INTERIM RECOVERY PLAN NO.209

LONG-SEPALLED DAVIESIA

(*DAVIESIA MEGACALYX*)

INTERIM RECOVERY PLAN

2005-2010

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Photo: Sarah Barrett

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Natural Heritage Trust
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Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
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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 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.

This IRP will operate from September 2005 to August 2010 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Endangered, this IRP will be reviewed after five years and the need for further recovery actions assessed.

This IRP was given regional approval on 22 October, 2005 and was approved by the Director of Nature Conservation on 14 December 2005. 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 August 2005.

ACKNOWLEDGMENTS

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

Anne Cochrane Manager, CALM Threatened Flora Seed Centre
Andrew Brown Threatened Flora Coordinator, CALM Species and Communities Branch
Malcom Grant Conservation Officer, CALM Ravensthorpe

Thanks also to staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and CALM's Wildlife Branch for their assistance.

SUMMARY

Scientific Name:	*Daviesia megacalyx*	**Common Name:**	Long-sepalled daviesia
Family:	Papilionaceae	**Flowering Period:**	July to September
CALM Regions:	South Coast	**CALM District:**	Albany Work Centre
Shires:	Ravensthorpe	**Recovery Team:**	Albany District Threatened Flora Recovery Team

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; Western Australian Herbarium (1998) FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/.

Current status: *Daviesia megacalyx* was declared as Rare Flora in 1987 under the Western Australian *Wildlife Conservation Act 1950* and is listed under the Commonwealth Environment and Biodiversity Protection Act 1999 as Endangered. It is ranked as World Conservation Union Red List Category Endangered under Criteria B1 & 2e (IUCN 2001), primarily due to its limited extent of occurrence and low number of mature individuals. The species is confined to an area of approximately 85 hectares over a range of 25 kilometres in which 8 populations total approximately 2,600 mature plants.

Description: This erect bushy shrub, up to 1.5 m high, has angular branches. Dull green leaves, 4 to 8 cm long, are flat, blunt and erect. The 1 cm long flowers are in clusters in the leaf axils. They each have a yellow standard petal, with a yellow centre surrounded by red, and a deep red keel. Triangular fruits, about 1.5 cm long, have a large conspicuous calyx, which persists on the plant and turns black, long after the pods have been shed.

Habitat requirements: The species is confined to heavy red gravely-clay over laterite in the Ravensthorpe Range.

Habitat critical to the survival of the species, and important populations: Given that this species is listed as Endangered, it is considered that all known habitat is critical to its survival and all populations are important populations. The habitat for *Daviesia megacalyx* comprises the area of occupancy of the known population; similar habitat within 200 metres of the known population; remnant vegetation that may link future populations; and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so in the past and may be suitable for translocations.

Benefits to other species/ecological communities: The Ravensthorpe Range occurs within one of the fifteen National Biodiversity Hotspots. The Ravensthorpe Range is habitat for a number of endemic species and threatened species, and some twenty Priority taxa. Recovery actions put in place for *Daviesia megacalyx* will benefit these species and reciprocally, recovery actions put in place for these species will benefit *D. megacalyx*.

International obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity. *Daviesia megacalyx* is not specifically listed under any international treaty and therefore this plan 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, six registered sites occur in close proximity to the *Daviesia megacalyx* populations. The Department has welcomed any future consultation that will seek input and involvement from Indigenous groups that have an active interest in the areas that are habitat for *Daviesia megacalyx*.

Affected interests: Population 6 is on freehold land. All other populations occur on Crown land.

Social and economic impacts: The implementation of this recovery plan has the potential to have some minimal social and economic impact as all populations are located on mining tenements and one is on freehold land. However, recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Evaluation of the Plan's Performance: The Department of Conservation and Land Management (CALM), in conjunction with the Albany District Threatened Flora Recovery Team (ADTFRT) will evaluate the performance of this IRP.

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

1. All land managers have been notified of the location and threatened status of the species.

2. Seed collections have been made by staff of CALM's Threatened Flora Seed Centre (TFSC).
3. Staff from the CALM Albany Work Centre regularly monitor populations.
4. Research is being conducted into the species susceptibility to *Phytophthora cinnamomi*.
5. Staff from the CALM Albany Work Centre have conducted some surveys for additional populations.

Objectives

The objective of this Interim Recovery 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 and individuals within populations remains stable or increases over the five years of the plan.
Criteria for failure: The number of populations or the number of individuals within populations decreases over the five years of the plan.

