TRANSLOCATION PROPOSAL
Prickly Honeysuckle,
Lambertia echinata R.Br. subsp. *echinata* Hnatiuk (PROTEACEAE)

1. SUMMARY

Lambertia is a genus within the family Proteaceae, of which nine of the ten species are endemic to southwest Western Australia. *Lambertia echinata* R.Br subsp. *echinata* Hnatiuk. is a shrub to 1 m with spreading branches. Leaves narrowly triangular 3 - 4 cm long with 3 - 5 spines on the margins and prominent raised veins on the underside. The inflorescence is 7 flowered, with numerous bracts. The perianth is orange-red to pink between 2.5 and 4 cm long and loosely enclosed by bracts. Flowers are produced from September to January.

Robert Brown first collected *Lambertia echinata* whilst in the Esperance area, it was then described by him in 1810. He also described *L. propinqua* from material collected from Albany in 1830. Further taxonomic work (Hnatiuk 1995) considered *L. propinqua* a synonym for *L. echinata* subsp. *citrina*, and so *L. echinata* became *L. echinata* subsp. *echinata.* More recently a newly discovered *Lambertia* was described as *L. echinata* subsp. *occidentalis* (Keighery 1997), bringing the number of subspecies in the complex to three.

L. echinata subsp. *echinata* grows in lateritic gravels and sandy clay soils that are found on the windswept rocky coastal slopes in the Lucky Bay area in association with *Dryandra falcata*, *Eucalyptus doratoxylon* and *E. tetragona*.

The only live population of *L. echinata* subsp. *echinata* grows on two islands left in a gravel pit and consisting of three adult and four seedlings. The extraction of gravel was stopped after this subspecies was found there and then rehabilitation of the gravel pit began in 1994. Seed was collected from the three remaining adult plants, germinated and planted into the gravel pit in 1995. In 1998 only one of these translocated seedlings was found alive.

L. echinata subsp. *echinata* was declared as Rare Flora in November 1980 and ranked as critically endangered in September 1995 due to threats associated with low population numbers, restricted distribution, habitat destruction and potential *P. cinnamomi* infection.

The aim of this translocation proposal is to conserve the wild genetic stock of the subspecies by restocking the single known population of *L. echinata* subsp. *echinata*. This translocation proposal outlines the need for translocation of the critically endangered *L. echinata* subsp. *echinata*, 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

Lambertia is a genus within the family Proteaceae, of which nine of the ten species are endemic to southwest Western Australia. The genus is named for the English horticulturalist Aylmer Lambert. The name *echinata* is derived from the Latin word *echinus* meaning hedgehog-like, referring to the prickly nature of the species.

Lambertia echinata R.Br. subsp. *echinata* Hnatiuk. is a shrub to 1 m with spreading branches. Leaves may or may not have a petiole to 2 mm long. Leaves narrowly cuneate (triangular) 3 - 4 cm long with 3 - 5 spines on the margins and prominent raised veins on the underside. The inflorescence is 7 flowered, with numerous bracts that may be up to two thirds of the length of the perianth. The perianth is orange-red to pink between 2.5 and 4 cm long and loosely enclosed by bracts. Flowers are produced from September to January. The shiny grey fruits are ovoid in shape 0.5 - 0.8 cm in diameter and covered in spines. Each fruit contains 2 circular seeds with narrow angular wings.

Robert Brown first collected *Lambertia echinata* whilst in the Esperance area, it was then described by him in 1810. He also described *L. propinqua* from material collected from Albany in 1830. Further taxonomic work (Hnatiuk 1995) considered *L. propinqua* a synonym for *L. echinata* subsp. *citrina*, and so *L. echinata* became *L. echinata* subsp. *echinata.* More recently a newly discovered *Lambertia* was described as *L. echinata* subsp. *occidentalis* (Keighery 1997), bringing the number of subspecies in the complex to three.

The only live population of *L. echinata* subsp. *echinata* grows on two islands left in a gravel pit consisting of three adult plants and four seedlings. The extraction of gravel was stopped after this subspecies was found there and rehabilitation of the gravel pit began in 1994. Seed was collected from the three remaining adult plants and germinated. Four seedlings resulted from this and these were planted into the gravel pit in 1995. Inspection of these seedlings in 1996 showed that only two had survived and further inspections in 1997 and 1998 found only one seedling.

