



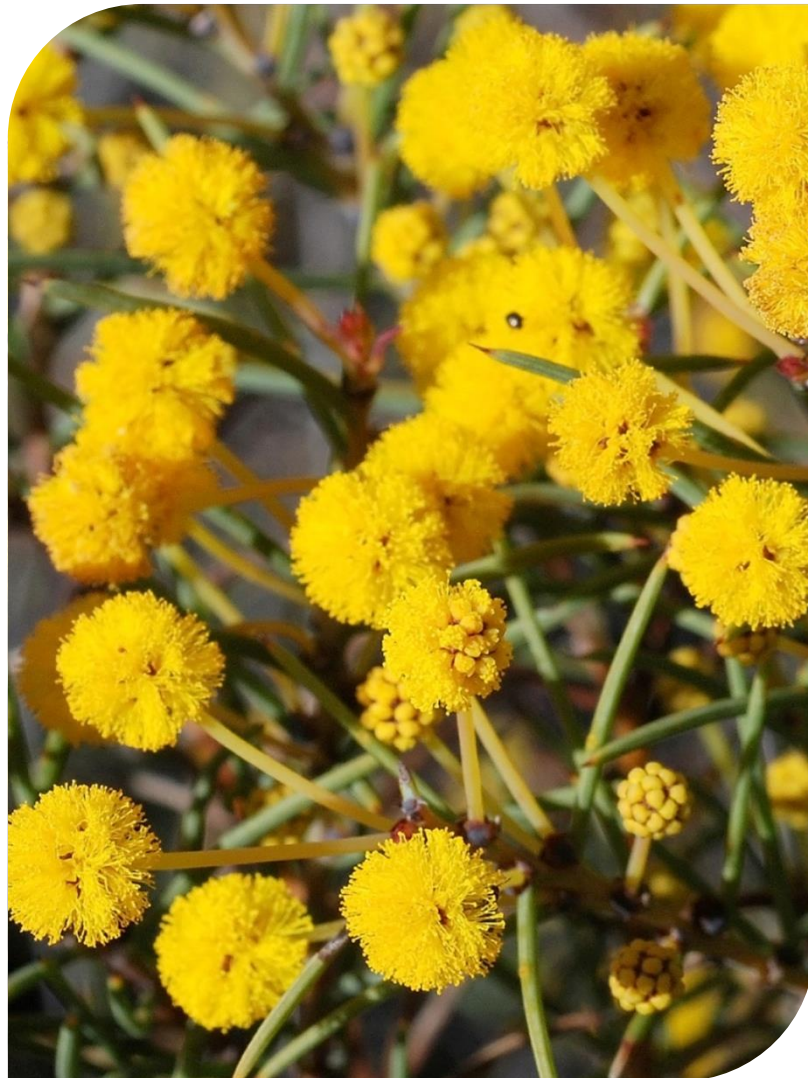
Department of
Parks and Wildlife



Interim Recovery Plan No. 357

Acacia chapmanii subsp. *australis*

Interim Recovery Plan
2015–2020



Department of Parks and Wildlife, Western Australia

November 2015

List of Acronyms

The following acronyms are used in this plan:

BGPA	Botanic Gardens and Parks Authority
CALM	Department of Conservation and Land Management
CCWA	Conservation Commission of Western Australia
CFF	Conservation of Flora and Fauna
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
CWDTFRT	Central Wheatbelt District Threatened Flora Recovery Team
DEC	Department of Environment and Conservation
DAA	Department of Aboriginal Affairs
DPaW	Department of Parks and Wildlife (also shown as Parks and Wildlife)
DRF	Declared Rare Flora (also shown as Threatened flora)
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
NRM	Natural Resource Management
PEC	Priority Ecological Community
PICA	Public Information and Corporate Affairs
PTA	Public Transport Authority
RP	Recovery Plan
SCB	Species and Communities Branch
SRTFCRT	Swan Region Threatened Flora and Communities Recovery Team
SWALSC	South West Aboriginal Land and Sea Council
TEC	Threatened Ecological Community
TFSC	Threatened Flora Seed Centre
UNEP-WCMC	United Nations Environment Program World Conservation Monitoring Centre
WA	Western Australia

Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in the Department of Parks and Wildlife (Parks and Wildlife) Policy Statement No. 35 and Corporate Guideline No. 36 (DPaW 2015). Plans outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened flora or ecological communities and begin the recovery process.

Parks and Wildlife is committed to ensuring that threatened flora (also known as Declared Rare Flora (DRF)) are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) flora within one year of endorsement of that rank by the Minister.

This plan will operate from October 2015 to September 2020 but will remain in force until withdrawn or replaced. It is intended that, if *Acacia chapmanii* subsp. *australis* is still ranked as Endangered (EN) in WA, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 21 September 2015 and was approved by the Director of Science and Conservation on 6 November 2015. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at November 2015.

