

INTERIM RECOVERY PLAN NO. 144

MCCUTCHEON'S GREVILLEA (*GREVILLEA MACCUTCHEONII*)

INTERIM RECOVERY PLAN

2003-2008

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July 2003

Photograph: Andrew Brown

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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (DCLM) 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.

DCLM 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This Interim Recovery Plan will operate from July 2003 to June 2008 but will remain in force until withdrawn or replaced.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 on 21 July, 2003. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting DCLM, as well as the need to address other priorities.

Information in this IRP was accurate at July 2003.

SUMMARY

Scientific Name:	<i>Grevillea maccutcheonii</i>	Common Name:	McCutcheon's Grevillea
Family:	Proteaceae	Flowering Period:	July – November
Dept Region:	South West	Dept District:	Blackwood
Shire:	Busselton	Recovery Team:	South West Region Threatened Flora Recovery Team (SWRTFRT)

Illustrations and/or further information: A. Brown, C. Thomson-Dans and N. Marchant (Eds) (1998) *Western Australia's Threatened Flora*; V. English (1999) *Shrubland Association on Southern Swan Coastal Plain Ironstone, Draft Interim Recovery Plan*; G.J. Keighery and R.J. Cranfield (1996) *Grevillea maccutcheonii* (Proteaceae), a new rare Grevillea from Western Australia. *Nuytsia* 11, 33-36.

Current status: *Grevillea maccutcheonii* was declared as Rare Flora in August 1994 and ranked as Critically Endangered (CR) in September 1995. It currently meets World Conservation Union (IUCN, 2000) Red List category 'CR' under criteria B1ab(iii,v)+2ab(iii,v); C2a; D due to it being known from a single location, a continuing decline in the quality of habitat and number of mature individuals and population size estimated to be fewer than 50 mature individuals. *G. maccutcheonii* has specific habitat requirements and is naturally geographically restricted to ironstone formations near Busselton. This soil type has been massively impacted by vegetation clearing in the past. The main continuing threats are weed invasion, rabbit grazing, disease, fire, road maintenance and degraded habitat.

Distribution and habitat: *Grevillea maccutcheonii* was probably once found in a tall mixed shrubland but this is now hard to confirm as its remaining habitat is now very degraded. Soils are shallow red brown clay associated with the highly restricted southern ironstone formations found at the base of the Whicher Range, a Critically Endangered assemblage currently listed as a Threatened Ecological Community (TEC) and known as 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999). In this area the single known population grows on a one metre high mound of soil which was probably left following early road construction works. During winter months the mound is surrounded by water.

Critical habitat: The critical habitat for *Grevillea maccutcheonii* comprises the area of occupancy of the known population; the area of occupancy of translocated populations; similar habitat within 200 metres of known and translocated populations; corridors of remnant vegetation that link populations; the local catchment area; and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so and may be suitable for future translocations.

Habitat critical to the survival of the subspecies, and important populations: Given that this species is listed as Critically Endangered it is considered that all known habitat containing wild and translocated populations is habitat critical.

Benefits to other species/ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Grevillea maccutcheonii* will also improve the health of the Critically Endangered TEC 'Shrublands on southern Swan Coastal Plain Ironstones' in which it occurs.

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 maccutcheonii* 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: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. The single known population occurs along a narrow road reserve.

Evaluation of the Plan's Performance: The Department of Conservation and Land Management (DCLM), in conjunction with the Recovery Team will evaluate the performance of this IRP. The plan is to be reviewed within five years of its implementation.

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

1. All appropriate land managers have been made aware of the location and threatened status of the species.
2. Declared Rare Flora (DRF) markers have been installed at Population 1a.
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.

