INTERIM RECOVERY PLAN NO. 96

STIRLING RANGE DAVIESIA

(*DAVIESIA PSEUDAPHYLLA*)

INTERIM RECOVERY PLAN

2001-2004

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Photograph: E. Hickman

March 2001

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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 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This Interim Recovery Plan will operate from March 2001 to February 2004 but will remain in force until withdrawn or replaced.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 26 June 2001. 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 March 2001.

SUMMARY

Scientific Name:	***Daviesia pseudaphylla***	**Common Name:**	Stirling Range Daviesia
Family:	Papilionaceae	**Flowering Period:**	July to September
CALM Region:	South Coast	**CALM District:**	Albany
Shire:	Gnowangerup	**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; Crisp, M.D. (1995) Contributions towards a revision of *Daviesia* (Fabaceae: Mirbelieae). III. A Synopsis of the Genus. *Australian Systematic Botany* 8: 1155-1249.

Current status: *Daviesia pseudaphylla* was declared as Rare Flora in May 1997 and ranked as Critically Endangered (CR) in September 1999. It currently meets World Conservation Union (IUCN, 1994) Red List Category CR under criteria B1+2c and C1 due to it being known from a single area, a continuing decline in population size, habitat quality and area, and the low number of individuals. The main threats are disease, inappropriate fire regimes and firebreak maintenance.

Habitat requirements: *Daviesia pseudaphylla* is endemic to Western Australia where it is confined to the Stirling Range National Park. The species grows on brown sandy loam over sandstone and quartz gravel in heath and open mallee.

Critical habitat: The critical habitat of *Daviesia pseudaphylla* comprises the area of known populations, adjacent areas of similar habitat within 200 metres of populations, corridors of remnant vegetation that link populations, and other nearby occurrences of suitable habitat that are not currently known to contain populations of the species but which may be suitable for translocations.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. In November 1993 and 1994 some 1050 and 225 seeds were collected from Subpopulation 1a and in December 1999 a further 57 seeds were collected from Population 3. All seeds are stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C.
2. The Botanic Garden and Parks Authority currently has 18 nursery grown plants of *Daviesia pseudaphylla*, which were obtained from seed propagated by the TFSC in 1995.
3. To control *Phytophthora cinnamomi*, Population 2 was sprayed with phosphite in 1998 and again in March 2000.
4. Stirling Range National Park Rangers are aware of the location and threatened nature of the species.
5. Staff from CALM's Albany District Office regularly monitor populations.
6. The Albany District Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive and funding bodies.

IRP Objective: 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.

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.

Recovery actions
1. Coordinate recovery actions.
2. Apply phosphite.
3. Monitor populations.
4. Develop and implement a fire management strategy.
5. Install Declared Rare Flora markers.
6. Conduct further surveys.
7. Collect seed and cutting material.
8. Obtain biological and ecological information.
9. Promote awareness.
10. Write a full Recovery Plan.

1. BACKGROUND

History

Arthur Weston discovered *Daviesia pseudaphylla* in the Stirling Range in 1974. Searches over the next 25 years found no new populations. However, its diffuse habit and long, thin phyllodes make *Daviesia pseudaphylla* difficult to see among other vegetation (Crisp 1985) and it was not until 1999 and 2000 that CALM staff located more populations within Stirling Range National Park.

Between April and May 1991 a fire burnt all known populations of *Daviesia pseudaphylla*. Although adult plants were killed, soil-stored seed germinated and after five years plants in these populations had again reached maturity. Another fire occurred in October 2000 and again burnt all populations. The species is currently known from three populations with few unburnt plants remaining and it is unknown at this early stage if they will regenerate from soil-stored seed.

Most populations appear to be in decline from dieback disease (*Phytophthora cinnamomi*) which has damaged their habitat and may directly impact the species itself.

Description

Daviesia pseudaphylla is a low, spreading, spindly shrub 1.3 m wide by 30 cm tall. The phyllodes are up to 3 cm long by 0.75 to 1.5 mm wide, are ascending with gently upward curving edges, and on some branchlets are reduced to minute scales. Inflorescences of 2 or 3 flowers are held in the phyllode axils, on a very short stem. The 10 mm standard petal is yellowish-orange on the sides and dark purple, with a central three-lobed yellow streak, on top. The wings and keel are dark red, with the wings being 8 mm in length (Brown *et al*. 1998).

