Department of
Parks and Wildlife

Interim Recovery Plan No. 356

Scale-leaf Poison
Gastrolobium appressum

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
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
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 known 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
MDTFRT	Moora District Threatened Flora Recovery Team
MRWA	Main Roads WA
NP	National Park
NRM	Natural Resource Management
PEC	Priority Ecological Community
PICA	Public Information and Corporate Affairs
PTA	Public Transport Authority
SCB	Species and Communities Branch
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
VU	Vulnerable
WA	Western Australia

Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in 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.

The department is committed to ensuring that Threatened taxa 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This plan will operate from November 2015 to October 2020 but will remain in force until withdrawn or replaced. It is intended that, if the species is still ranked as CR in Western Australia, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 21 August 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 the department, 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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Cover photograph by Emma Richardson.

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Summary

Scientific name:	*Gastrolobium appressum*	**Common name:**	Scale-leaf Poison
Family:	Fabaceae	**Flowering period:**	September–November, sometimes December
DPaW region:	Midwest		
Shires:	Coorow, Moora	**DPaW district:**	Moora
IBRA regions:	Avon Wheatbelt, Geraldton Sandplains	**NRM region:**	Northern Agricultural Catchment Council
IBRA subregions:	Avon Wheatbelt P1, Avon Wheatbelt P2, Lesueur Sandplain	**Recovery team:**	MDTFRT

Distribution and habitat: *Gastrolobium appressum* is found between Watheroo and Marchagee, growing in quartz gravel and white or yellow sand on the crowns and slopes of hills in vegetation ranging from thicket to open low scrub over low heath and open dwarf scrub (Brown *et al.* 1998).

Habitat critical to the survival of the species, and important populations: It is considered that all known habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *Gastrolobium appressum* 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 of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Conservation status: *Gastrolobium appressum* 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 2014) criteria C2a due to a population size estimated to be less than 2,500 mature individuals; a continuing decline in numbers of mature individuals and no subpopulation estimated to contain more than 250 mature individuals. The species is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Vulnerable (VU).

Threats: The main threats to the species are road, track and railway maintenance, weeds, altered fire regimes, grazing, trampling, farming activities, rubbish dumping, dieback disease (*Phytophthora cinnamomi*) and future mining operations.

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 *Gastrolobium appressum* and its locations, and their legal obligations regarding its protection
2. There has been extensive survey for the species over the last 20 years including a survey of remnant vegetation in the Marchagee Catchment in 2000 (Davies and Ladd).
3. Declared Rare Flora (DRF) markers have been installed at Populations 1 and 16, and Subpopulations 5a, 5b, 7a, 7b, 8a, 9a, 11a, 13b and 17a.
4. Dashboard stickers and posters highlighting the significance of DRF markers have been produced and distributed to relevant Shires and other organisations.
5. Eight hundred and sixty two *Gastrolobium appressum* seeds are stored in Parks and Wildlife's Threatened Flora Seed Centre (TFSC) at –18°C.

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 species in the wild.

Recovery criteria

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

- No important populations have been lost and the number of mature plants within those populations has remained within a 10% range or has increased by >10% over the term of the plan from 988 to 1,087 or more or
- New populations have been found, increasing the number of known populations from 13 to 14 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 >10% from 988 to 889 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

See table 2 for important populations.

Recovery actions

1. Coordinate recovery actions
2. Fence subpopulations
3. Monitor populations
4. Undertake regeneration trials
5. Collect and store seed
6. Undertake surveys
7. Undertake weed control
8. Determine susceptibility to dieback disease
9. Maintain disease hygiene
10. Develop and implement a translocation proposal
11. Develop and implement a fire management strategy
12. Obtain biological and ecological information
13. Ensure long-term protection of habitat
14. Liaise with land managers and Aboriginal communities
15. Promote awareness
16. Map habitat critical to the survival of *Gastrolobium appressum*
17. Review this plan and assess the need for further recovery actions

1. Background

History

The first collection of *Gastrolobium appressum* was made near Gunyidi in 1961 by C.A. Gardner who described the species in 1964. The species is currently known from 13 populations comprising 988 mature individuals. However five of these populations have not been surveyed since 1993 and one is no longer known to contain extant plants. Large numbers of senescing and dead plants are present at many populations.