Plan preparation: This plan was prepared by:

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Acknowledgments: The following people provided assistance and advice in the preparation of this plan:

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Fred and Jean Hort	Western Australian Herbarium Volunteer Research Associates (Threatened and Priority flora)
Robert Huston	District Nature Conservation Coordinator, Parks and Wildlife Perth Hills District
Natasha Moore	Flora and Fauna Conservation Officer, Parks and Wildlife Central Wheatbelt District
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Thanks also to the staff of the Western Australian Herbarium for providing access to Herbarium databases and specimen information, and other departmental staff for assistance in developing this plan.

Cover photograph by Fred and Jean Hort.

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Summary

Scientific name:	<i>Acacia chapmanii</i> subsp. <i>australis</i>	Common name:	NA
Family:	Fabaceae	Flowering period:	July–September
DPaW regions:	Wheatbelt, Swan	DPaW districts:	Central Wheatbelt, Perth Hills
Shires:	Toodyay, Victoria Plains	NRM regions:	Wheatbelt NRM, Northern Agricultural Catchment Council
IBRA regions:	Avon Wheatbelt, Jarrah Forest	Recovery teams:	CWDTFRT, SRTFCRT
IBRA subregions:	Katanning (AVW02), Northern Jarrah Forest (JAF01)		

Distribution and habitat: *Acacia chapmanii* subsp. *australis* has an extent of occurrence of 17km² and an area of occupancy of 0.045km² in the Wyening and Bolgart areas, growing in brown, grey or yellow sand or sandy gravel in woodlands and shrublands with *Corymbia calophylla*, *Eucalyptus wandoo*, *Xanthorrhoea preissii*, *Banksia armata*, *Leptospermum erubescens* and *Santalum acuminatum* (Collins 2009).

Habitat critical to the survival of the subspecies, and important populations: It is considered that all known habitat for wild populations is critical to the survival of *Acacia chapmanii* subsp. *australis* and that all wild populations are important populations. Habitat critical to the survival of *A. chapmanii* subsp. *australis* includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Conservation status: *Acacia chapmanii* subsp. *australis* is specially protected under the Western Australian *Wildlife Conservation Act 1950* and is ranked as Endangered (EN) in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(v)+2ab(v); C1 due to an extent of occurrence of less than 5,000km²; severely fragmented populations; no more than five locations; a continuing decline in number of mature individuals; area of occupancy less than 500km²; population number estimated to be less than 2,500 mature individuals; and an estimated continuing decline of at least 20% within three years or one generation. *Acacia chapmanii* subsp. *australis* is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as EN.

Threats: Threats to *Acacia chapmanii* subsp. *australis* include road, track and railway maintenance, weeds, hydrological changes, altered fire regimes, grazing, gravel extraction and disease.

Existing recovery actions: The following recovery actions have been or are currently being implemented and have been considered in the preparation of this plan:

1. Land owners have been made aware of *Acacia chapmanii* subsp. *australis* and its locations and their legal obligations in regards to its protection.
2. There has been extensive survey for the subspecies over the last 20 years.
3. Declared Rare Flora (DRF) markers have been installed at Populations 1, 2 and 3 and Subpopulations 4a, 4d and 4e.
4. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to relevant Shires and other organisations.
5. An adaptive management plan which enables management intervention using scientific principles based on the best available knowledge has been developed for the subspecies (Huston 2009). Post-fire regeneration burns were undertaken for *Acacia chapmanii* subsp. *australis* in 2004, 2005 and 2014. Post-fire germination of augmented seeds in Subpopulation 1a was 14.3%, following the 2004 burn compared to post-fire germination in unburnt (control) quadrats of 0.7%. Similar results followed the 2005 burn. Data has yet to be assessed for the 2014 burn (Swinburn and Huston 2014).
6. Parks and Wildlife undertook post-fire monitoring at Subpopulations 1a and 1b in August and September 2012.

7. 23,345 seeds collected from *Acacia chapmanii* subsp. *australis* are stored in Parks and Wildlife's Threatened Flora Seed Centre (TFSC) at -18°C .
8. The Botanic Gardens and Parks Authority (BGPA) have 14 plants of the subspecies in their nursery.

Plan objective: The objective of this plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term conservation of the subspecies in the wild.

Recovery criteria

Criteria for recovery success: The plan will be deemed a success if one or more of the following occur.

- No important populations have been lost and the number of mature plants within those populations has remained within a 5% range (1,318 +/- 66) or have increased or
- New populations have been found, increasing the number of known populations from four to five or more over the term of the plan with no net loss of mature plants or
- The area of occupancy has increased by >10% over the term of the plan with no net loss of mature plants.

Criteria for recovery failure: The plan will be deemed a failure if one or more of the following occur.

