TRANSLOCATION PROPOSAL
Norseman Pea,
Daviesia microcarpa Crisp. (Fabaceae)

1. SUMMARY

A member of the family Fabaceae, *Daviesia microcarpa* is a sprawling shrub to 0.4 m in height. The many weak, tangled stems are grey green in colour and glabrous, forming a shrub that is up to one metre in diametre. The phyllodes are crowded, needle-like and spread at right angles to the stems. The racemes contain one flower (or very rarely two) which are produced in August and September. The flowers are small, typically pea-shaped and orange with pinkish red veins. The name *microcarpa* refers to the small size of the seed pods, some of the smallest in the genus. The response of *D. microcarpa* to fire is unknown. Germination of between 94 and 100% has been observed for *D. microcarpa* after treatment of soaking in near boiling water (A. Cochrane pers. comm).

D. microcarpa is found growing in alkaline (Schwarten 1995) red brown loamy clays with calcrete nodules. The surrounding vegetation is dominated by *Allocasurina helmsii* and *Eucalyptus oleosa* var. *oleosa* with an understorey of *Triodia scariosa, Melaleuca pungens* and *Westringia dampieri*.

D. microcarpa was first collected by D. Whibley in 1974 (population 1a). It was thought that extensive roadside grading may have subsequently cause the extinction of this population. In November 1992 a new subpopulation of 16 plants was located 500m to the north east of the original population (population 1b). This subpopulation has declined from the 16 live plants in 1992 to 12 in 2000. In 2001 the Environmental Officer from the Central Norseman Gold Corporation located a second subpopulation, with 31 plants, to the north west of subpopulation 1b. A second population of a small number of plants was recently confirmed 5km to the south east of subpopulation 1b. There are also reports of plants being discovered at a mine site near Southern Cross.

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

The aim of this translocation is to conserve the wild genetic stock of the species by translocating *D. microcarpa* to another site and augmenting one of the known sites. This translocation proposal outlines the need for translocation of the critically endangered *D. microcarpa*, the site selection process, the design of the translocation and the provisions for monitoring. In addition it outlines the criteria for success or failure of this proposed translocation.

2. PROPONENTS

Sarah Barrett
Conservation Officer
Dept. Conservation and
Land Management
ALBANY WA 6330
(08) 9842 4521

Klaus Tiedemann
District Manager
Dept. Conservation and
Land Management
ESPERANCE WA 6450
(08) 9071 3733

Leonie Monks
Research Scientist
Dept. Conservation and
Land Management
KENSINGTON WA 6151
(08) 9334 0495

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3. BACKGROUND

3.1 History, Taxonomy and Status

A member of the family Fabaceae, *Daviesia microcarpa* is a sprawling shrub to 0.4 m in height. The many weak, tangled stems are grey green in colour and glabrous, forming a shrub that is up to one metre in diametre. The phyllodes are crowded (2.5 – 3.5/cm), needle-like and spread at right angles to the stems. The racemes contain one flower (or very rarely two) and are 0.5 – 1.5mm in length. The flowers, which are produced in August and September, are small, typically pea-shaped and orange with pinkish red veins. The seed is contained within a rounded, triangular shaped pod 4 – 4.5mm in length. The name *microcarpa* refers to the small size of the seed pods, some of the smallest in the genus.

D. microcarpa was first collected by D. Whibley in 1974 (population 1a). It was subsequently collected from the same locality a further three times. However, an inspection in 1982 failed to locate any live plants. It was thought that extensive roadside grading may have cause the extinction of this population. In 1996 the population was found to be directly in the path of a road realignment. Due to the absence of any live plants at this population Main Roads WA was given permission to remove the top soil from this subpopulation and remove it to a gravel pit nearby. To date there has been no regeneration of *D. microcarpa* at this gravel pit site. In November 1992 a new subpopulation of 16 plants was located 500m to the north east of the original population (population 1b). This population has declined from the 16 live plants recorded in November 1992 to 12 in October 2000 (Table 1). In 2001 the Environmental Officer from the Central Norseman Gold Corporation located a third subpopulation 250m to the north west of subpopulation 1b, containing 31 plants. A second population of just two plants was recently discovered by Barbara Archer 5km to the south east of subpopulation 1b. Bec Ryan of Mattiske Consulting has recently reported the discovery of seven plants near Southern Cross. The plants were found along an old drilling exploration line. The area has now been fenced.