Description

Gastrolobium appressum is a small, woody shrub to 50cm high, with young branches covered in fine, white hairs. The leaves are pale green, leathery, on short stalks and end in a fine, sometimes slightly hooked point. The flowers are a typical pea and are borne above the leaves in several whorls of three, and clustered at the ends of the branchlets. The flowers are pea shaped, with a lobed, 2-lipped calyx. The three lobes of the lower lip are lanceolate in shape and pointed at their tips. The petals are orange yellow and reddish-purple. The fruit is a hairy pod containing two hard seeds (Brown *et al*. 1998). When flowering *G. appressum* is unlikely to be confused with any other plant but vegetatively is similar to *Pultenaea reticulata*. *G. appressum* is distinguished from *P. reticulata* by its many-flowered, terminal racemes and its distribution in the northern sandplains. *Pultenaea reticulata* has one or two flowered, axillary inflorescences and occurs in the southern sandplains (Chandler *et al*. 2002).

Illustrations and/or further information

Brown, A., Thomson-Dans, C. and Marchant, N. (eds) (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Chandler, G.T., Crisp, M.D., Cayzer, L.W. and Bayer, R.J. (2002) Monograph of *Gastrolobium* (Fabaceae: Mirbelieae). *Australian Systematic Botany* 15: 619−739; Western Australian Herbarium (1998−) *FloraBase− the Western Australian Flora*. Department of Parks and Wildlife. http://florabase.dpaw.wa.gov.au/.

Distribution and habitat

Gastrolobium appressum is found between Watheroo and Marchagee, with an extent of occurrence of 155km^2 and an area of occupancy of 0.6km^2. The species grows in quartz gravel and white or yellow sand on the crowns and slopes of hills in vegetation ranging from thicket to open low scrub over low heath to open dwarf scrub (Brown *et al*. 1998). Associated species include *Allocasuarina campestris*, *A. drummondiana*, *Melaleuca holosericea*, *M. uncinata*, *Dodonaea hexandra*, *D. pinifolia*, *Hakea sulcata*, *Grevillea integrifolia, G. thyrsoides, Jacksonia pungens*, *J. floribunda*, *Ecdeiocolea monostachya*, *Calothamnus quadrifidus*, *Callitris pyramidalis*, *Conospermum stoechadis*, *Xylomelum angustifolium* and *Gastrolobium spinosum*.

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

Population number & location	Parks and Wildlife district	Shire	Vesting	Purpose	Manager
1. WNW of Gunyidi	Moora	Coorow	MRWA	Road reserve	MRWA
5a. N of Gunyidi	Moora	Coorow	PTA	Railway reserve	Brookfield Rail
5b. N of Gunyidi	Moora	Coorow	LGA	Road reserve	Shire of Coorow
6. NE of Gunyidi	Moora	Coorow	Private property		Landowners
7a. N of Gunyidi	Moora	Coorow	PTA	Railway reserve	Brookfield Rail
7b. N of Gunyidi	Moora	Coorow	LGA	Road reserve	Shire of Coorow
8a. NW of Gunyidi	Moora	Coorow	MRWA	Road reserve	MRWA
8b. NW of Gunyidi	Moora	Coorow	Private property		Landowners
9a. NW of Gunyidi	Moora	Coorow	LGA	Road reserve	Shire of Coorow
9b. NW of Gunyidi	Moora	Coorow	Private property		Landowners
11a. NW of Gunyidi	Moora	Coorow	MRWA	Road reserve	MRWA
11b. NW of Gunyidi	Moora	Coorow	Private property		Landowners
12. NW of Gunyidi	Moora	Coorow	MRWA	Road reserve	MRWA
13a. NW of Gunyidi	Moora	Coorow	Private property		Landowners
13b. NW of Gunyidi	Moora	Coorow	LGA	Road reserve	Shire of Coorow
14. NE of Marchagee	Moora	Coorow	MRWA	Road reserve	MRWA
15. WNW of Gunyidi	Moora	Coorow	Private property		Landowners
16. NW of Gunyidi	Moora	Coorow	MRWA	Road reserve	MRWA
17a. NE of Watheroo	Moora	Moora	LGA	Road reserve	Shire of Moora
17b. NE of Watheroo	Moora	Moora	Private property		Landowners