Recovery actions

1. Coordinate recovery actions.
2. Monitor populations.
3. Continue fire management.
4. Continue seed collection.
5. Conduct further surveys.
6. Liaise with stake holders.
7. Obtain biological and ecological information.
8. Map habitat critical to the survival of the species.
9. Promote awareness.
10. Review the IRP and assess the need for further recovery actions.

1. BACKGROUND

History

Daviesia megacalyx was first discovered in 1962 by K.R. Newbey. Originally known as *Daviesia* sp. (Ravensthorpe) M.D. Crisp 6065, the species was given its current name in 1991. The specific epithet is derived from the Greek *megas*, meaning large, and *calyx*, referring to the enlarged, persistent fruiting calyces.

The first detailed survey of Population 1 was conducted in 1963 and at that time contained over 200 mature individuals. With further survey, the population range has expanded to now include four additional subpopulations. Population 1 was most recently burnt in the summer of 2000/2001 and currently consists mainly of juveniles.

Population 2 was located in 1992 by N. McQuoid. The two subpopulations combined to consist of thirty-four mature individuals at the time; however current estimates are over 300 mature individuals.

In 1993, Population 3 was located by N. McQuoid and consisted of over 50 mature individuals. The population has since extended to contain five subpopulations and over 2000 mature individuals. The vegetation in the area was long unburnt (last burnt in 1951) until 1999, when part of the population was subjected to fire. The whole population was then burnt in the summer of 2000/2001 and has since regenerated well with an approximated 100,000 juveniles.

Population 4 was first located in 1992 by C.J. Robinson and at the time consisted of 23 mature individuals that were confined to disturbed areas. In 1995, Population 7 was found by Ellen Hickman and consisted of only 3 individuals. Populations 4 and 7 occur on and around a track and are therefore subject to track use and maintenance. The area was most recently burnt in autumn 2001 as part of fire management procedures. Both populations appear to have recovered well from the disturbance and juveniles are now present in high numbers.

In 1995, Population 5, consisting of just over 10 individuals, was discovered by N. McQuoid. In 1987, a collection was made from Population 6 by K.L. Bradby. Neither of these two populations have been relocated and surveyed to date.

Population 8 was located by G.F. Craig in 2000, whilst conducting a flora survey on a proposed mobile phone access site. Two subpopulations were identified, totalling over 200 plants.

Description

This erect bushy shrub, up to 1.5 m high, has angular branches. Dull green leaves, 4 to 8 cm long, are flat, blunt and erect. The 1 cm long flowers are in clusters in the leaf axils. They each have a yellow standard petal, with a yellow centre surrounded by red, and a deep red keel. Triangular fruits, about 1.5 cm long, have a large conspicuous calyx, which persists on the plant and turns black, long after the pods have been shed.

Distribution and habitat

Daviesia megacalyx is confined to heavy red gravelly-clay over laterite in the Ravensthorpe Range, on slopes and ridgelines. It is confined to an area of approximately 85 hectares over a range of 25 kilometres. The species occurs in tree mallee over heath and associated species include *Acacia durabilis, A. heterochroa, Adenanthos flavidiflorus, Allocasuarina humilis, Banksia laevigata, B. lemanniana, Beaufortia orbifolia, B. schaueri, Calothamnus pinifolius, Daviesia emarginata, Dryandra cirsioides, D. corvijuga, D. erythrocephala, D. foliosissima, D. quercifolia, Eucalyptus falcata, E. pleurocarpa, E. preissiana, Exocarpos sparteus, Goodenia scapigera, Grevillea coccinea, G. concinna, G. fulgens, Guichenotia anota, Hakea cygna,*

Isopogon buxifolius, I. polycephalus, Lasiopetalum indutum, Persoonia teretifolia, Spyridium glaucum and *Taxandria spathulata*.

Biology and ecology

Little is known about the biology and ecology of *Daviesia megacalyx*. It flowers from July to September and has a juvenile period of four years (S. Barrett and R. Hartley, personal observation). *Daviesia* flowers are commonly hermaphroditic, with yellow and red colouring thought to be specialised for bee-pollination (CALM 1998; Crisp 1995). Typically, *Daviesia* species set seed approximately three months after flowering, but can take longer if the season is hot and dry (Schwarten 1995). *Daviesia* seed is attractive to animals as the species have elaisomes with high starch and oil contents. Upon dehiscence, seed is collected by vertebrates or ants (Schwarten 1995).

