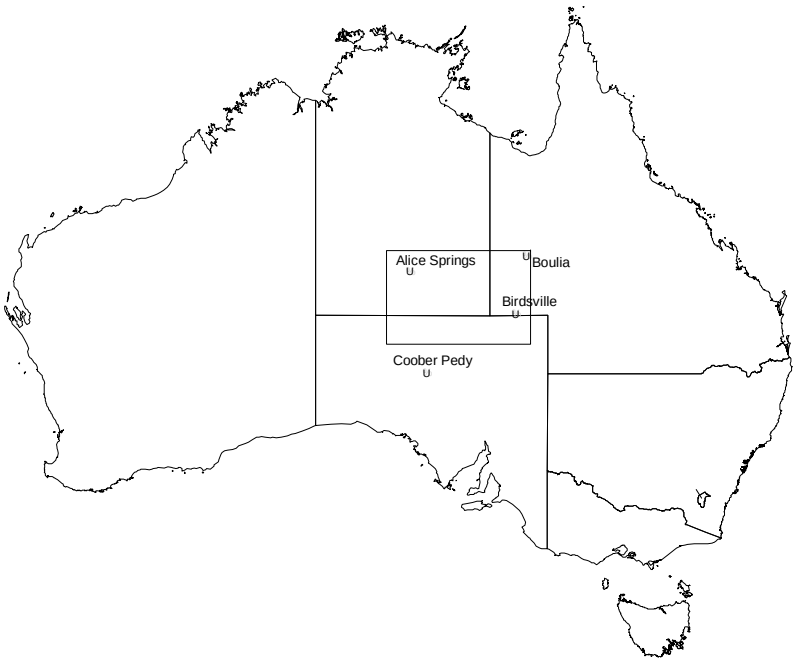



**Figure 1.** Map of Australia showing the region in central Australia (boxed) where the five species covered in the recovery plan occur.

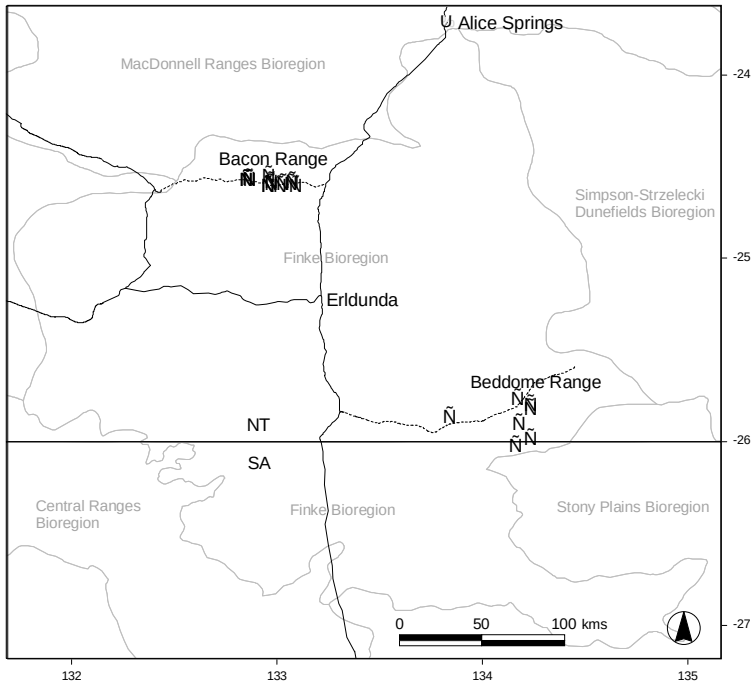
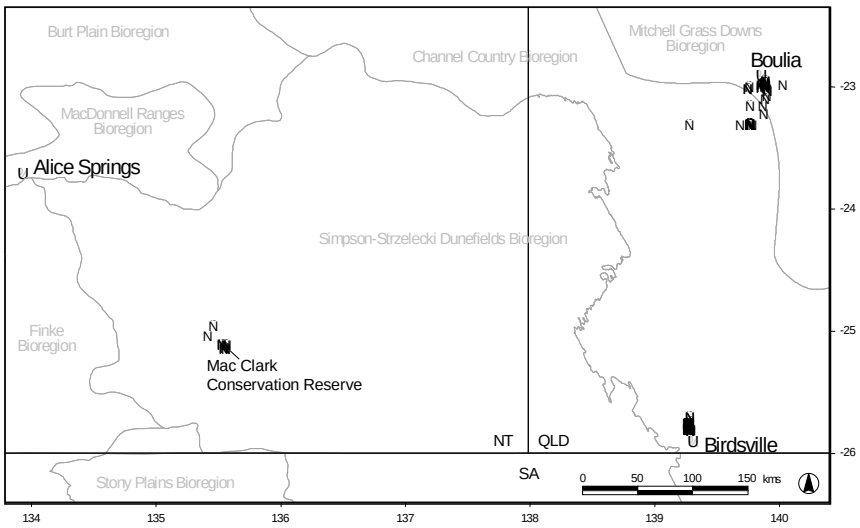