4. Populations 1a, 1b, 1T and 2T have been fenced to protect plants from road maintenance activities and grazing.
5. Pruning of associated native flora at Population 1a is undertaken as necessary to avoid excessive competition.
6. Broad scale weed control was undertaken at Population 1t in 2001.
7. The fences around wild and translocated populations are maintained as necessary, and 1080 poisoned oats, gassing and shooting have all been used to reduce the number of rabbits.
8. Disease hygiene is always observed, but dieback is known to occur near Populations 1b and 1t. All translocates planted in 2000 were backpack sprayed with phosphite in February 2001.
9. Susceptibility testing undertaken by DCLM's Science Division indicates that this species is moderately susceptible to *Phytophthora* dieback.
10. A fire response plan has been prepared for wild and translocated sites, and incorporated into the Blackwood District's Fire Control Working Plan.
11. Part of the private property adjacent to the population was purchased by DCLM in 1999, was then vested as an A Class Nature Reserve, and is being rehabilitated (site of Subpopulations 1b and 1T).
12. A total of approximately 1000 seeds are stored in DCLM's Threatened Flora Seed Centre.
13. The Botanic Garden and Parks Authority currently hold 15 plants of *Grevillea maccutcheonii* from 5 clones.
14. An experimental translocation of this species has been implemented in stages in 2000, 2001 and 2002. Planting is occurring into two newly vested Nature Reserves. This action is ongoing.
15. Implementation of the recovery actions outlined in the IRP for the TEC 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999) has commenced and is ongoing. Various actions that protect the community in which it occurs also protect this species.
16. An information sheet that describes and illustrates the species, threats and recovery actions has been produced.
17. A separate information sheet describing and illustrating the TEC in which it occurs has also been produced.
18. Staff from DCLM's Blackwood District regularly monitor wild and translocated populations of the species.
19. The South West Region Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include information on progress in an annual report to DCLM's Corporate Executive and funding bodies.

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

Recovery criteria

Criteria for success: The number of individuals within populations and/or the number of populations have increased by 10% or more.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by 10% or more.

Recovery actions

- | | |
|---|--|
| 1. Coordinate recovery actions | 10. Liaise with land managers |
| 2. Weed control | 11. Monitor populations |
| 3. Rabbit control | 12. Promote awareness |
| 4. Implement hygiene measures | 13. Conduct further surveys |
| 5. Spray Phosphite | 14. Stimulate germination of soil-stored seed |
| 6. Implement the fire management strategy | 15. Promote community awareness |
| 7. Continue translocations | 16. Obtain biological and ecological information |
| 8. Rehabilitate habitat | 17. Review the IRP and if required update, or prepare a full Recovery Plan |
| 9. Collect seed and cutting material | |

1. BACKGROUND

History

Grevillea maccutcheonii was first collected from southeast of Busselton prior to 1992 by G. Robertson who had not seen the species elsewhere in the area. A specimen was given to a former employee of The Department of Conservation and Land Management (DCLM), G. McCutcheon who recognised it as an undescribed species and collected the type specimen in November 1993.

Despite comprehensive surveys in the area conducted between 1992 and 1994 by DCLM staff (Gibson *et al.* 1994) and floristic records for the area dating back to the turn of the century the site of the original collection is the only known location of the species.

In 1993, *Grevillea maccutcheonii* was known from 27 plants, five on a road reserve and 22 on adjoining private property. During a survey of the population in September 1994 none of the private property plants were located and it was noted that the area was being grazed by cattle. The landowner volunteered to remove the cattle, and the site, which was purchased by DCLM in 1999, is being monitored for regeneration of the species.

A number of seedlings have germinated in the area of the wild population since 1995, often in response to accidental or managed disturbance. Seedlings that appeared in areas of high threat such as in a drain alongside the road have been carefully removed and translocated to more secure ground. Steps have also been taken to protect seedlings from fungal attack and insect predation. Deaths of some juvenile and mature plants have occurred, from natural attrition, roadworks, drought and disease. There are currently a total of 13 mature plants and 20 seedlings at the wild population. Experimental translocations were undertaken in 2000, 2001 and 2002, with plants going into two recently acquired Nature Reserves. A number of other threatened ironstone species are also being translocated into the same Nature Reserves which were purchased for this purpose.

