TRANSLOCATION PROPOSAL
Mt Lesueur Grevillea
Grevillea batrachioides F.Mueller ex D.J. McGillivray (Proteaceae)

1. SUMMARY

Grevillea batrachioides was first collected by James Drummond between 1850 and 1851. No further specimens were found until 1982, when E.A. Griffin collected a specimen in surveys of the Mt Lesueur area. The population from which this collection had been made was relocated within Lesueur National Park in 1991.

Grevillea batrachioides is a bushy shrub, which grows to 2m in height. The leaves are between 1 and 4 cm long, deeply divided with a prominent midrib. The leaf lobes are 3 - 20 mm long with a pungent point at the apex. The inflorescences are 2-5 cm long and held erect at the ends of the branches. Flowers are pale pink with red styles and flowering occurs between September and October. Fruit is 17-23 mm in length and ellipsoid in shape (Olde and Marriott 1995). There are currently just 120 seed in long term storage at the Kings Park Seed Store (K. Biggs pers. comm.). *G. batrachioides* is endemic to the Lesueur area where it is known from just one population of 98 plants. It is restricted to sandy loams over sandstone where it occurs in areas of low heath with scattered, emergent mallees.

G. batrachioides was declared as Rare Flora in July 1992. It was ranked as Critically Endangered in October 2000, due threats from disease, inappropriate fire regimes and recreational activities and the small population size (Stack and English 2002)

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. batrachioides.* This will be achieved by translocating this species to another part of Lesueur National Park. This translocation proposal outlines the need for translocation of the critically endangered *G. batrachioides*, 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

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

Gina Broun
Conservation Officer
Dept. Conservation and
Land Management
JURIEN BAY WA 6516
(08) 9652 1911

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3. BACKGROUND

3.1 History, Taxonomy and Status

Grevillea batrachioides was first collected by James Drummond between 1850 and 1851. It's name, suggested by Baron Ferdinand von Mueller, refers to the resemblance of its leaves to some species of Ranunculus (from the Greek "batrachion"), although he did not publish this name. No further specimens were found after the Drummond collection and McGillivray reluctantly named the species based on this one specimen (McGillivray 1985, McGillivry and Makinson 1993). In 1982 E.A. Griffin collected a specimen during surveys of the Mt Lesueur area, although the specimen was not identified for a while and in the mean time the area was burnt (most likely in 1985). The population from which this collection had been made was not relocated again until 1991, when Peter Olde and John Cullen, members of the Grevillea Study Group, located the current known population.

Grevillea batrachioides is a bushy shrub, which grows to 2m in height. The leaves are between 1 and 4 cm long, deeply divided with a prominent midrib. The leaf lobes are 3 - 20 mm long with a pungent point at the apex. The inflorescences are 2-5 cm long and held erect at the ends of the branches. Flowers are pale pink with red styles and flowering occurs between September and October. Fruit is 17-23 mm in length and ellipsoid in shape (Olde and Marriott 1995).

Response to fire is not clear. Notes from P.M. Olde and J. Cullen on a specimen at the WA Herbarium state the species is not lignotuberous and is therefore likely to be a seeder. The lack of juveniles in the population would suggest recruitment is confined to the period immediately after fire. There are currently just 120 seed in long term storage at the Kings Park Seed Store (K. Biggs pers. comm.). Seed viability is unassessed due to the small size of the collection.

The reason for the rarity of the species is unknown. Griffin *et al.* (1990) highlighted the high species diversity (821 taxa) and high endemism (111 species) in the Lesueur area. Many of these endemics are restricted to only a few populations (Griffin *et al*. 1990). Given the specificity of the habitat, confined to the Cockleshell Gully Sandstones (as defined by Lowry, 1974), it is possible that *G. batrachioides* is a Lesueur endemic with a narrow geographic range and is simply naturally rare. However, due to the small population size and potential threats from disease, inappropriate fire regimes and recreational activities (Stack and English 2002) the species was declared as Rare Flora in July 1992. It was ranked as Critically Endangered in October 2000.

3.2 Distribution and Habitat

G. batrachioides is endemic to the Lesueur area where it is known from just one population of 102 plants. It is restricted to sandy loams over sandstone where it occurs in areas of low heath with scattered patches of woodland (Beard 1979). Other associated species are listed below in Table 1.

4. THE TRANSLOCATION

4.1 The Need to Translocate

There is only one known population of this species with just 102 individuals. The vulnerability of this single population to frequent disturbance events is of concern. 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).

