

INTERIM RECOVERY PLAN NO. 129

SPLIT-LEAVED GREVILLEA *(Grevillea althoferorum)*

INTERIM RECOVERY PLAN

2003-2008

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Photograph: Leonie Monks

May 2003

Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (the Department) Policy Statements Nos. 44 and 50.

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.

The Department 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 Interim Recovery Plan results from a review of, and replaces, number 42 *Grevillea althoferorum* (S. Hamilton-Brown and V. English, 1999). This IRP will operate from May 2003 to April 2008 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was approved by the Director of Nature Conservation 20 June, 2003. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

Information in this IRP was accurate at May 2003.

SUMMARY

Scientific Name:	<i>Grevillea althoferorum</i>	Common Name:	Split-leaved Grevillea
Family:	Proteaceae	Flowering Period:	August – October
Dept Regions:	Midwest, Swan	Dept Districts:	Moora, Perth Hills
Shires:	Coorow, Swan	Recovery Teams:	Moora District Threatened Flora Recovery Team (MDTFRT) and Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT)

Illustrations and/or further information: Brown, A., Thomson-Dans, C. and Marchant, N. (Eds) (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Olde, P.M. and Marriott, N.R. (1993). New species and taxonomic changes in *Grevillea* (Proteaceae: Grevilleoideae) from south-west Western Australia. *Nuytsia*: 9 (2) 237-304.

Current status: *Grevillea althoferorum* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in September 1986 and ranked as Critically Endangered (CR) in November 1998. It currently meets World Conservation Union (IUCN 2000) Red List category 'CR' under criterion B2ab(iii) (IUCN 2000) as there are less than 300 individuals known from two highly fragmented populations with continued decline in the quality of the habitat. The known populations are small and susceptible to threats including weeds, grazing, disease, road, track, fence and firebreak maintenance, inappropriate fire regimes and chemical drift. The species is also listed as Endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* (EPBC Act) 1999.

An Interim Recovery Plan was developed for the species in 1999 (Hamilton-Brown and English 1999). Information collected since that plan was completed has been incorporated into this plan and this document now replaces Hamilton-Brown and English (1999).

Critical habitat: The critical habitat for *Grevillea althoferorum* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so and may be suitable for translocations.

Habitat critical to the survival of the species, and important populations

Given that this species is Critically Endangered it is considered that all known habitat is habitat critical. In addition all populations are considered important to the survival of the species as the two populations have been found to be genetically distinct.

Benefits to other species/ecological communities

A threatened ecological community (TEC) listed as Vulnerable in Western Australia the 'herb rich saline shrublands in clay pans' occurs adjacent to Population 2. Recovery actions implemented to improve the quality or security of the habitat of *Grevillea althoferorum* Population 2, such as control of dieback disease are likely to improve the status of this TEC.

International Obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. However, as *Grevillea althoferorum* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this species.

Social and economic impacts

There are not likely to be any major social or economic implications as a consequence of the implementation of this plan.

Evaluation of the Plan's Performance

The Department of Conservation and Land Management, in conjunction with the Recovery Teams will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Habitat requirements: *Grevillea althoferorum* is known from two populations that occur 200 km apart. Population 1 grows on pale brown or grey loamy sand in low heath while Population 2 grows on yellow colluvial sand in low *Banksia* woodland.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:

1. Relevant land managers have been made aware of the location and threatened status of the species.
2. DRF markers have been installed at the populations.
3. Research has been conducted into the reproductive biology of this species.
4. Smoke water trials were conducted in 2001, but were not successful in stimulating germination.
5. Research has been conducted into the genetic diversity of individuals of the species.
6. A very small quantity of seed has been collected from Population 2 and stored in the Department's Threatened Flora Seed Centre.
7. The Botanic Garden and Parks Authority (BGPA) currently have 23 plants of *Grevillea althoferorum* from two clones.
8. BGPA is currently propagating plants for use in dieback susceptibility trials.
9. An information sheet has been produced that describes and illustrates the species.
10. Staff from the Department's Moora and Perth Hills Districts regularly monitor populations of the species.
11. The Moora District Threatened Flora Recovery Team and the Swan Region Threatened Flora and Communities Recovery Team regularly monitor the species.

