INTERIM RECOVERY PLAN NO. 174

IRONSTONE BRACHYSCIAS

(*BRACHYSCIAS VERECUNDUS*)

INTERIM RECOVERY PLAN

2004-2009

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Photograph: Greg Keighery

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FOREWORD

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

CALM 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This Interim Recovery Plan will operate from July 2004 to June 2009 but will remain in force until withdrawn or replaced. It is intended that this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was given regional approval on 16 July 2004 and was approved by the Director of Nature Conservation on 22 July 2004. The allocation of staff time and provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at July 2004.

ACKNOWLEDGMENTS

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

Anne Cochrane	Senior Research Scientist, CALM's Science Division
Andrew Crawford	Technical Officer, CALM's Science Division
Greg Keighery	Senior Principal Research Scientist, CALM's Science Division
Andrew Webb	Conservation Officer, CALM's Blackwood District
Kim Williams	Program Leader Nature Conservation, CALM's South West Region

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

SUMMARY

Scientific Name:	*Brachyscias verecundus* J.M. Hart & M.J. Henwood	**Common Name:**	Ironstone brachyscias
Family:	Apiaceae	**Flowering Period:**	November
CALM Region:	South West	**CALM Districts:**	Blackwood (and possibly Donnelly)
Shires:	Shire of Busselton (and possibly Manjimup)	**Recovery Team:**	South West Region Threatened Flora and Communities Recovery Team (SWTFCRT)

Illustrations and/or further information: Hart, J.M. and Henwood, M.J. (1999) *Brachyscias* (Apiaceae): a New Genus from South-west Western Australia. *Australian Systematic Botany* 12, 175-179; Western Australian Herbarium (1998) FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/.

Current status: *Brachyscias verecundus* was declared as Rare Flora in 2002 under the Western Australian *Wildlife Conservation Act 1950* and ranked as Critically Endangered (CR). It currently meets World Conservation Union (IUCN 2000) Red List Category Endangered (CR) under criteria B1ab(iii,v)+2ab(iii,v); C2a(i,ii)b and D as there is only a single confirmed population with extreme fluctuations in the number of mature individuals, and a continuing decline in the quality of the habitat. The main threats are firebreak maintenance activities, lack of appropriate disturbance, inappropriate fire regimes, mineral exploration, hydrological changes, weed invasion and rabbits.

Critical habitat: The critical habitat for *Brachyscias verecundus* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; remnant vegetation that links subpopulations; additional nearby occurrences of similar habitat that do not currently contain the taxon but may have done so in the past and may be suitable for translocations; and the local catchment for the surface and ground waters that provide the winter-wet habitat of the taxon.

Habitat critical to the survival of the species, and important populations: Given that this taxon is listed as Critically Endangered it is considered that all known habitat is habitat critical and all populations, including any resulting from translocations, are important.

Benefits to other species/ecological communities: The single confirmed population (Population 2) is located within an occurrence of a Threatened Ecological Community (TEC) (the 'shrublands on Swan Coastal Plain Ironstone (Busselton area)'). Other Declared Rare and Priority flora also occur in the wider habitat of the population. Recovery actions implemented to improve the quality or security of the habitat of Population 2 are likely to improve the status of the TEC in which the population is located, as well as the Rare and Priority flora.

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. The taxon is not listed under any specific international treaty, however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites have been discovered near the *Brachyscias verecundus* population. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *B. verecundus*, and this is discussed in the recovery actions.

Social and economic impacts: The implementation of this recovery plan has the potential to have some limited social and economic impact, as one subpopulation is located on private property and the other on a rail reserve. Areas on private land that are considered to be 'habitat critical' may be regarded as having potential for uses other than conservation by landholders. Approaches that may minimise this potential impact could include covenants, management agreements or land acquisition. There is a mineral exploration and extraction lease over the area of land that contains Population 2 of *Brachyscias verecundus*. Recovery actions refer to continued liaison between stakeholders with regard to the management of these areas.

