INTERIM RECOVERY PLAN NO. 244

WONGAN GULLY WATTLE

(*Acacia pharangites*)

INTERIM RECOVERY PLAN

2008-2013

February 2008

Department of Environment and Conservation
Species and Communities Branch (SCB)
Kensington

Natural Heritage Trust
Helping Communities Helping Australia
An Australian Government Initiative

Government of Western Australia

Department of Environment and Conservation

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: the Department of 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.

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.

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 IRP replaces IRP No.20 (1999-2002), prepared by Rebecca Evans and Andrew Brown.

This IRP will operate from February 2008 to January 2013 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked CR, this IRP will be reviewed after five years and the need for full recovery actions assessed.

This IRP was given regional approval on 17 January 2008 and approved by the Director of Nature Conservation on 6 February 2008. The allocation of staff time and provision of funds identified in this IRP is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate as of February 2008.

IRP PREPARATION

This IRP was prepared by Craig Douglas[1], Joel Collins[2], David Jolliffe[3], Wendy Johnston[4] and Andrew Brown[5]

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ACKNOWLEDGMENTS

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

Andrew Crawford	Technical Officer, Threatened Flora Seed Centre, DEC
Bob Dixon:	Manager of Biodiversity and Extensions, Botanic Gardens and Parks Authority
Ian Smith	Wongan-Ballidu Bush Care volunteer

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and DEC's Species and Communities Branch for assistance.

Cover photograph by Steve Hopper.

CITATION

This IRP should be cited as:

Department of Environment and Conservation (2008). Wongan Gully Wattle (*Acacia pharangites*) Interim Recovery Plan 2008-2013. Interim Recovery Plan No. #. Department of Environment and Conservation, Perth, Western Australia.

SUMMARY

Scientific Name:	***Acacia pharangites***	**Common Name:**	Wongan Gully Wattle
Family:	Mimosaceae	**Flowering Period:**	August - September
DEC Region:	Weatbelt	**DEC District:**	Avon Mortlock
Shire:	Wongan-Ballidu	**Recovery Team:**	Avon Mortlock District Threatened Flora Recovery Team (AMDTFRT).

Illustrations and/or further information: Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998). *Western Australia's Threatened Flora*. Department of Environment and Conservation (formally CALM), Perth, Western Australia; Hopper, S., Van Leeuwen, S., Brown, A. and Patrick, S. (1990). *Western Australia's Endangered Flora*. Department of Environment and Conservation (formally CALM), Perth, 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. Western Australian Herbarium (2006) FloraBase - Information on the Western Australian Flora. Department of Environment and Conservation (formally CALM), Perth, Western Australia. http://www.calm.wa.gov.au/science/.

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 20 (1999-2002) prepared by R. Evans and A. Brown.

The criteria for failure in the previous plan (the number of individuals in populations and/or the number of populations have decreased by 10% or more over the term of the plan) has been met, as follows.

The number of mature plants in wild populations has decreased from 333 to 70, a decrease of 79%.

This is believed to have occurred due to senescence and poor recruitment resulting from a lack of suitable disturbance such as fire.

Actions carried out in the previous plan include:

Action 6 Collect Seed. DEC's Threatened Flora Seed Centre (TFSC) and the Botanic Gardens and Parks Authority (BGPA) hold seed of this species.

Action 7 Promotion of Awareness. A two-sided poster has been distributed to relevant authorities, schools, libraries and other institutions. The species has been included in the Wongan-Ballidu Wildlife Management Program, published in 2006.

Action 10 Research into Biology and Ecology. Research into seed viability and soil seed bank dynamics has been undertaken.

Other recovery actions included in the previous plan are ongoing and are included in this revised plan.

New recovery actions included in this plan are:

Action 8 Map habitat critical to the survival of *Acacia pharangites*

Current status: *Acacia pharangites* was declared as Rare Flora in 1986 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 1994) Red List criteria B1+2c; C2b; D due to its area of occupancy being less than 10 km^2, a continuing decline in the number of mature individuals and a total population size of less than 250 mature individuals with all occurring in a single population. Following the discovery of a second population and reassessment using IUCN 2001 criteria the species now meets CR under criteria B1ab(v)+2ab(v);C2a(i). The species is listed as Endangered under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act 1999). The main threats are lack of suitable disturbance such as fire, a lack of recruitment, limited genetic diversity, seed predation and grazing.

