

TRANSLOCATION PROPOSAL

Spreading Grevillea

***Grevillea humifusa* Olde & Marriott (Proteaceae)**

1. SUMMARY

Grevillea humifusa was first collected in 1968 and was considered to be a variant of *Grevillea thelemanniana*. The name *humifusa* is derived from Latin and means “spread along the ground” referring to the habit of the species (Olde and Marriott 1995). It is a lignotuberous prostrate shrub with trailing stems to 3 m in length. Leaves are grey-green and the flowers are pale pink to red (Olde and Marriott 1995). Flowering occurs between June and September (Olde and Marriott 1995).

The species is thought to be both a nonsprouter and a resprouter (Olde and Marriott 1995). Seed viability ranges from 52 to 95% and there are currently 1574 seed in long term storage at the Threatened Flora Seed Centre (A. Crawford pers. comm.).

G. humifusa is known from just one population with an estimated 1350 individuals. The species grows in gravelly brown loamy clay. It occurs in a highly disturbed habitat, which contains remnants of *Eucalyptus loxophleba* and *E. wandoo* woodland.

The species was declared as Rare Flora in October 1996, due to threats from weed competition, inappropriate fire regimes and road and firebreak maintenance activities. In November 1998 it was ranked as Critically Endangered. The highly disturbed nature of the habitat of the only known population combined with the genetic consequences of small population size as well as the threats outlined above contributed to the ranking.

The aim of this translocation proposal is to conserve the wild genetic stock of the species by establishing at least one more viable population of *G. humifusa*. This will be achieved by establishing one new population in a reserve with appropriate habitat. This translocation proposal outlines the need for translocation of the critically endangered *G. humifusa*, the site selection process, the design of the translocation site and the provisions for monitoring. In addition it outlines the criteria for success or failure of this proposed translocation.

2. PROPONENTS

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3. BACKGROUND

3.1 History, Taxonomy and Status

Grevillea humifusa was first collected in 1968 by H. Demarz for inclusion in the living collection at the Botanic Gardens at Kings Park. It was considered to be a variant of *Grevillea thelemanniana* and was subsequently introduced into horticulture as “*G. thelemanniana* Grey-leaf prostrate form”. McGillivray and Makinson (1993) considered it to be part of the *G. thelemanniana* complex but were not able to assign it to a subspecies. However, Old and Marriott (1994, 1995) after relocating the type locality in 1991 decided to name it as a separate species “until its relationships can be properly assessed”.

The name *humifusa* is derived from the Latin *humifusus* meaning “spread along the ground”, referring to the ground hugging sprawling habit of the species (Olde and Marriott 1995). It is a lignotuberous prostrate shrub with trailing stems to 3 m in length. Leaves are grey-green, 1.5 - 2 cm in length, bipinnatisect with lobes 0.5 – 1 cm long. The conflorescences are 2 cm long and held erect at the end of the branches. The flowers are pale pink to red, with a pink to red-orange style. Flowering occurs between June and September (Olde and Marriott 1995). Birds are considered to be the most likely pollinators for the species (Olde and Marriott 1995), although honeybees have also been observed on the flowers (G. Broun, Conservation Officer, CALM, Moora District. Pers. comm). The oblong fruit are 12-15 mm long, 3-4 mm wide and prominently ridged and grooved. There is a possibility that ants may play a role in seed dispersal, as they do with a number of other species of *Grevillea* which produce seeds with elaisomes (B. Makinson). Royal Botanic Gardens Sydney. Pers. comm.). Ants have been observed on *G. humifusa* (G. Broun, Conservation Officer, CALM, Moora District. Pers. comm), but it was not confirmed from these observations as to whether these were seed dispersal agents.

It is thought that the species regenerates through both resprouting and seeding (Olde and Marriott 1995). Resprouting from the lignotuber was reported following a fire in 1995 (Diana Papenfus pers. comm). Seedling recruitment and lignotuberous resprouting has also been recorded in the interfire period (Harris and Yates 2003). There is also evidence of the species producing adventitious roots at the nodes however, this has only been reported in plants close to the road edge where stems have been lightly buried under soil from road grading (G. Broun, Conservation Officer, CALM, Moora District. Pers. comm). This mode of regeneration is unlikely to contribute significantly to the reproduction of the species. Seed viability ranges from 52 to 95% and there are currently 1574 seed in long term storage at the Threatened Flora Seed Centre (A. Crawford, Technical Officer, Threatened Flora Seed Centre, CALM. Pers. comm.). Preliminary experiments suggest the species has moderate resistance to *Phytophthora cinnamomi* (B. Shearer, Principal Research Scientist, CALM).