IRP Objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

Recovery criteria

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more.

Recovery actions

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| 1. Coordinate recovery actions | 8. Monitor populations |
| 2. Rehabilitate habitat | 9. Liaise with land managers |
| 3. Map critical habitat | 10. Conduct further surveys |
| 4. Implement feral animal control | 11. Undertake and monitor translocation |
| 5. Maintain disease hygiene | 12. Obtain biological and ecological information |
| 6. Develop and implement a fire management strategy | 13. Promote awareness |
| 7. Collect seed, cutting and tissue culture material | 14. Review the need for a full Recovery Plan |

1. BACKGROUND

History

Grevillea althoferorum was first collected south of Eneabba in 1978 by E.A. Griffin¹. This population was destroyed during mining operations and subsequent surveys by Griffin did not locate any additional populations. In 1991, P. Olde² discovered approximately 100 plants some 5 km east of the Griffin collections (Population 1). Departmental staff and consultants carried out subsequent surveys of the area during 1991-1994, but no further populations were located. A second population of 30 plants, occurring 200 km south of Population 1 was located during a floristic survey of the southern Swan Coastal Plain (Gibson *et al.* 1994).

An Interim Recovery Plan was developed for the species in 1999 (Hamilton-Brown and English 1999). Information collected since that plan was completed has been incorporated into this plan and this document now replaces Hamilton-Brown and English (1999).

Description

Grevillea althoferorum is a lignotuberous shrub with trailing stems up to 3 m long, and angular branchlets covered with very fine, long, soft hairs. Its leaves are 1.5 to 2 cm long, ascending to spreading, shortly petiolate and twice divided, lobes broadly triangular with recurved pungent points. The terminal inflorescence is 2 to 6 cm long and erect or decurved. The cream flowers (floral whorl and style) are regular (not one-sided), and the buds are covered in pinkish-brown hairs. The grooved, oblong fruit is 12 to 15 mm long and 3 to 4 mm wide.

It is closely related to *Grevillea rudis* but differs in that the leaves are more deeply divided to the midrib, and it has a shorter (generally not exceeding the leaves), denser inflorescence.

Distribution and habitat

Grevillea althoferorum is currently restricted to two known populations 200 km apart, one south of Eneabba and the other near Bullsbrook.

Population 1 is found on the crest of a low rise on pale brown loamy sand or grey sand supporting low heath. *Grevillea althoferorum* forms a part of the mid-dense shrub layer with *Grevillea integrifolia*, *G. shuttleworthiana*, *Verticordia grandis*, *Viminaria juncea*, *Hakea prostrata* and numerous other shrub species. The population occurs on a 12 m wide road verge and is threatened by weed invasion, road maintenance and agricultural activities, grazing, general ground disturbance by rabbits and foxes, and inappropriate fire regimes.

Population 2 occurs at the base of the Darling Scarp in greyish-yellow colluvial sand in *Banksia* low woodland. It forms part of the shrub layer in a *Banksia menziesii* and *B. attenuata* woodland with *Hibbertia hypericoides*, *Xanthorrhoea preissii*, *Conostephium pendulum*, other shrubs, and herb species. The population is in a conservation reserve adjacent to agricultural land. The reserve is known to contain dieback disease caused by the plant pathogen *Phytophthora megasperma* and the *Grevillea althoferorum* population is also at risk from firebreak maintenance, inappropriate fire regimes and possibly herbicide or fertiliser drift associated with agricultural activity on adjacent land.

Any future searches for the species and for possible translocation sites should be focused on both habitats described above, as both appear suitable for the species.

Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms or once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms

¹ Ted Griffin, botanist

² Peter Olde, botanist and *Grevillea* specialist

of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

The critical habitat for *Grevillea althoferorum* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, i.e. low heath or woodland on lateritic sandy clay or yellow colluvial sand (these provide potential habitat for natural range extension);
- additional occurrences of similar habitat that do not currently contain the species but may have done so in the past (these represent possible translocation sites).