L. echinata subsp. *echinata* was declared as Rare Flora in November 1980 and ranked as critically endangered in September 1995 due to threats associated with low population numbers, restricted distribution, habitat destruction and potential *P. cinnamomi* infection.

The genus *Lambertia* is considered to be highly susceptible to Dieback (*Phytophthora* spp) (Obbens and Coates 1997). They are known to lack a lignotuber (Hnatiuk 1995) and are killed by fire, regenerating from seed (Obbens and Coates 1997). Seed collected from this subspecies appears to be highly viable (75 - 100%) and this high viability is retained in low temperature (-18°C) storage after one year (A. Cochrane pers. comm.).

3.2 Distribution and Habitat

L. echinata subsp. *echinata* grows in lateritic gravels and sandy clay soils that are found on the windswept rocky coastal slopes in the Lucky Bay area. It grows in association with *Dryandra falcata*, *Eucalyptus doratoxylon* and *E. tetragona*. A full list of associated species is given below in Table 1.

This species is only known from two small subpopulations. Subpopulation 1a has three adults and four seedlings, and subpopulation 1b (500 metres to the north east of subpopulation 1a) has seven dead adult plants. The cause of the deaths of the seven plants in population 1b is not known, however, Dieback is suspected. Extensive searches for this subspecies were undertaken in the Lucky Bay area in 1995, however, no new populations were located.

Table 1. Main associated species found in the gravel pit where *L. echinata* subsp. *echinata* occurs

Main associated species
Adenanthos sericeus subsp. *sphalma*
Agonis obtusissima
Bossiaea dentata
Dryandra falcata
Eucalyptus aquilina
Eucalyptus conferruminata
Eucalyptus doratoxylon
Eucalyptus tetragona
Hakea drupacea
Hakea trifurcata
Lambertia inermis
Melaleuca striata
Mirbelia dilatata
Nuytsia floribunda
Verticordia sp.

4. THE TRANSLOCATION

4.1 The Need to Translocate

L. echinata subsp. *echinata* is known from only one live subpopulation consisting of three adult plants and four seedlings and these occur in the middle of a disused gravel pit. Land clearing for gravel extraction is thought to have reduced the number of individuals in subpopulation 1a and dieback may have been the cause of the death of population 1b, although this has not been confirmed. *Phytophthora* has been identified in many areas of Cape Le Grand National Park (Obbens and Coates 1997), and visual observations indicate that *Phytophthora* is in the vegetation surrounding the gravel pit.

An Interim Recovery Plan has been written for this subspecies (Monks and Brown in draft) and this plan recommends the restocking of the known population or translocation to another site. Due to the extremely small population size of this subspecies translocation is considered to be urgent.

4.2 Translocation Site Selection

The gravel pit where this taxon already grows (see Appendix one) is considered the best site to concentrate translocation efforts, as the remaining adult plants are healthy and recruitment has occurred over the last few years. This translocation can therefore be considered a restocking under the definitions provided by Policy Statement 29 and the Guidelines for Translocation of Threatened Plants in Australia. The gravel pit site was chosen so that there will be no further disturbance of the area as a result of the translocation. In addition, rehabilitation of the gravel pit by CALM has already commenced. This involved deep ripping the site and allowing natural rehabilitation to occur. The translocation will be closely integrated into the rehabilitation process. The area where the subspecies occurs is managed by CALM, as it occurs within the boundaries of Cape Le Grande National Park, and so no conflict of interest over land use is anticipated. The translocation has been endorsed by the CALM South Coast Region (Appendix three).

The issue of *Phytophthora* species, particularly *P. cinnamomi* will be addressed using the chemical Phosphite (Komorek and Shearer 1997), and therefore it is not considered to be a factor influencing site selection. The gravel pit area will be aerially sprayed prior to seedlings being planted out. Seedlings will be individually sprayed with Phosphite when they are considered to be old enough to warrant such treatment. Repeat sprayings will be undertaken when necessary. Whilst the presence of *P. cinnamomi* is often the reason for translocation to another site, here translocation back into a site where *P. cinnamomi* has been confirmed is still considered the best option. This is because *P. cinnamomi* is widespread throughout the Cape Le Grande National Park, and we believe that *P. cinnamomi* can be controlled adequately using regular applications of Phosphite. Phosphite spraying will have to continue indefinitely, for this to be a viable population in the long term.