- Important populations have been lost or
- The number of mature plants in important populations has decreased by >5% from 1,318 to 1,252 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

Note: all populations are considered important populations.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Install DRF markers
4. Undertake fire regeneration
5. Undertake weed control
6. Develop and implement a fire management strategy
7. Maintain disease hygiene
8. Collect and store seed
9. Undertake rabbit control
10. Undertake surveys
11. Develop and implement a translocation proposal

12. Determine the need for fencing/cage installation at Subpopulations 4a–c and undertake if required
13. Obtain biological and ecological information
14. Liaise with land managers and Aboriginal communities
15. Promote awareness
16. Map habitat critical to the survival of *Acacia chapmanii* subsp. *australis*
17. Review this plan and assess the need for further recovery actions

1. Background

History

Acacia chapmanii subsp. *australis* was first collected between Bolgart and Calingiri in 1990 by Richard Cowan who, along with Bruce Maslin, described the subspecies in 1999. The Latin *australis* (southern) refers to its southern distribution (Collins 2009). The subspecies is currently known from four populations comprising of 1,318 mature plants. Most populations are in decline and this is particularly noticeable at Population 1 which has declined from 400 plants in 1992 to 105 plants in 2009. Decline may be due to natural senescence of mature individuals following a lack of suitable disturbance (fire) which is required for germination of soil-stored seed but this has yet to be confirmed. Hydrological investigations have ruled out salinity as the cause and soil testing ruled out fungal diseases.

Description

Acacia chapmanii subsp. *australis* is a dense, intricately branched, pungent shrub, 0.5 to 2m high. Its hairless stems contain narrow, non-rigid stipules \pm 1mm long, and glands 4 to 9mm above the phyllode base. The phyllodes are sharply pointed, green to greyish-green, 2 to 3 (-5)cm long and 0.7 to 1mm in diameter, erect, circular to flat in cross-section and shallowly recurved. The phyllodes have 8 distant raised nerves altogether, 3-nerved when flat. The flowers heads are golden, globular, 4 to 5mm in diameter; 24 to 27 flowered and arranged 1 per axil. The flower stems are hairless and mostly 10 to 15mm long. The pods are up to 40mm long, 2.5 to 3mm wide, coiled and hairless (Collins 2009). *Acacia chapmanii* subsp. *australis* is distinguished from subspecies *chapmanii* by its stipules which are not spiny, and phyllodes which are ascending, subterete to flat and gently curved (Cowan and Maslin 1999).

Illustrations and/or further information

Collins, J. (2009) Threatened Flora of the Western Central Wheatbelt. Department of Environment and Conservation, WA; Cowan, R.S. and Maslin, B.R. (1999) *Acacia* miscellany. 18, the taxonomy of miscellaneous species of with sharply pungent phyllodes in *Acacia* section *Plurinerves* (Leguminosae: Mimosoideae). *Nuytsia* 12: 453–467; Western Australian Herbarium (1998–) *FloraBase- the Western Australian Flora*. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/>.

Distribution and habitat

Acacia chapmanii subsp. *australis* occurs in the Wyening and Bolgart areas where it has an extent of occurrence of 17km² and an area of occupancy of 0.045km². It grows in brown, grey or yellow sand or sandy gravel in woodlands and shrublands with *Corymbia calophylla*, *Eucalyptus wandoo*, *Xanthorrhoea preissii*, *Banksia armata* and *Santalum acuminatum* (Collins 2009).

Table 1. Summary of population land vesting, purpose and manager

Population number & location	DPaW district	Shire	Vesting	Purpose	Manager
1a. WSW of Bolgart	Perth Hills	Toodyay	CCWA	CFF	Parks and Wildlife
1b. WSW of Bolgart	Perth Hills	Toodyay	CCWA	CFF	Parks and Wildlife
2. NW of Wyening	Central Wheatbelt	Victoria Plains	LGA	Road reserve	Shire of Victoria Plains
3. SW of Wyening	Central Wheatbelt	Victoria Plains	LGA	Road reserve	Shire of Victoria Plains
4a. NW of Wyening	Central Wheatbelt	Victoria Plains	LGA	Road reserve	Shire of Victoria Plains
4b. SW of Wyening	Central Wheatbelt	Victoria Plains	LGA	Gravel pit	Shire of Victoria Plains
4c. South of Wyening	Central Wheatbelt	Victoria Plains	LGA	Gravel pit	Shire of Victoria Plains
4d. SE of Wyening	Central Wheatbelt	Victoria Plains	LGA	Road reserve	Shire of Victoria Plains
4e. SE of Wyening	Central Wheatbelt	Victoria Plains	PTA	Railway reserve	Brookfield Rail

Biology and ecology

Acacia chapmanii subsp. *australis* appears to be killed by fire and regenerate from soil stored seed. It is moderately resistant to *Phytophthora cinnamomi* with six out of 20 plants (30%) dying under laboratory conditions as a result of infection. It may, however, be affected by the secondary impact of the pathogen on its habitat.