The peculiar calyx of this species is similar only to that of *Daviesia obovata*. Both have a calyx which doubles in size from flower to fruit, hardening and turning black in the process. After the pods have dehisced and fallen, the old black calyces remain on the plant for a considerable period, giving the appearance of still bearing fruits (Crisp 1995).

Legumes are described as disturbance opportunists (Schwarten 1995). *Daviesia megacalyx* is thought to be killed by fire and regenerate from seed after disturbance events. It established prolifically along historical drill lines where laterite is close to the surface (Brearley 1999). After sections of Population 8 were slashed as part of break maintenance, one seedling and two mature *D. megacalyx* were observed to resprout. In addition, inter-disturbance recruitment of this species has been observed ([1]M. Grant, personal communication).

Research suggests that some *Daviesia* species die after eight to ten years, with crown death starting after six. Crown death is sometimes rapid and affects the plant's growth, assimilation, flower production and therefore the plant's reproductive success (Schwarten 1995).

Threats

Daviesia megacalyx was declared as Rare Flora in 1987 under the Western Australian *Wildlife Conservation Act 1950* and is ranked as World Conservation Union Red List Category Endangered under Criteria B1 & 2e (IUCN 2001). The rarity of *D. megacalyx* is due to the species limited extent of occurrence and low number of mature individuals**.**

All areas occupied by *Daviesia megacalyx* are affected or potentially affected by one or more threats identified in this IRP. Threats include:

- **Inappropriate timing of disturbance events:** Poorly timed disturbance events may be detrimental to *Daviesia megacalyx* populations and are of particular importance as a number of populations occur on or adjacent to roads and tracks. Disturbance is needed to stimulate germination, yet plants need sufficient time between these events to reach reproductive maturity to build up a seed bank. An estimation of the minimum desirable fire interval may be determined by doubling the primary juvenile period (time to first flower from germination, in 50% of the population) (Gill and Nichols 1989). The primary juvenile period for *D. megacalyx* is four years, making the minimum desirable fire interval eight years. However, a longer fire-free interval may be required for other members of the plant community.

- **Mining:** All populations are on land currently under mining tenements. Population 1 is currently under live exploration and prospecting licences and pending mining leases, Population 2 is under pending exploration licences, Population 3 is under live and pending exploration licences and a pending mining lease, Population 4 is under a pending mining lease and exploration licence, Population 5 is under a live exploration licence and pending mining lease, Population 6 is under a

[1] Malcom Grant Senior Operations Officer, Nature Conservation, CALM Albany Work Centre, Ravensthorpe Office

pending exploration licence, Population 7 is under a live exploration licence and Population 8 is under pending exploration licences. Possible impacts of mining include vegetation clearing and destruction, ground compaction, introduction and spread of weeds and pathogens such as *Phytophthora cinnamomi*, increased risk of fires, alteration and contamination of surface runoff, increased risk of erosion and contamination of groundwater with fluids associated with drill rigs.

- **Disease:** *Phytophthora cinnamomi* is an introduced soil-borne plant pathogen. Infection results in plant death in susceptible species through the destruction of root systems. The impact of the disease on plant communities is variable between sites as it is dependent on temperature, soil type, nutrient status, water and species susceptibility. The greatest impact usually occurs where soils are infertile and drainage is poor (Weste and Marks 1987; Shearer and Tippett 1989; Wilson *et al*. 1994). The Ravensthorpe Range is currently free of *P. cinnamomi*, however the community in which *Daviesia megacalyx* occurs is considered to be susceptible to the disease (M. Grant, personal communication). While *D. megacalyx* has not been tested to date, other members of this genus are known to be susceptible (S. Barrett, personal observation). Infestation will result in changes in the structural and floristic composition of the vegetation, which may in turn affect the abundance of pollinators.

- **Small population size:** The low number of mature *Daviesia megacalyx* in Populations 2, 5 and 8 renders these populations vulnerable to local extinction by either demographic stochasticity (eg. lack of recruitment in one year), or environmental stochasticity (random variation in for example rainfall or fire).

- **Drought:** In March 2005, the juveniles of Population 3 showed signs of considerable drought-related stress. Some *Daviesia megacalyx* and its associated species were chlorotic and dying. The species grows on shallow soils on north-facing slopes and are therefore vulnerable to drought.