4.3 Translocation Design

A total of 165 seedlings of *L. echinata* subsp. *echinata* have been raised for this years restocking from seed collected from a bulk of three adult plants.

At the proposed restocking site four replicates of 14m x 4m each will be measured. Each replicate will be divided into a grid of 41 holes, arranged in two rows of 14, and one row of 13, with 2m between each hole (see Appendix two for site diagram).

A total of three treatments will be tested: control, shaded or watered (see Table 2). Treatments will be randomly assigned to one row in the grid (see Appendix two for site diagram).

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. All effort will be taken to minimise the movement of soil into, out of, and within the site during translocation planting.

An irrigation system will be set up during planting out of the seedlings to water those plants assigned to the watering treatment (see Table 2). Water will be collected in tanks in-situ, or scheme water will be brought in, therefore, all water used will be considered disease free. A soil wetting agent will be added to the soil around those plants assigned to the watering treatment.

Table 2. Description of experimental treatments.

Treatment	Description of Treatment
Control	Plants not given any treatment.
Shaded	A circle of wire netting, approximately 1m in diameter covered in shade cloth is placed around the plant after planting to see whether survival is enhanced by the creation of a shaded environment around the plant.
Watered	Plants will be watered with a set amount of water once a week for 24 weeks from the start of November to the end of April to see whether watering over the first summer 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 predation of the seedlings by large herbivores.

Monitoring of the restocked population will be undertaken every second month commencing one month after the planting out of the seedlings. Strict disease hygiene measures will be followed during monitoring. In particular, due to the inaccessibility of the site by vehicle, the strict washdown of boots into, and out of the site will be followed. 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 (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. A set photo point will be allocated for each plot and a photo will be taken each time monitoring takes place.

Monitoring of the original population (subpopulation 1a only) will also occur every second month in conjunction with monitoring of the restocked population. 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 was collected under guidelines outlined in Appendix four. Seed has been sourced from population 1a from a bulk of three adult plants for planting at the translocation site in 1998. Seedlings have been raised at Kings Park and Botanic Gardens nursery after being germinated at the Threatened Flora Seed Center.

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, and a soil stored seed bank has been established.
- The production of guidelines for the establishment of future translocations of related species.

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
October 1997	Seeds put down for germination. Resulting seedlings raised at Kings Park and Botanic Gardens.
March 1998	Translocation site selected.
April 1998	Translocation proposal submitted for review and approval.
June - July 1998	Translocation of seedlings into the gravel pit where population 1a occurs.
July - August 1998	Follow up monitoring and maintenance of translocation site.
August 1998 - May 1999	Monitoring and maintenance of translocation site.
October 1998	Translocation proposal for 1999 translocation submitted for review.
~ November 1998	Seeds collected
November 1998	Second batch of seeds put down for germination. Resulting seedlings raised at Kings Park and Botanic Gardens.
April 1999	Progress report.
May - June 1999	Further translocation of seedlings into the gravel pit where population 1a occurs.
June - July 1999	Follow up monitoring and maintenance of translocation site.
August 1999 - May 2001	Monitoring and maintenance of translocation site.
May 2001	Final Report