Conservation status

Acacia chapmanii subsp. *australis* is specially protected under the Western Australian *Wildlife Conservation Act 1950* and is ranked as Endangered (EN) in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria B1ab(v)+2ab(v); C1 due to an extent of occurrence of less than 5,000km²; severely fragmented populations; no more than five locations; a continuing decline in number of mature individuals; area of occupancy less than 500km²; population number estimated to be less than 2,500 mature individuals; and an estimated continuing decline of at least 20% within three years or one generation. The subspecies is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as EN.

Threats

- **Poor recruitment.** A lack of natural disturbance has resulted in poor germination of soil-stored seed.
- **Road, track and railway maintenance.** Threats to Populations 2 and 3, and Subpopulations 4a, 4d and 4e include grading, chemical spraying, construction of drainage channels and mowing of roadside vegetation.
- **Weeds.** These include wild oats (*Avena fatua*) at Subpopulations 4a and 4b and Cape Lilac (*Melia azedarach*) at Subpopulation 4c.
- **Hydrological change and salinity.** The drainage channel adjacent to Subpopulation 1a was found to be saline (conductivity of 100–180mS/m in 2003) with deaths of some wandoo (*Eucalyptus wandoo*) occurring in the upper part of the channel. The conductivity in the area of Subpopulation 1b was lower (15mS/m in 2003).
- **Altered fire regimes.** *Acacia chapmanii* subsp. *australis* requires infrequent fire to promote regeneration from soil-stored seed. Frequent fire is likely to deplete the soil seed bank and

conversely a lack of fire will result in poor recruitment. An ecologically appropriate fire regime is required.

- **Grazing.** Rabbits (*Oryctolagus cuniculus*) are a threat to Population 2 and Subpopulations 4a–c. Grazing by kangaroos is a threat at Population 1.
- **Gravel extraction.** Subpopulations 4a–c are within and adjacent to a gravel pit.
- **Disease.** *Phytophthora* and *Armillaria* are potential threats to Population 1.

The intent of this plan is to provide actions that will mitigate immediate threats to *Acacia chapmanii* subsp. *australis*. Although climate change and drought may have a long-term effect on the subspecies, direct actions to prevent the impact of climate change and drought are beyond the scope of this plan.

Table 2. Summary of population information and threats

Population number & location	Land status	Year/no. plants	Condition	Threats
1a. WSW of Bolgart	Nature reserve	1992 400 2000 319 2002 169 (1) [150] 2009 80 (205) [72] 2012 769 [6]	Moderate	Hydrological changes, altered fire regimes, disease, grazing
1b. WSW of Bolgart	Nature reserve	2001 60 (2) 2003 7 [100+] 2009 25 (51) [3] 2012 208 [12]	Moderate	Hydrological changes, altered fire regimes, disease, grazing
2. NW of Wyening	Road reserve	2001 14 2007 17	Disturbed	Road maintenance, weeds, altered fire regimes, grazing, hydrological changes
3. SW of Wyening	Road reserve	2003 4 (3) [2] 2007 10 2009 6 (3)	Healthy	Road maintenance, weeds, altered fire regimes
4a. NW of Wyening	Road reserve	2003 46 [76] 2009 15 (10) [10]	Healthy/moderate	Road maintenance, gravel extraction, grazing, weeds, altered fire regimes
4b. SW of Wyening	Gravel pit	2002 3 2009 2 (2) [11]	Healthy/moderate	Road maintenance, gravel extraction, grazing, weeds, altered fire regimes
4c. South of Wyening	Gravel pit	2002 3 [1] 2009 1 (2)	Healthy	Road maintenance, gravel extraction, grazing, weeds, altered fire regimes
4d. SE of Wyening	Road reserve	2002 *561 [4] 2009 *300 (200) [20]	Healthy/moderate	Road maintenance, weeds, altered fire regimes
4e. SE of Wyening	Railway reserve	2002 *561 [4 dead] 2009 *300 (200) [20]	Healthy/moderate	Rail maintenance, weeds, altered fire regimes

Note: Populations in **bold text** are considered to be important populations. () = number of seedlings. [] = number of dead

* = total for populations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land clearing in the immediate vicinity of *Acacia chapmanii* subsp. *australis* may require assessment. Actions that could result in any of the following may potentially result in a significant impact on the subspecies:

- Damage or destruction of occupied or potential habitat.
- Alteration of the local surface hydrology or drainage.
- A reduction in population size.
- A major increase in disturbance in the vicinity of a population.