Note: Populations 2, 3, 4 were found to be another species and have not been included in the above table and Population 10 was merged with 11a.

Biology and ecology

As senescing and dead plants are present in populations, it is likely *Gastrolobium appressum* has a relatively short life span and requires disturbance such as fire to stimulate recruitment.

Conservation status

Gastrolobium appressum 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 2014) criteria C2a due to a population size estimated to be less than 2,500 mature individuals, a continuing decline in the number of mature individuals and no subpopulation estimated to contain more than 250 mature individuals. The species is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Vulnerable (VU).

Threats

- **A reduction of fire and natural disturbance events** is likely to result in less natural recruitment.
- **Road, track and railway maintenance** including grading, chemical spraying, construction of drainage channels and mowing of roadside vegetation may damage or kill plants.

- **Weeds** compete for soil moisture, nutrients and light, and increase the likelihood of fire due to higher than natural fuel loads.
- **Altered fire regimes** are likely to result in a depleted soil seed bank.
- **Grazing and trampling.** Stock may be impacting on some private property populations.
- **Farming activities.** Fence and firebreak maintenance, fertiliser and chemical drift and weed encroachment from cleared areas may damage or kill plants and degrade associated habitat.
- **Dieback disease.** Dieback (*Phytophthora cinnamomi*) may kill plants or degrade associated habitat. Note: it is not known if *Gastrolobium appressum* is directly susceptible to dieback disease.
- **Future mining operations.** Active exploration permits cover the sites of Populations 6 and 15, and Subpopulations 8b, 9b, 11b and 17b and may impact on the species and its habitat.

The intent of this plan is to provide actions that will mitigate immediate threats to *Gastrolobium appressum*. Although climate change and drought may have a long-term effect on the species, 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. of plants		Current condition	Threats
1. WNW of Gunyidi	Road reserve	1982 1983 2007 2012	86 [1 dead] 86 26 17 [4 dead]	Moderate	Road maintenance, weeds, altered fire regimes, disease
5a. N of Gunyidi	Rail reserve	1982 2007 2012	396 [2 dead] 34 [2 dead] 28 [3 dead]	Moderate	Rail maintenance, weeds, altered fire regimes
5b. N of Gunyidi	Road reserve	2007 2012	50 [6 dead] 31 [3 dead]	Moderate	Road maintenance, weeds, altered fire regimes, grazing
6. NE of Gunyidi	Private property	1982	217 [5 dead]	Poor	Weeds, altered fire regimes, mining
7a. N of Gunyidi	Rail reserve	1982 2012	27 0	Moderate	Rail maintenance, weeds, altered fire regimes, grazing
7b. N of Gunyidi	Road reserve	1989 2012	30 5	Moderate	Road maintenance, weeds, altered fire regimes, grazing
8a. NW of Gunyidi	Road reserve	1982 1991 2007 2012	249 [35 dead] 185 240 [12 dead] 149 [58 dead]	Moderate	Road maintenance, weeds, altered fire regimes, disease
8b. NW of Gunyidi	Private property	1982 2007	14 0	Disturbed	Weeds, farming activities, altered fire regimes, grazing, mining
9a. NW of Gunyidi	Road reserve	1982 2007	35 19 [3 dead]	Moderate	Road maintenance, weeds, altered fire regimes
9b. NW of Gunyidi	Private property	1982 1985 1988 2007	65 4 0 0	Disturbed	Road maintenance, weeds, farming activities, altered fire regimes, grazing, mining
11a. NW of Gunyidi	Road reserve	1982 2007 2012	171 197 93 [25 dead]	Moderate	Road maintenance, weeds, grazing, altered fire regimes, disease
11b. NW of Gunyidi	Private property	1982 1991	12 12	Disturbed	Weeds, grazing, farming activities, altered fire regimes, mining
12. NW of Gunyidi	Road	1982	1214 [7 dead]		Road maintenance, weeds, grazing,