Apart from plants in BGPA and several private native gardens, *Grevillea maccutcheonii* is not known to be in cultivation. However, its compact habit, beautiful foliage, colourful flowers and extended flowering period would make it an attractive native plant for the nursery trade.

Description

Grevillea maccutcheonii is a dense tall shrub to two metres tall. It has attractive large red flowers and distinctive flattened three-lobed leaves that encircle the stem. The species is distantly related to *G. manglesioides* but differs in having completely glabrous vegetative and floral organs, and rigid, stem-clasping leaves and larger flowers. Flowering has been recorded between May and December, peaking in July to November.

Distribution and habitat

Grevillea maccutcheonii was probably once found in a tall mixed shrubland but this is now hard to confirm as its remaining habitat is now very degraded. Soils are shallow red brown clay associated with the highly restricted southern ironstone formations found at the base of the Whicher Range, a Critically Endangered habitat currently listed as a Threatened Ecological Community (TEC) and known as 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999). In this area the single known population grows on a one metre high mound of soil which was probably left following early road construction works. During winter months the mound is surrounded by water.

The ecological community 'Shrublands on southern Swan Coastal Plain Ironstones' in which *Grevillea maccutcheonii* occurs is also ranked Critically Endangered (English 1999). There are a total of 13 occurrences of this plant community located on seasonally inundated ironstone wetlands on the Swan Coastal Plain near Busselton.

Much of the species' diversity in the ironstone community comes from annuals and geophytes. Common native species are *Kunzea* aff. *micrantha*, *Pericalymma ellipticum*, *Hakea* sp. Williamson, *Hemiandra pungens*, *Viminaria juncea*, *Aphelia cyperoides* and *Centrolepis aristata* (Gibson *et al.* 1994).

Biology and ecology

The life span of this species is unknown, but flowering has been noted to occur on cutting grown plants in approximately two years. It is likely to take longer for seedlings. Seed is probably dehisced soon after maturity as this is typical of grevillea species. Longevity of the seed is unknown, but seed viability tends to be good (75-80% - unpublished data A. Cochrane¹).

The species is a disturbance opportunist with seedlings appearing on a road reserve in grader spoil, and in response to deliberate disturbance at the base of a dead mature plant.

Grevillea maccutcheonii is moderately susceptible to the plant pathogen *Phytophthora cinnamomi* which has been recorded from Subpopulation 1t. The occurrence of the species in soils that are seasonally waterlogged may predispose the plants to the infection.

Threats

Grevillea maccutcheonii was declared as Rare Flora in August 1994 and ranked as Critically Endangered (CR) in September 1995. It currently meets World Conservation Union (IUCN, 2000) Red List category 'CR' under criteria B1ab(iii,v)+2ab(iii,v); C2a; D due to it being known from a single location, a continuing decline in the quality of habitat and number of mature individuals and population size estimated to be fewer than 50 mature individuals. *G. maccutcheonii* has specific habitat requirements and is naturally geographically restricted to the ironstone formations near Busselton. This soil type has been massively impacted by vegetation clearing in the past. The main continuing threats are weed invasion, rabbit grazing, disease, fire, road maintenance, chemical drift and degraded habitat.

- **Weed invasion and competition** is a major threat to both the natural and translocated populations. 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 high fuel loads that are produced annually by many grass weed species. Narrow linear populations such as road reserves have little buffering, and are severely affected by weed invasion from adjacent cleared land. The translocated populations are being planted into areas previously cleared for agriculture and presently being rehabilitated.
- **Grazing** by rabbits has impacted on *G. maccutcheonii* populations. In addition to direct grazing, rabbits also encourage invasion of weeds through soil digging, addition of nutrients to soil, and introduction of weed seeds. The high level of palatable weeds in the area of populations and in adjacent farming properties attract herbivorous animals, which are often unselective in their grazing.
- **Disease** is a serious threat to all populations. *Phytophthora cinnamomi* is a plant pathogen that causes root rot which results in the plant dying of drought stress. *G. maccutcheonii* has been found to be moderately susceptible to dieback caused by *P. cinnamomi* (personal communication C. Crane²).
- **Inappropriate fire regimes** would impact the viability of populations as seeds of *Grevillea maccutcheonii* are likely to germinate following fire. If this is the case, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. Fires also generally stimulate the germination of weeds which have infested the habitat of the natural population.
- **Degraded habitat** represents a threat to all populations. The lack of associated native vegetation makes it more likely that pollinators will be infrequent or absent. In addition, the lack of available habitat for recruitment is of concern. Part of the natural population occurs on a narrow road reserve with cleared land beyond.
- **Strong wind** is a threat to Populations 1b and 1t due to a lack of protective natural vegetation. Wind can physically damage adult plants, increase soil moisture loss and dislodge enough material to smother small plants. Planting of windbreaks has commenced.

