Government of **Western Australia**
Department of **Environment and Conservation**

Australian Government

INTERIM RECOVERY PLAN NO. 311

VASSAL'S WATTLE

(*Acacia vassalii*)

INTERIM RECOVERY PLAN

2011-2016

February 2011
Department of Environment and Conservation
Kensington

FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50. Note: CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

These plans outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

DEC 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) taxa, always within one year of endorsement of that rank by the Minister.

This plan will operate from February 2011 to January 2016 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Critically Endangered (CR) 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 7 July 2011 and was approved by the Director of Nature Conservation on 14 July 2011. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this plan was accurate at February 2011.

PLAN PREPARATION

This plan was prepared by Robyn Luu[1], Gillian Stack[2] and Andrew Brown[3].

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ACKNOWLEDGMENTS

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

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Cover photograph by Joel Collins.

CITATION

This plan should be cited as:

Department of Environment and Conservation (2011) *Acacia vassalii* Interim Recovery Plan 2011-2016. Interim Recovery Plan No. 311. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	***Acacia vassalii***	**Common Name:**	Vassal's Wattle
Family:	Mimosaceae	**Flowering Period:**	June - August
DEC Regions:	Wheatbelt, Midwest	**DEC Districts:**	Moora, Central Wheatbelt
Shires:	Wongan-Ballidu, Moora, Victoria Plains	**NRM Regions:**	Avon, Northern Agricultural
Recovery Teams:	Moora District Threatened Flora Recovery Team (MDTFRT); Central Wheatbelt District Threatened Flora Recovery Team (CWDTFRT)		

Illustrations and/or further information: Brown, A., Thomson-Dans, C. and Marchant, N. (Eds) (1998) *Western Australia's Threatened Flora*; Collins, J. (2009) *Threatened Flora of the Western Central Wheatbelt*, Department of Environment and Conservation; Maslin, B.R. (1978) Studies in the genus *Acacia* (Mimosaceae) - 7: The taxonomy of some diaphyllodinous species. *Nuytsia* 2(4): 200-219; Maslin, B.R. (2001) Acacia. *Flora of Australia* 11A: 558-562; Western Australian Herbarium (1998−) *FloraBase − The Western Australian Flora*. Department of Environment and Conservation. http://florabase.dec.wa.gov.au/.

Current status *Acacia vassalii* was declared to be Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in September 1987 and is ranked as Critically Endangered (CR) in WA under World Conservation Union (IUCN 1994) Red List criteria B1+2ce; C2a; D due to the severe fragmentation of populations, continuing decline in the area, extent and quality of habitat and the number of mature individuals. The species is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Endangered. The main threats to the species are land clearing, road, firebreak and rail maintenance, weed invasion, recreational activities, rubbish dumping, inappropriate fire regimes, insect galling, poor recruitment, competition from other plants, grazing and farming activities.

Description: *Acacia vassalii* is a shrub to 60 cm high which forms a low, dense cushion in open areas but is more diffuse and upright when shaded by other shrubs. The branches are felty at the apices but become hairless with age. The epidermis is grey with cracks that run the length of the branch, revealing smooth red bark underneath. The phyllodes are 4-8 mm long by 1 mm wide, and are slightly horizontally flattened with hooked tips. The flower heads are globular and yellow, and occur singly rather than in clusters. The pods are up to 2 cm long and 0.1 to 0.15 cm wide (Maslin 1978; Patrick and Brown 2001).

Habitat requirements: *Acacia vassalii* is known from a range of approximately 120 km between Wongan Hills, Moora and Watheroo. It occupies areas of brown sand and gravel over laterite or yellow sand in scrub or heath.

Habitat critical to the survival of the species, and important populations: *Acacia vassalii* is ranked in WA as Critically Endangered, and as such 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 *A. vassalii* 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 *Acacia vassalii* will also improve the status of associated native vegetation including five Declared Rare Flora (DRF) and nine Priority Flora.

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 plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation: A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register did not reveal any sites of Aboriginal significance within or adjacent to populations of *Acacia vassalii*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. Indigenous opportunity for future involvement in the implementation of the Recovery plan is included as an action in the plan.

Social and economic impact: The implementation of this plan may cause some economic impact through the loss of production farmland, land available for development and the cost of implementing recovery actions (i.e. weed control, fencing) for populations occurring on private property, and through the implementation of recovery actions (deterring access, controlling weeds and rabbits) for populations on land managed by Westnet Rail and Shires.

Affected interests: The protection of the species will have implications on Shire and private landholder operations, and WestNet Rail maintenance.