	reserve	1991	200		altered fire regimes
13a. NW of Gunyidi	Private property	1982 2012	36 0	Cleared	
13b. NW of Gunyidi	Road reserve	2012	120 [12 dead]	Poor	Road maintenance, weeds, altered fire regimes, disease
14. NE of Marchagee	Road Reserve	1982 1991	7 40	Disturbed	Road maintenance, weeds, altered fire regimes
15. WNW of Gunyidi	Private property	1983 2007	30 0	Disturbed	Weeds, farming activities, altered fire regimes, mining
16. NW of Gunyidi	Road reserve	1989 2012	1 1	Moderate	Road maintenance, weeds, altered fire regimes, disease
17a. NE of Watheroo	Road reserve	1993 2007	20 46	Moderate	Road maintenance, weeds, altered fire regimes
17b. NE of Watheroo	Private property	1993	10		Farming activities, altered fire regimes, mining

Note: Populations 2, 3, 4 were found to be another species and have not been included in the above table and Population 10 was merged with 11a. Populations in **bold text** are considered to be important populations.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions that result in any of the following may significantly impact the conservation of the species:

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

Habitat critical to the survival of *Gastrolobium appressum* and important populations

Gastrolobium appressum is ranked as EN and it is considered that all known current habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *G. appressum* 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 of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Gastrolobium appressum* will also benefit the three Declared Rare Flora (DRF) and seven Priority flora listed in the table below:

Table 3. Conservation-listed flora species occurring within 500m of *Gastrolobium appressum*

Species name	Conservation status (WA)	Conservation status (EPBC Act)
Acacia vassalii	DRF (CR)	EN
Daviesia dielsii	DRF (EN)	EN
Jacksonia pungens	DRF (CR)	EN
Dodonaea hexandra	Priority 1	-
Gompholobium roseum	Priority 2	-
Acacia lirellata subsp. *lirellata*	Priority 3	-
Grevillea thyrsoides subsp. *pustulata*	Priority 3	-
Lechenaultia juncea	Priority 3	-
Petrophile biternata	Priority 3	-
Verticordia venusta	Priority 3	-

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

The species is not associated with any Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs).

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. The species 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 Department of Aboriginal Affairs (DAA) Aboriginal Heritage Sites Register revealed no sites of Aboriginal significance adjacent to populations of *Gastrolobium appressum*. 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 species. 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 species occurs. No populations are known from CALM Act lands.

Social and economic impacts

Populations 6 and 15, and Subpopulations 8b, 9b, 11b, 13a and 17b are on private property and social and economic impacts could occur as a result of the loss of land available for agricultural development and the cost of implementing recovery actions. For Subpopulations 5b, 7b, 9a and 13b on land vested with the Shire of Coorow and Subpopulation 17a vested with the Shire of

Moora impacts may be through the implementation of recovery actions (controlling weeds and fencing) and restrictions imposed on the management of these lands. Similar impacts apply to Populations 1, 12, 14 and 16 and Subpopulations 8a and 11a on land vested with Main Roads WA (MRWA) and Subpopulations 5a and 7a on land managed by Brookfield Rail. Mineral exploration leases cover the area containing Populations 6 and 15, and Subpopulations 8b, 9b, 11b, 13a and 17b (all private property) and there is potential for economic impact should mining be impeded.

Affected interests

The implementation of this plan has some implications for private landholders, the Shires of Moora and Coorow, MRWA, Brookfield Rail and mining tenement holders.