Acacia pharangites is known from two populations (totaling 70 mature plants) in an area of remnant natural vegetation in the Shire of Wongan-Ballidu, in DEC's Avon Mortlock District. Approximately ninety five percent of native vegetation in the Shire has been cleared for agriculture (Shepherd *et al.* 2002).

Population 1, on Private property, contains sixty three percent of mature plants. Population 2 is located in a nature reserve and contains the remaining thirty seven percent of plants.

Description: *Acacia pharangites* is a somewhat spindly shrub to 4 m tall. Its branches have a thick, waxy, powdery coating towards the extremities and lack hairs. Branches are scarred by raised stem-projections where phyllodes have fallen. The phyllodes are erect, straight to shallowly curved, circular in cross-section, 1.5-4 cm long, approximately 1 mm in diameter, ± a distinct pungent mucro, ± rigid, smooth, seven-nerved and blue-green with a whitish bloom. Inflorescences composed

of one, occasionally two, headed racemes, with raceme axes approximately 0.5 mm long. Peduncles are ± 10 mm long and lack hairs. The basal bract is prominent, falling away before associated organs mature. Inflorescence heads are obloid, 7-10 mm long, and golden with approximately twenty five flowers. The bracteole conspicuously overlaps the flower bud. Flowers are five-merous with sepals ¼-½ united and irregularly lobed. The pods are linear, strongly raised over the seeds on alternating sides, up to 7 cm long, ± 4 mm wide, thinly leathery, with a slightly thick, waxy, powdery coating, with no hairs. Seeds are longitudinal, elliptic, 3-4 mm long, glossy and black with a yellowing aril (Maslin 2001).

Habitat requirements: *Acacia pharangites* occurs in a sheltered gully within and flanking a seasonally dry creek, growing in rocky red-brown clay comprised of small stones derived from greenstone and in grey sand in the creek bed.

Habitat critical to the survival of the species, and important populations: Given that *Acacia pharangites* is ranked as CR, it is considered that all the known habitat of 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. pharangites* includes the area of occupancy of the extant populations; areas of similar habitat nearby (i.e. sheltered gullies of rocky red-brown clay, flanking a seasonally dry creek and grey sand in the creek bed) and remnant vegetation that surrounds populations (this is necessary to provide habitat for pollinators and seed dispersing ant guilds) and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Acacia pharangites* will also improve the status of remnant associated vegetation dominated by *Acacia acuminata*, *A. collina*, *Allocasuarina campestris*, *Calothamnus asper*, *Melaleuca radula*, *Eucalyptus myriadena*, *Eremophila teretifolia* and *Hibbertia cryptandra*. Several threatened flora species located with *A. pharangites* are listed in the table below.

Conservation-listed flora species occurring in habitat of *Acacia pharangites*

Species name	Conservation Status (Western Australia)	Conservation Status (EPBC Act 1999)
Philotheca wonganensis	DRF, Endangered	Endangered
Acacia pygmaea	DRF, Endangered	Endangered
Eremophila ternifolia	DRF, Vulnerable	Endangered
Microcorys eremophiloides	DRF, Vulnerable	Vulnerable

DRF – Declared Rare 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. *Acacia pharangites* is not listed under any specific international treaty however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the species covered by this IRP. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of the species.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impact: The implementation of this IRP is unlikely to cause significant adverse social and economic impacts. However, as one of the two known populations is located on private property its conservation may potentially affect farming activities. Actions will involve liaison and cooperation with stakeholders with regard to this area.

Affected interests: Stakeholders include the owners of private property.

Evaluation of the plan's performance: DEC in conjunction with the Avon Mortlock District Threatened Flora Recovery Team will evaluate the performance of this IRP. 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:

1. Land managers including the private land owners with a population on their property have been made aware of the threatened nature of this species, its location and their legal obligations to protect the species.
2. Seed was collected in 1997 and again in 1998 by staff from the former Department of CALM (now Department of Environment and Conservation) Threatened Flora Seed Centre (TFSC). Seed was also collected in August and November 1996 by Staff from the Botanic Gardens and Parks Authority (BGPA). In December 2005 seed was collected from subpopulation 1a and population 2 by Joel Collins from DEC's Avon Mortlock District.
3. BGPA has six plants in the botanic gardens, and eleven in nursery frames.
4. The AMDTFRT is overseeing the implementation of this IRP and will include it in their annual report to DEC's Corporate Executive and funding bodies.
5. Staff from DEC's Avon Mortlock District office are monitoring both known populations.

