

INTERIM RECOVERY PLAN NO. 20

WONGAN GULLY WATTLE
(ACACIA PHARANGITES)
INTERIM RECOVERY PLAN
1999-2002

by

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Photograph: S.D. Hopper

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Natural Heritage Trust
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Department of Conservation and Land
Management

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.

IRPs 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.

CALM is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from April 1999 to March 2002 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

This IRP was approved by the Director of Nature Conservation on 1 April 1999. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at April 1999.

SUMMARY

Scientific Name: *Acacia pharangites*
Common Name: Wongan Gully Wattle
Family: Mimosaceae
Flowering period: August - September
CALM Region: Wheatbelt
CALM District: Merredin
Shire: Wongan-Ballidu
Recovery team: Merredin District Threatened Flora Recovery Team (MDTFRT).

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; Hopper, S., Van Leeuwen, S., Brown, A. and Patrick, S. (1990). *Western Australia's Endangered Flora*. Department of Conservation and Land Management, Western Australia; Maslin, B.R. (1982). Studies in the genus *Acacia* (Leguminosae: Mimosoideae) No. 10 - *Acacia* species of the Wongan Hills, Western Australia. *Nuytsia* 4(1): 29-46.

Current Status: *Acacia pharangites* was Declared as Rare Flora in September 1986 and ranked as Critically Endangered in November 1998 under World Conservation Union (IUCN) Red List Criteria A1, D (IUCN 1994). It is not closely related to any other *Acacia* species. The number of individual *Acacia pharangites* plants has dropped from 329 in 1980 to 40 in 1998. The main threats are inappropriate fire, seed predation, grazing, lack of recruitment and limited genetic diversity.

Habitat requirements: The species is geographically restricted (known from a single gully on a unique soil of small rocks derived from greenstone) in a habitat that is unknown elsewhere in the Wongan Hills. As this habitat is relatively undisturbed it is likely that the species still occupies its full geographic range (Maslin, 1988) and is therefore naturally rare. The community in which the species grows is considered threatened due to its restricted nature and inappropriate fire regimes.

Existing recovery actions: The following recovery actions have been or are currently being implemented:

1. All appropriate land managers have been made aware of the threatened nature of this species and its location.
2. Seed was collected in November 1997 and again in 1998 by CALM's Threatened Flora Seed Centre (TFSC).
3. Kings Park and Botanic Garden (KPBG) collected seed in August and November 1996.
4. KPBG hold 13 plants in its nursery frames.
5. Staff from CALM's Merredin District office are monitoring the single known population.

IRP Objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain viable *in situ* populations to ensure the long-term preservation of the species in the wild.

Recovery criteria

Criterion for success: The number of individuals within populations and/or the number of populations have increased.

Criterion for failure: The number of individuals within populations and/or the number of populations have decreased.

Future recovery actions

Conduct further surveys.	Promote awareness.
Monitor population.	Develop a translocation proposal.
Develop and implement fire and disturbance trials.	Determine extent and impact of grazing.
Determine extent and impact of seed predation.	Obtain biological and ecological information.
Develop a fire management strategy.	Write Recovery Plan.
Collect seed	

1. BACKGROUND

History

B.R. Maslin (Western Australian Herbarium, Department of Conservation and Land Management (CALM) first collected *Acacia pharangites* in 1976 from private property at the base of Mt O'Brien, west of Wongan Hills. This population was surveyed in 1980 and 329 plants were recorded; the population has subsequently declined to 38 plants. A sub-population was found in the same area in 1988, and currently consists of two plants. To date, there have been eight collections, all of which are lodged at the WA Herbarium. Seed and cutting material has also been collected for this species and several plants are now in cultivation at CALM's WA Herbarium and at Kings Park and Botanic Garden (KPBG).