Habitat critical to the survival of the species, and important populations

Given that this species is Critically Endangered it is considered that all known habitat is habitat critical. In addition all populations are considered important to the survival of the species as the two populations have been found to be genetically distinct.

Benefits to other species/ecological communities

A threatened ecological community (TEC) listed as Vulnerable in Western Australia the 'herb rich saline shrublands in clay pans' occurs adjacent to Population 2. Recovery actions implemented to improve the quality or security of the habitat of *Grevillea althoferorum* Population 2, such as control of dieback disease are likely to improve the status of this TEC.

International Obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. However, as *Grevillea althoferorum* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this species.

Social and economic impacts

There are not likely to be any major social or economic implications as a consequence of the implementation of this plan.

Evaluation of the Plan's Performance

The Department of Conservation and Land Management, in conjunction with the Recovery Teams will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Biology and ecology

It appears that there is a divergence in the reproductive biology of the two populations of this species. Neither population has shown recent evidence of seedling recruitment. Population 1 has been confirmed as clonal and is actively recruiting from root suckers. Population 2 does produce seed but at very low levels. Burne *et al.* (in press) found that 0.15% of flowers set fruit. In addition, they found that the lack of sexual recruitment in *Grevillea althoferorum* is most likely to be due to the lack of viable pollen on the stigmas, which was almost nil at Population 1 (Burne *et al.* in press).

Genetic work also suggests that both populations are clonal, with very little diversity within each, and substantial difference between populations (personal communication M. Byrne³). *Banksia goodii* is a similarly rare resprouter that produces few seeds, for which any accidental losses of adult plants were found to increase

³ Dr. Margaret Byrne, Principal Research Scientist (genetics), the Department's Science Division

the mortality rate and cause accelerated declines in population size (Drechsler *et al.* 1999; cited in Burne *et al.* in press).

The presence of root suckering at Population 1 and lignotubers at Population 2 indicates that *Grevillea althoferorum* resprouts following removal of above-ground plant material through disturbances such as fire or grazing (Burne *et al.* in press).

G. althoferorum is suspected to be susceptible to dieback disease.

Threats

Grevillea althoferorum is currently ranked Critically Endangered under World Conservation Union (IUCN, 2000) Red List criterion B2ab(iii) (IUCN 2000) as there are less than 300 adult plants known from two highly fragmented populations, with continuing decline in the quality of the habitat. The main threats are weeds, grazing, disease, road, track, fence and firebreak maintenance, inappropriate fire regimes and chemical drift.

- **Weed invasion** is a major threat to Population 1. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species.
- **Grazing** by rabbits (*Oryctolagus cuniculus*) and possibly kangaroos (*Macropus* spp.) and/or sheep has had a major impact on Population 1. In addition, disturbance of soil by rabbit warren and fox midden construction, increased nutrient levels from their droppings and the introduction of weeds are impacting the habitat of the species. Grazing may have an impact on the establishment of *Grevillea althoferorum* juveniles (seedlings or young ramets), thereby limiting natural recruitment.
- **Disease** could be a serious threat to Population 2. Dieback, in this case believed to be caused by the plant pathogen *Phytophthora megasperma*, occurs in the immediate vicinity of Population 2. This plant pathogen causes the roots to rot and results in death from drought stress. It is suspected that *G. althoferorum* is susceptible to this pathogen. Even if not susceptible (some *Grevillea*s are not susceptible to *Phytophthora* spp.), the *Banksia* woodland habitat that occurs at this site is characteristically highly susceptible. Changes in the structure of the habitat caused by dieback, for example opening up of the canopy, may then impact on the *G. althoferorum* population.
- **Road, track and firebreak maintenance activities** have threatened both populations in the past. Construction of drainage channels, grading and other road maintenance activities impact on road verge populations of *G. althoferorum*. Several of these actions also encourage weed invasion. Relevant authorities have been informed of the road reserve population and have been advised of the need for appropriate protective measures.
- **Fence maintenance activities** are a potential threat to the roadside Population 1, in the event that the adjoining farmland boundary fence should need repair or replacement. This is not considered an immediate threat as the landholders have been made aware of the population.
- **Inappropriate fire regimes** may affect the viability of populations, as *Grevillea althoferorum* resprouts after fire. The reserves of the lignotuber could be exhausted if fires recurred before plants could build up fresh reserves. However, it is likely that occasional fires would stimulate ramet production in this species.
- **Chemical drift** from herbicide and fertiliser application on adjacent farmland may affect the species' growth and survival, particularly at Population 1. The owners of land adjacent to Population 1 have been informed of the species' presence, to prevent possible grazing, fire damage and agricultural chemical drift.
- **Lack of genetic diversity** is evident within each population, affecting the evolutionary adaptability of this species. The populations may continue indefinitely if well adapted to their environmental conditions, but if those conditions change, the taxon may have limited ability to adapt.