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

Recovery criteria

Criteria for success: The number of populations have increased or the number of mature individuals in populations have increased by ten percent or more over the term of the plan.

Criteria for failure: The number of populations have decreased or the number of mature individuals in populations have decreased by ten percent or more over the term of the plan.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Develop and implement fire and disturbance trials
4. Develop and implement a fire management strategy
5. Promote awareness
6. Conduct further surveys
7. Collect and store seed
8. Map habitat critical to the survival of *Acacia pharangites*
9. Obtain biological and ecological information
10. Review the need for further recovery actions

1. BACKGROUND

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 20 (1999-2002) prepared by R. Evans and A. Brown.

The criteria for failure in the previous plan (the number of individuals in populations and/or the number of populations have decreased by 10% or more over the term of the plan) has been met, as follows.

The number of mature plants in wild populations has decreased from 333 to 70, a decrease of 79%.

This is believed to have occurred due to senescence and poor recruitment resulting from a lack of suitable disturbance such as fire.

Actions carried out in the previous plan include:

Action 6 Collect Seed. DEC's Threatened Flora Seed Centre (TFSC) and the Botanic Gardens and Parks Authority (BGPA) hold seed of this species.

Action 7 Promotion of Awareness. A two-sided poster that illustrates and describes the species and provides information on distribution and flowering period has been distributed to relevant authorities, schools, libraries and other institutions. The species has been included in the Wongan-Ballidu Wildlife Management Program, to be published in 2006.

Action 10 Research into Biology and Ecology. Research into seed viability and soil seed bank dynamics has been undertaken.

Other recovery actions included in the previous plan are ongoing and are included in this revised plan.

New recovery actions included in this plan are:

Action 8 Map habitat critical to the survival of *Acacia pharangites*

History

Bruce Maslin and Robert Coveny first collected *Acacia pharangites* from private property west of Wongan Hills in 1976. This population (Pop. 1) was surveyed in 1980 and 329 plants were recorded. In 1988 subpopulation 1b was found in an adjacent gully.

In 2005 a second population was discovered by Ian Smith, a Wongan-Ballidu Bush Care volunteer, on a hill close to population one.

Acacia pharangites is known from two populations (totaling 70 mature plants) in an area of remnant natural vegetation in the Shire of Wongan-Ballidu, in DEC's Avon Mortlock District. Approximately ninety five percent of native vegetation in the Shire has been cleared for agriculture (Shepherd *et al.* 2002).

Description

Acacia pharangites is a somewhat spindly shrub to 4 m tall. Its branches have a thick, waxy, powdery coating towards the extremities and lack hairs. Branches are scarred by raised stem-projections where phyllodes have fallen. The phyllodes are erect, straight to shallowly curved, circular in cross-section, 1.5-4 cm long, approximately 1 mm in diameter, ± a distinct pungent mucro, ± rigid, smooth, seven-nerved and blue-green with a whitish bloom. Inflorescences composed of one, occasionally two, headed racemes, with raceme axes approximately 0.5 mm long. Peduncles are ± 10 mm long and lack hairs. The basal bract is prominent, falling away before associated organs mature. Inflorescence heads are obloid, 7-10 mm long, approximately twenty five-flowered and golden. The bracteole conspicuously overlaps the flower bud. Flowers are five-merous with sepals ¼-½ united and irregularly lobed. The pods are linear, strongly raised over the seeds on alternating sides, up to 7 cm long, ± 4mm wide, thinly leathery, with a slightly thick, waxy, powdery coating, with no hairs. Seeds are longitudinal, elliptic, 3-4 mm long, glossy and black with a yellowing aril (Maslin 2001).

Distribution and habitat

Acacia pharangites is restricted to the Wongan Hills area in the central northern Wheatbelt of Western Australia.

The species occupies sheltered gullies within and flanking a seasonally dry creek where it grows in rocky red-brown clay comprised of small stones derived from greenstone and in grey sand in the creek bed. Species associated with *Acacia pharangites* include *A. acuminata, A. collina, Allocasuarina campestris, Calothamnus asper* and *Melaleuca radula*.