Evaluation of the Plan's Performance: The DEC in conjunction with the Moora District Threatened Flora Recovery Team (MDTFRT) and Central Wheatbelt District Threatened Flora Recovery Team (CWDTFRT) 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.

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. All stakeholders have been made aware of the existence of this species and its locations.
2. Declared Rare Flora (DRF) markers have been installed at Populations 3, 9, 13, 15, 16 and 17, and Subpopulations 1a, 1b, 2a, 2b, 2c, 2d, 2e, 5a and 10a
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to relevant Shires and other authorities.
4. Bollards were erected at Subpopulation 1b in March 2000 to protect plants from roadworks and road users.
5. The area containing Population 8 on private property was fenced by the landowners in 1982.
6. Bennett Environmental Consulting Pty Ltd was commissioned to undertake a Declared Rare and Priority Flora search of the proposed extension to the WestNet Rail line between Miling and Toodyay in 2003, resulting in 6 new populations being found.
7. New populations were located in 2008 through surveys conducted by a DEC volunteer in the Shire of Wongan-Ballidu.
8. Approximately 1159 seeds were collected from Populations 1 and 2 in November 1996, and 3,080 seeds in 1997. These are stored in DEC's Threatened Flora Seed Centre.
9. Propagation by cuttings, taken in 1995 and 1996, was undertaken at BGPA with limited success.
10. BGPA hold a small amount of seed collected in November 1996.
11. A double-sided information sheet, including a description of *Acacia vassalii*, its habitat, threats, recovery actions and photos, was printed and distributed to community members through local libraries and wildflower shows.
12. Staff from DEC's Moora and Central Wheatbelt Districts monitor populations annually where practicable.
13. The MDTFRT and CWDTFRT are overseeing the implementation of this plan and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

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

Recovery Criteria

Criteria for success: The number of populations has increased and/or the number of mature individuals has increased by ten percent or more over the term of the plan.
Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by ten percent or more over the term of the plan.

Recovery actions

1. Coordinate recovery actions
2. Install DRF markers
3. Conduct weed control
4. Ensure long-term protection of habitat
5. Undertake germination trials
6. Deter access
7. Monitor populations
8. Collect seed
9. Undertake rabbit control
10. Remove rubbish from Subpopulation 6a
11. Obtain biological and ecological information
12. Develop a translocation proposal
13. Develop and implement a fire management strategy
14. Undertake surveys
15. Map habitat critical to the survival of *Acacia vassalii*
16. Undertake liaison with land managers and indigenous communities
17. Promote awareness
18. Review this plan

1. BACKGROUND

History

The first known collection of *Acacia vassalii* was made from the Wongan Hills area by E.H. Ising in 1935 and a formal description published in 1978, the species being named in honour of the contemporary French botanist Dr Jacques Vassal. The species was then not seen until relocated in the Wongan Hills area in 1983. There are currently 17 known populations in the Wongan Hills, Moora and Coorow areas, together containing an estimated 2033 mature plants. The majority of the 17 populations contain fewer than forty plants. Most populations occur in disturbed sites on insecure tenure with only one population of 12 plants in a nature reserve. A number of populations within the townsite of Wongan Hills are surrounded by housing. These are threatened by further development.

Description

Acacia vassalii is a shrub to 60 cm tall which forms a low, dense cushion in open areas, but is more diffuse and upright when shaded by other shrubs. The branches are felty at the apices but become hairless with age. The epidermis is grey with cracks that run the length of the branch, revealing smooth red bark underneath. The phyllodes are 4-8 mm long by 1 mm wide, and are slightly horizontally flattened with hooked tips. The flower heads are globular and yellow, and occur singly rather than in clusters. The pods are up to 2 cm long and 0.1 to 0.15 cm wide (Maslin 1978; Patrick and Brown 2001).

Acacia vassalii is most closely related to *A. ericifolia* and *A. leptospermoides* but has hooked rather than blunt phyllodes (Maslin 2001).

Distribution and habitat

Acacia vassalii is known from 17 populations over a range of 120 km between Wongan Hills, Moora and Watheroo. Nine populations are found in DEC's Central Wheatbelt District and together comprise 357 plants (18%), while the other eight populations are in DEC's Moora District and comprise 1676 plants (82%). The species is found in scrub or heath in brown sand and gravel over laterite or yellow sand. Associated species include *Acacia microbotrya*, *Allocasuarina campestris*, *Banksia fraseri*, *B. carlinoides*, *Actinostrobus arenarius*, *A. pyramidalis*, *Daviesia hakeoides* subsp. *subnuda*, *Ecdeiocolea monostachya*, *Gastrolobium calycinum*, *Grevillea biformis*, *Grevillea eriostachya* and *Xylomelum angustifolium*.