- **Climate change:** Long-term climate change may stress the *Daviesia megacalyx* populations given the predicted decrease in rainfall and increases in temperature and evaporation. It has been considered that those groups likely to be most affected by climate change include geographically localised taxon such as *D. megacalyx*, peripheral or disjunct populations, specialised species, poor dispersers, genetically impoverished species, and coastal communities (Peters & Darling 1985).

Summary of population land vesting, purpose and tenure

Population	Vesting	Purpose	Tenure
1A.	Unvested	Common	Crown
1B.	Unvested	Common	Crown
1C.	Unvested	Common	Crown
1D.	Unvested	Common	Crown
1E.	Unvested	Common	Crown
2A.	Water and Rivers Commission	Water	Crown
2B.	Water and Rivers Commission	Water	Crown
3A.	-	-	Unallocated Crown Land
3B.	-	-	Unallocated Crown Land
3C.	-	-	Unallocated Crown Land
3D.	-	-	Unallocated Crown Land
3E.	-	-	Unallocated Crown Land
4.	Unvested	Common	Crown
5.	-	-	Unallocated Crown Land
6.	-	-	Freehold
7.	Unvested	Common	Crown
8A.	-	-	Unallocated Crown Land
8B.	-	-	Unallocated Crown Land

Summary of population information and threats

Pop. Number & Location	Year/Number of Plants	Condition	Threats
1A. Elverdton Rd	1989 100 (200) + 1992 130 +/-	Moderate Healthy	Power line maintenance

		1993 2005	150 (50) +/- 37 (6)	Healthy Moderate	Vehicles (motorbike) Gravel works Fire
1B.	Elverdton Rd	1983 1988 1989 1990 1991 1992 1995 2001 2004	220 (several) +/- 100 (200) + 100 (400) + 100 + 100 + 100 + 200+ 500 +/- 100 (300) +/-	 Healthy Healthy Healthy Healthy Healthy Healthy Healthy Healthy	Gravel works Mining Road maintenance Fire
1C.	Elverdton Rd	1991 1992 1995 2004	100 + 2 6 10 +/-	Healthy Poor Healthy Healthy	Gravel works
1D.	Elverdton Rd	1992 1995	10 5	Healthy Healthy	
1E.	Elverdton Rd	1991 2004	1 not found		Road maintenance
2A.	Floater Rd	1992 2001 2004	10 28 +/- 15	Healthy Healthy Moderate	Road maintenance
2B.	North of Gravel Pit	1992 2001 2004	24 100 +/- 300 +/-	Healthy Healthy Healthy	
3A.	North of Archer Lookout	1994 1995 2001 2004	25 (5) 300 + 65 (6) + 2000 (100000) +/-	Healthy Healthy Healthy Healthy	Firebreak maintenance Fire Drought
3B.	Archer Drive	1993 2004	Seed collection 1 (100) +/-	Healthy Healthy	
3C.	South of Bonnymidgup track	2001	50 +	Partly Burnt	
3D.	North of Mount Benson	1993 2001	50 + 30 (12) +	Healthy Partly Burnt	
3E.	West of Mt Benson	2001	6	Healthy	
4.	South of Elverdton Rd	1992 1994 1995 1999 2004	23 100 + 30+ 40+ (3000) +/-	Healthy Healthy Healthy Healthy	Firebreaks
5.	South of Mt Benson	1995	11 +	Healthy	Road maintenance
6.	North of Floater Rd	1987 2001	Specimen Unable to locate		
7.	South of Elverdton Rd	1995 2004	3 15 (350) +/-	Healthy Healthy	
8A.	Radio Station	2000 2001	150 (10-20) +/- 2 (15) +/-	Healthy Partial survey post-slashing	
8B.	Radio Station	2000	50 +/-	Healthy	

Numbers in brackets indicate number of seedlings or juveniles.

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

Given that this species is listed as Endangered under the Commonwealth EPBC Act, it is considered that all known habitat is habitat critical to the survival of the species. In addition all populations, including any translocated populations, are considered important to the survival of the species. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms, or once occupied

(continuously, periodically or occasionally) by an organism or group of organisms, and into which organisms of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999*). The area of occupancy of the currently known *Daviesia megacalyx* populations has been mapped. However, other parts of the habitat critical to the survival of *D. megacalyx* have not been mapped and an action outlined in this Interim Recovery Plan is to map all habitat as defined above.

The habitat critical to the survival of *Daviesia megacalyx* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations that provide potential habitat for natural recruitment;
- remnant vegetation that surrounds and links populations (this is necessary to allow pollinators to move between populations) and
- additional occurrences of similar habitat that do not currently contain the species but may have done so in the past (these represent possible translocation sites).

