INTERIM RECOVERY PLAN NO. 11

NORSEMAN PEA (*DAVIESIA MICROCARPA*) INTERIM RECOVERY PLAN

1996-1999

by

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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 are designed to run for three years only and will be replaced by full Recovery Plans where required.

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 IRP was approved by the Director of Nature Conservation on 7 May 1997. Approved IRPs are subject to modification as dictated by new findings, changes in status of the taxon or ecological community and the completion of recovery actions. 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, 1997.

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SUMMARY

Norseman Pea, *Daviesia microcarpa* **Family:** PAPILIONACEAE

Flowering period: August-September

CALM Region: South Coast **CALM District:** Esperance **Shire:** Dundas

Current status: Declared as Rare Flora in September 1987, ranked as Critically Endangered in September 1995

Recovery team: A Threatened Flora Recovery Team will be established for CALM's Esperance District in 1996/1997

Illustrations and/or further information: S. D. Hopper *et al*. *Western Australia's Endangered Flora* (1990); E. M. Mattiske and Associates*, Assessment of Three Gazetted Rare Plants* (1994); M. D. Crisp, *Contributions Towards a Revision of* Daviesia *(Fabaceae: Mirbelieae) III A Synopsis of the Genus* (1995); T. Schwarten, *The Biology and Ecology of Threatened Daviesia Species in Western Australia* (1995).

Daviesia microcarpa is a sprawling shrub to 40 cm high and 1 m wide, with 8-20 mm long phyllodes which are spirally arranged on tangled stems. The flowers and pods are among the smallest in the genus. *D. microcarpa* was formally described by M. D. Crisp in 1995.

The first known collection of *D. microcarpa* was made by D. Whibley in 1974 just west of the currently known subpopulation.

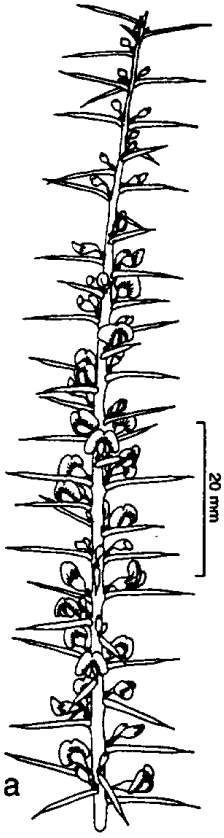
A single extant subpopulation of 15 plants is known from east of Norseman, growing adjacent to the Eyre Highway in disturbed, loamy red-brown soil with calcrete nodules.

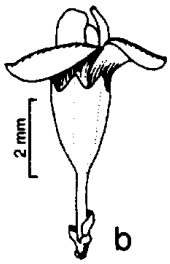
Pastoral practices, resulting in loss of suitable habitat, and a lack of appropriate disturbance, ie. soil disturbance and fire, may be the cause of the critically endangered status of the species. The aim of this Interim Recovery Plan is to abate identified threats and maintain viable *in situ* populations of *D. microcarpa* in order to conserve the wild genetic stock of the species. To achieve this aim the following essential and desirable recovery actions are prescribed.

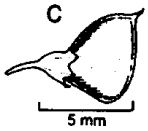
Recovery actions:

Essential	Desirable
1. Protect from road reconstruction	1. Conduct further surveys
2. Develop a fire management plan	2. Information dissemination
3. Install Declared Rare Flora markers	3. Conduct research
4. Monitor subpopulation	4. Survey for possible translocation sites
5. Preserve genetic diversity of the species	

Daviesia microcarpa







Distribution of *Daviesia microcarpa*
Not available

1. BACKGROUND

1.1 History, taxonomy and status

Daviesia microcarpa Crisp is a sprawling shrub to 40 cm high and 1 m wide, with 8-20 mm long needle-like phyllodes spirally arranged on tangled stems. The flowers, which are produced from August to September, are found towards the end of each stem. Each flower has a standard *c*. 4 mm long and 5 mm broad that is orange in colour with pinkish red veins. The wings are pinkish red with orange tips and the keel is pale orange pink. The flowers and pods (4-4.5 mm long) distinguish *D. microcarpa* from nearly all its relatives as they are amongst the smallest in the genus (Crisp 1985).