Summary of population information and threats

Pop. No. & Location	District	Land Status	Year/No. plants	Condition	Threats
1. S of Eneabba	Moora	Shire Road Reserve	1995 100 1999 75 2000 55 (5) 2001 147	Moderate	Weeds, grazing, warren and midden construction, road and fence maintenance activities, fire, chemical drift
2. Bullsbrook	Perth Hills	Nature Reserve	1995 30 1997 100+ 1999 151	Healthy	Disease, inappropriate fire regimes, firebreak maintenance

Numbers in brackets = number of juveniles.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks etc) in the immediate vicinity of *Grevillea althoferorum* will require assessment. On-ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the species, its habitat or potential habitat.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

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

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more.

3. RECOVERY ACTIONS

Existing recovery actions

All land managers have been notified of the location and threatened status of the species. The notification details the Declared Rare status of *Grevillea althoferorum* and the associated legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at both populations. These serve to alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage vegetation in the area.

Research has established that sexual reproduction of this species is limited by the viability and abundance of pollen (Burne *et al.* in press). There is a significant difference between the two populations in the number of viable pollen grains produced, which appears to indicate a divergence in reproductive biology. Population 1 near Eneabba has an almost total absence of viable pollen and is entirely clonal, while Population 2 near Bullsbrook has a higher production of viable pollen (although still significantly lower than two closely related more common taxa), produces a small amount of seed and has the ability to resprout following fire. This research trialed the use of smoke water to stimulate germination of soil-stored seed, but no germination was recorded. However, germination trials conducted by the Department's Threatened Flora Seed Centre (TFSC) suggest that physical nicking of the seed coat is a more important germination trigger. Seed nicking simulates the effects produced by heat of fire rather than chemicals in the smoke (personal communication A. Cochrane⁴).

Genetic evidence suggests that Population 2 may also be clonal, but this has not been conclusively proven (personal communication M. Byrne). This research established that there was very little genetic diversity within each population, but substantial difference between the populations.

⁴ Anne Cochrane, Manager, the Department's Threatened Flora Seed Centre

Sixty six seeds were collected from Population 2 during a number of visits by staff from the Department's Threatened Flora Seed Centre in November 1997. An initial germination rate of 50% was recorded for this seed (unpublished data A. Cochrane). There is insufficient seed to conduct any repeat testing. An additional 13 seeds were collected from 7 plants at Population 2 in January 2003. As stated above, the rate of seed production is very low at this population, and has been found to be non-existent at Population 1, where the plants are completely clonal (Burne *et al.* in press).

The BGPA currently have 23 plants of *Grevillea althoferorum* from two clones. One of the clones is sourced from cutting material taken from Population 2, and the other is from seed germinated by the TFSC during trials, also sourced from Population 2. There has been variable success with cuttings, with strike rates between 20% and 90%. It is thought that this may be at least partly attributable to the quality of propagation material (personal communication A. Shade⁵). Additional plants are currently being propagated for the purposes of dieback susceptibility testing.

A double-sided information sheet was produced for this species in 2002, and includes a description of *Grevillea althoferorum*, its habitat, threats, recovery actions and photos. This is being distributed through local libraries, wildflower shows and other means.