The response of *D. microcarpa* to fire is unknown, however, fire is usually a stimulus for regeneration from seed for most Australian legumes (Crisp 1985). Experiments by Schwarten (1995) showed several *Daviesia* species had a significant decrease in germination after treatment with various levels of smoke. He speculated that it was the heat, rather than the smoke of a fire which promoted germination of *Daviesia* species. Germination of between 94 and 100% has been observed for *D. microcarpa* after treatment of soaking in near boiling water (A. Cochrane pers. comm).

Due to the low number of plants and the threats associated with growing on narrow, degraded road reserves or near areas that are disturbed often, *D. microcarpa* was declared as Rare Flora in September 1987 and then ranked as Critically Endangered in September 1995 (Holland *et al.* 1997).

3.2 Distribution and Habitat

Daviesia microcarpa is known from two just three small populations (see Table 1). It is found around Norseman, occurring over a range of just 5km and from one small population southwest of Southern Cross.

D. microcarpa is found growing in alkaline (Schwarten 1995) red brown loamy clays with calcrete nodules. The surrounding vegetation is dominated by *Allocasurina helmsii* and *Eucalyptus oleosa* var. *oleosa* with an understorey of *Triodia scariosa*, *Melaleuca pungens* and *Westringia dampieri*.

Table 1. Population details for *Daviesia microcarpa.*

Population number	Number of individuals	Land tenure and Location
1a	0	MRD Road Reserve No. 2826 - Norseman
1b	16 (1992) 14 (1995) 12 (2000)	MRD Road Reserve No. 2826 - Norseman
1c	31	Common (↑8322) - Norseman
2	2	Unallocated Crown Land - Norseman
3	7	Unallocated Crown Land – Southern Cross

4. THE TRANSLOCATION

4.1 The Need to Translocate

The rarity of *D. microcarpa* is probably due to a lack of available habitat due to pastoral practices combined with a geographically restricted distribution. There is currently only three known live populations. All populations are small and therefore may be prone to genetic consequences of small population size such as inbreeding depression and the Allee Effect. In addition subpopulation 1b is vulnerable to accidental destruction through road maintenance activities and is declining rapidly. Subpopulation 1a is thought to have become extinct, possibly due to extensive road verge grading, between 1979 and 1984.

Several extensive surveys have been undertaken for this species since 1992, however, only two new populations and one small subpopulation have been located. The discovery of the third population at a mine site near Southern Cross increases the potential range of the species. However, due to the vast area in between, a systematic survey effort is not considered possible. The species is therefore represented by just 52 individuals and translocation is considered urgent.

Survey to locate suitable translocation sites is recommended in the Interim Recovery Plan for *D. microcarpa* (Holland *et al*. 1997), whilst the actual translocation is recommended to be considered under a full recovery plan. The failure to locate any live plants outside the three known populations combined with the probable extinction of one of the subpopulations leads us to believe that translocation is now crucial to the recovery of this species.

4.2 Translocation Site Selection

Two sites have been chosen as suitable translocation sites. The first is located approximately 650 metres north east from subpopulation 1b. As this species has not previously been recorded from this area this translocation can be considered an introduction under the definitions provided by Policy Statement 29 and the Guidelines for Translocation of Threatened Plants in Australia. A map of the proposed translocation site in relation to the known populations is shown in Appendix 1.

This site is located in a Water Supply Catchment Reserve (↑6043) that is covered by a mining lease owned by Central Norseman Gold Corporation. The reserve has been identified in the Regional Management Plan for the South Coast Region for the current vesting to be changed to nature reserve status. It appears that the site was previously mined and has been deep ripped and rehabilitated. There has been speculation that this species may germinate after disturbance (Crisp 1985). In which case a previously distrubed area such as that proposed would be ideal in providing both a suitable environment for seedling recruitment for *D. microcarpa* as well as reducing the need to disturb any other areas of vegetation.

The soil at the proposed translocation site appears to be similar to that found at population 1b, red brown loamy clay with calcrete nodules. The vegetation surrounding the rehabilitation area also appeared similar to that at the known site, *Eucalypt* and *Allocasurina* overstorey with a *Triodia* and *Westringia* understorey.