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

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1a. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	DPI	School-site	DPI
1b. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
1c. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Non vested	UCL	
2a. South of Bindi Bindi	Moora	Moora	Shire of Moora	Road reserve	Shire of Moora
2b. South of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
2c. South of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
2d. South of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
2e. South of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
2f. South of Bindi Bindi	Moora	Moora	Shire of Moora	Road reserve	Shire of Moora
2g. South of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
3. SE of Moora	Moora	Moora	Shire of Moora	Road reserve	Shire of Moora
4. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	DPI	UCL	DPI
5a. NE of Watheroo	Moora	Moora	Shire of Moora	Road reserve	Shire of Moora
5b. NE of Watheroo	Moora	Moora	Freehold	Private Property	Landowners
5c. NE of Watheroo	Moora	Moora	Conservation Commission of	Conservation of Flora and Fauna	DEC

			WA		
6a. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Municipal Purposes	Shire of Wongan-Ballidu
6b. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Non vested	UCL	Shire of Wongan-Ballidu
6c. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
*6d. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Private	Private (cleared)
*6e. Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Private	Private (cleared)
7. East of Wongan Hills	Central Wheatbelt	Wongan-Ballidu	DPI	Government Requirements	DPI
8a. SE of Coorow	Moora	Moora	Freehold	Private Property	Landowners
8b. SE of Coorow	Moora	Moora	Shire of Moora	Road reserve	Shire of Moora
9. S of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
10a. S of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
10b. S of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
11a. S of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
11b. S of Bindi Bindi	Moora	Moora	Public Transport Authority	Rail reserve	WestNet Rail
12. N of Calingiri	Moora	Victoria Plains	Public Transport Authority	Rail reserve	WestNet Rail
13. E of Piawaning	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
14. E of Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
15. E of Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
16. E of Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
17. E of Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu
New. E of Wongan Hills	Central Wheatbelt	Wongan-Ballidu	Shire of Wongan-Ballidu	Road reserve	Shire of Wongan-Ballidu

Note: Populations in **bold text** are considered to be important populations. *Subpopulations 6d and 6e are thought extinct.

Biology and ecology

It is likely that *Acacia vassalii* plants are killed by fire, while germination of *Acacia* seed is often stimulated by fire (note: germination also depends on factors such as fire intensity and seed depth in the soil). Most plants in Population 2 occur in an area that had previously been burnt, supporting the hypothesis that *A. vassalii* requires fire or other disturbance to promote germination (Patrick and Brown 2001).

Galling of the flower heads of *Acacia vassalii* by the larvae of a wasp (*Perilampella* sp.) was first recorded in 1998 and was particularly noticeable at Population 1.

Seed collected in 1996 had a viability of approximately 10%. However, seed collected in 1997 had a viability of approximately 90%. Additional seed collections will shed further light on the general pattern of viable seed production, and whether action needs to be taken to address low seed production.

Threats

Acacia vassalii was declared to be Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in September 1987 and is ranked as Critically Endangered in WA under World Conservation Union (IUCN 1994) Red List criteria B1+2ce, C2a and D due to the severe fragmentation of populations, continuing decline in the area, extent and quality of habitat and the number of mature individuals. The species is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats to the species are clearing, road, firebreak and rail maintenance, weed invasion, recreational activities, rubbish

dumping, inappropriate fire regimes, insect galling, poor recruitment, competition from other plants, grazing and farming activities.