Staff from the Department's Moora and Perth Hills Districts regularly monitor the populations.

The Moora District Threatened Flora Recovery Team (MDTFRT) and the Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) are overseeing the implementation of this IRP and include information on progress in reports to the Department's Corporate Executive and funding bodies.

Future recovery actions

Where populations occur on lands other than those managed by the Department, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken.

1. Coordinate recovery actions

The Moora District Threatened Flora Recovery Team and the Swan Region Threatened Flora and Communities Recovery Team will continue to coordinate recovery actions for *Grevillea althoferorum* and other Declared Rare Flora in their jurisdictions. The highest priority will be given to eliminating impacts to existing adult plants.

They will include information on progress in their annual reports to the Department's Corporate Executive and funding bodies.

Action:	Coordinate recovery actions
Responsibility:	The Department (Moora and Perth Hills Districts) through the Recovery Teams
Priority:	Moderate
Cost:	\$2,000 per year

2. Rehabilitate habitat

Weeds impact on *Grevillea althoferorum* by competing for resources, degrading habitat, exacerbating grazing pressure, and increasing the risk and severity of fire. Weeds are a threat to Population 1. Appropriate local co-occurring species will be used to provide a buffer to weed seed being blown into this population. These plants will be placed in denuded patches surrounding the population's periphery and following their establishment weed control will be undertaken in consultation with the land managers. This will be by hand weeding or localised application of herbicide (wicking) during the appropriate season to minimise the effect of herbicide on the species and the surrounding native vegetation. All occurrences of weed control will be followed by a report on the method, timing and success of the treatment against weeds, and the effect on *Grevillea althoferorum* and associated native plant species.

⁵ Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

Action:	Rehabilitate habitat
Responsibility:	The Department (Moora District) through the MDTFRT
Priority:	Low
Cost:	\$2,700 in the first year, then \$700 per year thereafter

3. Map critical habitat

It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas as described have not yet been mapped and that will be done under this action. If any additional populations are located, then critical habitat will also be determined and mapped for these locations.

Action:	Map critical habitat
Responsibility:	The Department (Perth Hills and Moora Districts, WATSCU) through the Recovery Teams
Priority:	Moderate
Cost:	\$2000 in the first year

4. Implement feral animal control

Rabbits and foxes have caused major disturbance in Population 1, and control measures will be undertaken. Baiting using 1080 is likely to be the most favoured option. Baiting is generally conducted in summer and repeated each year if animals reappear. Fox baiting will be conducted in liaison with surrounding landholders to avoid risk of poisoning pets.

Action:	Implement feral animal control
Responsibility:	The Department (Moora District) through the MDTFRT
Priority:	High
Cost:	\$900 per year

5. Maintain disease hygiene

The susceptibility of *Grevillea althoferorum* to dieback (*Phytophthora* spp.) is unknown, but it is suspected to be vulnerable to the disease as this is a characteristic of many Proteaceous species. Dieback is also likely to compromise the quality of habitat. *Phytophthora megasperma* is known to occur very close to Population 2, and the dieback front near this population will be mapped and monitored at least every five years in summer and flagging that marks the front will be replaced regularly. Dieback hygiene (outlined in Department of Conservation and Land Management 1992b) will therefore be adhered to wherever possible for activities such as installation and maintenance of firebreaks and walking into the population in wet soil conditions. The need for dieback treatment of the site will also be assessed through evaluation of the impact of the disease on the habitat and, specifically, on *Grevillea althoferorum*.

Action:	Maintain disease hygiene
Responsibility:	The Department (Perth Hills District) through the SRTFCRT
Priority:	High
Cost:	\$1,200 in the first year, \$500 in subsequent years

6. Develop and implement a fire management strategy

Fire may stimulate the production of new clones of this species (personal communication C. Yates⁶), and possibly stimulate germination of seed stored in the soil at Population 2. However, frequent fire is likely to compromise the quality of habitat as it encourages weed invasion. Field evidence from the Stirling Ranges suggests that fire also compromises the ability of many species to survive in the presence of dieback disease. A

⁶ Dr. Colin Yates, Senior Research Scientist (ecology), the Department's Science Division

fire management strategy will be developed that will describe fire regimes and recommended intensity, and fire control measures.