6. FUNDING

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7. ACKNOWLEDGMENTS

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8. REFERENCES

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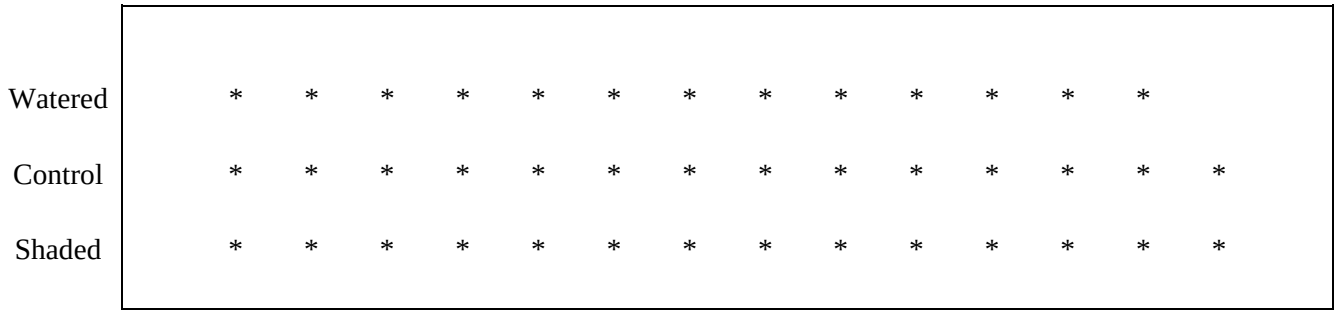
Appendices One, Three and Four may be available on contacting the authors.

Appendix Two.

Site Diagram for Proposed Translocation of *Lambertia echinata* subsp. *echinata*

There is a total of 165 seedlings of *Lambertia echinata* subsp. *echinata* available.
These will be planted as shown in the diagram below, with one seedling at each point marked with an asterix (*).
The three treatments of control, watered and shaded will be assigned as per the diagram below.

Replicate 1



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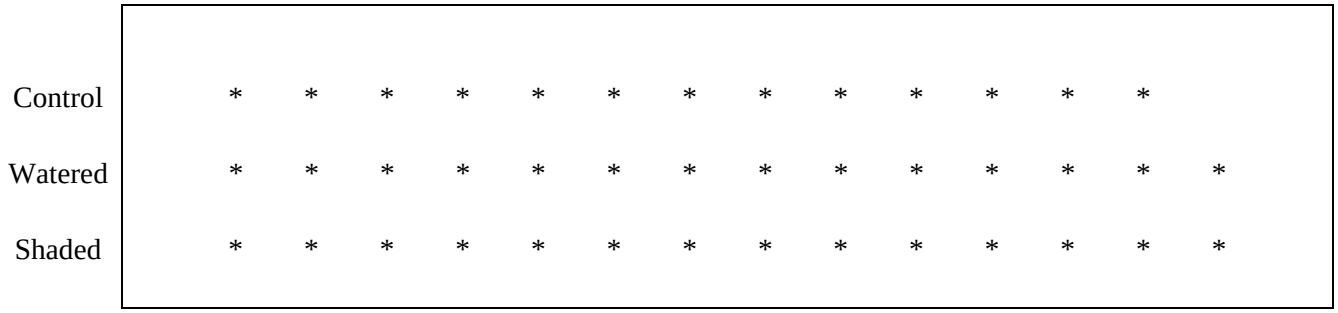

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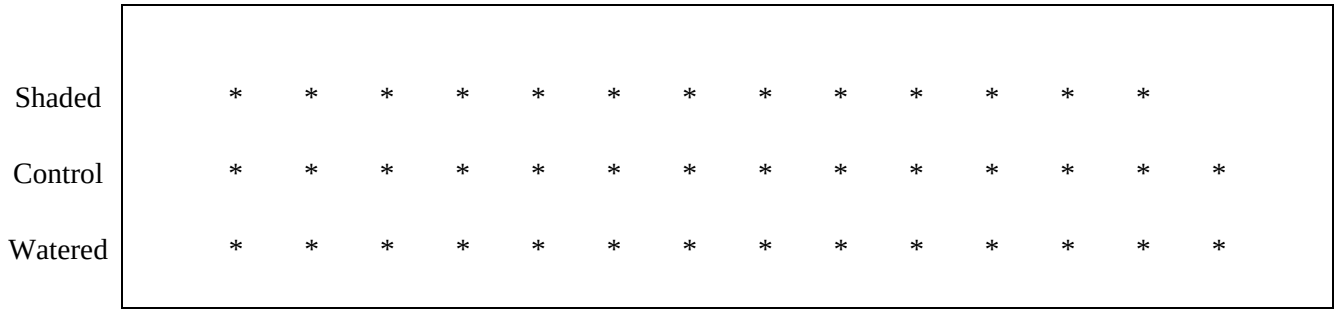

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