- **Clearing** of bushland for development is likely to be proposed at several sites where *Acacia vassalii* is found. Negotiations will occur between relevant parties at each site. As the species is listed as Declared Rare Flora under the Western Australian *Wildlife Conservation Act 1950*, no *A. vassalii* plants may be taken or damaged without Ministerial approval.
- **Road and rail maintenance** threatens all road and rail reserve populations. Threats include grading, chemical spraying, construction of drainage channels and the mowing of roadside vegetation. Several of these actions also encourage weed invasion.
- **Habitat degradation through weed invasion** is a potential threat to populations of *Acacia vassalii*, although most remain largely weed-free at present.
- **Recreational activities** are a potential threat to Population 4 and Subpopulations 1a, 1c and 6b near the Wongan Hills town site. Pedestrian and vehicular traffic (off-road motorbikes) are known to occur near some populations.
- **Rubbish dumping**, including garden refuse and other material into bushland is a possible threat to Subpopulation 6a.
- **Inappropriate fire regimes** may affect the viability of populations. Seeds of *Acacia vassalii* are thought to germinate following fire and the soil seed bank would rapidly be depleted if fires recur before plants reach maturity. Conversely, populations will senesce in the absence of fire. An additional consideration is the role of fire in facilitating weed invasion. Many populations have weeds currently restricted to the edges of the habitat but they are likely to invade post-fire.
- **Galling** by the larvae of a wasp (*Perilampella* sp.) is present on the flower heads of many plants, particularly at Population 1. Research is needed to ascertain whether the flower head galling is a serious impediment to seed production.
- **Poor recruitment** is apparent at most populations with no seedlings recently observed. This seems most likely to be due to an absence of germination triggers such as fire.
- **Competition** from *Cassytha* sp. (dodder) is a threat to Subpopulation 1c as it is growing over and choking adult plants of *Acacia vassalii*.
- **Grazing** by rabbits (*Oryctolagus cuniculus*) is a threat to Population 13 and Subpopulation 8b. Grazing would have an impact on the establishment of young plants of *A. vassalii* thereby limiting natural recruitment.
- **Farming activities** including spray drift are a threat to Populations 14, 15, 16 and 17. Herbicide and fertilizer applied on properties adjacent to these populations have the potential to drift onto road reserves.

The intent of this plan is to provide actions that will deal with immediate threats to *Acacia vassalii*. Although climate change may have a long-term effect on the species, actions taken directly to prevent the impact of climate change are beyond the scope of this plan.

Table 2. Summary of population information and threats

Pop. No. & Location	Land Status	Year / No. of plants	Current Condition	Current and potential threats
1a. Wongan Hills	School reserve	1995 10 1998 26 2001 26 2004 2	Healthy	Clearing, recreational activities (including off-road motorbikes), insect galling, fire
1b. Wongan Hills	Shire road reserve	1996 5 1998 5 (1) 1999 5 2001 2 2004 5 [1 dead]	Healthy	Roadworks, weeds, insect galling, fire
1c. Wongan Hills	Unallocated Crown Land (UCL)	1998 9 2001 9 2004 7	Healthy	Clearing, roadworks, recreational activities, insect galling, dodder
2a. South of Bindi Bindi	Shire road reserve	1991 ~100* 2000 380+* 2008 10	Moderate	Roadworks, weeds, fire
2b. South of Bindi Bindi	Railway	1991 ~100*	Moderate	Rail maintenance, weeds, fire

	reserve	2000 380+* 2008 280		
2c. South of Bindi Bindi	Railway reserve	2003 2 2008 623	Moderate	Rail maintenance, weeds, fire
2d. South of Bindi Bindi	Railway reserve	2003 53 2008 316	Moderate	Rail maintenance, weeds, fire
2e. South of Bindi Bindi	Railway reserve	2003 6 2008 273	Moderate	Rail and firebreak maintenance, weeds, fire
2f. South of Bindi Bindi	Shire road reserve	2003 2 2008 10	Moderate	Roadworks, weeds, fire
2g. South of Bindi Bindi	Railway reserve	2003 3		
3. SE of Moora	Shire road reserve	1987 10	Unknown	Not found recently
4. Wongan Hills	UCL	1996 2 1998 1 2004 0		Clearing, recreational activities, weeds, fire
5a. NE of Watheroo	Shire road reserve	2000 33 2008 34	Poor	Roadworks, weeds
5b. NE of Watheroo	Private property	2000 6	Healthy	Weeds
5c. NE of Watheroo	Nature Reserve	2008 12	Poor	Firebreak maintenance, weeds
6a. Wongan Hills	Private property	2000 2 2001 0 2004 300*	Disturbed – Burnt April 2001	Clearing, weeds, rubbish dumping
6b. Wongan Hills	UCL	2000 9 2004 300*	Healthy	Possibly recreational activities (adjacent to housing)
6c. Wongan Hills	Shire road reserve	2000 2 2001 2 2004 300*	Healthy	Roadworks
6d. Wongan Hills	Private property	2000 1 2001 1 2004 1 2005 (11)	Cleared	Cleared
6e. Wongan Hills	Private property	2000 11 2004 9	Cleared	Cleared
7. East of Wongan Hills	Government reserve	2000 36 2004 25	Healthy	Weeds, recreational activities, roadworks
8a. SE of Coorow	Private property	2000 11 2003 11 2008 5	Poor	Weeds
8b. SE of Coorow	Shire road reserve	2008 5	Poor	Roadworks, weeds, rabbits
9. S of Bindi Bindi	Railway reserve	2003 14 2008 47	Poor	Rail maintenance, weeds
10a. S of Bindi Bindi	Railway reserve	2003 115 2008 28	Moderate	Rail maintenance, weeds, recreational activities (off-road motorbikes)
10b. S of Bindi Bindi	Railway reserve	2003 1	Unknown	Unknown
11a. S of Bindi Bindi	Railway reserve	2003 9	Unknown	Unknown
11b. S of Bindi Bindi	Railway reserve	2003 1	Unknown	Unknown
12. N of Calingiri	Railway reserve	2003 3	Unknown	Unknown
13. E of Piawaning	Shire road reserve	2005 11	Disturbed	Roadworks, weeds, grazing (rabbits)
14. E of Wongan Hills	Shire road reserve	2008 [1 dead]	Dead	Farming activities (herbicide drift)
15. E of Wongan Hills	Shire road reserve	2008 1	Disturbed	Roadworks, weeds, farming activities (herbicide drift)
16. E of Wongan Hills	Shire road reserve	2008 4	Disturbed	Roadworks, weeds, farming activities (herbicide drift)
17. E of Wongan Hills	Shire road reserve	2008 2	Disturbed	Roadworks, weeds, farming activities (herbicide drift)
New. E of Wongan Hills	Shire road reserve	2009 5	Disturbed	Roadworks, weeds, farming activities (herbicide drift)