Benefits to other species/ecological communities

The Ravensthorpe Range is an area of high conservation value and occurs within one of the fifteen National Biodiversity Hotspots, which are areas of species richness and endemism, and areas under major threat (CALM 2004). The Ravensthorpe Range is habitat for a number of endemic species and threatened species, including *Acacia rhamphophylla* (En) and *Marianthus villosus* (Vu) and some twenty Priority taxa, such as *Melaleuca stramentosa* (P1), *Guichenota apetala* (P1), *G. anota* (P1), *Acacia laricina* var. *crassifolia* (P2), *Spyridium glaucum* (P3) and *Siegfriedia darwinioides* (P4). Recovery actions put in place for *Daviesia megacalyx* will benefit these species and reciprocally, recovery actions put in place for these species will benefit *D. megacalyx*.

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. However, as *Daviesia megacalyx* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, the registered sites Claytup Surface Scatter, Kundip, Coujinup Surface Scatter, Gnamma Hole and North Jerdacuttup River 1 & 2 occur in close proximity to the *Daviesia megacalyx* populations. The Department has welcomed any future consultation that will seek input and involvement from Indigenous groups that have an active interest in the areas that are habitat for *Daviesia megacalyx*, and this is discussed in the recovery actions.

Affected interests

Population 6 is on freehold land. All other populations occur on Crown land. All populations are on mining tenements.

Social and economic impacts

The implementation of this recovery plan has the potential to have some minimal social and economic impact as all populations are located on mining tenements and one is on freehold land. Sixteen mining tenements cover the *Daviesia megacalyx* populations, eleven of which are exploration licences, four are mining leases and one is a prospecting licence. However, recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the population or within the defined critical habitat of *Daviesia megacalyx* require assessment for the potential for a significant level of impact. No developments should be approved unless the proponents can demonstrate that they will not have a detrimental impact on the species, or its habitat or potential habitat, or the local surface and ground water hydrology.

Evaluation of the Plan's Performance

The Department of CALM, in conjunction with the Albany District Threatened Flora Recovery Team will evaluate the performance of this recovery plan. In addition to annual reporting on progress against the criteria for success and failure, the plan is to be reviewed within five years of its implementation. Any changes to management and/or recovery actions made in response to monitoring results will be documented accordingly.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery 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 and individuals within populations remains stable or increases over the five years of the plan.
Criteria for failure: The number of populations or the number of individuals within populations decreases over the five years of the plan.

3. RECOVERY ACTIONS

Existing or completed recovery actions

All land managers have been notified of the location and threatened status of *Daviesia megacalyx*. The notification details the Declared Rare status of the species and the legal responsibility to protect it.

Staff from the CALM Albany Work Centre monitor the populations as regularly as practicable.

Daviesia megacalyx is currently being tested for susceptibility for *Phytophthora cinnamomi* ([2]B. Shearer, personal communication).

Six collections of *Daviesia megacalyx* seed are currently in storage. Preservation of germplasm is essential to guard against the possible extinction of wild populations. Seed can also be used to

[2] Bryan Shearer Principle Research Scientist, CALM Science

propagate plants for future translocations and is required from all populations to maximise the genetic diversity of *ex situ* material. Approximately 2400 seed were collected from four of the eight populations in 1993 and 1994 by staff from CALM's Threatened Flora Seed Centre. Germination has been tested and due to the species hard seed, some scarification treatment is necessary. Initially, a boiling water treatment was trialled; however it appeared to adversely affect the germination of the species, with some tests resulting in 0% germination. More recently, the seed coats have been nicked to overcome the physical dormancy, which has proved to be a more suitable technique. To date, results have shown an average of 90% germination. ([3]A. Crawford, personal communication).

Kings Park and Botanic Garden currently store 1.5 grams of seed from 3 different *Daviesia megacalyx* clones. They also have four plants in the Botanic Garden. The work done on this species has shown that it can be successfully maintained in a container for a number of years ([4]A. Shade, personal communication).

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken. The following recovery actions are roughly in order of descending priority; however this should not constrain addressing any of the priorities if funding is available and other opportunities arise.

1. Coordinate recovery actions

The Albany District Threatened Flora Recovery Team (ADTFRT) is coordinating recovery actions for *Daviesia megacalyx* and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Albany Work Centre) through the ADTFRT
Cost: $3,000 per year

2. Monitor populations

Continue regular monitoring of *Daviesia megacalyx* populations.