Three surveys specifically targeting this species have failed to locate any new populations of this species. The species was declared as Rare Flora in October 1996, due to threats from weed competition, inappropriate fire regimes and road and firebreak maintenance activities. In November 1998 it was ranked as Critically Endangered. The highly disturbed nature of the habitat of the only known population combined with the genetic consequences of small population size as well as the threats outlined above contributed to the ranking.

3.2 Distribution and Habitat

G. humifusa is known from just one population. In 1995 only 150 plants were known, however, after the population was fenced in 1997 this increased to 609 in 1998 to an estimated 1350 in 2002. The trailing stems entwining amongst other plants makes the species difficult to count, therefore some of the dramatic increase in population numbers can be attributed to an extremely accurate count being undertaken in 2002. However, much of the increase has occurred through seedling recruitment and lignotuberous resprouting following the fencing (Anne Harris, WATSCU Consultant. Pers. comm.).

The species grows in gravelly brown loamy clay. It occurs in a highly disturbed habitat, which contains remnants of *Eucalyptus loxophleba* and *E. wandoo* woodland.

4. THE TRANSLOCATION

4.1 The Need to Translocate

There is just one population of this species known and this occurs on a narrow road verge and extending into private property. Whilst numbers have been increasing following the fencing of the private property, the single population is still vulnerable to disturbance events that may occur in rapid succession. Translocating this species to a new site will buffer the taxon against random loss of a population due to catastrophic or other unpredictable environmental events (Guerrant 1996).

Rare flora markers have been installed at the site and ongoing liaison between CALM and the Dandaragan Shire means shire workers are aware of the location and significance of the species. However, many of the plants occur right at the road edge and are extremely vulnerable to road maintenance activities and general road use. Weeds are a major problem at the natural site and current control attempts have not been successful due to reinvasion from adjoining paddocks. Weeds have the potential to outcompete *G. humifusa* for nutrients and water and in addition can alter the fire regime by annually providing a highly combustible fuel layer. Translocation to a site where these threats are not present will help secure the long term future of the species. An Interim Recovery Plan has been drafted for this species and this recommends survey to locate suitable translocation sites (Stack and English 1999), whilst the actual translocation is recommended for consideration under a full recovery plan. The failure to locate any new populations and the difficulty in successfully managing threats in a road verge and weedy paddock environment leads us to believe that translocation is the best way to recover this species.

4.2 Translocation Site Selection

A search was made of areas around the area east of Jurien to locate a suitable translocation site. An area in Reserve # was chosen as the translocation site. As *G. humifusa* has not previously been recorded from this reserve 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 population is shown in Appendix one. Endorsement for the use of this site was received from the CALM Midwest Region (Appendix three).

The proposed translocation site was chosen as it has similar soil and associated vegetation to the natural population. The known population has a soil type of gravelly brown loamy clay, with an underlying geology of Colluvium (soils found at the foot of a slope) - quartz sand (Lowdry 1974). Similar soils of brown loamy clays are found at the proposed translocation site. The underlying geology is also the same as the natural population (Lowdry 1974). Both the translocation site and the existing population have a vegetation structure of Marri/Wandoo Woodlands (Beard 1979) and have many associated species in common (Table 1). The site appears undisturbed, with the exception of the access track and an old disused track, which is rehabilitating naturally. The presence of potential pollinators (birds or honeybees) have not been confirmed at the site, however are quite likely to be present in such a sizeable area of natural vegetation (8807 ha). The presence of potential seed dispersal agents, such as ants, is also unconfirmed. Observations about seed dispersal agent and pollinator presence will be made as part of the monitoring program.

Feral pigs have been recently sighted at the Reserve, although they have not had an impact at the proposed translocation site. As part of the translocation process CALM, Moora District, has liaised with the adjoining property owners and Department of Agriculture to address long term control of the feral pigs. As a result a control program has been developed for the reserve and surrounding private properties and this will be initiated prior to the translocation commencing. In addition the translocation site will be fenced to prevent any remaining pigs damaging the site. It is expected that these measures will be sufficient to prevent the feral pigs damaging the translocation site. The translocation monitoring program will include monitoring for any damage to the site as a result of feral pigs. In the event of any damage the need for further control measures will be raised with CALM Moora District.

There is a distance of 100m between the translocation site and the adjoining private property to the east. This property is uncleared and is currently not used for agricultural purposes. To the north, south and west the reserve extends between 2.5 and 3.5km from the translocation site to agricultural areas. These distances are believed to be sufficient enough for there to be minimal impact on the site from agricultural practices. The proposed translocation site is currently free from weeds. As part of the ongoing monitoring of the site,

observations as to whether this weed free status is maintained, will be made. In the event of weed species being identified at the site, a weed control program will be implemented following liaison with CALM, Moora District and the adjoining landowners.