Description

Acacia pharangites is an open, somewhat spindly shrub to 4 m tall with grey, slightly roughened bark and smooth, terete ascending phyllodes 1.5 to 4 cm long. Its golden flower heads, which appear in the axils between the stem and phyllodes, are slightly oblong in shape. The species is distinguished by the terete, seven veined phyllodes, which are concentrated towards the ends of branches, and its stems which are pockmarked with scars of phyllodes that have died and fallen.

Distribution and Habitat

Acacia pharangites is endemic to the Wongan Hills where it is known from a single population, consisting of two sub populations on Mt O'Brien (TV Tower Hill). It is restricted to sheltered gullies, mainly growing in rocky red-brown clay, flanking seasonally dry creeks. Plants are also found in grey sand in the creek beds themselves. This soil type, comprising of small stones derived from greenstone, is not known from elsewhere in the hills. This site is particularly difficult to survey due to the density of the vegetation and the steepness of the terrain and this may account for some of the variations in the number of plants recorded during different years.

Acacia pharangites forms part of a dense shrub layer to 5 m tall with *Allocasuarina campestris*, *Calothamnus asper* and *Melaleuca radula* over other *Acacia* species, including *A. acuminata* and *A. collina*. This community is considered threatened due to its restricted nature.

Biology and ecology

While the biology of many *Acacia* species is well researched, the biology of *A. pharangites* is poorly known. Field research suggests that the single known population is reaching senescence. As is the case for many other *Acacia* species, *A. pharangites* probably requires disturbance (such as fire) to germinate soil-stored seed and, while the site remains undisturbed, the population will continue to age and decline.

It is presumed that the species is insect pollinated, as are many other *Acacia* species (Rye 1980) but there is currently no supportive field evidence. Plants produce abundant fruit, with up to six seeds per pod. Some minor seed predation has been observed but not enough to prevent a large amount of seed being stored in the soil. However, no seedlings have been located. This indicates that the factor limiting regeneration is occurring after seed set.

Threats

This species is ranked as Critically Endangered under World Conservation Union (IUCN) Red List Criterion A1, D (IUCN 1994) due to there being only a single, small population in a restricted habitat, with plant numbers in serious decline. The main threats are fire, seed predation, grazing, lack of recruitment and limited genetic diversity.

- **Inappropriate fire regimes** have adversely affected the viability of the population. Seeds of *A. pharangites* probably germinate following fire and, given this, the recent lack of fire has resulted in little or no recruitment.

- **Poor genetic diversity** may result from the current rapid decline in plant numbers. There are now just 40 adult plants in the known population and this represents an extremely limited gene pool (although there may be additional genetic variation in the soil-stored seed bank). Genetic diversity is needed so that a species has the ability to adapt to changes in its environment. Low genetic diversity would lower this capacity.
- **Senescence**, due there being no natural recruitment of *A. pharangites*, is having a dramatic effect on the population. Mature plants are dying and if recruitment does not occur soon there will be no extant plants in the wild.
- **Predation of seed** is having a moderate effect on the population. Field observations in 1998 show that predation is occurring at variable levels throughout the population, ranging from a 'high incidence on some plants to very few seed being predated on others (*A. Cochrane*¹ personal communication). To date, the extent of this threat and the impact on the survival of the species is unknown.
- **Grazing** by an unidentified herbivore has had a minor impact on the population in the past when new shoot tips appeared damaged. To date, the extent of this threat and the impact on the survival of the species are unknown.

Summary of population information and threats

Pop. No & Location.	Land Status	Year/No. plants	Condition	Threats
1A. Wongan Hills	Private property	1980 329	Undisturbed	Grazing of the tips of leaves observed, some seed predation, plants reaching senescence
		1992 7		
		1998 36		
1B. Wongan Hills	Private property	1988 4	Undisturbed	Plants reaching senescence
		1992 4		
		1998 2		

2. RECOVERY OBJECTIVE AND CRITERIA

Objective

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

Criterion for success: The number of individuals within the population and/or the number of populations have increased.

Criterion for failure: The number of individuals within the population and/or the number of populations have decreased.