Habitat critical to the survival of *Acacia chapmanii* subsp. *australis* and important populations

Acacia chapmanii subsp. *australis* is ranked as EN in Western Australia and it is considered that all known habitat for wild populations is critical to the survival of the subspecies, and that all wild populations are important populations. Habitat critical to the survival of *A. chapmanii* subsp. *australis* includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the taxon.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Acacia chapmanii* subsp. *australis* will also improve the status of associated native vegetation, including the eight Priority flora listed in the table below.

Table 3. Priority flora species occurring within 500m of *Acacia chapmanii* subsp. *australis*

Species name	Conservation status (WA)	Conservation status (EPBC Act)
<i>Conostylis caricina</i> subsp. <i>elachys</i>	Priority 1	-
<i>Comesperma rhadinocarpum</i>	Priority 2	-
<i>Tricoryne</i> sp. Wongan Hills (B.H. Smith 794)	Priority 2	-
<i>Acacia campylophylla</i>	Priority 3	-
<i>Acacia drummondii</i> subsp. <i>affinis</i>	Priority 3	-
<i>Eucalyptus macrocarpa</i> x <i>pyriformis</i>	Priority 3	-
<i>Stylidium sacculatum</i>	Priority 3	-
<i>Stylidium scabridum</i>	Priority 4	-

For a description of conservation codes for Western Australian flora see http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf

A rare fauna species, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) (EN), and one species, Rainbow Bee-eater (*Merops ornatus*) (IA), protected under Schedule 3 of the Wildlife Conservation Notice 2013 for migratory birds, also occur within the range of populations and will benefit from management of *Acacia chapmanii* subsp. *australis* and its habitat.

Acacia chapmanii subsp. *australis* Subpopulations 1a and 1b occur within the area of two Priority Ecological Communities (PECs), one of which is within a larger EPBC Act Threatened Ecological Community (TEC) which is ranked CR (see Table 4 below).

Table 4. PECs adjacent to *Acacia chapmanii* subsp. *australis* occurrences

PEC title	Conservation status (WA)	Conservation status (EPBC Act)
Claypans with mid dense shrublands of <i>Melaleuca lateritia</i> over herbs	Priority 1	CR
Wandoo woodland over dense low sedges of <i>Mesomelaena preisii</i>	Priority 2	-

For a description of TEC and PEC categories see Department of Environment and Conservation (2010).

International obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. *Acacia chapmanii* subsp. *australis* is not listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES), and this plan does not affect Australia's obligations under any other international agreements.

Aboriginal consultation

A search of the Aboriginal Affairs (DAA) Aboriginal Heritage Sites Register revealed no sites of Aboriginal significance adjacent to populations of *Acacia chapmanii* subsp. *australis*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and DAA to determine if there are any issues or interests with respect to the management of this taxon. Opportunity for future Aboriginal involvement in the implementation of the plan is included as an action in the plan. Aboriginal involvement in management of land covered by an agreement under the *Conservation and Land Management Act 1984* is also provided for under the joint management arrangements in that Act, and will apply if an agreement is established over any reserved lands on which this taxon occurs.

Social and economic impacts

Some social and economic impacts may occur in relation to populations of *Acacia chapmanii* subsp. *australis* that occur on land under the management of the Shires of Toodyay and Victoria Plains (Populations 2, 3, and Subpopulations 4a–d), and Brookfield Rail (Subpopulation 4e), through the loss of potential areas for gravel extraction, the implementation of recovery actions (controlling weeds and rabbits, and fencing) and restrictions imposed on the management of the land, including maintenance of road and rail infrastructure.

Affected interests

The implementation of this plan has some implications for Brookfield Rail and the Shires of Toodyay and Victoria Plains in those areas where populations occur on lands not specifically managed for conservation.

Evaluation of the plan's performance

Parks and Wildlife with assistance from the Central Wheatbelt District Threatened Flora and Communities Recovery Team (CWDTFCRT) and Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

2. Recovery objective and criteria

Plan objective

The objective of this plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term conservation of *Acacia chapmanii* subsp. *australis* in the wild.

Recovery criteria

Criteria for recovery success: The plan will be deemed a success if one or more of the following occur.

- No important populations have been lost and the number of mature plants within those populations has remained within a 5% range (1,318 +/- 66) or have increased or
- New populations have been found, increasing the number of known populations from four to five or more over the term of the plan with no net loss of mature plants or
- The area of occupancy has increased by >10% over the term of the plan with no net loss of mature plants.

Criteria for recovery failure: The plan will be deemed a failure if one or more of the following occur.

- Important populations have been lost or
- The number of mature plants has decreased by >5% from 1,318 <1,252 or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

Note: all populations are considered important populations.

3. Recovery actions

Existing recovery actions

Parks and Wildlife, with assistance from the CWDTFCRT and SRTFCRT is overseeing the implementation of recovery actions for *Acacia chapmanii* subsp. *australis*.