Action: Monitor populations
Responsibility: CALM (Albany Work Centre)
Cost: $2,770 per year

3. Continue fire management

Maintain firebreaks around populations to enable plants to reach maturity and build up a seed bank.

Action: Continue fire management
Responsibility: CALM (Albany Work Centre)
Cost: $4,000 in the first year

4. Continue seed collection

[3] Andrew CrawfordSenior Technical Officer, CALM Threatened Flora Seed Centre
[4] Amanda Shade Botanic Gardens and Parks Authority, Western Australia

Seed collection will be ongoing to obtain seed from as wide a range of individuals as possible.

Action: Continue seed collection
Responsibility: CALM (Threatened Flora Seed Centre and Albany Work Centre)
Cost: $13,770 per year

5. Conduct further surveys

Surveys supervised by CALM staff, with assistance from local naturalists and wildflower society members, are to be conducted during the species flowering period (July to September). Similar habitat has not been extensively surveyed. Information on soil and vegetation types will be used to identify similar habitat to target for further surveys.

Action: Conduct futher surveys
Responsibility: CALM (Science Division and Albany Work Centre)
Cost: $5,320 per year

6. Liaise with land managers

Staff from CALM Albany District will continue to liaise with current and future mining leasees to ensure populations on mining tenements are not accidentally damaged or destroyed and that the impacts of identified threats are minimised. Input and involvement will also be sought from Indigenous groups that have an active interest in areas that are habitat for *Daviesia megacalyx*.

Action: Liaise with land managers
Responsibility: CALM (Albany Work Centre)
Cost: $1,600 per year

7. Obtain biological and ecological information

Knowledge of the biology and ecology of *Daviesia megacalyx* will provide a better scientific basis for management of the wild populations. An understanding of the following is particularly necessary for effective management:

1. The phenology, seasonal growth and pollination biology.
2. Soil seed bank dynamics and the role of various disturbances, competition and rainfall in germination and recruitment.

Action: Obtain biological and ecological information
Responsibility: CALM (Science Division and Albany Work Centre)
Cost: $24,000 per year for three years

8. Map habitat critical to the survival of the species

It is a requirement of the EPBC Act (Section 207A) that spatial data relating to critical habitat be determined. Although habitat critical to the survival of the species is alluded to in Section 1, all the areas described have not yet been accurately mapped and will be addressed under this action. If additional populations are located, habitat critical to their survival will also be determined and mapped.

Action: Map habitat critical to the survival of the species
Responsibility: CALM (Albany Work Centre)
Cost: $400 in first year

9. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: CALM (Albany Work Centre) through the ADTFRT
Cost: $900 per year

10. Review the IRP and asses the need for further recovery actions

If *Daviesia megacalyx* is still ranked as Endangered at the end of the fourth year of the five-year term of this IRP, the plan will be reviewed and the need for further recovery actions assessed.

Action: Review the IRP and assess the need for further recovery actions
Responsibility: CALM (Species and Communities Branch and Albany Work Centre) through the ADTFRT
Cost: $4,000 in the fifth year (if required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from August 2005 to July 2010 but will remain in force until withdrawn or replaced. If the taxon is still ranked as Endangered after five years, this IRP will be reviewed and if necessary, further recovery actions put in place.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Shrubs to 1.5 m tall, glabrous; branchlets erect, angular. *Phyllodes* erect, narrow-obovate or –elliptic, apiculate at apex, rarely retuse, tapered to the articulate base, 40-80 mm long, 5-12 mm broad, with a faint midrib and barely visible venation, coriaceous, green. *Racemes* 1-(rarely 2-)-flowered; rachis short, to 4 mm long; pedicels 3-6 mm long, much longer than the stripe-like receptacle. *Calyx* 3.5-5 mm long in flower including the 1.5 mm receptacle, in fruit enlarged 2-fold and thickened, persistent black and conspicuous after fruit has fallen; lobes nearly uniform, acuminate, c. equal to tube. *Standard* very broad-ovate, 12-14 mm broad, apricot towards margins, maroon towards centre, with an intensely yellow central marking; *wings* broad-spathulate, strongly incurved at apex but scarcely overlapping, deep pink; *keel* inflated, acuminate; deep pink. *Stamens* strongly dimorphic; inner whorl of 5 with anther-cells confluent. Pod compressed, obliquely transverse-narrow-triangular, 20-23 mm long, 9-11 mm broad, pericarp coriaceous.