Note: * = total for both subpopulations, ( ) = number of seedlings.

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 vassalii* may require assessment.

Actions that could result in any of the following may potentially result in a significant impact on 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 populations

This species is protected under the *Environment Protection and Biodiversity Conservation Act 1999* and by the Western Australian *Wildlife Conservation Act 1950*.

Habitat critical to the survival of the species, and important populations

Acacia vassalii is ranked as Critically Endangered in WA and as such it is considered that all known habitat for wild populations is habitat critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *A. vassalii* 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 *Acacia vassalii* will also improve the status of associated native vegetation, including five Declared Rare Flora (DRF) and nine Priority flora that occur within 500 m of *A. vassalii* and which are listed in the table below:

Table 3. Conservation–listed flora species occurring within 500m of *Acacia vassalii*

Species name	Conservation Status (WA)	Conservation Status (EPBC Act)
Gastrolobium hamulosum	Critically Endangered	Endangered
Acacia cochlocarpa subsp. *velutinosa*	Critically Endangered	Critically Endangered
Daviesia dielsii	Endangered	Endangered
Gastrolobium appressum	Endangered	Vulnerable
Grevillea bracteosa subsp. *bracteosa*	Endangered	-
Commersonia sp. Bindoon	Priority 1	-
Acacia arcuatilis	Priority 2	-
Acacia drewiana subsp. *minor*	Priority 2	-
Eucalyptus macrocarpa x *pyriformis*	Priority 3	-
Lechenaultia juncea	Priority 3	-
Leucopogon sp. Bungulla	Priority 3	-
Verticordia huegelii var. *tridens*	Priority 3	-
Banksia bella	Priority 4	-
Daviesia spiralis	Priority 4	-

For a description of the Priority categories see Smith (2010).

Acacia vassalii does not occur within or adjacent to any known Threatened or Priority Ecological Community (TEC/PEC).

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. This plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation

A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register did not reveal any sites of Aboriginal significance within or adjacent to populations of *Acacia vassalii*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. Indigenous opportunity for future involvement in the implementation of the Recovery plan is included as an action in the plan.

Social and economic impacts

Implementation of this plan may result in some economic impact through the loss of production farmland and land available for development for populations on private property, and through the implementation of recovery actions for populations on land managed by Westnet Rail and local Shires.

Affected interests

The protection of the species may potentially impact on Shire operations, WestNet Rail maintenance activities and private landholder activities.

Evaluation of the Plan's Performance

The DEC in conjunction with the Moora District Threatened Flora Recovery Team (MDTFRT) and Central Wheatbelt District Threatened Flora Recovery Team (CWDTFRT) 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

Objective

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

Criteria for success: The number of populations has increased and/or the number of mature individuals has increased by ten percent or more over the term of the plan.
Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by ten percent or more over the term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

All stakeholders have been made aware of the existence of this species and its locations. These notifications detail the current status of the species as Declared Rare Flora (DRF) and the associated legal obligations regarding its protection.