Land managers have been made aware of *Acacia chapmanii* subsp. *australis* and its locations. Notifications detail the current Declared Rare Flora (DRF) status of the subspecies and the associated legal obligations in regards to its protection.

Surveys for *Acacia chapmanii* subsp. *australis* include:

- Survey by Parks and Wildlife staff during the mid 1990's.
- Survey by a contract botanist and with Parks and Wildlife staff during 1995, 1996 and 2002.
- Surveys by a rare flora volunteer.

DRF markers have been installed at Populations 1, 2, 3 and Subpopulations 4a, 4d and 4e. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to relevant Shires and other organisations.

Adaptive management which enables management intervention using scientific principles based on the best available knowledge has been developed and implemented for *Acacia chapmanii* subsp. *australis* (Huston and Dufty 2009). The approach consisted of three phases:

- **Phase 1:** An experimental burn was conducted on dead *Acacia chapmanii* subsp. *australis* plants at Population 1 in April 2004 to examine post-fire germination and seedling establishment (Garkaklis *et al.* 2005).
- **Phase 2:** Ecosystem scale behaviour including the impact on the floristic community was measured following an autumn fuel reduction burn conducted in May 2005. Areas to be measured included if regeneration of *Acacia chapmanii* subsp. *australis* was similar to the experimental burn; the influence of herbivory on seedling survival; and the impact of fire on the floristic community.
- **Phase 3:** Phase 3 was implemented in Autumn 2014 at Subpopulation 1b to regenerate soil stored seed by means of applied fire or soil disturbance (scarification) and to test if scarification is an efficient management tool for senescing populations of *Acacia chapmanii* subsp. *australis*.

Post-fire monitoring by Parks and Wildlife staff occurred at Subpopulations 1a and 1b in August and September 2012. High resolution locational information was collected for each plant. A fenced enclosure (~20 x 20m) was installed in 2007 to protect plants from grazing.

Some 23,345 seeds collected from *Acacia chapmanii* subsp. *australis* are stored in the Threatened Flora Seed Centre (TFSC) at -18°C (see table 5). Some seeds have been processed with germination ranging from 80 to 100%.

Table 5. TFSC seed collection details for *Acacia chapmanii* subsp. *australis*

Accession number	Date collected	Population number	Collection type	Seeds/follicles in storage	Germination rate (%)
00701	1/12/2000	1	B/150	6217 seeds, 600 seeds	100
01299	2/12/2003	1	B/65	10190 seeds, 600 seeds	100
01589	29/11/2005	1	B/9	165 seeds	80
01702	30/11/2004	1	B/11	71 seeds	not yet tested
03147	24/11/2009	3	I/2	4711 seeds, 791 seeds	not yet tested

Note: 'I' = a collection of individuals and the number of plants collected; 'B' = a bulked collection and the number of plants sampled

The Botanic Gardens and Parks Authority (BGPA) have 14 cutting grown plants of *Acacia chapmanii* subsp. *australis* in their nursery. Plants range in age from two to eight years old. Propagation records show varied success from cuttings, ranging from 4% to 38% (generally quite low).

Future recovery actions

The following recovery actions are roughly in order of descending priority, influenced by their timing over the term of the plan. However this should not constrain addressing any recovery action if funding is available and other opportunities arise. Where these recovery actions are implemented on lands other than those managed by Parks and Wildlife, permission has been or will be sought from the appropriate land managers prior to actions being undertaken.

1. Coordinate recovery actions

Parks and Wildlife with assistance from the CWDTFCRT and SRTFCRT will coordinate the implementation of this plan and include information on progress in annual reports.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts) with assistance from the CWDTFCRT and SRTFCRT
Cost:	\$8,000 per year

2. Monitor populations

Ongoing monitoring of grazing, weed invasion, habitat degradation, hydrology (inundation, drought and salinity), disease presence (*Phytophthora* sp. and *Armillaria*), population stability (expansion or decline), pollinator activity, seed production, recruitment and longevity should be undertaken. Where possible, populations will be monitored annually.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts), with assistance from the CWDTFCRT and SRTFCRT
Cost:	\$10,000 per year

3. Install DRF markers

DRF markers are required at Subpopulations 4b and 4c.

Action:	Install DRF markers
Responsibility:	Parks and Wildlife (Central Wheatbelt District)
Cost:	\$4,000 in year 1

4. Undertake fire regeneration

As *Acacia chapmanii* subsp. *australis* plants are senescing and fire has been shown to be an effective means of germinating soil stored seed in the wild, fire regeneration will be undertaken in conjunction with weed control.