¹ Anne Cochrane, Manager, DCLM's Threatened Flora Seed Centre

² Colin Crane, *Phytophthora* researcher, DCLM's Science Division

- **Road maintenance** threatens Population 1a and its habitat. Associated threats include grading, chemical spraying, construction of drainage channels and the mowing of roadside vegetation. Several of these actions also encourage weed invasion.
- **Competition:** There are several competing native species growing with *Grevillea maccutcheonii* the dominant ones being *Melaleuca incana*, *Viminaria juncea*, *Hakea* sp. Williamson, *Kunzea* aff. *micrantha*, *Loxocarya magna*, *Juncus microcephalus*, *Acacia* sp. and *Dryandra nivea* subsp. *uliginosa*. These may need to be pruned to reduce competition.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. SE Busselton	Shire Road Reserve	1993 8 2000 14 (ca 300)	Moderate	Weed invasion, grazing, disease, inappropriate fire regimes, degraded habitat, road maintenance activities, competition, chemical drift
1b. SE Busselton	Nature Reserve	1993 22 1994 0	Moderate	Weed invasion, grazing, disease, inappropriate fire regimes, degraded habitat, chemical drift
1t. SE Busselton	Nature Reserve	2000 300 2001 ? [147]		Weed competition, grazing, disease, inappropriate fire regimes, degraded habitat, strong wind, chemical drift
2t. SE Busselton	Nature Reserve	2000 48 2001 ? [21]		Weed competition, grazing, disease, inappropriate fire regimes, degraded habitat, chemical drift

Numbers in () = number of juveniles. Pop.t = translocated population. [] = additional plantings.

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

The critical habitat for *Grevillea maccutcheonii* comprises:

- the area of occupancy of the known population;
- occurrences of similar habitat currently containing translocated plants of this species (these may in time become self-sustaining populations);
- areas of similar habitat within 200 metres of wild and translocated populations, i.e. shallow red brown clay associated with ironstone (these provide potential habitat for natural range extension);
- corridors of remnant vegetation that link wild and translocated populations (these are necessary to allow pollinators to move between populations and are usually road and rail verges);
- the local catchment area (the species occurs in a winter-wet habitat dependent on the maintenance of local surface and ground water hydrology); and
- 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 *Grevillea maccutcheonii* is listed as Critically Endangered it is considered that all known habitat is habitat critical. In addition, all populations, including future translocated populations, are or will be considered important to the survival of the species.

Benefits to other species/ecological communities

Recovery actions implemented for *Grevillea maccutcheonii* will improve the status of the Critically Endangered TEC 'Shrublands on southern Swan Coastal Plain Ironstones' in which it occurs.

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 maccutcheonii* 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

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. All populations occur in Nature Reserves or along road reserve.

Evaluation of the Plans Performance

The Department of Conservation and Land Management (DCLM), in conjunction with the South West Region Threatened Flora Recovery Team will evaluate the performance of this IRP. The plan is to be reviewed within five years of its implementation. Any changes to management / recovery actions will be documented accordingly.

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 maccutcheonii* 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, or on the local surface hydrology such that drainage in the habitat of the species would be altered.

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 10% or more.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by 10% or more.