Declared Rare Flora (DRF) markers have been installed at Populations 9, 13, 15, 16, 17 and Subpopulations 1a, 1b, 2a, 2b, 2c, 2d, 2e, 3, 5a and 10a. These alert people working in the vicinity to the presence of DRF and the need to avoid work that may damage the species or its habitat. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to relevant Shires and other organisations.

Bollards were erected at Subpopulation 1b in March 2000 to protect it from road works and road users.

The area on private property containing Population 8 was fenced by the landowners in 1982.

Bennett Environmental Consulting Pty Ltd was commissioned to undertake a Declared Rare and Priority Flora search of the proposed extension to the WestNet Rail line between Miling and Toodyay in 2003. As a result of this survey six new populations were discovered.

During surveys conducted by a DEC volunteer in 2008 new populations were located in the Shire of Wongan-Ballidu.

Approximately 1159 seeds were collected from Populations 1 and 2 in 1996 and a further 3,080 seeds collected from the same populations in 1997. Seeds are stored in DEC's Threatened Flora Seed Centre (TFSC) at –18°C. Germinants resulting from TFSC viability trials were delivered to Botanic Gardens and Parks Authority (BGPA) nursery but none survived.

Cuttings taken in 1995 and 1996 by the BGPA were propagated with limited success. Out of 363 cuttings treated, only 23 (6%) developed roots. There are currently three *Acacia vassalii* plants in BGPA's Nursery, representing two genetic lines. Two plants are now 15 years old and the third is 11 years old. BGPA also hold a small amount of seed collected in November 1996.

A double-sided information sheet with a description of *Acacia vassalii*, its habitat, threats, recovery actions and photos, was printed and distributed to Shires and community members. It is hoped that this will result in the discovery of new populations.

Staff from DEC's Moora and Central Wheatbelt Districts monitor populations annually if possible.

The MDTFRT and CWDTFRT are overseeing the implementation of this plan and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Future recovery actions

Where recovery actions occur on lands other than those managed by DEC, permission has been or will be sought prior to actions being undertaken. The following recovery actions are generally in order of descending priority, influenced by their timing over the life of the plan. However this should not constrain addressing any of the actions if funding is available and other opportunities arise.

1. Coordinate recovery actions

The MDTFRT and CWDTFRT will oversee the implementation of the recovery actions for *Acacia vassalii* and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $6,000 per year

2. Install DRF markers

DRF markers are required at Subpopulations 2f and 8b and need to be replaced at Subpopulation 1b.

Action: Install DRF markers
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $3,000 in year 1

3. Conduct weed control

Weeds and a *Cassytha* sp. (dodder) are potential threats to some populations. The following actions will be implemented:

1. Determine which weeds are present.
2. Select appropriate technique; herbicide, mowing or hand weeding.
3. Control invasive weeds and *Cassytha* sp. by hand removal and/or spot spraying.
4. Monitor the success of the treatment on weed death and the tolerance of *Acacia vassalii* and associated native plant species to the treatment.
5. Report on the method and success of the treatment and its effect on *Acacia vassalii* plants and associated species.

Action: Conduct weed control
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $6,000 per year, as required

4. Ensure long-term protection of habitat

The conservation status of land that supports Population 7 and Subpopulations 1a, 1c, 4, 6a and 6b will be reviewed and the possibility of purchase, a change of land tenure and/or establishment of nature conservation covenants investigated.

Action: Ensure long-term protection of habitat
Responsibility: DEC (Moora and Central Wheatbelt Districts, Land Unit); Department of Planning (DoP); Department of Mines and Petroleum (DMP), through the MDTFRT and CWDTFRT
Cost: $3,000 per year

5. Undertake germination trials

Soil disturbance or fire may be the most effective means of germinating *Acacia vassalii* seed in the wild. Different techniques should be investigated (i.e. soil disturbance, fire, smoke water), to determine the most appropriate method. Records will need to be maintained for future research. Any disturbance trials will need to be undertaken in conjunction with weed control.

Action: Undertake germination trials
Responsibility: DEC (Science Division, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $7,000 in years 1 and 3, $2,000 in years 2, 4 and 5

6. Deter access

To deter access to Population 4 and Subpopulations 1a, 1c and 6b, barriers such as bollards or fencing may be needed. Signs indicating the significance of the area may also be required.

Action: Deter access
Responsibility: DEC (Central Wheatbelt District), Shire of Wongan-Ballidu, through the CWDTFRT
Cost: $5,000 in years 1 and 2

7. Monitor populations

Monitoring of factors such as weed invasion, habitat degradation, hydrology (including salinity), population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is required. Populations will be inspected and an accurate location recorded. Populations 2, 10 and 11 require re-survey to determine if they are actually one population.