3. RECOVERY ACTIONS

Existing recovery actions

- Land managers have been made aware of the threatened nature of this species and its location.
- Some 1800 seeds were collected in November 1997 and November 1998 and stored in CALM's Threatened Flora Seed Centre (TFSC). An initial germination rate of 80% was recorded on the seed collected in 1997, which was one test of five seeds.
- KPBG collected approximately 90 g of seed in August and November 1996.
- Thirteen plants raised from seed collected by are held in KPBG nursery frames.
- The Merredin District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive.
- CALM staff from the Merredin District Office are regularly monitoring the population

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken.

¹ Anne Cochrane, Western Australian Herbarium, CALM

1. Conduct further surveys

The known population will be resurveyed to ascertain accurate boundaries and ensure that no plants have been missed during previous surveys. This will be done during the species' flowering period, which is between August and November, with assistance from local naturalists. This action is essential as the terrain in which the species occurs is particularly difficult to survey and an accurate map showing where each plant is located is needed for monitoring and further management.

It is suggested that this be done in conjunction with surveying other areas of suitable habitat within the shire, and should include appropriate habitat on private land. Volunteers from the local community, wildflower societies and naturalist clubs could be involved in surveys supervised by CALM staff.

Action: Conduct further surveys
Responsibility: CALM (Merredin District) through the MDTFRT
Cost: \$1,600 per year.

2. Monitor population

Monitoring of factors such as weed encroachment, habitat degradation, population stability (expansion or decline), pollination activity, seed production, recruitment, and longevity is essential.

The population will be inspected annually.

Action: Monitor population
Responsibility: CALM (Merredin District) through the MDTFRT
Cost: \$500 per year.

3. Develop and implement fire and disturbance trials

CALM Merredin District will, in consultation with private landowners and the Wongan Hills Shire, develop and implement burn and disturbance trials to stimulate the germination of soil stored seed. Attention will be given to each of the following to ensure maximum recruitment but at the same time maintaining the integrity of the population:

- a) burning discrete dead plants
- b) raking of the soil below dead plants
- c) scarification of the soil around dead plants.

Care will be taken to avoid stimulating competition with existing *A. pharangites* plants. The results of all trials will be monitored regularly and, if successful, a larger scale operation undertaken (see 5).

Action: Develop and implement fire and disturbance trials
Responsibility: CALM (CALMScience, Merredin District) through the MDTFRT
Cost: see 10 - Obtain biological and ecological information.

4. Determine extent and impact of seed predation

To date it the extent and impact of predation of seed on the survival of *A. pharangites* is not known. It is recommended that research be undertaken to ascertain this.

Action: Determine extent and impact of seed predation
Responsibility: CALM (CALMScience, Merredin District) through the MDTFRT
Cost: see 10 - Obtain biological and ecological information.

5. Develop a fire management strategy

Little is known about the effects of fire on this species (see under biology and ecology), however it is highly likely that the species requires occasional fire to stimulate germination of soil stored seed.

CALM's Merredin District, in consultation with relevant authorities, will develop a fire management strategy.

Action: Develop a fire management strategy
Responsibility: CALM (Merredin District) through the MDTFRT, and relevant authorities
Cost: \$2,900 once, in the first year.

6. Collect seed

Preservation of germplasm is essential to guard against extinction if the wild population is lost. Seed collections are also needed to propagate plants for translocations (see 8). Some seed of *A. pharangites* is currently held in CALM's TFSC and at KPBG. Further collections from as many plants as possible will be made and lodged in the TFSC and at KPBG.

Action: Collect seed
Responsibility: CALM (CALMScience, Merredin District) through the MDTFRT
Cost: \$3,100 twice, in years 1 and 3.

7. Promote awareness

The importance of biodiversity conservation and the protection of the Critically Endangered *Acacia pharangites* will be promoted to the public. This will be achieved through an information campaign using the local print and electronic media and by setting up poster displays. This is especially important as there is only one known population of the species and increased awareness may result in the discovery of others.