Evaluation of the Plans Performance: CALM, in conjunction with the Recovery Team will evaluate the performance of this IRP. The plan is to be reviewed within five years.

Habitat requirements: *Brachyscias verecundus* occurs near Busselton on the Swan Coastal Plain, in winter-wet clay over ironstone, in open to tall shrubland.

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

1. Land managers have been notified of the location and threatened status of the taxon.
2. Aerial spraying of phosphite has been undertaken in the Busselton Ironstone habitat and will be repeated every second year.
3. Disease hygiene measures are implemented in the habitat of Population 2, including limiting vehicle access to tracks.
4. The ironstone area containing Population 2b has been fenced by the land owners to protect the habitat.
5. A fire response strategy for areas containing *Brachyscias verecundus* has been prepared and incorporated into the Blackwood District's Fire Control Working Plan.
6. Implementation of the recovery actions outlined in the IRP for the community 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999) has commenced, and recovery actions that benefit the TEC habitat will also benefit *Brachyscias verecundus*.
7. A brochure about the values of Abba Plains vegetation has also been produced by local catchment group Geocatch with Departmental assistance, in support of landholders protecting remnant vegetation on their land.
8. There have been two collections of *Brachyscias verecundus* seed and these are stored in CALM's TFSC at –18°C.
9. The SWTFCRT is overseeing the implementation of this IRP and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.
10. Staff from CALM's Blackwood District monitor populations of this taxon.

IRP Objective: The objective of this Interim Recovery Plan is to abate identified threats to improve the conservation status of the taxon in the wild over the period of the plan's adoption under the EPBC Act.

Recovery criteria

Criteria for success:

1. An increase in the area of the habitat of this species under conservation management.
2. Maintenance in terms of diversity and basic composition of native species in the habitat (as described in Gibson *et al* 1994) and of hydrological and biological processes, taking account of natural change in the community and its habitat over time.
3. Improvement in terms of reduction of numbers of exotic species and of other threatening processes as defined in this document.

Criteria for failure: Significant loss of area or further significant modification of the immediate TEC habitat of the species.

Recovery actions

1. Coordinate recovery actions.
2. Map critical habitat.
3. Stimulate the germination of soil-stored seed.
4. Collect seed.
5. Install Declared Rare Flora markers.
6. Conduct further surveys.
7. Seek improved security for the population.
8. Maintain disease hygiene.
9. Develop and implement a fire management strategy.
10. Undertake weed control.
11. Monitor the population.
12. Liaise with land managers.
13. Promote awareness.
14. Control rabbits.
15. Obtain biological and ecological information.
16. Review the need for a full Recovery Plan.

1. BACKGROUND

History

The first known collection of *Brachyscias verecundus*, housed at the Western Australian Herbarium, was made in 1986 by P. Wilson, apparently near Shannon township (Donnelly District). Despite numerous searches over many years by a number of CALM staff, this population has never been relocated. It is quite possible that the locational information for this herbarium collection is incorrect and was actually for *Brachyscias verecundus* collected from the Busselton area.

Until recently the Wilson collection was the only collection ever made of the species. Numerous surveys were undertaken including over the five years of the Floristic Surveys of the Southern Swan Coastal Plain (Gibson *et al*. 1994), and ongoing survey by CALM Blackwood and Manjimup District staff as well as private consultants. However these failed to locate any populations of the species. The species was finally located in October 2000 during joint surveys carried out by a mining company and CALM Blackwood District staff following disturbance for firebreak maintenance. *Brachyscias verecundus* is known from one population with around 60 plants, which were last observed in 2001 and 2002.

Description

Brachyscias verecundus J.M. Hart & M.J. Henwood is an annual or ephemeral herb, 12-22 mm high and is entirely glabrous. The leaves are basal, ternately divided, the lateral segments sometimes again divided. The inflorescence is a compound umbel with three rays each having 3-6 bisexual and/or male flowers and up to three flowers between the rays. Flowers are pedicellate, minute, mostly male. Sepals are absent. The five petals are free, ovate, c. 0.7 mm long, c. 0.5 mm wide, white or cream, and inflexed. The possibly immature fruit is pale yellow, with undulate-striate surface, broadly ovate, c. 0.55 mm long, and c. 0.9 mm wide (Hart and Henwood 1999).