It is believed that frequent fire and the possibility of a *Phytophthora cinnamomi* infection are the most likely catastrophic events to potentially effect *G. batrachioides*. There is currently no evidence of herbivory threatening the species. The population of *G. batrachioides* is thought to have burnt in wildfires in the Mt Lesueur area in 1985. When the population was rediscovered in 1991 plants (most likely seedlings recruited post fire) were observed to be flowering. The juvenile period of this species is therefore likely to be between 2 and 5 years. The vegetation community in which this species occurs can carry fire at a frequency of 4-5 year intervals (K. Hockey pers. comm. 2003). There is therefore a possibility that fire can occur at a frequency that may deplete the seed bank of the species and cause the extinction of the species. There is also concern of the possibility of dieback being introduced into the area. The park is popular for hiking and four-wheel driving, and although dieback hygiene measures are in place, there is still the potential for the introduction of dieback

through one of these activities. Translocation is therefore considered to be a precautionary measure to ensure long-term survival of *G. batrachioides* in the wild.

An Interim Recovery Plan has been drafted for this species. This plan recommends translocation to a secure site due to the vulnerability of the single small population of this species in the wild (Stack and English 2002).

4.2 Translocation Site Selection

Searches of Mount Lesueur National Park to locate a suitable translocation site were made on 4th February 2002 and 26th March 2004. The searches focused on areas with similar soil and associated vegetation, which were separated from the natural population by a sufficient barrier to reduce the risk of a catastrophic event affecting both the natural and translocated population at the same time. An area north of the natural population was chosen as the translocation site. This area is separated from the natural population by a track, which will allow firefighters to protect at least one population in the event of a fire in the national park. The two sites are also separated by a gully and there is no water movement between the sites. In the event that one population is infected with dieback this gully should be a sufficient barrier to prevent dieback moving naturally between the two sites, as it is unlikely that dieback can move up hill in this landform, soil type combination. A map of the proposed translocation site in relation to the known populations is shown in Appendix one. As *G. batrachioides* has not previously been recorded from this site 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. Endorsement for the use of this site was received from the Midwest Region (Appendix three).

The proposed translocation site is located…….. An area of sandy loam over sandstone, the soil type to which this species is confined, is located at this site. In addition the vegetation structure (low heath with scattered patches of woodland (Beard 1979)) was found to be similar between the natural population and translocation site. Many associated species were also found at both sites (Table 1).

The proposed translocation site was chosen because the environmental attributes of soil type, vegetation structure and associated vegetation are similar to the known population of this species. In addition the risk of extinction of the species due to a catastrophic event is reduced as the translocation site is separated from the natural site by a track.

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

Associated species at the proposed translocation site	Associated species of the original population of *Grevillea batrachioides*.
Actinostrobus ?acuminatus	
Banksia tricuspis	*Banksia tricuspis*
Calothamnus hirsuitus	*Calothamnus hirsuitus*
	Conospermum nervosum
Darwinia neildiana	
Daviesia chapmanii	*Daviesia chapmanii*
Dryandra armata	*Dryandra armata*
Hakea nervosum	
	Hakea undulata
	Hibbertia sp.
Isopogon sp.	
Kingia australis	
Lambertia multiflora	
Melaleuca sp.	*Melaleuca* sp.

4.3 Translocation Design

It is aimed to raise at least 100 plants of *G. batrachioides* for this year's translocation. Plants have been raised at the accredited nursery at Kings Park and Botanic Gardens. Rigorous hygiene procedures and follow up monitoring are used in this nursery to ensure plants are not infected with diseases and therefore the plants are considered disease free. All equipment used during planting will be maintained under strict disease hygiene. Vehicles and footwear will be cleaned of soil before entering the National Park for visits to the natural population and translocation site and these same procedures will be undertaken when moving between the natural and translocated populations.

At the proposed translocation site five replicates of 4m x 3m each will be measured. Each replicate will be divided into a grid of 21 or 22 holes, arranged in five rows of one, two or five, with approximately 1m between each hole and a border of 1m on each side of the plot. A total of two treatments will be tested: watered and not watered (see Table 2). Treatments will be randomly assigned to one row in the grid (see Appendix two for site diagram). Plots will not be cleared of vegetation; instead seedlings and cuttings 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 national park from this translocation. An irrigation system, using water supplied from the Water Corporation, will be set up in November 2004 to water weekly those plants assigned to the watering treatment (see Table 2).