D. microcarpa was formally described by M. D. Crisp in 1995, a copy of which is included in Appendix 1.

The first known collection of *D. microcarpa* was made in 1974 by D. Whibley of the State Herbarium of South Australia, who located plants from a disturbed area in a roadside ditch, north-east of Norseman on the Eyre Highway (subpopulation 1a). Three other collections were made from the same area by M.D. Crisp (February and September 1979) and M.I.H. Brooker (August 1979). During the latter half of 1984, Main Roads Western Australia (MRWA) graded the road reserve and it was believed that the subpopulation was destroyed. However in March 1985, an unconfirmed report of thirteen plants was made from the same site by P. Collins from the Department of Fisheries and Wildlife. It is believed that soil disturbance during MRWA maintenance in 1984 stimulated the germination of the thirteen plants recorded in 1985. This was the last sighting of the species until 1992.

In 1990 MRWA was refused permission by CALM to disturb the *D. microcarpa* area, pending resolution of the status of the species. Engineering consultants, Halpern Glick Maunsell Pty Ltd were commissioned by MRWA to prepare an Environmental Assessment and Management Plan (EAMP), including a biological survey for *D. microcarpa*, pending the upgrading and realignment of the Norseman section of the Eyre Highway. No plants were found during surveys conducted by them in 1991 and 1992.

Mattiske Consulting Pty Ltd was commissioned by CALM in 1992 to survey for the species. Eighteen plants were found, of which two were dead (subpopulation 1b). This subpopulation was located approximately 500 m further north-east along the Eyre Highway from the last reported location of the species. The site was believed to have been graded four or five years prior to 1992. Extensive surveys for the species in other areas failed to locate more plants.

An opportunistic survey of subpopulation 1b in September 1993 by A. Brown found twelve plants in flower. In September 1995, fourteen plants in early fruit were recorded from the same area by E. Holland.

On 10 November 1994 MRWA was granted permission to take Declared Rare Flora from subpopulation 1a (no extant plants).

Road works for the realignment of the Eyre Highway commenced late 1995. In May 1996 the site was surveyed by A. Brown, E. Holland and F. Bunny. The area had been fenced and flagged by MRWA as per the recommended guidelines in the EAMP and fifteen live plants (plus one dead plant) were recorded. The embankment of the new road was, however, extremely close to the edge of the subpopulation and several trees within the fenced area had been cut down. Also, several Declared Rare Flora (DRF) markers had been removed.

The site was again surveyed by A. Brown in September 1996. The DRF markers had still not been re erected and a culvert had been positioned through the road into the middle of the subpopulation. In the process of building the culvert, two plants had been buried, one of which was unlikely to survive. It appeared likely that water would drain through the culvert into the low lying area of the subpopulation, possibly causing flooding.

Due to the low number of plants and the threats associated with growing on narrow, degraded road reserves, *D. microcarpa* was declared as Rare Flora in September 1987 and ranked as Critically Endangered in September 1995.

1.2 Distribution and habitat

D. microcarpa is known from a single subpopulation of 15 plants covering an area of 40 x 80 m along the Eyre Highway to the east of Norseman. The site has been highly modified due to previous road construction and little natural vegetation grows in association with the species. The subpopulation is restricted to disturbed soils over the underground Telecom line and graded soils between the line and the road.

The habitat consists of *Eucalyptus oleosa* var. *oleosa*, over *Melaleuca pungens, Allocasuarina helmsii, Acacia hemiteles* and *Westringia dampieri* over grasses of *Aristida contorta* and *Triodia* sp. in dry red-brown loamy clay with calcrete nodules.

A list of associated species is included in Appendix Two.

Table 1: Summary of population information

Pop no & location	Land status	No of plants	Condition	Threats
1a. ENE of Norseman	Road Reserve, MRWA	1985, 13 1995, 0	Moderate	Road works, inappropriate fire
1b. ENE of Norseman	Road Reserve, MRWA	1996, 15 alive, 1dead	Moderate	Road works, flooding, inappropriate fire

1.3 Biology and ecology

Daviesia is the second most diverse genus of pea-flowered legumes in Australia, with 135 known species and subspecies. Germination is known to be stimulated by fire and soil disturbance, such as grading (Crisp 1983). It is recognised from previous work on threatened species of *Daviesia* (Schwarten 1995) that some species have high incidences of flower and fruit abortion with a low seed set. However, *D. microcarpa* has been noted to have a high seed set.

Seed collected by CALM's Threatened Flora Seed Centre (TFSC) in 1993 had a 94% germination rate (A. Cochrane[1] pers comm 1995).

1.4 Threatening processes

1.4.1 Causes of the critically endangered status of the species

Pastoral practices, resulting in loss of suitable habitat, combined with a naturally restricted geographical range, may be the cause of the critically endangered status of the species. Poor germination of soil stored seed due to a lack of suitable disturbance (soil disturbance or fire) may also be contributing to the low numbers.