Daviesia pseudaphylla resembles *D. debilior* with the latter having costate branchlets and phyllodes, shorter internodes, smaller flowers, deep pink colouring with no central streak on the abaxial face and a shorter, broader pod (Crisp 1995).

Distribution and habitat

Daviesia pseudaphylla is endemic to Western Australia where it is confined to Stirling Range National Park. The species grows on brown, sandy loam over sandstone and quartz gravel in heath and open mallee. Associate species include *Eucalyptus marginata*, *Beaufortia anisandra*, *Hakea trifurcata*, *Corymbia calophylla*, *Andersonia echinocephala*, *Hakea cucullata*, *Agonis spathulata*, *Agonis floribunda*, *Kingia australis*, *Agonis parviceps*, *Xanthorrhoea preissii*, *Melaleuca thymoides*, *Lambertia inermis*, *Dryandra mucronulata*, *Hakea baxteri*, *Allocasuarina humilis*, *Banksia gardneri*, *Banksia sphaerocarpa* and *Melaleuca striata*.

At Population 2, *Daviesia pseudaphylla* occurs with several other Declared Rare Flora species including *Dryandra anatona* and *Daviesia glossosema* (both Critically Endangered).

Critical Habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or community. Habitat means the biophysical medium or media: (a) occupied (continuously, periodically or occasionally) by an organism or group of organisms; or (b) 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* (EPBC Act)).

The critical habitat for *Daviesia pseudaphylla* comprises:

- The habitat of known populations.
- Similar habitat within 200 metres of known populations (these provide potential habitat for natural recruitment).
- Corridors of remnant vegetation that link populations with other nearby areas of apparently suitable habitat that do not currently contain the species.
- Areas of similar habitat that may be used for future translocation.

Biology and ecology

The name *pseudaphylla* is derived from the Greek *pseudo-* (false), *a* (without) and *phyllon* (leaf), and refers to the leaflessness of the plant (Crisp 1995).

It is not known if *Daviesia pseudaphylla* is itself susceptible to dieback caused by *Phytophthora cinnamomi* (personal communication C. Crane[1]). However, the species has been identified in the Stirling Range and Porongurup National Parks Management Plan as flora that requires urgent management intervention due to populations being subject to severe threat from dieback disease and occurring in susceptible habitat (CALM, 1999).

The response of *Daviesia pseudaphylla* to successive fires is not known. Although, the species is killed by fire it does regenerate from soil-stored seed. Frequent fires may, however, result in little or no seed being produced to replenish the soil-seed bank.

Threats

Daviesia pseudaphylla was declared as Rare Flora in May 1997 and ranked as Critically Endangered (CR) in September 1999. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'CR' under criteria B1+2c and C1 due to it being known from a single area, a continuing decline in population size, habitat quality and area, and the low number of individuals. The main threats are disease, inappropriate fire regimes and firebreak maintenance.

- **Disease** is a serious threat to all *Daviesia pseudaphylla* populations. The habitat of most populations is already infected with dieback (*P. cinnamomi*) and many deaths are likely to be attributed to this.
- **Inappropriate fire regimes** may adversely affect the long-term viability of populations. Fires in 1991 and 2000 killed many adult plants and if further fires occur before seed is produced there is a significant risk of depleting the soil seed store.
- **Firebreak maintenance** including grading threatens Subpopulation 1b and Population 2. Declared Rare Flora markers will be installed to prevent possible damage to the population.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
*1A. Pillenorup Track	National Park	1999 200 2000 #30 [85% burnt]	Burnt	Disease (dieback infested), inappropriate fire
*1B. Kyanorup Track	National Park	2000 25 2000 #30 [85% burnt]	Burnt	Disease (dieback infested), inappropriate fire, firebreak maintenance
*2. Ellen Track	National Park	1999 6 2000 6?	Burnt	Disease, inappropriate fire, firebreak maintenance
*3. Mirlpunda Track	National Park	1999 50 2000 10	Burnt	Disease (dieback infested), inappropriate fire

counts include both subpopulations. *refers to populations that were burnt in the October 2000 fire. Two of these populations have not yet been surveyed for numbers of surviving plants.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Development in the immediate vicinity of populations or within the defined critical habitat of *Daviesia pseudaphylla* will require assessment. Developments should not be approved unless the proponents can demonstrate that they will not have a negative impact on the species, and its habitat or potential habitat or have the potential to spread or amplify dieback disease caused by the plant pathogen *Phytophthora cinnamomi*.