Action:	Develop and implement a fire management strategy
Responsibility:	The Department (Moora and Perth Hills Districts District) through the Recovery Teams
Priority:	Moderate
Cost:	\$1,500 in the first year, \$1,000 in subsequent years

7. Collect seed, cutting and tissue culture material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Such collections are also needed to propagate plants for translocation. A small quantity of seed has been collected from Population 2, and further collections will be made as seed production occurs. Population 1 is clonal and produces no seed. The genetic diversity within each population has been determined. Cuttings will be collected to maximise genetic material available for translocation. Cuttings will also be collected from Population 2.

It is hoped that cutting material will be suitable to propagate plants for translocation, but as the possibility of long-term storage of seed is severely restricted, the suitability of this species for tissue culture and subsequent cryostorage will be trialed. This cryostored material will then function to conserve the full extent of the relatively low level of genetic diversity remaining.

Action:	Collect seed, cutting and tissue culture material
Responsibility:	The Department (TFSC), through the Recovery Teams
Priority:	High
Cost:	\$3,800 per year

8. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion, plant diseases such as *Phytophthora* spp. and salinity), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential.

Action:	Monitor populations
Responsibility:	The Department (Moora and Perth Hills Districts) through the Recovery Teams
Priority:	High
Cost:	\$700 per year

9. Liaise with land managers

Staff from the Department's Moora and Perth Hills Districts will continue liaising with land managers and owners of land occupied by and adjacent to populations, to ensure that populations are not accidentally damaged or destroyed.

Action:	Liaise with land managers
Responsibility:	The Department (Moora and Perth Hills Districts) through the Recovery Teams
Priority:	Moderate
Cost:	\$800 per year

10. Conduct further surveys

Departmental staff will encourage community volunteers to be involved in further surveys to be conducted during the species' flowering period (August to early November). Likely habitat near Population 2 will be searched, with a focus on private lands between this population and the Darling Scarp, if permission can be obtained.

Action:	Conduct further surveys
Responsibility:	The Department (Moora and Perth Hills Districts) through the Recovery Teams

Priority: Moderate
Cost: \$1,800 per year

11. Undertake and monitor translocation

The two populations are completely disjunct and are biologically quite distinct, so the possibility of complete loss of either population through a single catastrophe must be minimised by translocation to other secure sites. Genetic research indicates that the two populations are substantially different, and so care will be required to prevent any mixing of genetic material from the different populations. A Translocation Proposal will be developed and suitable translocation sites selected for each District. This will be coordinated by the Recovery Teams. Information on the translocation of threatened plants and animals in the wild is provided in the Department's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All translocation proposals require endorsement by the Department's Director of Nature Conservation.

Monitoring of translocations is essential and will be undertaken according to the timetable that will be developed as part of the Translocation Proposal.

Action: Undertake and monitor translocation
Responsibility: The Department (Science Division), BGPA through the Recovery Teams
Priority: High
Cost: \$11,000 in the first year, \$12,000 subsequent years

12. Obtain biological and ecological information

Knowledge of the susceptibility of *Grevillea althoferorum* and its habitat to dieback disease (*Phytophthora* spp.) and the impact of control techniques would greatly assist the management of Population 2, as *Phytophthora megasperma* is known to occur in the vicinity.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division) through SRTFCRT
Priority: Moderate
Cost: \$1000 in the first year

13. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: The Department (Moora and Perth Hills Districts) through the Recovery Teams
Priority: Low
Cost: \$300 per year

14. Review the need for a full Recovery Plan

At the end of the fourth year of its five-year term this Interim Recovery Plan will be reviewed and the need for further recovery actions will be assessed. If the species is still ranked as Critically Endangered at that time a full Recovery Plan may be required.