[1] Ann Cochrane (Western Australian Herbarium)

1.4.2 Threats to the ongoing survival of the species in the wild

- **Accidental destruction** to individual *D. microcarpa* plants and associated species as a result of soil disturbance and alterations to hydrology, may arise from MRWA highway realignment currently in progress (1996).

- **Inappropriate fire regimes** during the reproductive phase of *D. microcarpa* (ie. flowering, pollination, seed development and seed dispersal) may result in low/nil seedling recruitment. High fire frequency may also lead to the degradation of the habitat of *D. microcarpa* due to a depletion of soil seed banks and a temporary increase in the availability of nutrients for weed establishment (Panetta and Hopkins 1991). Irregular summer fire may be an important part of the life cycle of this species and be necessary for regeneration.

- **Weeds** are not currently a major problem within the subpopulation, however the potential for invasion may be increased if the area is exposed to disturbance (grading, fire).

1.5 Conservation status

D. microcarpa is known from a single subpopulation located on a road reserve vested in Main Roads Western Australia. No populations are known to exist on conservation reserves.

1.6 Strategy for recovery

A Threatened Flora Recovery Team is to be established for CALM's Esperance District which will oversee the implementation of this IRP and report annually to CALM's Corporative Executive. The following essential strategies will be implemented:

1. Control of the most threatening factors currently affecting *D. microcarpa* as outlined at 3.2.
2. Protect *D. microcarpa* from possible future threats (eg clearing, changes to hydrology), by appropriate management (see 3.2.1, 3.2.2).
3. Conserve the genetic diversity of *D. microcarpa* by including it in seed banks, cryostorage and/or *ex situ* cultivation (see 3.2.5).

The following desirable strategies will be implemented if resources permit:

1. Ensure that all relevant land managers and CALM personnel are aware of the presence of *D. microcarpa*, and the need to protect it (eg notification and DRF markers) and ensure that all are familiar with the threatening processes identified in these guidelines (see 3.3.2).
2. Conduct research into the biology, ecology and management of *D. microcarpa* (see 3.3.3).
3. Enhance plant numbers by the removal of limiting factors, direct interference with propagation or translocation (see 3.3.4 and CALM Policy Statement No 29 *Translocation of Threatened Flora and Fauna*).

2. RECOVERY OBJECTIVE AND CRITERIA

2.1 Objective

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

2.2 Criteria

2.2.1 Criteria for success

Recovery will be deemed a success if threatening processes identified within this IRP have been reduced or removed within the three year period.

2.2.2 Criteria for failure

The recovery process will have been unsuccessful if identified threats have not abated or there has been a substantial decrease in the number of mature plants within the three year period of this IRP.

3. RECOVERY ACTIONS

3.1 Existing recovery actions

Kings Park and Botanic Garden (KPBG) has 300 seeds in storage (February 1996).

CALM's TFSC has a total of approximately 4 500 seeds in storage from two collections (1993 and 1995). Tests of the 1993 collection gave a 94 % germination rate.

Monitoring of the subpopulation has been routinely undertaken by CALM Esperance District staff. The following sites were surveyed by Mattiske Consulting Pty Ltd in 1992:

- North and south of Eyre Highway near subpopulation 1b, in recently burnt/regenerating area.
- Numerous tracks in the Jimberlana Hill area.
- Calcrete pits in the Jimberlana Hill area.
- Calcrete pits *c*. 2.5 kilometres north east of subpopulation 1b, north of the Eyre Highway.
- Unnamed road three kilometres north east of subpopulation, south of the Eyre Highway.

In late 1995 road works along the Eyre Highway commenced and subpopulation 1b was fenced and flagged. In January 1996, half of the area where subpopulation 1a had occurred (plants last seen 1985) was cleared (Haberley[2] pers comm 1996). The topsoil from this location was spread over a disused gravel scrape in the hope that soil stored seed might germinate.

3.2 Essential recovery actions

3.2.1 Protect from road works

Conservation strategies relating to *D. micrantha,* as outlined by MRWA Environmental Assessment and Management Plan (EAMP) prepared by Halpern Glick Maunsell (1992), should be implemented. Liaison between CALM Esperance District and MRWA is required to ensure the following actions are undertaken:

- Monitor the area where top soil potentially containing *D. microcarpa* seeds from the non extant subpopulation 1a was spread.
- Ensure minimal disturbance to subpopulation 1b (fencing, flagging, drainage).
- Control weed species invading the subpopulations following disturbance from roadworks (spraying in the vicinity of subpopulation 1a and 1b would require permission from CALM).