Summary of population land vesting, purpose and tenure

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1a. Northwest of Wongan Hills	Avon-Mortlock	Wongan-Ballidu	Freehold	Private Property	Landholders
1b. Northwest of Wongan Hills	Avon-Mortlock	Wongan-Ballidu	Freehold	Private Property	Landholders
2. Northwest of Wongan Hills (Nature Reserve)	Avon-Mortlock	Wongan-Ballidu	Conservation Commission of Western Australia	Conservation of Flora and Fauna	DEC

Populations in **bold text** are considered to be Important Populations.

Biology and ecology

Maslin (1982) used taxonomic features to determine the relatedness of *Acacia pharangites*, concluding that it is most likely a relic that is only distantly related to other currently known species. *A. pharangites* is therefore possibly of greater biodiversity value for conservation management compared to *Acacia* species that have a more recent divergence from sister species.

The two known populations are reaching senescence and, as is the case for many other *Acacia* species, it is likely that they require disturbance such as fire to stimulate germination of soil-stored seed. While the sites remain undisturbed populations will continue to senesce.

Although there is currently no supportive field evidence it is presumed that *Acacia pharangites* is insect pollinated as are many other *Acacia* species (Rye 1980). Following fertilization, it is known that plants produce abundant fruit, with up to six seeds per pod but in 2003 Andrew Crawford from the TFSC conducted seed viability and germination trials on a sample of seeds and commented that "seed in the collection appears to be of very poor quality with $^1/_3$ of seed totally empty when nicked and, of the remainder, most had shriveled cotyledons and appeared non-viable." Germination results for the collection were poor with only 2% germination. Considering these results Andrew Crawford concludes that, of approximately 1400 seeds in the collection, just 30 would be viable. The second smaller collection of 50 seeds had greater viability with 80-100% germination (A. Crawford personal communication).

Poor seed viability is counter weighed by the large amounts of seed that has been observed in the soil seed bank. To date, however, only one seedling of the species has been located. This indicates an absence of a suitable disturbance regime such as a fire. The senescence of even-aged plants also indicates a long period since the last disturbance event. *Acacia pharangites* appears to regenerate solely from seed following fire making the species vulnerable to both a lack of fire and overly frequent fires if the latter occurs before plants reach maturity and replenish soil seed banks.

Acacia pharangites has a scattered occurrence and only rarely occurs in dense stands.

Threats

Acacia pharangites was declared as Rare Flora in 1986 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 1994) Red List criteria B1+2c; C2b; D due to its area of occupancy being less than 10 km^2, a continuing decline in the number of mature individuals and a total population size of less than 250 mature individuals with all occurring

in a single population. Following the discovery of a second population and reassessment using IUCN 2001 criteria the species now meets CR under criteria B1ab(v)+2ab(v);C2a(i). The species is listed as Endangered under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). The main threats are lack of suitable disturbance such as fire, a lack of recruitment, limited genetic diversity, seed predation and grazing. Threats include:

- **Inappropriate fire regimes** have adversely affected the long-term viability of populations. Seeds of *Acacia pharangites* are thought to germinate following disturbance such as fire and a lack of such disturbance has resulted in there being little recruitment.
- **Poor genetic diversity.** There are currently just seventy adult plants known, these representing an extremely limited gene pool. However, additional genetic material is likely to be present in the soil seed bank.
- **Senescence.** Mature plants are senescing with the population decreasing in size from a high of 333 to just 70 plants in 2005.
- **Predation of seed.** Field observations in 1998 show that predation of seed is occurring at variable levels, ranging from a 'high incidence on some plants to very few seed being predated on others (Anne Cochrane personal communication). To date, the extent of this threat and its impact on the survival of the species is unknown.
- **Grazing.** To date, the impact of grazing on the species is unknown but thought to be low.

Summary of population information and threats

Pop. No & Location.	Land Status	Year/No. plants	Condition	Threats
1a. Northwest of Wongan Hills	Private property	1980 329 1992 7 1999 36 2000 107 2001 127 (1) 2004 40	Healthy	Grazing of the tips of leaves observed, some seed predation, plants reaching senescence
1b. Northwest of Wongan Hills	Private property	1988 4 1992 4 1997 20 2001 10 2004 4	Healthy	Plants reaching senescence
2. Northwest of Wongan Hills	Nature Reserve	2005 26	Healthy	Inappropriate fire regimes

Populations in **bold text** are considered to be Important Populations, ( ) = number of seedlings.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments and/or clearing in the immediate vicinity of *Acacia pharangites* requires assessment and should not be approved unless the proponents can demonstrate that their actions will not have a significant impact on the species, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the species would be altered.