Action: Monitor populations
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $10,000 per year

8. Collect seed

Further seed collections are required.

Action: Collect seed
Responsibility: DEC (Moora and Central Wheatbelt Districts, TFSC), BGPA through the MDTFRT and CWDTFRT
Cost: $5,000 per year

9. Undertake rabbit control

The level of threat at Population 13 and Subpopulation 8b posed by rabbits may vary from year to year with conditions and numbers. When monitoring ascertains the threat is high, control measures may be required. Control should be undertaken in summer months when less green feed is available as an alternative food source.

Action: Undertake rabbit control
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT; relevant land managers
Cost: $7,000 in years 1, 3 and 5

10. Remove rubbish from Subpopulation 6a

Garden waste and other rubbish has been dumped at Population 6a. Rubbish removal will need to be carried out with careful supervision from DEC District staff to ensure that disturbance to surrounding plants is minimized. This should be done during summer to minimize soil disturbance and avoid spreading disease. Signs to warn the public about the illegality of rubbish dumping will be erected where needed.

Action: Remove rubbish from Subpopulation 6a
Responsibility: DEC (Central Wheatbelt District) through the CWDTFRT
Cost: $5,000 in the first year

11. Obtain biological and ecological information

Knowledge of the biology and ecology of the species will provide a scientific basis for management of *Acacia vassalii* in the wild. Galling by the larvae of a wasp (*Perilampella* sp.) is present on the flower heads of many plants, particularly at Population 1 but it is unknown if this poses a serious threat to seed production. Investigations will ideally include:

1. Study of the soil seed bank dynamics and the role of various factors including disturbance, competition, drought, inundation and grazing in recruitment and seedling survival.
2. Ascertain whether the flower head galling is a serious impediment to seed production.
3. Determination of reproductive strategies, phenology and seasonal growth.
4. Investigation of reproductive sucess and pollination biology.
5. Investigation of population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $10,000 per year

12. Develop a translocation proposal

Translocation may be deemed desirable for the conservation of this species if surveys fail to locate new populations of adequate size on secure land tenure. 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 DEC's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna* (CALM 1995). Translocations should meet the standards set in the Australian Network for Plant Conservation translocation

guidelines (Vallee et al 2004). All translocation proposals require endorsement by DEC's Director of Nature Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action: Develop a translocation proposal
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $5,000 in year 4

13. Develop and implement a fire management strategy

If possible, fire will be prevented from occurring in the habitat of populations except where it is being used experimentally as a recovery tool. A fire response strategy will be developed that recommends fire frequency, intensity, season, and control measures.

Action: Develop a fire management strategy
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $10,000 in first year and $2,000 in subsequent years

14. Undertake surveys

It is recommended that areas of potential habitat be surveyed for the presence of *Acacia vassalii* during its flowering period between June and August, with specific focus on secure land tenures.

All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and reduce duplicate surveys. Where possible, volunteers from the local community, Landcare groups, wildflower societies and naturalists clubs will be invited to become involved.

Action: Undertake surveys
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $5,000 in years 1, 3 and 5

15. Map habitat critical to the survival of *Acacia vassalii*

Spatial data relating to habitat critical to the survival of *Acacia vassalii* needs to be determined. Although this is alluded to in Section 1, it has not yet been fully mapped and will be addressed under this action. 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 *Acacia vassalii*
Responsibility: DEC (SCB, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $6,000 in year 2

16. Undertake liaison with land managers and indigenous communities

Staff from DEC's Moora and Central Wheatbelt Districts will liaise with appropriate land managers to ensure that populations of *Acacia vassalii* are not accidentally damaged or destroyed. Indigenous consultation will take place to determine if there are any issues or interests in areas that are habitat for *A. vassalii*.