[2] Bernie Haberley (Esperance District Wildlife Officer)

Action:	Liaise closely with MRWA to ensure that management actions are undertaken, as outlined by MRWA Environment Assessment and Management Plan
Responsibility:	CALM (Esperance District, Western Australian Threatened Species and Communities Unit (WATSCU)), MRWA
Cost:	$1000

3.2.2 Develop a fire management plan

Little is known of the affects of fire on *Daviesia microcarpa* (see 1.3). However, it is likely that the species requires occasional fire for recruitment. It is recommended that a fire management plan for the area be developed in consultation with relevant authorities and land managers. Collation of historical fire data may prove useful in developing such a plan.

Action:	Develop a fire management plan
Responsibility:	CALM (Esperance District, WATSCU)
Cost:	$450

3.2.3 Install Declared Rare Flora Markers

DRF markers at subpopulations 1a and 1b require repositioning following removal during road works in the area. DRF markers alert road maintenance workers of the presence of rare flora.

Action:	Reposition DRF markers at subpopulations 1a and 1b
Responsibility:	CALM (Esperance District, WATSCU)
Cost:	$150

3.2.4 Monitor subpopulation

Monitoring of factors such as weed encroachment, habitat degradation, subpopulation stability (expanding or declining), pollination activity, seed production, recruitment and longevity is prescribed.

The subpopulation will be inspected annually as a requirement under CALM Policy Statement Nos. 9 *Conservation of Threatened Flora in the Wild* and No 28 *Reporting Monitoring and Re-evaluation of Ecosystems and Ecosystem Management*. See also 3.3.3 *Development of a Quadrat/Transect Based Monitoring System For Threatened Plant Species.*

Action:	Monitor subpopulation
Responsibility:	CALM (Esperance District, WATSCU)
Cost:	$450 pa.

3.2.5 Preserve genetic diversity of the species

Seed is currently in storage at KPBG and at CALM's TFSC. Further germplasm collections should be given a high priority if the extinction of *D. microcarpa* is considered a high probability through disease, its limited distribution or low number of plants. If this is deemed to be the case, recovery of the species is likely to need *ex situ* conservation techniques.

Genetic diversity conservation of the species should be incorporated into the research component (see 3.3.3) and should include careful collection of seed, ensuring an adequate representation of genetic diversity.

If it is not possible to collect adequate quantities of viable seed, other more costly germplasm storage methodologies may need to be investigated. These can involve living collections from cutting or other source material, or storage of tissue culture material. If resources are limited these techniques will need to be carefully prioritised in relation to *in situ* conservation. This will be coordinated by the Esperance District Threatened Flora Recovery Team (EDTFRT) when it is formed.

It is also important that the size and viability of the soil seed bank is determined and research undertaken to develop techniques for stimulating germination of soil stored seed. Care, however, should be taken as these processes inherently carry a significant risk of depletion of seed bank reserves.

Action:	Collect more seed and/or other genetic material from the subpopulation
Responsibility:	EDTFRT once established, CALM (Threatened Flora Seed Centre (TFSC), Esperance District, WATSCU)
Cost:	$1800

3.3 Desirable recovery actions

3.3.1 Conduct further surveys

D. microcarpa has been extensively surveyed for by CALM and consultants in recent years. However, it is recommended that surveying for the species in other suitable habitats is continued on a systematic basis, particularly during its flowering period (August-September) and following disturbances such as fire and grading. Volunteers from the local community and wildflower societies and naturalist clubs from Perth could be involved in surveys supervised by CALM staff. One area recommended for further surveying is Dundas Nature Reserve ↑36957, vested in the National Parks and Nature Conservation Authority (NPNCA) for the conservation of flora and fauna.

Action:	Conduct further surveys
Responsibility:	CALM (Esperance District, WATSCU)
Cost:	$1000 pa.

3.3.2 Information dissemination

To promote an awareness of *D. microcarpa* among relevant CALM staff and the Shire of Dundas, the production of vehicle dashboard stickers and posters is recommended. Dashboard stickers should illustrate a rare flora marker and provide a contact telephone number if one is encountered. Posters should illustrate and provide information on the species.

The importance of biodiversity conservation and the preservation of critically endangered species need to be promoted to the general public, however, it is recommended that the exact location of *D. microcarpa* remains confidential. Awareness can be encouraged throughout the community by a publicity campaign using the local print and electronic media and by setting up poster displays in venues of high exposure. Formal links with local naturalist groups and interested individuals should also be encouraged. Such activities may lead to the discovery of new populations of the species.