An information sheet, which includes a description of the plant, its habitat type, threats, management actions and photos will be produced. The preparation of a poster illustrating all Critically Endangered flora species in the District is also recommended. Formal links with local naturalist groups and interested individuals should also be encouraged.

Action: Promote awareness
Responsibility: CALM (Merredin District, Corporate Relations) through the MDTFRT
Cost: \$1,300 per year.

8. Develop a translocation proposal

Background information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No 29 *Translocation of Threatened Flora and Fauna*. Translocation is considered as desirable for the conservation of a species if populations are in rapid decline. It is recommended that restocking the existing population and translocation to a more secure site be investigated with the former given priority.

Although translocations are generally undertaken under full Recovery Plans, in this case it is clearly vital to commence this course of action before a full Recovery Plan is written as it is possible to develop translocation proposals and start growing plants within the timeframe of an Interim Recovery Plan. This will be coordinated by the MDTFRT. All translocation proposals require endorsement by the Director of Nature Conservation.

Action: Develop a translocation proposal
Responsibility: CALM (Merredin District) through the MDTFRT and KPBG
Cost: \$1,700 once, in the third year.

9. Determine extent and impact of grazing

To date the extent and impact of grazing on the survival of *A. pharangites* are not known. It is recommended that trials are developed and implemented to ascertain the effect of grazing and therefore aid in future management actions.

Action: Determine extent and impact of grazing
Responsibility: CALM (CALMScience, Merredin District) through the MDTFRT
Cost: see 10 - Obtain biological and ecological information.

10. Obtain biological and ecological information

Research designed to increase understanding of the biology of the species will provide a scientific base for management of *A. pharangites* in the wild. Research will include:

1. Response of *A. pharangites* and habitat to fire.
2. Role of disturbance in regeneration.
3. Pollination biology and seed set.
4. Size and viability of soil seed bank.
5. Level of invertebrate grazing or removal of seed.
6. Seed germination requirements of *A. pharangites*.
7. Factors determining level of flower and fruit abortion.
8. Longevity of plants, and time taken to reach maturity.

Action: Obtain biological and ecological information
Responsibility: CALM (CALMScience, Merredin District) through the MDTFRT
Cost: \$9,100 per year.

11. Write a full Recovery Plan

At the end of the three-year term of this Interim Recovery Plan, the need for further recovery will be assessed. If the species is still ranked Critically Endangered a full Recovery Plan will be prepared with the benefit of knowledge gained over the period of this Interim Recovery Plan.

Action: Write a full Recovery Plan
Responsibility: CALM (District and WATSCU) through the MDTFRT
Cost: \$17,200 once, in the third year.

4. TERM OF PLAN

This Interim Recovery Plan will operate from April 1999 to March 2002 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

5. ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this Interim Recovery Plan:

Mr. Alex Agafonoff	Conservation Officer, CALM Merredin District
Ms. Anne Cochrane	Manager, CALM Threatened Flora Seed Centre
Ms. Sheila Hamilton-Brown	Project Officer, Communities, WATSCU, CALM
Ms. Sophie Juskiewicz	Propagator, Kings Park and Botanic Garden
Ms. Gillian Stack	Project Officer, WATSCU, CALM

We would like to thank the staff of the W.A. Herbarium for allowing us access to the Herbarium database and specimen information, and the staff of CALM's Wildlife Branch for their invaluable assistance.

