

INTERIM RECOVERY PLAN NO. 94

MAROON-FLOWERED DAVIESIA
(*DAVIESIA GLOSSOSEMA*)
INTERIM RECOVERY PLAN
2001-2004

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Photograph Anne Cochrane
March 2001

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Western Australian Threatened Species and Communities Unit (WATSCU)
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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This Interim Recovery Plan will operate from March 2001 to February 2004 but will remain in force until withdrawn or replaced.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:	<i>Daviesia glossosema</i>	Common Name:	Maroon-flowered Daviesia
Family:	Papilionaceae	Flowering Period:	November
CALM Region:	South Coast	CALM District:	Albany
Shire:	Gnowangerup	Recovery Team:	Albany District Threatened Flora Recovery Team (ADTFRT)

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

Crisp, Taylor and Jackson first collected *Daviesia glossosema* from the Stirling Range in 1979. Further surveys were undertaken by CALM staff in 1999 and 2000 with three new subpopulations found, each consisting of just a few plants.

A fire burnt all populations of *Daviesia glossosema* in April to May 1991. A further fire occurred in October 2000 and again burnt all populations of *D. glossosema* with few unburnt plants remaining. The species is currently known from four populations, three of which contain no extant plants.

Current status: *Daviesia glossosema* currently meets World Conservation Union (IUCN, 1994) Red List Category 'CR' under criteria A1c, B1+2abce due to it being known from a single location, the low number of mature individuals and a continuing decline in habitat quality, number of mature individuals and area of occupancy. The main threats are disease, inappropriate fire regimes and firebreak maintenance.

Habitat requirements: *Daviesia glossosema* is endemic to Western Australia where it is confined to the Stirling Range National Park. The species occurs in areas of brown/grey sandy loam/clay with a low laterite gravel content.

Critical habitat: The critical habitat for *Daviesia glossosema* is the area of habitat in which it occurs, similar habitat within 200 metres of known populations, corridors of vegetation that are linked to populations of the species and additional occurrences of appropriate habitat that do not currently contain the species.

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

1. Approximately 29 seeds were collected from Population 1 in December 1999 and January 2000, 66 seeds from Population 2 in January 2000 and three seeds from Population 3 in December 1999. The seed is stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C.
2. Plant material was taken from *Daviesia glossosema* in April/May 1999 to test for dieback (*Phytophthora cinnamomi*) susceptibility.
3. To control dieback Population 2 was sprayed with phosphite in 1998 and March 2000.
4. Stirling Range National Park Rangers are aware of the threatened nature of the species and its location.
5. Staff from the CALM Albany District Office regularly monitor the population.
6. 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.

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. Install Declared Rare Flora (DRF) markers
5. Develop and implement a fire management strategy
6. Conduct further surveys.
7. Collect seed and cutting material
8. Obtain biological and ecological information.
9. Incorporate recovery actions into the Stirling Range and Porongurup National Parks Management Plan.
10. Promote awareness.
11. Write a full Recovery Plan.

1. BACKGROUND

History

Crisp, Taylor and Jackson first collected *Daviesia glossosema* from the Stirling Range in 1979. Further surveys were undertaken by CALM staff in 1999 and 2000 with three new subpopulations found, each consisting of just a few plants.

A fire burnt all populations of *Daviesia glossosema* in April to May 1991. Although adult plants were killed, soil-stored seed germinated and after five years plants in these populations had again reached maturity. A further fire occurred in October 2000 and again burnt all populations of *D. glossosema* with few unburnt plants remaining. The species is currently known from four populations, three of which contain no extant plants. However, it is likely that new plants will germinate from soil stored seed. M. Crisp, when making collections in 1979, noted that the species was previously more abundant. With the habitat of all populations currently infected with dieback, and several dieback fronts occurring within the area of the largest population, the species is highly endangered.

Description

Daviesia glossosema Crisp is an intricate shrub with arching, minutely scabrid, glaucous branches c. 0.5 m high. Branchlets are striate, at least when dry. Phyllodes are spreading, needle-like, gently recurved, scarcely rigid, acuminate, pungent, 8-40 mm long, striate when dry. Flowers are c. 12 mm long. Petals are maroon. Stamens at anthesis are splayed out in gap between the standard and wings. The plant is weakly dimorphic with anthers all 2-celled (Crisp 1995).