3. RECOVERY ACTIONS

Existing recovery actions

All relevant land managers have been notified of the location and threatened status of the species. The notification details the Declared Threatened status of *Grevillea maccutcheonii* and the legal responsibility to protect it.

Declared Rare Flora (DRF) markers have been installed at Population 1a. These alert people working in the area to the presence of significant flora, helping to prevent accidental damage during maintenance operations.

Awareness of the significance of these markers is being promoted to relevant bodies such as the Shire. To this end, dashboard stickers and stubby holders have been produced. These illustrate DRF markers and the need to avoid disturbance between them. An onsite meeting has been held at Population 1a with relevant road maintenance workers, a Shire representative and Blackwood District staff, at which road maintenance workers were presented with stubby holders.

The single known wild population has been fenced to protect plants from road works and grazing.

In 2001, invasive weeds were controlled by hand around *Grevillea maccutcheonii* by volunteers and Department staff. The paddock section of Population 1t had herbicide applied via a blanket wiper mounted on a four-wheel motorbike to control Guilford grass (*Romulea* sp.), which was very effective. The remaining weed species are mostly annuals which will be controlled by application of herbicide and slashing as required. The aim is to eventually smother the weed species with native vegetation.

The fence surrounding Population 1 was observed to have rusted in some sections in 2001. Rabbit activity was also observed. Repairs have been completed and 1080 poisoned oats, gassing and shooting have all been used to reduce the number of rabbits. However, rabbits continue to threaten translocated plants and further rabbit control will be undertaken.

Although disease hygiene is actively practiced during all recovery activities, dieback appears to be active in the south west corner of the Nature Reserve containing Populations 1b and 1t. The first positive *Phytophthora cinnamomi* result from this species was confirmed from a plant translocated into that area in 2002. Results from dieback susceptibility testing indicate the species to be moderately susceptible. Investigations into the possibility of using Restionaceae species to inhibit the spread of the disease were conducted in 2002.

The translocated plants planted in 2000 were backpack-sprayed with phosphite in February 2001. Tissue samples were obtained and analysed for phosphite concentrations in early 2002. Uptake was shown to be good, however, it is too early to judge if it is effective in controlling dieback in this species.

Fire response plans have been developed for this site and incorporated into the Fire Control Working Plan. It is also intended to inform other relevant fire fighting agencies of appropriate responses to a fire threatening the site. Firebreaks surrounding the property are maintained in good working order.

Two areas of ironstone habitat on private property were purchased by DCLM in 1999. Although degraded due to clearing for agriculture, the sites have the right soil type and are being rehabilitated using both common and critically endangered ironstone species. One site is adjacent to the natural population (Population 1a) of *Grevillea maccutcheonii* and has been rabbit proof fenced. The second site has been fenced with three strand wire. Both areas have been vested as Class A Nature Reserves for the purpose of conservation. The purchase of another area of private property is also in progress, further extending the potential area for future translocations.

A translocation was undertaken in 2000 with about 300 plants propagated by BGPA from seed and cuttings. These plants were translocated into the vicinity of Population 1b (Population 1t). A further 48 plants were translocated into an area of similar habitat type that had been recently purchased and vested as a Nature Reserve (Population 2t). Different treatments being trialled to improve the success rate of translocated plants include ripping and mounding, mounding, watering and shading. Control sites were also established. Problems are being experienced due to the death of translocated plants from *Phytophthora* infection.

Additional plantings have taken place in 2001 and 2002, extending the original translocations. In 2001 a further **176** plants were planted (147 into Population 1t and 21 into Population 2t). Jute matting was trialled to suppress weeds and conserve water with mixed success. Strong winds unpegged a number of the mats and blew them onto translocated plants, smothering them. Wind guards were also trialled but had similar problems due to unpegging and it was thought that they may also foster fungal infection. In addition to these problems, rabbits, weeds, strong winds, and inundation followed by a longer than average summer drought all contributed to deaths of translocated plants, with poor initial survival overall. Watering systems were installed at both sites, weed and rabbit control undertaken and windbreaks started in 2002 in order to address these issues.