Action: Review the need for further recovery actions and/or a full Recovery Plan
Responsibility: The Department (WATSCU, Moora and Perth Hills Districts) through the Recovery Teams
Priority: Low
Cost: \$20,300 in the fifth year (if full Recovery Plan required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from May 2003 to April 2008 but will remain in force until withdrawn or replaced. If the taxon is still ranked Critically Endangered after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. ACKNOWLEDGMENTS

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

Gina Broun	Conservation Officer, the Department's Moora District
Dr Margaret Byrne	Principal Research Scientist, the Department's Science Division, WA Herbarium
John Carter	Nature Conservation Coordinator, the Department's Perth Hills District
Anne Cochrane	Manager, the Department's Threatened Flora Seed Centre
Colin Crane	Senior Technical Officer, the Department's Science Division, Kensington
Sheila Hamilton-Brown	Botanist, previously W.A. Threatened Species and Communities Unit
David Mitchell	Program Leader Nature Conservation, the Department's Swan Region
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Dr Colin Yates	Senior Research Scientist, the Department's Science Division, WA Herbarium

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and the Department's Wildlife Branch for assistance.

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

Olde, P.M. and Marriott, N.R. (1993). New species and taxonomic changes in *Grevillea* (Proteaceae: Grevilloideae) from south-west Western Australia. *Nuytsia*: 9 (2): 237-304.

Compact, rounded **shrubs** 0.3-0.5 m high, 0.5-1 m wide; flexuose, ascending to spreading branches, dense to the ground. **Branchlets** round, scabrous to sparsely hirsute. **Leaves** 3-7.5 cm long, 1-5 cm wide, including petioles 1-5 cm long, bluish green, tangled, persistent after death, secund, ascending to erect, persistent, usually pinnatipartite; rarely (confined to foliage at the base of the plant) simple, pinnatifid, obovate-cuneate with 3-4 apical teeth, sometimes with secondary lobing of apical lobe, sometimes leaves subtending the peduncles simple and entire, 1.8-2.4 cm long, 0.1-0.2 cm wide, linear, often fasciculate near the base of the confluence, sessile, usually curved, pungent; primary leaf lobes 3-7 per leaf, 2-2.5 cm long, 1-3 cm wide, obovate-cuneate, distant, cuspidate, apically 3(4)-fid, the ultimate secondary lobe broadly triangular, pungent; the apical lobe often linear, occasionally the secondary lobes bifid; upper and lower surfaces similar, scabrous to sparsely hirsute; concolorous; venation prominent, more conspicuous on undersurface; mixed craspedodromous with prominent reticulum, margin flat, coincident with a conspicuous, rounded, scabrous vein; texture firmly chartaceous to coriaceous. **Conflorescence** terminal, usually simple, rarely 1-3 branched, erect, sessile, scarcely or not exceeding the foliage; unit conflorescence 2-5 cm long, 1.5 cm wide, cylindrical, loose, development acropetal; floral rachis 1.5 mm wide at the base, arising from a leaf-opposed rosette of bracts, villous; floral bracts 6-7 mm long, 1.5 mm wide, narrowly triangular with apex acuminate, villous outside with mixed biramous and glandular trichomes, glabrous inside, caducous. **Flowers** pedicels 2-3 mm long, villous, patent; torus \pm 1 mm across, straight; nectary not evident; **perianth** 5-6 mm long, 1.5-1.8 mm wide, actinomorphic, reddish when young, ageing dull creamy-yellow, oblong below the limb, villous outside with a mixed indumentum of biramous and glandular trichomes; tepals cohering to anthesis, becoming free to base and strongly rolled down after anthesis, exposing an inner surface either densely papillose or bearing short papilloid trichomes; limb 1.5-2 mm long, 1.5-2 mm wide, erect, densely villous with spreading to erect straight trichomes; style creamy yellow, kinked or folded above ovary, glandular-pubescent on lower filiform portion, papillose on the upper third where continuously dilated to c. 4mm wide below the broadly expanded style-end; pollen presenter c. 0.8 mm long, 0.6-0.7 mm wide at its base, straight, conico-cylindrical with cupuliform apex. **Fruits** not seen.