Vegetatively, *Daviesia glossosema* is similar to several other *Daviesia* species. However, its minutely scabrous epidermis distinguishes it from all but *D. articulata*, which has different flowers and small, compressed pods (Crisp 1995). *Daviesia glossosema* has distinctive flowers that cannot be confused with any other species in the genus. The inflorescence, maroon petals, strange shaped floral parts and exposure of the stamens and style at anthesis are unique and suggest an unusual, specialised pollination process (Crisp 1995).

The species name *glossosema* is derived from the Greek words *glossa* (tongue) and *sema* (sign or standard), and refers to the linguiform shape of the standard-petal, which is unique in the genus (Crisp 1995).

Distribution and habitat

Daviesia glossosema is endemic to Western Australia where it is confined to Stirling Range National Park. The species grows in brown/grey sandy loam/clay with a low laterite gravel content.

Associated species include *Eucalyptus marginata*, *Beaufortia anisandra*, *Andersonia echinocephala*, *Hakea cucullata*, *Agonis spathulata*, *Agonis parviceps*, *Melaleuca thymoides*, *Lambertia inermis*, *Banksia coccinea* and *Lambertia ericifolia*.

Daviesia glossosema occurs with two other CR species, *Dryandra anatona* and *Daviesia pseudaphylla*.

Critical Habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. 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 that the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

The critical habitat for *Daviesia glossosema* 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 (these represent possible translocation sites).

Biology and ecology

Daviesia glossosema is considered to be highly susceptible to dieback caused by *Phytophthora cinnamomi* based on field observations and sampling (personal communication S. Barrett¹). The species mode of regeneration post-fire is unclear (pers observation, S. Barrett).

Threats

Daviesia glossosema was ranked as Critically Endangered (CR) in November 2000. It currently meets World Conservation Union (IUCN 1994) Red List Category 'CR' under criteria A1c, B1+2abce due to it being known from a single location, the low number of mature individuals and a continuing decline in habitat quality, number of mature individuals and area of occupancy. The main threats are disease, inappropriate fire regimes and firebreak maintenance.

- **Disease** is a serious threat to *Daviesia glossosema*. Dieback (*Phytophthora* spp.) has infected the habitat of all populations and may be killing plants of *Daviesia glossosema*.
- **Inappropriate fire regimes** may adversely affect the long-term viability of populations. Fires in 1991 and 2000 killed most adult plants.
- **Firebreak maintenance** is a possible threat to Subpopulations 3b and 4a. CALM is aware of the location of the populations and 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
1. South Bluff Track	National Park	1999 150 [30% dead] 2000 0	Burnt	Disease, inappropriate fire
2. Ellen Track	National Park	1999 250 [25 dead] 2000 100 [>50% burnt]	> 50% Burnt	Disease, inappropriate fire
3A. South Mirlpunda Track	National Park	1999 1 2000 0	Burnt	Disease, inappropriate fire
*3B. Ellen Track	National Park	1999 1 2000 0	Burnt	Disease, inappropriate fire, firebreak maintenance
3C. South Mirlpunda Track	National Park	2000 7 2000 0	Burnt	Disease, inappropriate fire
4A. Kyanorup Track	National Park	1999 3 2000 0	Burnt	Disease, inappropriate fire, firebreak maintenance
4B. Kyanorup Track	National Park	2000 30+ 2000 0	Burnt	Disease, inappropriate fire

All populations were burnt in the October/November 2000 fire.

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 glossosema* 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.

¹ Sarah Barrett, Flora Officer, CALM Albany District

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.

3. RECOVERY ACTIONS

Existing recovery actions

Approximately 29 seeds were collected from Population 1 in December 1999 and January 2000, 66 seeds from Population 2 in January 2000 and three seeds from Population 3 in December 1999. The seed is stored in CALM's TFSC at -18°C . Staff from the TFSC usually test the viability of the seed when first collected, after one year in storage and again after five years, however, as yet none of this seed have been tested (unpublished data, A. Cochrane²).

Plant material was taken from *Daviesia glossosema* in April/May 1999 to test for dieback (*Phytophthora cinnamomi*) susceptibility (personal communication S. Barrett).

Daviesia glossosema (Population 2) is included in the *Dryandra anaton* phosphite program and was sprayed in 1998 and again in March 2000. Due to the continuing threat of dieback, these areas will continue to be sprayed as part of CALM's phosphite spraying program.