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

Given that *Acacia pharangites* is ranked as CR, 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. pharangites* includes the area of occupancy of extant populations; areas of similar habitat (i.e. sheltered gullies of rocky red-brown clay, flanking seasonally dry creeks and grey sand in creek beds within 200 m of populations, remnant vegetation that surrounds populations (this is necessary to provide habitat for pollinators and seed dispersing ant guilds) and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of *Acacia pharangites* habitat will improve the status of associated vegetation including *Acacia acuminata, A. collina, Allocasuarina campestris, Calothamnus asper, Melaleuca radula, Eucalyptus myriadena, Eremophila teretifolia* and *Hibbertia cryptandra*. Several other threatened flora species are located with *A. pharangites* and these are listed in the table below.

Conservation-listed flora species occurring in the habitat of *Acacia pharangites*

Species name	Conservation Status (Western Australia)	Conservation Status (EPBC Act 1999)
Philotheca wonganensis	DRF, Endangered	Endangered
Acacia pygmaea	DRF, Endangered	Endangered
Eremophila ternifolia	DRF, Vulnerable	Endangered
Microcorys eremophiloides	DRF, Vulnerable	Vulnerable

DRF – Declared Rare 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. *Acacia pharangites* is not listed under any specific international treaty however and this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the species covered by this IRP. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of the species.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impact

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. However, as one of the two known populations is located on private property, its conservation may potentially affect farming activities. Actions will involve liaison and cooperation with all stakeholders with regard to these areas.

Affected interests

Stakeholders potentially affected by the implementation of this plan include owners of private property.

Evaluation of the plan's performance

DEC in conjunction with the Avon Mortlock District Threatened Flora Recovery Team (AMDTFRT) will evaluate the performance of this IRP. 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

Objectives

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

Criteria for success: The number of populations have increased or the number of mature individuals in populations have increased by ten percent or more over the term of the plan.

Criteria for failure: The number of populations have decreased or the number of mature individuals in populations have decreased by ten percent or more over the term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

Land managers, including the private landowners with a population on their property have been made aware of the threatened nature of the species, its location and their legal obligations to protect it.

Seed was collected in 1997 and again in 1998 by staff from the Department of Conservation and Land Management (now Department of Environment and Conservation) Threatened Flora Seed Centre (TFSC). Staff from the Botanic Gardens and Parks Authority (BGPA) collected seed in August and November 1996. In December 2005 seed was collected from subpopulation 1a and population 2 by the District Conservation Officer Joel Collins.

The BGPA currently have six plants on display in the botanic gardens and eleven plants in nursery frames, six of which are to be planted into the display gardens in the winter of 2006.

The AMDTFRT is overseeing the implementation of this IRP and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Staff from DEC's Avon Mortlock District office regularly monitor populations.

Future recovery actions

Where populations occur on lands other than those managed by DEC, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken. 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 of the priorities if funding is available for 'lower' priorities and other opportunities arise.

1. Coordinate recovery actions

The AMDTFRT is coordinating recovery actions for *Acacia pharangites* and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: AMDTFRT
Cost: $1,400 per year

2. Monitor populations

Monitoring of factors such as weed encroachment, habitat degradation, population stability (expansion or decline), pollination activity, seed production, recruitment, and longevity is essential.
Action: Monitor populations
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $500 per year.

3. Develop and implement fire and disturbance trials

DEC's Avon Mortlock District will, in consultation with private landowners and the Wongan-Ballidu Shire, develop and implement burn and disturbance trials to stimulate the germination of soil stored seed. Care will be taken to avoid competition with existing *Acacia pharangites* plants. The results of trials will be monitored and, if successful, a larger scale operation undertaken. Attention will be given to the following to ensure maximum recruitment but at the same time maintaining the integrity of the extant population:

- burn several discrete dead plants
- rake the soil below and near dead plants

Action: Develop and implement fire and disturbance trials
Responsibility: DEC (Science Division, Avon Mortlock District) and relevant authorities through the AMDTFRT
Cost: $1,200 in the first year.

4. Develop and implement a fire management strategy

It is thought that it is highly likely that *Acacia pharangites* requires occasional fire to stimulate germination of soil stored seed. However, frequent fire may have an adverse impact on the species if it occurs before seedlings reach maturity and replenish the seed bank. Overly frequent fire should therefore be excluded from populations if possible and a fire management strategy developed and implemented.