Eight seed collections have been made from Population 1 since 1994, resulting in a total of approximately 1000 seeds in storage at DCLM's Threatened Flora Seed Centre (TFSC). Some seed has been germinated for propagation as per approved translocation proposals. Staff of the TFSC test the viability of seed soon after collection and again after one year in storage. The initial germination rate of *Grevillea maccutcheonii* seed ranged from 75% to 77%, and after one year in storage, the germination rate was 80% (unpublished data A. Cochrane).

The Botanic Garden and Parks Authority (BGPA) currently hold fifteen plants of *Grevillea maccutcheonii* representing five clones. The species has been extremely variable in its propagation success rate, with strike rates ranging from 0% to 100%. This may be due in part to time of year and quality of collected material but no consistency has yet been determined (personal communication A. Shade³).

A double-sided information sheet has been produced, and includes a description of *Grevillea maccutcheonii*, its habitat, threats, recovery actions and photos. This will be distributed to community members through local libraries, wildflower shows and other means. An information sheet in support of landholders protecting their remnant vegetation has been produced about the values of Abba Plains vegetation by the local catchment group Geocatch with Departmental assistance. This information sheet includes details of the 'Shrublands on southern Swan Coastal Plain Ironstones' threatened ecological community and photos of *Grevillea maccutcheonii* and other key species. It is hoped that it and the species' information sheet will result in the discovery of new populations. A threatened flora display was operated during the Annual Busselton Wildflower Show.

Staff from DCLM's Blackwood District regularly monitor all occurrences of *Grevillea maccutcheonii*.

The South West Region Threatened Flora Recovery Team (SWRTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to DCLM's Corporate Executive and funding bodies.

Future recovery actions

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

1. Coordination

The South West Region Threatened Flora Recovery Team (SWRTFRT) will coordinate recovery actions for *Grevillea maccutcheonii* and other Declared Rare flora in the region and will include information on progress in their annual report to DCLM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$4,500 per year

2. Weed control

Following some weed control that has been done in the past the current level of threat from weeds is not high. However, if weed density increases again it will impact on *G. maccutcheonii* by competing for resources, degrading habitat, exacerbating grazing pressure, and increasing the risk and severity of fire. Remaining weeds are mostly annuals, and weed control will be undertaken in consultation with the land managers as needed. This will be by hand weeding or localised application of herbicide. All weed control that is undertaken will be followed by a report on the method, timing and success of the treatment and any detrimental effect on *G. maccutcheonii* and associated native plant species.

Action: Weed control
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$500 per year

³ Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

3. Rabbit control

After some previous rabbit control the current level of threat is moderate. Populations have been surrounded by rabbit proof fences to protect them from grazing (Populations 1a, 1b, 1t and 2t). However, as rabbits are still having some impact on populations through grazing and digging they will be controlled using a variety of methods as appropriate in consultation with relevant landholders.

Action: Rabbit control
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$200 per year

3. Hygiene measures

Grevillea maccutcheonii has been shown to be moderately susceptible to *Phytophthora cinnamomi*. Hygiene measures (outlined in DCLM 1992a) will be adhered to wherever possible during road works, installation and maintenance of firebreaks and walking into the area of population during wet soil conditions.

Action: Implement hygiene measures
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$800 in first, third and fifth years and \$400 in second and fourth years

4. Phosphite application

Grevillea maccutcheonii has been shown to be moderately susceptible *Phytophthora cinnamomi*. As research conducted from 1992 to 1997 indicates that phosphite application is a very effective tool in controlling the pathogen (Murray 1997) DCLM will apply phosphite to the area of populations, either by hand spraying or by aerial spraying. This action will have the added benefit of protecting a number of other threatened plant species in the threatened ecological community in which *G. maccutcheonii* occurs

Action: Spray phosphite
Responsibility: DCLM (Blackwood District, Dieback Disease Coordinator) through SWRTFRT
Cost: \$3,800 per year for the first, third and fifth years