Evaluation of the plan's performance

Parks and Wildlife with assistance from the Moora District Threatened Flora Recovery Team (MDTFRT) 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 the species 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 10% range or has increased by >10% over the term of the plan from 988 to 1,087 or more or
- New populations have been found, increasing the number of known populations from 13 to 14 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 >10% from 988 to 889 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

See table 2 for important populations.

3. Recovery actions

Existing recovery actions

Parks and Wildlife, with assistance from the MDTFRT, is overseeing the implementation of recovery actions for *Gastrolobium appressum*.

Land owners have been made aware of *Gastrolobium appressum* and its locations. Notifications detail the current DRF status of the species and the associated legal obligations in regards to its protection.

There has been extensive survey for the species over the last 20 years including a survey of remnant vegetation in the Marchagee Catchment in 2000 (Davies and Ladd).

DRF markers have been installed at Populations 1 and 16, and Subpopulations 5a, 5b, 7a, 7b, 8a, 9a, 11a, 13b and 17a.

Dashboard stickers and posters highlighting the significance of DRF markers have been produced and distributed to relevant Shires and other organisations.

Eight hundred and sixty two *Gastrolobium appressum* seeds are stored in Parks and Wildlife's Threatened Flora Seed Centre (TFSC) at –18°C (see Table 4).

Table 4. Seed collection details for *Gastrolobium appressum*

Accession number	Date collected	Population number	Collection type	Seeds	Germination rate (%)
01507	19/11/2004	5	B/20	432	100
02186	14/11/2006	5	I/9	115	not yet tested
02559	27/11/2007	17	B/24	315	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

In 2010, the Botanic Gardens and Parks Authority (BGPA) had four plants of *Gastrolobium appressum* growing in their conservation garden, but all have since died.

Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to Shires and other organisations.

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 MDTFRT will coordinate the implementation of this plan and include information on progress in annual reports.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Moora District, SCB), with assistance from the MDTFRT
Cost:	$8,000 per year

2. Fence subpopulations

Agreement will be sought to fence Subpopulations 8b, 9b, 11b and 17b to protect them from grazing.

Action:	Fence subpopulations
Responsibility:	Parks and Wildlife (Moora District), Shires of Coorow and Moora, landowners
Cost:	$20,000 in years 1–3

3. Monitor populations

Monitoring of grazing, weed invasion, habitat degradation, hydrology (inundation and drought) and population stability (expansion or decline), pollinator activity, seed production, recruitment and longevity should be undertaken.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Moora District), with assistance from the MDTFRT
Cost:	$10,000 per year

4. Undertake regeneration trials

Suitable disturbance events (physical or fire) may be the most effective means of germinating *Gastrolobium appressum* seed in the wild and should be undertaken in conjunction with weed control. Records will be maintained for future research, and to inform management and recovery actions.

Action:	Undertake regeneration trials
Responsibility:	Parks and Wildlife (Science and Conservation Division (SCD), Moora District)
Cost:	$10,000 in years 1 and 3, $4,000 in years 2, 4 and 5

5. 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).

Action:	Collect and store seed
Responsibility:	Parks and Wildlife (Moora District, TFSC), BGPA
Cost:	$10,000 per year

6. Undertake surveys

Surveys should be undertaken in areas of potentially suitable habitat. Where feasible, volunteers from landcare groups, wildflower societies and naturalists clubs will be encouraged to participate. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and prevent duplication of effort.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Moora District), with assistance from the MDTFRT
Cost:	$10,000 per year

7. Undertake weed control

Weeds are a threat to most populations and the following actions should be implemented:

1. Determine which weeds are present.
2. Select appropriate techniques; herbicide, mowing or hand weeding.
3. Control invasive weeds by hand removal and/or spot spraying when they first emerge.
4. Revegetate with site-specific species to maintain low weed levels.
5. Monitor the success of treatments on weeds, and the tolerance of *Gastrolobium appressum* and associated native plant species.
6. Report on the method and success of treatments, and their effect on *Gastrolobium appressum* and associated species.