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.

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.

[1] Colin Crane, Senior Technical Officer, CALMScience Division, Kensington

3. RECOVERY ACTIONS

Existing recovery actions

In November 1993, 1050 seeds were collected from Subpopulation 1a and stored at CALM's TFSC at -18°C. TFSC staff do a test of seed viability when first collected and test again after one and five years in storage. The germination rate for *Daviesia pseudaphylla* ranged from 87% to 100% when first tested and was 87% after one year in storage. A further 225 seeds were collected from Subpopulation 1a in November 1994 and had an initial germination rate of 83% with some 73% germinating after one year in storage. In December 1999, 57 seeds were collected from Population 3. This germination rate of this seed has not yet been tested (unpublished data A. Cochrane[2]).

The Botanic Gardens and Parks Authority (BGPA) currently have 18 nursery-grown plants of *Daviesia pseudaphylla* obtained from seed propagated by the TFSC in 1995. Six plants are in the nursery while the others are planted out in various sites around the Botanic Gardens. In 1998 seed was collected from nursery plants but proved not to be viable (personal communication A. Shade[3]).

Population 2 of *Daviesia pseudaphylla* was included in the *Dryandra anatona* spray program (to control dieback) and was sprayed with phosphite in 1998 and 2000. Due to the continuing threat from dieback, CALM's Albany District staff will spray these areas at least annually.

National Park Rangers are aware of the locations and the threatened nature of the species. Staff from the CALM Albany District Office regularly monitors populations, particularly in relation to the impact of *Phytophthora cinnamomi* and the effectiveness of phosphite application.

The Albany District Threatened Flora Recovery Team (ADTFRT) is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive and funding bodies.

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. Coordinate recovery actions

The ADTFRT will oversee the implementation of recovery actions for *Daviesia pseudaphylla* and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $400 per year

2. Apply phosphite

Although it is not known if *Daviesia pseudaphylla* itself is impacted upon, the community in which it grows is infected with dieback (*Phytophthora cinnamomi*). CALM will apply phosphite to the area as it will protect other threatened plant species known to occur in the same community. Note: the cost of applying Phosphate is based on two sprays per year and will be spread across several species that occur in the same community. The $17,400 cost will not need to be repeated for each of these species.

Action: Apply phosphite
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: $17,400 in the second year

3. Monitor populations

Following the application of phosphite, monitoring its impact (if any) on *Daviesia pseudaphylla* and its effectiveness in controlling *Phytophthora cinnamomi* is required. Also, following the fire in October 2000, populations that were burnt will need to be monitored for post fire recruitment from soil-stored seed and to determine the fire response of adult plants

[2] Anne Cochrane, Manager, Threatened Flora Seed Centre, CALMScience Division
[3] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

(killed or resprouts). Other factors will also need to be monitored, such as habitat degradation (including the impact of dieback), population stability (expansion or decline), pollination activity, recruitment, seed production and longevity.

Action: Monitor populations
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: $1,800 per year

4. Develop and implement a fire management strategy

Although it is likely that soil-stored seed germinates following fire, frequent fire may result in the accumulation of insufficient seed for the effective long-term regeneration of populations. Fire should therefore be prevented from occurring in areas that have been burnt recently. A fire management strategy that defines fire control measures, and fire frequency and timing will be developed in consultation with relevant authorities and land managers.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $2,400 in first year and $1,000 in subsequent years

5. Install Declared Rare Flora markers

Declared Rare Flora (DRF) markers are required for Subpopulation 1b and Population 2.

Action: Install DRF markers
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $800 in first year

6. Conduct further surveys

CALM staff will conduct further surveys during the species' flowering period (July to September) with assistance of local naturalists and wildflower society members.

Action: Conduct further surveys
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $3,200 per year

7. Collect seed and cutting material

To guard against extinction of highly threatened wild populations, preservation of germplasm is essential. Seed has been collected from Subpopulation 1a and Population 3 but additional seed is required. Cuttings will also be collected to help establish a living collection of genetic material at the BGPA.