Stirling Range National Park Rangers are aware of the locations and threatened nature of the species. Staff from CALM's Albany District Office regularly monitor the population, 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 glossosema* 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 glossosema* 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 also 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 CR species that occur in the same community. The \$17,400 will not need to be repeated for each species.

Action: Apply phosphite
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: \$17,400 in first and third years

3. Monitor populations

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

² Anne Cochrane, Manager, Threatened Flora Seed Centre, CALM Science Division

Action: Monitor populations
Responsibility: CALM (Albany District, Dieback Disease Coordinator, CALMScience) through the ADTFRT
Cost: \$2,000 per year

4. Install Declared Rare Flora markers

Declared Rare Flora (DRF) markers are required for Subpopulations 3b and 4a.

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

5. Develop and implement a fire management strategy

Frequent fire may result in insufficient seed being stored 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

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

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Seed collections are also needed to propagate plants for translocations. A small quantity of seed has been collected from Populations 1, 2 and 3 but additional seed is required from all populations. Cuttings will also be collected to further establish a living collection of genetic material at the Botanic Gardens and Parks Authority (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 glossosema* in the wild. Investigations will include:

1. Study of the soil seed bank dynamics and the role of various factors including disturbance (such as fire), competition, and rainfall, grazing in recruitment and seedling survival.
2. Determination of reproductive strategies, phenology and seasonal growth.
3. Investigation of the mating system and pollination biology.
4. Investigation of population genetic structure, levels of genetic diversity and minimum viable population size.
5. Investigation of the impacts of dieback disease and control techniques on *Daviesia glossosema* and its habitat.

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

9. Incorporate the conservation of this species into Stirling Range and Porongurup National Parks Management Plan

Recovery actions from this Interim Recovery Plan will be included in the Management Plan for the Stirling Range and Porongurup National Parks. The plan will include recommendations on dieback, fire management and monitoring.

Action: Incorporate the conservation of this species into Stirling Range and Porongurup National Parks Management Plan
Responsibility: CALM (Albany District) through the ADTFRT
Cost: \$600 in first year

10. Promote awareness

The importance of biodiversity conservation and the protection of *Daviesia glossosema* will be promoted to the public. Awareness will be encouraged in the community by a publicity campaign through the local print and electronic media and poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet that includes a description of the plant, its habitat type, threats, management actions and photos will be produced.

Due to the susceptibility of the habitat of this species to dieback (*Phytophthora* spp.), the need for dieback hygiene procedures will be included in information provided to visitors to the site. This will stress the need to restrict the movement of soil into the habitat.

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

11. Write a full Recovery Plan

At the end of the three year term of this Interim Recovery Plan, the need for further recovery will be assessed. If the species is still ranked Critically Endangered a full Recovery Plan will be developed that prescribes actions required its long-term conservation.

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 November 2000 to October 2003 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

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

6. REFERENCES

- CALM (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
- CALM (1994) Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. 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.

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/>
World Conservation Union (1994) *IUCN red list categories prepared by the IUCN Species Survival Commission*, as approved by the 40th meeting of the IUCN Council. Gland, Switzerland.

7. TAXONOMIC DESCRIPTION

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 glossosema Crisp is an intricate shrub with arching branches, c. 0.5 m high, minutely scabrid, glaucous; branchlets striate, at least when dry. **Phyllodes** spreading at (45-)60-90°, needle-like, gently recurved, scarcely rigid, acuminate, pungent, 8-40 mm long, 0.75(-1) mm diam., striate when dry. **Racemes** pendulous, umbelliform, 2-5-flowered; rachis 5-10 mm long; pedicels bent so that flowers face outwards, 3-5 mm long. **Flowers** c. 12 mm long. **Calyx** obliquely cup-shaped, adaxially ventricose, c. 4 mm long and broad; teeth minute, uniform. Petals maroon; **standard** tongue-like, very strongly recurved, narrow-ovate, channelled, c. 5 mm broad; **wings** with margins involute and apices strongly incurved and interlocked to form a U-shape (viewed from above), thus exposing the keel and stamens; **keel** much shorter than wings, scarcely acute, with claws longer than laminae, soon opening to display stamens and style. **Stamens** at anthesis splayed out in gap between standard and wings, weakly dimorphic, with anthers all 2-celled. **Gynoecium** almost straight. **Pod** very turgid, c. 20 mm long, acuminate; lower suture ventricose and protruding beyond apex.