The second site is that where subpopulation 1c was located earlier this year, 250m north west of subpopulation 1b. The site is located wihtin an area that has been previously mined and then deep ripped, to allowed for regeneration. Clearly as live plants have been found at the site, the conditions are suitable for the germination and growth of this species. This site is located within Common land (↑8322) and, similar to the first site, the area is also covered by a mining lease owned by Central Norseman Gold Corporation. As this species currently occurs at this site the translocation can be considered a restocking under the definitions provided by Policy Statement 29 and the Guidelines for Translocation of Threatened Plants in Australia.

Endorsement of this translocation is currently being sought from the CALM South Coast Region (Appendix four).

4.3 Translocation Design

Seed will be sourced from subpopulation 1b and c. Only seed from subpopulation 1c will be planted at that site. Seed sourced from subpopulation1b will be planted at the first translocation site. The aim is to trial several different direct seeding techniques.

At each of the proposed translocation site four areas of 25m x 4m each will be measured. It is planned to plant these areas with 100 seeds, arranged in four rows of 25, with 1m between each seed (see Appendix two for site diagram).

Treatments to be tested included raking, boiling water pretreatment, nicking seed coast pretreatment and no treatment (see Table 2). Boiling water is known to be an effective pretreatment under laboratory conditions (A. Cochrane pers. comm). It was decided to tests the effectiveness of this treatment under field conditions. In addition it was also decided to test a several other pretreatments that may prove to be more easily applied under field conditions. Treatments will be randomly assigned to a row in the grid (see Appendix two for site diagram).

Table 2. Description of experimental treatments.

Treatment	Description of Treatment
Control	Plants not given any treatment.
Raking	After seed has been planted, the area will be vigourously hand raked
Nicking	The seed coat of each seed will be nicked with a scalpel blade prior to planting
Boiling water	Seeds will be soaked overnight in near boiling water prior to planting

All equipment used during planting will be maintained under strict disease hygiene. Each plant will be permanently tagged so that each individual will always be identifiable. A enclosure of rabbit netting will be erected around each 25 x 4m plot to prevent predation of the seedlings by large herbivores.

Monitoring of the translocated population will be undertaken every six months by the project proponents commencing at planting out of the seedlings. Monitoring will include counting the number of surviving germinants, height of the surviving seedlings, width of the crown of the surviving seedlings in two directions, reproductive state, number of flowers and pods, whether second generation plants are present and general health of the plants.

Monitoring of the original subpopulations will also occur every six months in conjunction with monitoring of the translocated populations. This will provide essential baseline data for assessing the performance of the translocated population. Monitoring will include counting the number of individuals, height and crown width of the individuals, reproductive state, number of flowers and pods and general health of the plants.

4.4 Source of Plants

Seed has been sourced from population 1b, from 4 plants and population 1c from 11 plants.

4.5 Criteria for Success or Failure

Criteria for Success

- Short Term: germination of seed and establishment of the resulting germinants
  production of flowers and seed
  after one generation the number of individuals is sustained by natural recruitment or a soil stored seed bank has established
- Long Term: after two or more generations the number of individuals is sustained by natural recruitment, or a soil stored seed bank has been established.

Criteria for Failure

- Short Term: failure of translocated seed to germinate or germinants to establish
  failure of plants to produce flowers and seed
- Long Term: there is a significant decline in the size of the translocated population due to lack of natural recruitment or a soil stored seed bank fails to establish.

5. TIMETABLE

Time	Action
October 2000	Translocation site selected.
November 2001	Seeds collected
December 2001	Translocation proposal submitted for review and approval.
June - July 2002	Planting of seeds into translocation site.
June 2002 - June 2007	Monitoring and maintenance of translocation site.
June 2003	Progress report from project proponents.
June 2007	Final Report from project proponents.

6. FUNDING

Funding has been received for the project from the Threatened Species and Communities Unit within the Department of Conservation and Land Management. Costs are outlined in the table below. The funding outlined below allows for an officer from the Esperance District Office to visit the site for three monitoring periods after the translocation has been set up. It is anticipated that once this funding has finished ongoing monitoring will be undertaken as part of the routine monitoring that the Department of Conservation and Land Management undertakes for all threatened plant species.

Action	Cost of action
Fence translocation sites	800 metres of fencing @ $340/100m = $2720
Travel for proponents to set up and monitor translocation sites	
- Sarah Barrett	$1310
- Klaus Tiedemann	$1408
- Leonie Monks	$950
Watering system	2 systems @ $2804 each = $5608
Total	$11996

7. ACKNOWLEDGMENTS

We would like to thank Bernie Haberley for his contribution towards the conservation of this species and his initial involvement in organising this translocation.