Action:	Undertake weed control
Responsibility:	Parks and Wildlife (Moora District), Shires of Coorow and Moora, Brookfield Rail, landowners
Cost:	$10,000 per year, as required

8. Determine susceptibility to dieback disease

As the level of susceptibility of *Gastrolobium appressum* to dieback disease is unknown, seedlings will be forwarded to Forest and Ecosystem Management Division for testing.

Action:	Determine susceptibility to dieback disease
Responsibility:	Parks and Wildlife (Moora District, Forest and Ecosystem Management Division)
Cost:	$3,000 in years 1 and 2

9. Maintain disease hygiene

Although it is unknown if *Gastrolobium appressum* is directly affected by dieback disease, a degradation of its habitat as a result of dieback infection may indirectly impact on the species. Dieback hygiene (outlined in CALM 2003) will be followed during installation and maintenance of firebreaks and when walking into populations in wet soil conditions. 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 (Moora District)
Cost:	$4,000 per year

10. Develop and implement a translocation proposal

Translocation may be deemed desirable for the conservation of this species if natural populations are lost or at a high threat status. If required, a translocation proposal will be developed and suitable translocation sites selected. 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 translocations
Responsibility:	Parks and Wildlife (SCD, Moora District), BGPA
Cost:	$42,000 in years 1 and 2; and $26,500 in years 3–5 as required

11. Develop and implement a fire management strategy

A fire management strategy that recommends fire frequency, intensity, season, and control measures will be developed and implemented.

Action:	Develop and implement a fire management strategy
Responsibility:	Parks and Wildlife (Moora District)
Cost:	$10,000 in year 1, and $6,000 in years 2–5

12. Obtain biological and ecological information

Research on the biology and ecology of *Acacia chapmanii* subsp. *australis* should include:

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

Action:	Obtain biological and ecological information
Responsibility:	Parks and Wildlife (SCD, Moora District)
Cost:	$50,000 in years 1–3

13. Ensure long-term protection of habitat

This may include land purchase, conservation covenants or registration through Land for Wildlife.

Action:	Ensure long-term protection of habitat
Responsibility:	Parks and Wildlife (Midwest Region, SCB Nature Conservation Covenant Program and Land Unit)
Cost:	$4,000 per year

14. Liaise with land managers and Aboriginal communities

Staff from Parks and Wildlife's Moora District will liaise with land managers to ensure that populations of *Gastrolobium appressum* are not inadvertantly damaged or destroyed, and habitat is maintained in a suitable condition for the conservation of the species. Consultation with the Aboriginal community will take place to determine if there are any issues or interests in areas that are habitat for the species.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Moora District)
Cost:	$4,000 per year

15. Promote awareness

The importance of biodiversity conservation and the protection of *Gastrolobium appressum* will be promoted using local print and electronic media and by setting up poster displays. An information sheet that includes a description of the plant, its habitat type, threats and management actions, and photos will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action:	Promote awareness
Responsibility:	Parks and Wildlife (Midwest Region, SCB and Public Information and Corporate Affairs (PICA)), with assistance from the MDTFRT
Cost:	$7,000 in years 1 and 2; $5,000 in years 3–5

16. Map habitat critical to the survival of *Gastrolobium appressum*

Although spatial data relating to habitat critical to the survival of *Gastrolobium appressum* is alluded to in Section 1 it has not been fully mapped. If additional populations are located, then habitat critical to their survival will also be determined and mapped.