The site will be excluded from the prescribed burning program for the nature reserve (G. Broun, Conservation Officer, CALM, Moora District. Pers. comm). The proximity of the site to a well maintained access track, its flat terrain as well as the structure of surrounding vegetation will allow for a relative ease of exclusion from prescribed burning activities. This is also applicable to protection of the population during any future wildfire events. District staff involved in prescribed burning and wildfire suppression will be made aware of the location of the translocation site, so that it's protection becomes part of the planning process in such instances.

There is no evidence of dieback caused by *Phytophthora spp.* at the proposed translocation site. However, to achieve a degree of certainty about the presence or absence of such species, the site and its immediate surrounds will be interpreted prior to the translocation.

The proposed translocation site therefore combines suitable habitat with security of tenure and is only 11 km from the natural population.

Table 1. A comparison of the associated vegetation at the proposed translocation site within the Reserve with the known population of *Grevillea humifusa*

Plants species found at the proposed translocation site.	Associated species of the original population of <i>Grevillea humifusa</i>
	<i>Acacia pulchella</i>
<i>Acacia saligna</i>	
<i>Calothamnus</i> sp.	<i>Calothamnus</i> sp.
<i>Corymbia (Eucalyptus) calophylla</i>	
<i>Daviesia</i> sp.	
	<i>Dianella revoluta</i>
<i>Eucalyptus wandoo</i>	<i>Eucalyptus wandoo</i>
<i>Hakea lissocarpha</i>	<i>Hakea lissocarpha</i>
	<i>Kennedia prostrata</i>
<i>Petrophile</i> sp.	
<i>Verticordia</i> sp.	
<i>Viminaria juncea</i>	<i>Viminaria juncea</i>
<i>Xanthorrhoea</i> sp.	<i>Xanthorrhoea</i> sp.

4.3 Translocation Design

It is aimed to raise 100 seedlings of *G. humifusa* for this years translocation. It is intended that future translocation of more seedlings will be made to increase the number of plants beyond 100. However this will be addressed in future translocation proposals. Seedlings have been raised at the accredited nursery at Kings Park and Botanic Gardens and therefore are considered disease free. All equipment used during seedling planting will be maintained under strict disease hygiene.

At the proposed translocation site five replicates of 4m x 3m each will be measured. Each replicate will be divided into a grid of 20 holes, arranged in four rows of five, with 1m between each hole and a border of 1m on each side of the plot. Plots will not be cleared of vegetation; instead seedlings will be planted in gaps in the vegetation, adhering as close as possible to the grid pattern presented in this proposal. In this way there will be minimal disturbance to the natural vegetation. There appears to be no reason that there would be adverse effects on the conservation values of the reserve from this translocation.

A total of two treatments will be tested: watered or not watered (control) (see Table 2). Treatments will be randomly assigned to individual plants (see Appendix two for site diagram). An irrigation system will be set up in November 2003 to water weekly those plants assigned to the watering treatment (see Table 2).

Each plant will be permanently tagged so that each individual will always be identifiable. All equipment used during seedling planting will be maintained under strict disease hygiene. The area surrounding the seedlings

(approx 0.5 hectares) will be fenced with rabbit netting to prevent large herbivores from grazing or trampling the plants.

Table 2. Description of experimental treatments.

Treatment	Description of Treatment
Control (not watered)	Plants not given any treatment.
Watered	Plants will be watered once a week from the start of November to the end of April to see whether watering over the first summer enhances survival.

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

Monitoring of the original population 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 inflorescences and follicles and general health of the plants.

4.4 Source of Plants

Seed has been sourced from a bulk collection from 16 plants from the natural population. The collection was made from 16 plants as this number of plants falls within the recommended guidelines for capturing up to 95% of genetic diversity in seed collections (Germplasm Conservation Guidelines for Australia, 1997). However, it is the intention of the proponents to increase the numbers of seedlings at the translocation in future years and source the seed from different parent plants to the ones where seed was collected from for this current translocation. This issue will be addressed in future translocation proposals.

Seed collected for this translocation will be germinated on agar plates at the Threatened Flora Seed Centre at the WA Herbarium. Following germination they will be transferred to the accredited nursery at Kings Park (Botanic Gardens and Parks Authority) for raising until planting.

4.5 Criteria for Success or Failure

Criteria for Success

- Short Term: establishment of translocated seedlings
production of flowers and seed
after one generation the number of individuals is sustained by natural recruitment
- Long Term: after two or more generations the number of individuals is sustained by natural recruitment

Criteria for Failure

- Short Term: failure of translocated seedlings 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.

5. TIMETABLE

Time	Action
February 2002	Translocation site selected.
December 2002	Seeds put down for germination.
February 2003	Translocation proposal submitted for review.
May - June 2003	Planting of seedlings.
June 2003- May 2004	Monitoring and maintenance of translocation site.
November 2003	Setting up of irrigation system.
April 2004	Progress report.
June 2004 - May 2005	Monitoring and maintenance of translocation site.
May 2005	Final Report and preparation of Translocation Proposal for further translocations if deemed necessary.