8. REFERENCES

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Guidelines for the Translocation of Threatened Australian Plants. (1997) Produced by The Australian Network for Plant Conservation Translocation Working Group. Canberra, Australia.

Holland E., Kershaw K. and Brown A. (1997) Norseman Pea (*Daviesia microcarpa*) Interim Recovery Plan 1996-1999. Department of Conservation and Land Management. Perth WA.

Schwarten T. (1995) The Biology and Ecology of Threatened *Daviesia* Species in Western Australia. Final Report to Australian Nature Conservation Authority. Perth, Western Australia.

South Coast Regional Management Plan 1992-2002. Management plan no. 24. Department of Conservation and Land Management. Western Australia.

Appendices One and three may be available on contacting the authors

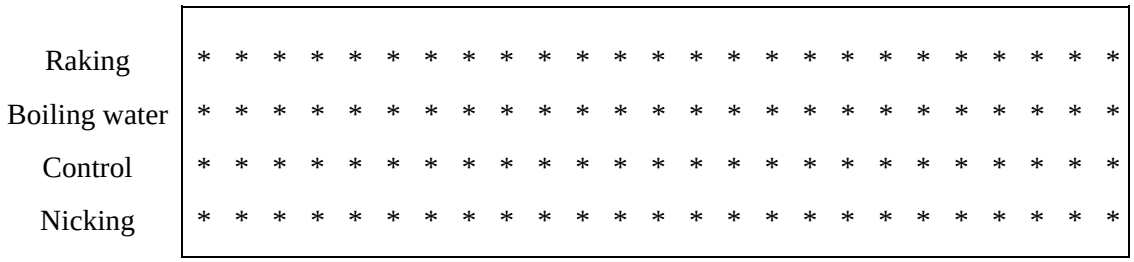
Appendix Two.

Site Diagram for Proposed Translocation Site of *Daviesia microcarpa*.

It is planned to plant 400 seed of *Daviesia microcarpa* at each translocation site.
These will be planted as shown in the diagram below, with one seed at each point (denoted by astrix).
The treatments will be assigned as per the diagram below. The digram is current for both translocation sites.

Scale: $\overline{1m}$

Replicate 1



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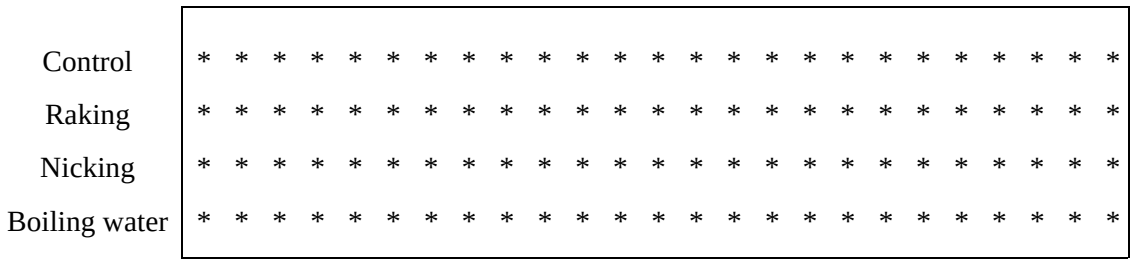

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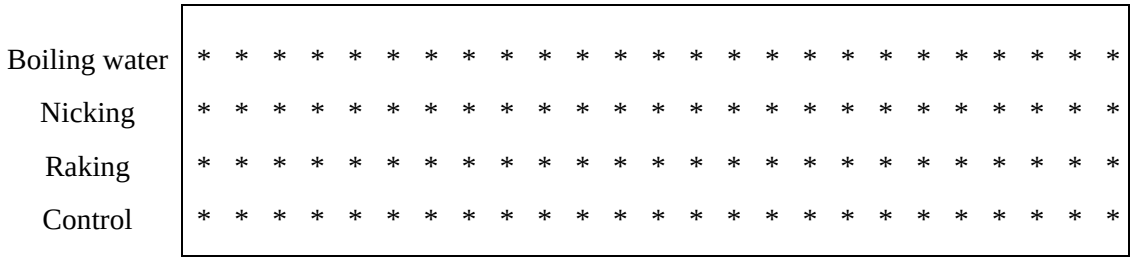

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