6. REFERENCES

- Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia.
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- Coates, A. (1988). *Vegetation Survey of the Wongan Hills*. CALM unpublished report.
- Elliot, W.R. and Jones, D.L. (1982). *Encyclopaedia of Australian Plants Suitable for Cultivation 2*: pp. 9-11 Lothian Publishing Co., Melbourne.
- Hopper, S., Van Leeuwen, S., Brown, A. and Patrick, S. (1990). *Western Australia's Endangered Flora*. Department of Conservation and Land Management, Western Australia.
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- Rye, B.L. (1980 - unpublished report). *Rare and Geographically Restricted Plants No. 4 - Wongan Hills Species*. Department of Fisheries and Wildlife, Western Australia. (Note: *Acacia pharangites* = *Acacia* sp. 2)
- World Conservation Union (1994). IUCN red list categories prepared by the IUCN Species Survival Commission, as approved by the 40th meeting of the IUCN Council. Gland. Switzerland.

7. TAXONOMIC DESCRIPTION

- Maslin, B.R. (1982). *Studies in the genus Acacia (Leguminosae: Mimosoideae)* No. 10 - *Acacia* species of the Wongan Hills, Western Australia. *Nuytsia* 4(1): 29-46.

Acacia pharangites is a somewhat spindly, open, erect *shrub* to 3(4) m tall, with main stems sparingly branched near base and phyllodes concentrated towards ends of branches. *Bark* grey, slightly roughened. *Branches* marked with raised scars of fallen phyllodes, terete, finely nerved, glabrous. *New shoots* arising at distal end of a very reduced raceme axis and subtended by a few scarious light-brown striate glabrous but marginally white-fimbriate early deciduous bracts. *Stipules* imbricate in vegetative bud, very early deciduous, connate, light brown, striate, glabrous but apically fimbriate, margins slightly revolute, apex cleft. *Phyllodes* linear-terete, slightly narrowed towards the base, 1.5-4 cm long, c. 1 mm wide, straight to slightly curved, ascending, rather rigid, smooth and turgid when fresh but finely wrinkled upon drying, \pm glaucescent, glabrous; *nerves* seven (three abaxial with only the central one extending wholly from the apex to the pulvinus, two lateral and two adaxial), neither prominent nor raised when fresh, yellowish upon drying; *apex* mucronulate, mucro yellowish or brown and somewhat pungent; *pulvinus* yellowish when fresh, brown and finely transversely wrinkled when dry; *gland* situated on adaxial surface (between the adaxial nerves) above the middle of the phyllode, not prominent. *Inflorescences* extremely reduced axillary racemes of 1(2) pedunculate flower heads, the axis c. 0.5 mm long and terminated by a young vegetative shoot; *basal peduncular bract* relatively large (1.5-2.5 mm long), deciduous, scarious, brown, striate, auriculate at base, cleft at apex; *peduncles* c. 10 mm long, glabrous. *Flower heads* obloid, 7-10 mm long, 5-6 mm wide, golden, c. 25-flowered; *bracteoles* conspicuously overtopping flowers in inflorescence bud, the claw less than 0.5 mm long, the lamina ovate 1.5-2 mm long, c. 1 mm wide, concave, scarious, finely striate, brown, white-fimbriate and sparsely puberulous abaxially near the base. *Flowers* 5-merous; *calyx* irregularly lobed, (1)2 lobes triangular and very reduced, the remaining lobes longer oblong dissected for 1/2 - 3/4 their length and sparsely ciliolate at the apex; *petals* glabrous, obscurely 1-nerved. *legumes* pendulous, narrowly oblong, to 6.5 cm long, c. 4 mm wide, slightly undulate, dark brown, glaucescent, glabrous, abruptly narrowed at both ends, prominently raised over the seeds with the umbro rounded and alternately more pronounced on one side of the legume than the other; *margins* very slightly thickened, slightly but variably constricted between seeds. *Seeds* longitudinal in legume, irregularly ellipsoid but truncate along edge adjacent to aril, turgid, 3-3.5 mm long, c. 2.5 mm wide, c. 2 mm thick, black, shiny; *pleurogram* obscure, with a narrow opening towards the hilum; *areole* minute, c. 0.5 x 0.3 mm; *funicle* minute, abruptly expanded into a clavate yellowish \pm straight *aril* which is c. 3 mm long and which extends 1/3 - 1/2 down one side of the seed.