Table 2. Description of experimental treatments.

Treatment	Description of Treatment
Control	Plants not given any treatment.
Watered	Plants will be watered once a week over the first summer to see whether watering enhances survival.

Each plant will be permanently tagged so that each individual will always be identifiable. A small cage of rabbit netting will be placed around each plant to prevent large herbivores from eating the plants. This cage will have the bottom portion (approx. 30cm) laid flat to the ground as an apron to prevent herbivores from excavating under the cages. If any evidence of grazing or digging around the translocated plants is observed, appropriate control measures will be implemented after consultation with Department of Conservation and Land Management research and operational staff.

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

Monitoring of the original populations 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

Plants have been grown from both seed and cutting material. Cutting material has been collected from plants currently being grown in the ground at the Botanic Gardens at Kings Park. Each plant in the gardens is tagged with clone identification information and this relates back to tagged plants in the natural population. There are 91 plants of 10 clones represented in the plants derived from cutting material. The eight seedlings available represent five accessions. Four accessions are from four individuals and the remaining accession (of 2 individuals) was grown from a bulk collection of seed. All plants are being raised at the accredited nursery at Kings Park. There are currently 109 plants available for translocation at the Kings Park Nursery.

4.5 Criteria for Success or Failure

Criteria for Success

- Short Term: establishment of translocated plants
  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 plants 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.
2002	Cutting material collected and propagated at the Kings Park nursery.
February 2004	Translocation proposal submitted for review.
August - September 2004	Planting
September 2004- May 2005	Monitoring and maintenance of translocation site.
November 2004	Setting up of irrigation system.
April 2005	Progress report.
May 2005 – May 2007	Monitoring and maintenance of translocation site.
May 2007	Final Report

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. In the event of her leaving this position, she will ensure her replacement is made aware of their responsibilities in maintaining this project. The proponents are therefore willing to make a commitment to monitor the translocation beyond the availability of the National Heritage Trust funding.

7. ACKNOWLEDGMENTS

Alice Reaveley (former Conservation Officer – CALM Moora District), Rick France (CALM National Park Ranger) and Luke Sweedman (Seed Collector – Botanic Gardens and Parks Authority) are thanked for their input into developing this translocation.

8. REFERENCES

Anon (1995) Policy Statement 29 Translocations of Threatened Flora and Fauna. Unpublished Internal Document. Department of Conservation and Land Management, Western Australia.

Beard J.S. (1979) The vegetation of the Moora and Hill River Areas Western Australia. Map and Explanatory Memoir 1:250,000 Series. Vegmap Publications. Perth, Western Australia.

Griffin E.A., Hopper S.D. and Hopkins A.J.M. (1990) Flora. In: Nature Conservation, Landscape and Recreational Values of the Lesueur Area. A report to the Environmental Protection Authority from the Department of Conservation and Land Management (Burbidge A.A., Hopper S.D. and van Leeuwen S., eds) Bulletin 424. pp 39-68. Environmental Protection Authority. Perth, Western Australia.

Guerrant E.O. (1996) Designing populations: demographic, genetic, and horticultural dimensions. In *Restoring Diversity: Strategies for Reintroduction or Endangered Plants* (D.A.Falk, C.I.Millar and M. Olwell, eds) pp. 399–402. Island Press, Washington D.C.

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

Lowry D.C. (1974) Dongara – Hill River Western Australia 1:250,000 Geological Series – Explanatory Notes. Geological Survey of Western Australia. Australian Government Publishing Service. Canberra, Australia.

McGillivray D.J. (1986) New names in *Grevillea* (Proteaceae) Privately Published, Castle Hill, NSW, Australia.

McGillivray D.J. and Makinson R.O. (1993) *Grevillea.* Melbourne Uni Press. Melbourne Australia. Pp 105.

Olde P. and Marriott N. (1995) *The Grevillea Book* Vol 2. Kangaroo Press, Kenthurst NSW.

Stack G. and English V. (2002) Mt Lesueur Grevillea (*Grevillea batrachioides*) Interim Recovery Plan Department of Conservation and Land Management. Perth W.A.

Appendices One and Three may be available on contacting the authors

Appendix Two.

Site Diagram for Proposed Translocation of *Grevillea batrachioides*

There are currently 109 plants of *Grevillea batrachioides* available for the translocation. These will be planted as shown in the diagram below, with one plant at each point marked with an asterix.
The two treatments of watered and not watered will be assigned as per the diagram below.