Action:	Map habitat critical to the survival of *Gastrolobium appressum*
Responsibility:	Parks and Wildlife (SCB, Midwest Region)
Cost:	$6,000 in year 2

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

If *Gastrolobium appressum* is still ranked as 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, Midwest Region)
Cost:	$6,000 in year 5

Table 5. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Midwest Region), with assistance from the MDTFRT	Ongoing
Fence subpopulations	High	Parks and Wildlife (Moora District), Shires of Coorow and Moora, landowners	2018
Monitor populations	High	Parks and Wildlife (Moora District), with assistance from the MDTFRT	Ongoing
Undertake regeneration trials	High	Parks and Wildlife (SCD, Moora District)	2020
Collect and store seed	High	Parks and Wildlife (Moora District, TFSC), BGPA	2020
Undertake surveys	High	Parks and Wildlife (Moora District), with assistance from the MDTFRT	2020
Undertake weed control	High	Parks and Wildlife (Moora District), Shires of	Ongoing

		Coorow and Moora, Brookfield Rail, landowners	
Determine susceptibility to dieback disease	High	Parks and Wildlife (Moora District, Forest and Ecosystem Management Division)	2017
Maintain disease hygiene	High	Parks and Wildlife (Moora District)	Ongoing
Develop and implement a translocation proposal	High	Parks and Wildlife (SCD, Moora District), BGPA	2020
Develop and implement a fire management strategy	High	Parks and Wildlife (Moora District)	Developed by 2016 with implementation ongoing
Obtain biological and ecological information	High	Parks and Wildlife (SCD, Moora District)	2019
Ensure long-term protection of habitat	High	Parks and Wildlife (Midwest Region, SCB Nature Conservation Covenant Program and Land Unit)	2020
Liaise with land managers and Aboriginal communities	Medium	Parks and Wildlife (Moora District)	Ongoing
Promote awareness	Medium	Parks and Wildlife (Midwest Region, SCB and PICA), with assistance from the MDTFRT	2020
Map habitat critical to the survival of *Gastrolobium appressum*	Medium	Parks and Wildlife (SCB, Midwest Region)	2017
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, Midwest Region)	2020

4. Term of plan

This plan will operate from November 2015 to October 2020 but will remain in force until withdrawn or replaced. If the species is ranked EN or at a higher threat category after five years, the need for further recovery actions will be determined.

5. References

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6. Taxonomic description

From Chandler *et al.* (2002)

Low *shrubs*, 0.2–0.3m high. *Branchlets* ascending, terete, moderately to densely pubescent. *Petiole* almost non-existent, continuous and sometimes decurrent with the branchlet, 0.5mm long. *Leaves* erect and appressed to the branchlet, in whorls of 3, ovate, 4–7.5 x 1.5–2.5mm, glabrous or occasionally with scattered hairs along the veins of the abaxial surface, venation prominently reticulate; apex acute, unarmed; margins entire, not recurved; base obtuse. *Stipules* absent. *Inflorescences* terminal racemes, 5–15-flowered; *peduncle* (4–)8–14mm long; *rachis* (10–)12–19(–45)mm long; *subtending bracts* caducous, entire, linear-lanceolate, *c.* 3mm long. *Pedicels* terete, 1–2mm long. *Calyx* strongly campanulate, 5–6mm long including the *c.* 1-mm receptacle, glabrous, lobes not recurved; upper 2 lobes united high than the lower 3, triangular, acute to obtuse, *c.* 4mm long; lower 3 lobes triangular, acute, *c.* 4mm long. *Corolla*: *standard* transversely elliptic, 10–10.5 x *c.* 10mm including the *c.* 3-mm claw, deep orange with a red ring surrounding the orange-yellow centre, apex emarginate, base obtuse, slightly auriculate; *wings* oblong, *c.* 9.5 x 2.5mm including the *c.* 3.5-mm claw, orange-red, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both sides, not saccate; *keel* half transversely broadly ovate, margins inrolled, *c.* 9.5 x 3.5mm including the *c.* 3.5-mm claw, maroon, darker at apex, apex barely acute to rounded, base auriculate, saccate. *Style* long, incurved to hooked, lower half pubescent on the inner margin; *ovary* stipitate, densely pubescent; *ovules* 2 or 3. *Pod* stipitate, very broadly ellipsoid, almost spherical, 4.5–5 x 5–5.5mm, moderately to densely pubescent. *Seed* ellipsoid, *c.* 3mm long.