**Figure 2.** Distribution of *Acacia latzii*.



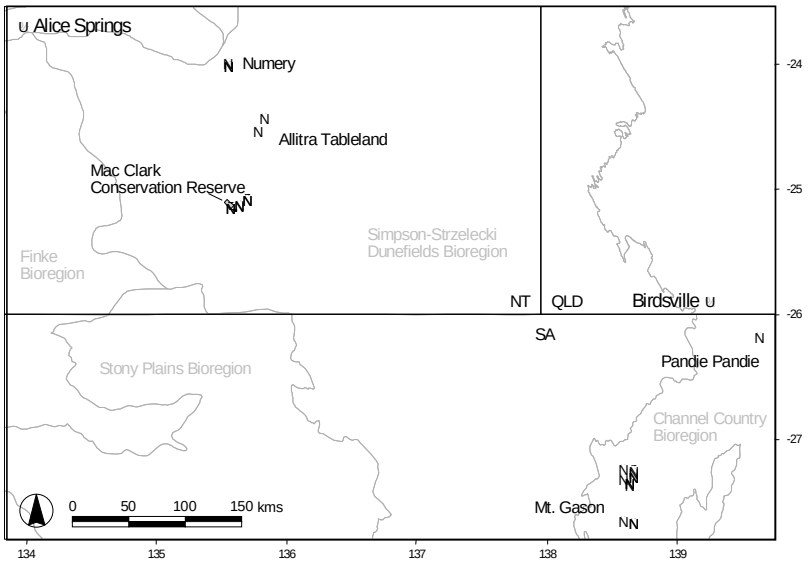
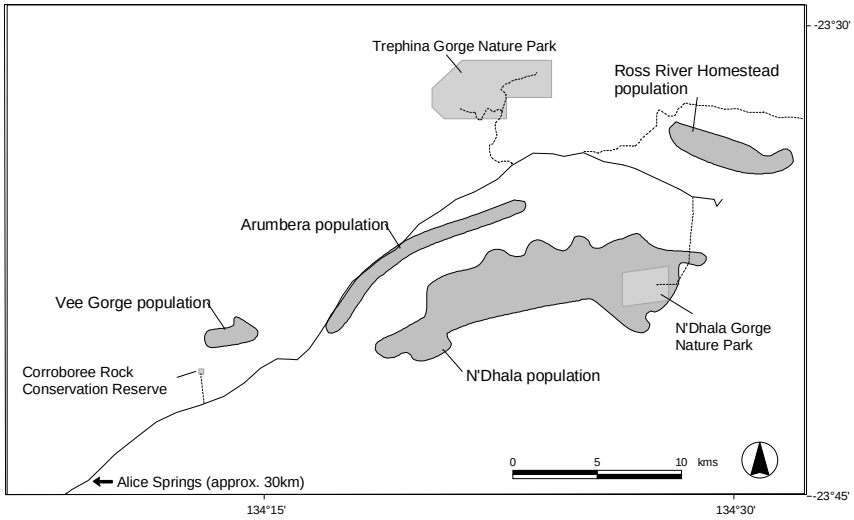




**Figure 3.** [top] Distribution of *Acacia peuce*.

**Figure 4.** [bottom] Distribution of *Acacia pickardii*.



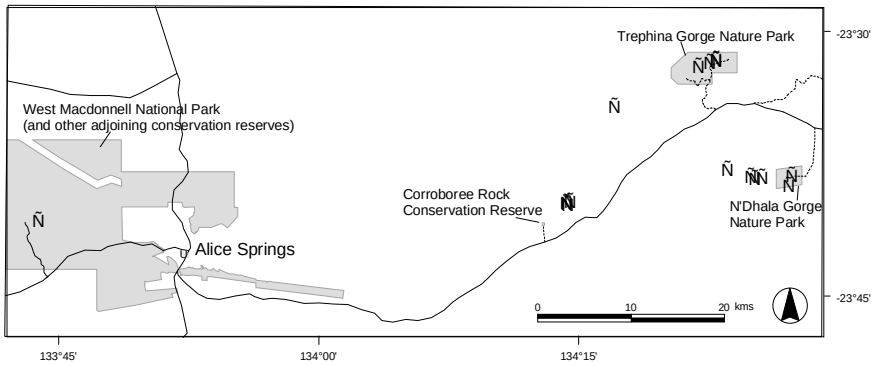




**Figure 5.** [top] Distribution of *Acacia undoolyana* (based on Duguid and Schunke 1998). The map outlines the extent of occurrence of the four populations. Each population occupies a smaller area within these boundaries. Refer to Table 4 (page 33) for details on area of occupancy.

**Figure 6.** [bottom] Distribution of *Ricinocarpos gloria-medii*.