Action: Collect seed and cutting material
Responsibility: CALM (Albany District, TFSC) and the BGPA, through the ADTFRT
Cost: $3,300 per year

8. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Daviesia pseudaphylla* in the wild. Investigations will include:

1. Studying the soil seed bank dynamics and the effect of disturbance (such as fire), competition, grazing and rainfall on recruitment and seedling survival.
2. Determining reproductive strategies, phenology and seasonal growth.
3. Investigating the species' pollination biology.
4. Investigating population genetic structure, levels of genetic diversity and minimum viable population size.
5. Investigating the impacts of dieback disease and control techniques (Phosphite) on *Daviesia pseudaphylla* and its habitat.

Action: Obtain biological and ecological information
Responsibility: CALM (CALMScience, Albany District) through the ADTFRT
Cost: $17,700 per year

9. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Daviesia pseudaphylla* in the wild will be promoted to the public through the local print and electronic media and through poster displays. An information sheet that includes a description of the plant, its habitat type, threats and management actions will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

Due to the susceptibility of the habitat of this species to dieback the need for dieback hygiene procedures will be included in information provided to visitors to the sites.

Action: Promote awareness
Responsibility: CALM (Albany District, Corporate Relations) through the ADTFRT
Cost: $1,100 in first year and $700 in subsequent years

10. Write a full Recovery Plan

At the end of the third-year of this IRP, the need for further recovery will be assessed. If *Daviesia pseudaphylla* is still ranked Critically Endangered at that time a full Recovery Plan will be developed that prescribes actions required for the long-term recovery of the species.

Action: Write a full Recovery Plan
Responsibility: CALM (WATSCU, Albany District) through the ADTFRT
Cost: $18,000 in third year

4. TERM OF PLAN

This Interim Recovery Plan will operate from March 2001 to February 2004 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:

Sarah Barrett	Conservation Officer, CALM Albany District
Colin Crane	Senior Technical Officer, CALMScience Division
Anne Cochrane	Manager, CALM's Threatened Flora Seed Centre, CALMScience Division
Greg Keighery	Principal Research Scientist, CALMScience Division
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Russell Smith	Ecologist, CALM Central Forest Region, Bunbury

We would like to thank the staff of CALM's W.A. Herbarium for providing access to Herbarium databases and specimen information, and CALM's Wildlife Branch for their extensive assistance.

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

Crisp, M.D. (1995) Contributions Towards a Revision of *Daviesia* (Fabaceae: Mirbelieae). III. A Synopsis of the Genus. *Australian Systematic Botany* 8: 1155-1249.

Daviesia pseudaphylla Crisp is a low, open, spreading shrub to 0.35 m high and 1.3 m broad, apparently increasing by root suckers; stems procumbent; internodes long; branchlets terete, smooth when fresh, striate when dry. Phyllodes scattered, ascending, continuous with and virtually indistinguishable from branchlets, gently upcurved, terete, up to 300 mm long, 0.75 to 1.5 mm diameter, smooth when fresh, wrinkled-striate when dry, glaucous in summer, abruptly reduced to minute scales on some branchlets; seedling phyllodes flat, to 8 mm broad. Racemes 2 to 3-flowered, rachis almost nil, enclosed at base by numerous imbricate shell-shaped striate bracts; bracts subtending pedicels erect, spathulate, abruptly contracted between lamina and claw; pedicels equal to bracts, c. 4 mm long. Calyx 3 to 3.5 mm long; upper two lobes united in a bidentate lip; lower three lobes acuminate. Standard transverse-broad-elliptic, c. 10 mm long including the 2.5 mm claw, c. 10.5 mm broad, predominantly yellowish orange adaxially, dark purple with a yellow streak abaxially; wings obovate, c. 8 mm long, dark reddish; keel half broad-elliptic, scarcely acute, c. 6 mm long, dark reddish. Stamens strongly dimorphic; inner whorl of 5 with anther cells confluent; vexillary filament rather thick and adaxially channelled. Pod obliquely transverse-narrow-obtriangular, with a long but scarcely acute apex, indented above the middle of the adaxial suture, 14 to 17 mm long, 9 to 10 mm broad (Crisp, 1995).