5. Fire management strategy

Grevillea maccutcheonii is an opportunistic species that germinates from soil-stored seed following fire and soil disturbance. However, frequent fire will kill plants before they reach maturity and may result in the accumulation of insufficient soil stored seed for regeneration. Except for recovery purposes, fire should be excluded from the area of populations. A fire response plan developed for this site which determines fire control measures and fire frequency has been incorporated into the Blackwood District's Fire Control Working Plan. Other fire fighting agencies will be informed of appropriate responses to fire threatening this site. Firebreaks will continue to be maintained.

Action: Implement the fire management strategy
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$1,000 per year

6. Translocation

Although translocations are generally undertaken under full Recovery Plans, the threats to the small wild population of *Grevillea maccutcheonii* requires the implementation of a translocation proposal within the time frame of this IRP. A translocation proposal that has been prepared and implemented is being coordinated by the KDTRFRT. Information on the translocation of threatened animals and plants in the wild is provided in DCLM's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*.

The translocation involves two sites – the first is in the vicinity of Population 1b in an area recently acquired as a Nature Reserve. The second is in a similar habitat type and is also on land recently acquired as a Nature Reserve.

The first plantings took place in 2000 with follow up plantings in 2001 and 2002. The propagation of plants for translocation will continue as necessary and additional plantings will occur in accordance with the approved Translocation Proposal. Monitoring of the translocation is essential.

Action: Continue translocations
Responsibility: DCLM (Blackwood District, TFSC) and BGPA through the SWRTFRT
Cost: \$9,500 per year

7. Habitat rehabilitation

Habitat rehabilitation at the site of Population 1b will include the planting of species native to that site with particular emphasis on species that provide habitat for pollinators. Site rehabilitation will extend beyond the current boundary of the *Grevillea maccutcheonii* population to control further weed invasion.

Action: Rehabilitate habitat
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$3,000 in first, second and third years and \$1,000 in subsequent years

8. Seed and cuttings

Preservation of germplasm is essential to guard against extinction if the wild population is lost. Such collections are also needed to propagate plants for translocations. A small quantity of seed has been collected from Population 1 but further collections are required. Cuttings will also be collected and used for propagation to enhance the living collection at BGPA.

Action: Collect seed and cutting material
Responsibility: DCLM (TFSC, Blackwood District) through the SWRTFRT
Cost: \$3,000 per year

9. Liaison

Staff from DCLM's Blackwood District will liaise with relevant land managers to ensure that populations of *Grevillea maccutcheonii* are not accidentally damaged or destroyed.

Action: Liaise with land managers
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$500 per year

10. Monitoring

Annual monitoring of factors such as habitat degradation (including weed invasion and salinity), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. Competition from associated native species will also be monitored at Population 1a.

The presence and movement of *Phytophthora cinnamomi* will be monitored and the need for further dieback control will be assessed periodically. Monitoring will also examine the affect phosphite application, both for its control of *P. cinnamomi* and its impact on native species.

Action: Monitor populations
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$1,200 per year

11. Surveys

Although the community type in which *Grevillea maccutcheonii* occurs has been extensively surveyed over the last decade it is possible that additional populations of this or other threatened ironstone species may be discovered on private land. Surveys will target remnant vegetation as permission is obtained. Surveys by Departmental staff and community volunteers will be conducted during the flowering period of the species (July - November).

Action: Conduct further surveys
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$500 per year

12. Stimulate germination of soil-stored seed

Soil disturbance has been shown to be effective in stimulating the germination of soil-stored seed. When mature plants senesce, soil disturbance will be implemented to encourage recruitment.

Action: Stimulate the germination of soil-stored seed
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$200 in second and fourth years

13. Community awareness

The importance of biodiversity conservation and the need for the long-term protection of *Grevillea maccutcheonii* in the wild will be promoted to the general community through the local print, electronic media and poster displays. An information sheet, which includes a description of the plant, its habitat type, threats, management actions and photos, has been produced. Formal links with local naturalist groups and interested individuals will be encouraged.