Action: Develop and implement a fire management strategy
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT, and relevant authorities
Cost: $500 in the first year and $1,400 in the third year

5. Promote awareness

The importance of biodiversity conservation and the protection of *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 CR 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: DEC (Avon Mortlock District, SCB, Strategic Development and Corporate Affairs) through the AMDTFRT
Cost: $1,600 in the first year, $1,000 in years three and five.

6. Conduct further surveys

Populations of *Acacia pharangites* will be resurveyed to ascertain accurate boundaries and ensure that no plants have been missed during previous surveys. As only a brief initial survey of population 2 has been conducted, a more extensive survey is needed to accurately record its size. This will be done during the species' flowering period between August and November, with assistance from local naturalists and volunteers.

It is suggested that this be done in conjunction with surveying other possible 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 DEC staff.

Action: Conduct further surveys
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $1,100 in years two and three.

7. Collect and store seed

Some seed of *Acacia pharangites* is currently held in DEC's TFSC and at the BGPA. Further collections from as many plants as possible will be made and lodged with the TFSC and BGPA. These collections should aim to sample and preserve the maximum range of genetic diversity possible (determined by an appropriate molecular technique such as genetic fingerprinting if feasible). The "Germplasm Conservation Guidelines for Australia" produced by the ANPC should be used to guide this process.

Action: Collect and store seed
Responsibility: DEC (Threatened Flora Seed Centre (TFSC), Avon Mortlock District) through the AMDTFRT
Cost: $1,000 per year for the first three years

8. Map habitat critical to the survival of *Acacia pharangites*

It is a requirement of the EPBC Act (1999) that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the habitat of population 2 requires mapping, this will be addressed under this action.

Action: Map habitat critical to the survival of *Acacia pharangites*
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $1,300 in the first year

9. Obtain biological and ecological information

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

1. Factors determining level of flower and fruit abortion.
2. Pollination biology.
3. Prevalence and impact of seed predation in *Acacia pharangites*.
4. Longevity of seeds in the soil seed banks.
5. Seed germination requirements of *Acacia pharangites.*
6. Longevity of plants, and time taken to reach maturity.
7. Level of heterozygosity within and between populations of *Acacia pharangites*.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Avon Mortlock District) through the AMDTFRT
Cost: $11,300 each year for the first three years.

10. Review the need for further recovery actions

At the end of the fourth year of this five-year term IRP, this IRP will be reviewed and the need for further recovery actions assessed.

Action: Review the need for further recovery actions
Responsibility: DEC (Avon Mortlock District, Species and Communities Branch) through the AMDTFRT
Cost: $2,000 in the fifth year.

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	AMDTFRT	Ongoing
Monitor populations	High	DEC (Avon Mortlock District) through the AMDTFRT	Ongoing
Develop and implement fire and disturbance trials.	High	DEC (Science Division, Avon Mortlock District) through the AMDTFRT and relevant authorities	2009
Develop and implement a fire management strategy.	High	DEC (Avon Mortlock District) through the AMDTFRT and relevant authorities	Strategy developed by 2009 with implementation ongoing
Promote awareness	Medium	DEC (Avon Mortlock District, SCB, Strategic Development and Corporate Affairs) through the AMDTFRT	2013
Conduct further surveys	Medium	DEC (Avon Mortlock District) through the AMDTFRT	2011
Collect and store seed	Medium	DEC (Threatened Flora Seed Centre (TFSC), Avon Mortlock District) through the AMDTFRT	2013
Map habitat critical to the survival	Medium	DEC (Avon Mortlock District) through the AMDTFRT	2009

of *Acacia pharangites*			
Obtain biological and ecological information	Medium	DEC (Science Division, Avon Mortlock District) through the AMDTFRT	2013
Review the need for further recovery actions	Medium	DEC (Avon Mortlock District and SCB) through the AMDTFRT	2013

4. TERM OF PLAN

This IRP will operate from February 2008 to January 2013 but will remain in force until withdrawn or replaced. If the taxon is still ranked CR after five years, the need for further recovery actions and an update of this IRP will be assessed.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Excerpt from: 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.

Shrub spindly, open, erect to 3-4m 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 much 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-circular in cross-section (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, ± 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 much reduced, the remaining lobes longer oblong dissected for 1/2 - 3/4 their length and sparsely ciliolateat 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 ± straight *aril* which is c. 3 mm long and which extends 1/3 - 1/2 down one side of the seed.