6. FUNDING

This project is funded for one year under National Heritage Trust ESP project number 24333. One of the proponents, Gina Broun, has ongoing funding for her position as Conservation Officer based at Jurien Bay. The proponents are therefore willing to make a commitment to monitor the translocation beyond the availability of the National Heritage Trust funding.

7. REFERENCES

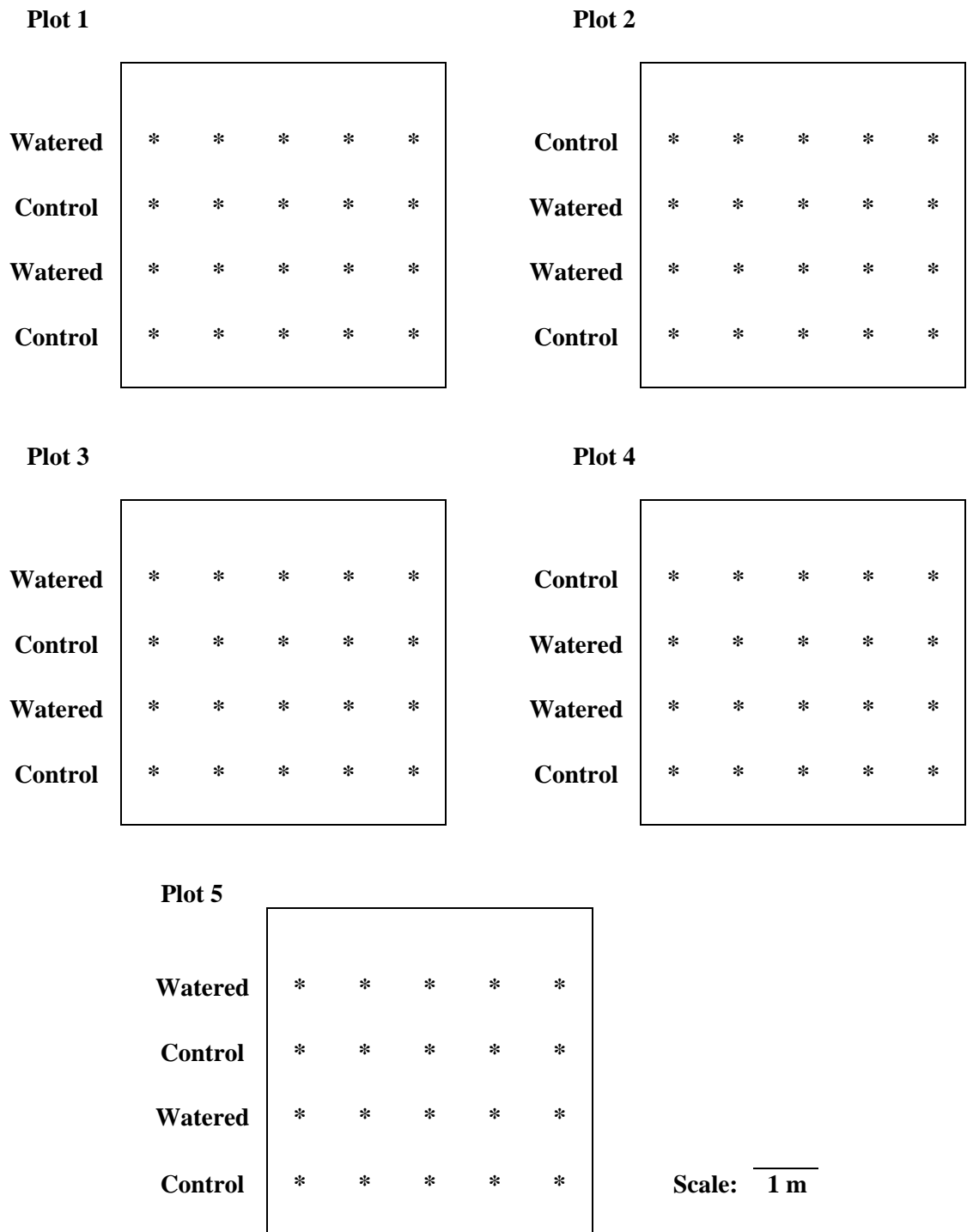
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Appendices One and Three may be available on contacting the authors.

Appendix Two.

Site Diagram for Proposed Translocation of *Grevillea humifusa*

The aim is to propagate a total of 100 seedlings of *Grevillea humifusa*. These will be planted as shown in the diagram below, with one seedling at each point marked with an asterix. The two treatments of watered and not watered will be assigned as per the diagram below.



Plot 2

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Watered

Watered

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