Action:	Undertake fire regeneration
Responsibility:	Parks and Wildlife (Science and Conservation Division, Central Wheatbelt and Perth Hills Districts)
Cost:	\$10,000 in years 1 and 3, \$4,000 in years 2, 4 and 5

5. Undertake weed control if required

1. Determine the threat of weeds in populations of *Acacia chapmanii* subsp. *australis* and which weeds are present.
2. If considered a threat, control by hand removal and/or spot spraying when they first emerge.
3. Monitor the success of weed control and the tolerance of associated native plant species to treatment.
4. Revegetate with site-specific native species to suppress weeds.
5. Report on the method and success of treatments.

Action:	Undertake weed control if required
Responsibility:	Parks and Wildlife (Central Wheatbelt District), Shire of Victoria Plains, Brookfield Rail
Cost:	\$10,000 per year, as required

6. Develop and implement a fire management strategy

A fire management strategy, including recommendations on fire frequency, intensity and seasonality, precautions to prevent wildfire and strategies for reacting to wildfire, and the need, method of construction, and maintenance of firebreaks, will be developed and implemented. Fire, where possible, will be prevented from occurring in the habitat of populations, except where it is being used as a recovery tool.

Action:	Develop and implement a fire management strategy
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts)
Cost:	\$10,000 in year 1, and \$6,000 in years 2–5

7. Maintain disease hygiene

As *Phytophthora* sp. and *Armillaria* are present at Population 1 and are a potential threat to other populations, hygiene measures (outlined in CALM 2003) will be followed during installation and maintenance of firebreaks and when walking into populations in wet soil conditions. Purpose built signs advising of the dieback risk and high conservation values of the sites will be installed if required.

Action:	Maintain disease hygiene
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts)
Cost:	\$4,000 per year

8. Collect and store seed

To guard against the extinction of natural populations it is recommended that seed be collected and stored at the TFSC and BGPA. Collections should aim to sample and preserve the maximum range of genetic diversity possible (which should be determined by an appropriate molecular technique such as genetic fingerprinting if feasible). Collection should also prioritise populations that are unlikely to be viable or feasible to maintain in-situ in the medium to long term (i.e. salvage). In these cases collections should also target any soil seed bank.

Action:	Collect and store seed
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts, TFSC), BGPA
Cost:	\$10,000 per year

9. Undertake rabbit control

Rabbit control using 1080 will need to be undertaken if monitoring shows the threat to be high.

Action:	Undertake rabbit control
Responsibility:	Parks and Wildlife (Central Wheatbelt District), land managers
Cost:	\$4,000 in years 1, 3 and 5

10. Undertake surveys

Surveys should be undertaken in areas of potentially suitable habitat (particularly recently burnt areas) with all surveyed areas recorded and the presence or absence of the subspecies documented to improve survey efficiency and prevent duplication of effort. Where feasible, volunteers will be encouraged to participate.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts), with assistance from the CWDTFRT and SRTFCRT
Cost:	\$10,000 per year

11. Develop and implement a translocation proposal

Translocations may be required for the long term conservation of *Acacia chapmanii* subsp. *australis* if natural populations continue to decline despite ongoing recovery actions. Information on the translocation of threatened plants and animals in the wild is provided in Parks and Wildlife's Policy No. 35 *Conserving Threatened Species and Ecological Communities* (2015) and Corporate Guideline No. 36 *Recovery of Threatened Species through Translocation and Captive Breeding or Propagation* (2015), and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al.* 2004). All translocation proposals require endorsement by Parks and Wildlife's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action:	Develop and implement a translocation proposal
Responsibility:	Parks and Wildlife (Science and Conservation Division, Central Wheatbelt and Perth Hills Districts), BGPA
Cost:	\$42,000 in years 1 and 2; and \$26,500 in years 3–5 as required

12. Determine the need for fencing or cage installation at Subpopulations 1a,b and 4a–c and undertake if required

Subpopulations 1a,b are subject to grazing by kangaroos. Fencing or cages may be required to protect seedlings from grazing.

Fencing may also be required to protect plants and their habitat within Subpopulations 4a–c which are located in an active gravel pit.

Action:	Determine the need for fencing or cage installation at Subpopulations 1a,b and 4a–c and undertake if required
Responsibility:	Parks and Wildlife (Central Wheatbelt District), Shire of Victoria Plains
Cost:	\$10,000 in year 1

13. Obtain biological and ecological information

This will include:

1. Identification of pollinators and their habitat requirements.
2. Presence, number and longevity of seed bank.
3. Seed viability.
4. Conditions necessary for natural germination.
5. Response to disturbance, competition, drought, inundation and grazing.
6. Longevity of plants, time taken to reach maturity, and minimum viable population size.
7. The impact of dieback and the effectiveness of control techniques.
8. The impact of changes in hydrology.