Action: Undertake liaison with land managers and indigenous communities
Responsibility: DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $2,000 per year

17. Promote awareness

The importance of biodiversity conservation and the protection of *Acacia vassalii* will be promoted to the public. This will be achieved through an information campaign using local 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: DEC (Moora and Central Wheatbelt Districts, SCB, Strategic Development and Corporate Affairs Division) through the MDTFRT and CWDTFRT
Cost: $4,000 in year 1 and $2,000 in years 2-5

18. Review this plan

If *Acacia vassalii* is still ranked as Critically Endangered 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
Responsibility: DEC (SCB, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT
Cost: $3,000 in year 5

Table 4. Summary of Recovery Actions

Recovery Action	Priority	Responsibility	Completion Date
Coordinate recovery actions	High	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Ongoing
Install DRF markers	High	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	2011
Conduct weed control	High	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Ongoing
Ensure long-term protection of habitat	High	DEC (Moora and Central Wheatbelt Districts, Land Acquisition Branch); Department of Planning and Infrastructure (DPI); Department of Mines and Petroleum (DOMP), through the MDTFRT and CWDTFRT	Ongoing
Undertake germination trials	High	DEC (Science Division, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	2016
Deter access	High	DEC (Central Wheatbelt District), Shire of Wongan-Ballidu, through the CWDTFRT	2012
Monitor populations	High	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Ongoing
Collect seed	High	DEC (Moora and Central Wheatbelt Districts, TFSC), BGPA through the MDTFRT and CWDTFRT	2016
Undertake rabbit control	Medium	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT; relevant land managers	Ongoing
Remove rubbish from Subpopulation 6a	Medium	DEC (Central Wheatbelt District) through the CWDTFRT	2012
Obtain biological and ecological information	Medium	DEC (Science Division, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	2016
Develop a translocation proposal	Medium	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Ongoing
Develop and implement a fire management strategy	Medium	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Developed by 2012 with implementation ongoing
Undertake surveys	Medium	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Ongoing
Map habitat critical to the survival of *Acacia vassalii*	Medium	DEC (SCB, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	2012
Undertake liaison with land managers and indigenous communities	Medium	DEC (Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	Ongoing
Promote awareness	Medium	DEC (Moora and Central Wheatbelt Districts, SCB, Strategic Development and Corporate Affairs Division) through the MDTFRT and	Ongoing

		CWDTFRT	
Review this plan	Medium	DEC (SCB, Moora and Central Wheatbelt Districts) through the MDTFRT and CWDTFRT	2016

4. TERM OF PLAN

This plan will operate from February 2011 to January 2016 but will remain in force until withdrawn or replaced. If the species is still ranked Critically Endangered after five years, the need for further recovery actions will be determined.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Acacia vassalii

Maslin, B.R. (1978) Studies in the genus *Acacia* (Mimosaceae) - 7: The taxonomy of some diaphyllodinous species. *Nuytsia* 2(4), 200-219.

Shrub (further details unknown); *branches* terete, very obscurely ribbed, densely tomentose towards apices but becoming glabrous with age; *epidermis* grey, finely longitudinally fissured (exposing a smooth red bark beneath). *Stipules* deciduous with age, very narrowly triangular, 1-2 mm long, scarious, ciliolate, otherwise glabrous, light brown and connate near base when very young (ie on new shoots) but becoming darker and separated (laterally displaced) with age. *Phyllodes* spreading to ascending, rather distant, slightly horizontally flattened (i.e. diaphyllodinous), ± plano-convex in cross section, sometimes medially sulcate above when dry, narrowly oblong but tapered towards base in plane view, 4-8 mm long, ca. 1 mm wide, straight or gently arched upwards and always prominently uncinate (thus sometimes producing a shallowly sigmoid outline), finely puberulous to glabrescent, obscurely finely wrinkled when dry; *nervature* very obscure, *principal nerves* 3 (2 marginal, 1 central abaxially), nerveless on adaxial surface; *apex* rostellate, apiculum ca. 0.3 mm long and light brown; *pulvinus* ca. 0.5 mm long, orange. *Gland* (often absent) situated on distal 1/3 of upper surface of phyllode, circular, 0.2 mm diam., lip not raised. *Inflorescences* simple, 1 per node; *peduncles* 3-4.5 mm long, glabrous or glabrescent; *basal peduncular bracts* persistent, solitary, triangular to oblong, concave, slightly

curved, ± 0.5 mm long, ciliolate, sometimes sparsely puberulous abaxially; *flower heads* yellow, globular, with 15-16 flowers. *Bracteoles* spathulate, 0.5 mm long; claws linear, ± equalling laminae in length; laminae ovate, inflexed, slightly concave, puberulous abaxially. *Flowers* 5-merous; *calyx* ± 1/3 length of corolla, divided for 1/4 its length into ± oblong ciliolate lobes which are slightly inflexed at apex, tube very obscurely 5-nerved a little angular when dry and ± sparsely puberulous; *petals* 1 mm long, connate for 2/3 their length, glabrous, 1-nerved; ovary sessile, glabrous. *Legumes* and seeds not seen.