Action:	Produce posters and dashboard stickers, implement a publicity campaign
Responsibility:	CALM (Corporate Relations Division, Esperance District, WATSCU)
Cost:	$500 first year, $1500 second year

3.3.3 Conduct research

Research designed to increase an understanding of the biology of *D. microcarpa* will provide a scientific base for management of the species in the wild. Research should include:

1. Pollinator activity within the subpopulation of *D. microcarpa*.
2. Investigation of factors determining level of flower and fruit abortion.
3. Quantification of the level of invertebrate grazing or removal of seed.
4. The size and viability of the soil seed bank.
5. The seed germination requirements of *D. microcarpa*.
6. The role of disturbance in regeneration and recruitment.
7. Longevity of plants, and time taken to reach maturity.
8. Response of *D. microcarpa* and its habitat to fire.
9. The extent of genetic variation within the subpopulation (essential knowledge if new populations are to be established).
10. The establishment of a monitoring system. Specific protocols for rare flora will be outlined in a future CALM discussion paper *Development of a Quadrat/Transect Based Monitoring System For Threatened Plant Species* (D. Coates, P. Pigott and A. Brown in prep).

Action: Conduct research
Responsibility: CALM (Science and Information Division (SID), WATSCU)
Cost: $3000

3.3.4 Translocation

Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No 29. Surveys for potential habitats for possible future translocation sites is recommended within the scope of this IRP and can be done at the same time further surveys are undertaken, with actual translocation addressed in a full Recovery Plan where necessary. This requires coordination by the District Threatened Flora Recovery team when established. All translocation proposals require endorsement by the Director of Nature Conservation.

Action: Survey potential habitats for translocation
Responsibility: EDTFRT, CALM (Esperance District, WATSCU)
Cost: See Section 3.3.1 (further surveys)

Table 2: Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Essential			
Protect from road works	High	CALM (Esperance District, WATSCU), MRWA	Commenced Jan 1996, ongoing.
Develop a fire management plan	High	CALM (Esperance District, WATSCU)	1996
Install DRF markers	High	CALM (Esperance District, WATSCU)	ASAP
Monitor subpopulation	High	CALM (Esperance District, WATSCU)	ASAP, ongoing
Preserve genetic diversity of the species	High	EDTFRT, CALM (TFSC, Esperance District, WATSCU)	Commenced 1995, ongoing
Desirable			
Conduct further surveys	Moderate	CALM (Esperance District, WATSCU)	August-September 1997, annually
Information dissemination	Moderate	CALM (Corporate Relations Division, Esperance District, WATSCU)	Ongoing
Conduct research	Moderate	CALM (SID, WATSCU)	Ongoing
Translocation	Low	EDTFRT, CALM (Esperance District, WATSCU)	August-September 1997, annually

3.4. Costs

Table 3: Summary of costs for each recovery action

Recovery Action	1996			1997		1998	
	CALM	EA	KPBG	CALM	EA	CALM	EA
Essential							
Protect from road works	1000						
Develop a fire management plan	250	200					
Install DRF markers	150						
Monitor subpopulation	450			450		450	
Preserve genetic diversity of the species		800	1100				
Sub-total	**$1850**	**$1000**	**$1100**	**$450**		**$450**	
Desirable							
Conduct further surveys	600	400		600	400	600	400
Information dissemination		500			1500		
Conduct research	1000			2000			
Sub-total	**$1600**	**$900**		**$2600**	**$1900**	**$600**	**$400**
Total	**$3450**	**$1900**	**$1100**	**$3050**	**$1900**	**$1050**	**$400**

EA Environment Australia (formerly ANCA)

Total cost: $12 850

ACKNOWLEDGMENTS

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

Bernie Haberley District Wildlife Officer, CALM's Esperance District

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Appendix One: Taxonomic description of *Daviesia microcarpa*

Crisp M. D. (1995). Contributions towards a revision of *Daviesia* (Fabaceae: Mirbelieae). III. A synopsis of the genus. *Australian Systematic Botany* **8**, 1155-1249.

Appendix Two: Associated species

POACEAE	MIMOSACEAE	MYRTACEAE
Aristida contorta	*Acacia hemiteles*	*Eucalyptus oleosa* var. *oleosa*
Triodia scariosa		*Melaleuca pungens*
	PAPILIONACEAE	
CASUARINACEAE	*Kennedia prorepens*	LAMIACEAE
Allocasuarina helmsii		*Westringia dampieri*