Action:	Obtain biological and ecological information
Responsibility:	Parks and Wildlife (Science and Conservation Division, Central Wheatbelt and Perth Hills Districts)
Cost:	\$50,000 in years 1–3

14. Liaise with land managers and Aboriginal communities

Parks and Wildlife will liaise with land managers to ensure that populations of *Acacia chapmanii* subsp. *australis* are not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the taxon. Consultation with the Aboriginal community will take place to determine if there are any issues or interests in areas that are habitat for the taxon.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts)
Cost:	\$4,000 per year

15. Promote awareness

The importance of biodiversity conservation and the protection of *Acacia chapmanii* subsp. *australis* will be promoted through the print and electronic media and by setting up poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action:	Promote awareness
Responsibility:	Parks and Wildlife (Wheatbelt and Swan Regions, Species and Communities Branch (SCB) and Public Information and Corporate Affairs (PICA)), with assistance from the CWDTFRT and SRTFCRT
Cost:	\$7,000 in years 1 and 2; \$5,000 in years 3–5

16. Map habitat critical to the survival of *Acacia chapmanii* subsp. *australis*

Although spatial data relating to habitat critical to the survival of *Acacia chapmanii* subsp. *australis* is alluded to in Section 1, it is not yet mapped. If additional populations are located, habitat critical to their survival will also be determined and mapped.

Action:	Map habitat critical to the survival of <i>Acacia chapmanii</i> subsp. <i>australis</i>
Responsibility:	Parks and Wildlife (SCB, Wheatbelt and Swan Regions)
Cost:	\$6,000 in year 2

17. Review this plan and assess the need for further recovery actions

If *Acacia chapmanii* subsp. *australis* is still ranked EN at the end of the five-year term of this plan, the need for further recovery actions, or a review of this plan will be assessed and a revised plan prepared if necessary.

Action:	Review this plan and assess the need for further recovery actions
Responsibility:	Parks and Wildlife (SCB, Wheatbelt and Swan Regions)
Cost:	\$6,000 in year 5

Table 6. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Wheatbelt and Swan Regions), with assistance from the CWDTFCRT and SRTFCRT	Ongoing
Monitor populations	High	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts), with assistance from the CWDTFCRT and SRTFCRT	Ongoing
Install DRF markers	High	Parks and Wildlife (Central Wheatbelt District)	2016
Undertake fire regeneration trials	High	Parks and Wildlife (Science and Conservation Division, Central Wheatbelt and Perth Hills Districts)	2020
Undertake weed control	High	Parks and Wildlife (Central Wheatbelt District), Shire of Victoria Plains, Brookfield Rail	Ongoing
Develop and implement a fire management strategy	High	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts)	Developed by 2016 with implementation ongoing
Maintain disease hygiene	High	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts)	Ongoing
Collect and store seed	High	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts, TFSC), BGPA	2020
Undertake rabbit control	High	Parks and Wildlife (Central Wheatbelt District), relevant land managers	Ongoing
Undertake surveys	High	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts), with assistance from the CWDTFCRT and SRTFCRT	2020

Develop and implement a translocation proposal if required	Medium	Parks and Wildlife (Science and Conservation Division, Central Wheatbelt and Perth Hills Districts), BGPA	2020
Install fencing at Subpopulations 4a–c	Medium	Parks and Wildlife (Central Wheatbelt District), Shire of Victoria Plains	2016
Obtain biological and ecological information	Medium	Parks and Wildlife (Science and Conservation Division, Central Wheatbelt and Perth Hills Districts)	2018
Liaise with land managers and Aboriginal communities	Medium	Parks and Wildlife (Central Wheatbelt and Perth Hills Districts)	Ongoing
Promote awareness	Medium	Parks and Wildlife (Wheatbelt and Swan Regions, SCB and PICA), with assistance from the CWDTFRT and SRTFCRT	2020
Map habitat critical to the survival of <i>Acacia chapmanii</i> subsp. <i>australis</i>	Medium	Parks and Wildlife (SCB, Wheatbelt and Swan Regions)	2017
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, Wheatbelt and Swan Regions)	2020

4. Term of plan

This plan will operate from January 2016 to December 2020 but will remain in force until withdrawn or replaced. If *Acacia chapmanii* subsp. *australis* is still ranked EN after five years, the need for further recovery actions will be determined.

5. References

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- Western Australian Herbarium (1998–) *FloraBase- the Western Australian Flora*. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/>.

6. Taxonomic description

Acacia chapmanii* subsp. *australis

Cowan and Maslin (1999)

Stipules c. 1mm long, not at all rigid, subulate. *Phyllodes* subterete to flat, ascending, shallowly recurved; gland 4–9mm above base. *Peduncles* 12–19mm long. *Heads* 5mm diam., 24–27-flowered; *bracteoles* evident in mature buds, the comparatively large lamina much broader than the sepals, to 0.75mm wide. Mature *Pods* and *seeds* not seen.