Action: Promote community awareness
Responsibility: DCLM (Blackwood District) through the SWRTFRT
Cost: \$600 per year

14. Obtain biological and ecological information

Better knowledge of the biology and ecology of *Grevillea maccutcheonii* will provide a scientific basis for management of wild populations. An understanding of the following is necessary for effective management:

1. Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
2. The pollination biology of the species.
3. The requirements of pollinators.
4. The reproductive strategies, phenology and seasonal growth of the species.
5. The population genetic structure, levels of genetic diversity and minimum viable population size.
6. The impact of dieback disease and control techniques on the species and its habitat.
7. The impact of changes in the level of salinity on the species and its habitat.

Action: Obtain biological and ecological information
Responsibility: DCLM (Science Division, Blackwood District) through the SWRTFRT
Cost: \$15,600 per year in the second third and fourth years

15. Review the IRP and if required update or prepare a full Recovery Plan

If *Grevillea maccutcheonii* is still ranked as Critically Endangered at the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for a full Recovery Plan or a review of this IRP will be assessed and a plan prepared if necessary.

Action: Review the IRP and if required update or prepare a full Recovery Plan

Responsibility: DCLM (WATSCU, Blackwood District) through the SWRTFRT
Cost: \$20,300 in the fifth year (if full Recovery Plan is required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from June 2003 to May 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

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Leonie Monks	Research Scientist, DCLM's Science Division
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Bryan Shearer	Principal Research Scientist, DCLM's Science Division
Meredith Spencer	Conservation Officer, DCLM's Blackwood District

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7. TAXONOMIC DESCRIPTION

Keighery, G.J. and Cranfield, R.J. (1996) *Grevillea maccutcheonii* (Protease), a New Rare *Grevillea* from Western Australia. *Nuytsia* 11(1), 33-36.

Grevillea maccutcheonii is an erect spreading densely branched, domed shrub to 2m tall x 2m wide, not lignotuberous or suckering. *Branchlets* terete, glabrous, reddish green, young growth red. *Immature leaves* entire or with a single apical lobe. *Mature leaves* sessile, pandurate, 12-33 mm long (mean 19), 6-22 mm wide (mean 11), with a central sinus, base stem-clasping, amplexicaule, rigid, glabrous, with a distinct white margin, margin flat, 3-lobed, one lobe apical, the others shortly below on either side, each lobe terminating in a black pungent point c. 1 mm long, shiny green above, dull green below, mid vein prominent when dry on both surfaces. *Inflorescence* terminal, racemose 26-42 flowered, lower flowers more widely spaced than upper flowers; peduncle glabrous, 10-12 mm long; rachis glabrous, markedly decurved, usually simple, rarely two-branched; unit inflorescence 2-4 cm long, loosely hemispherical and secund to subsecund, acropetal. *Inflorescence bract* leaf-like, narrowly cordate. *Floral bracts* ovate c. 1 mm long, 1 mm wide, margin hairy, caducous when buds are small. *Pedicels* 2-3 long, glabrous, green, torus oblique. *Flowers* reddish green, acroscopic. *Perianth* 6-8 mm long, narrowly ovate-oblong below the curve, c. 3 mm wide, green, glabrous outside, inside margins of tepals with a line of hairs and bearded in the throat above the ovary. *Nectary* prominent, yellow, broadly lunate. *Pistil* 20-24 mm long, glabrous; stipe 2-3 mm long; ovary obliquely ovoid, 1-2 mm long, green; style red; pollen presenter at 90 degrees, almost round, green; stigma almost central. *Fruits* brown, narrowly and obliquely ovoid, 13-16 mm long, 5-6 mm wide, surface smooth, pericarp uniform and c. 0.5 mm thick. *Seeds* narrowly oblong, 7-8 mm long, 2-3 mm wide, outer face markedly convex, margin revolute, inner face channelled, eliasome lacking.