Brachyscias verecundus is similar to *B. chlaenosciadium* Norman but differs in that it is smaller in all parts, is entirely glabrous, has leaves ternately divided; the involucral bracts and bracteoles are foliaceous and without extra bracts around the flowers between the rays; the nectaries are adnate to styles; and fruit has an undulate surface (Hart and Henwood 1999).

Distribution and habitat

Brachyscias verecundus occurs near Busselton on the Swan Coastal Plain. The taxon occurs in winter-wet clay over ironstone in open to tall shrubland.

Common species of the Busselton ironstone habitat include *Kunzea rostrata*, *Pericalymma ellipticum*, *Acacia stenoptera*, *Hakea varia*, *Hemiandra pungens*, *Viminaria juncea*, *Aphelia cyperoides*, *Centrolepis aristata*, *Borya scirpoidea*, *Caladenia marginata*, *Caustis dioica*, *Centrolepis drummondiana*, *Dampiera linearis*, *Drosera glanduligera*, *Drosera rosulata*, *Desmocladus fasciculata*, *Loxocarya magna*, *Phyllangium paradoxum*, *Opercularia vaginata*, *Philydrella pygmaea*, *Utricularia multifida*, *Schoenus odontocarpus*, *Stylidium calcaratum*, *Thelymitra antennifera* and *Thysanotus thyrsoideus* (Gibson *et al*. 1994).

Brachyscias verecundus appears to be endemic to a threatened ecological community (TEC) (English and Blyth 1999), the ‘Shrublands on southern Swan Coastal Plain Ironstones (Busselton area), Swan Coastal Plain Community type 10b, as described in Gibson *et al.* (1994)’. The Busselton ironstone soils are highly restricted in distribution and there is a total of 14 occurrences (91 hectares) remaining uncleared (Gibson *et al*. 2000). This IRP will be implemented in conjunction with the IRP for the 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999).

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

Given that this taxon is listed as Critically Endangered it is considered that all known habitat is habitat critical. In addition all populations are considered important to the survival of the taxon. Recovery actions include survey for further populations that may lead to the identification of additional habitat critical.

Benefits to other species/ecological communities

Brachyscias verecundus appears to be endemic to the 'Shrublands on southern Swan Coastal Plain Ironstones (Busselton area)', Threatened Ecological Community (TEC), which is listed as Critically Endangered in Western Australia, and Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (EPBC Act) 1999. Other listed and Priority flora that also occur in the TEC (but not necessarily in the immediate habitat of Population 2 of *Brachscias verecundus*) (from Gibson *et al*. 2000) include *Andersonia ferricola* ms (Priority 1), *Gastrolobium modestum* (Vulnerable under both the *Wildlife Conservation Act* 1950 and EPBC Act), *Gastrolobium papilio* (Critically Endangered under the *Wildlife Conservation Act* 1950, Endangered under the EPBC Act), *Chamelaucium roycei* ms (Vulnerable under both the *Wildlife Conservation Act* 1950 and EPBC Act), *Darwinia* sp. Williamson (Critically Endangered under the *Wildlife Conservation Act* 1950, Endangered under the EPBC Act), *Dryandra squarrosa* subsp. *argillacea* (Endangered under the *Wildlife Conservation Act* 1950, Vulnerable under the EPBC Act), *Grevillea elongata* (Endangered under the *Wildlife Conservation Act* 1950, Vulnerable under the EPBC Act), *Grevillea mccutcheonii* (Critically Endangered under the *Wildlife Conservation Act* 1950, Endangered under the EPBC Act), *Hakea oldfieldii* (Priority 3), *Lambertia echinata* subsp. *occidentalis* (Critically Endangered under the *Wildlife Conservation Act* 1950, Endangered under the EPBC Act), *Petrophile latericola* ms (Critically Endangered under the *Wildlife Conservation Act* 1950, Endangered under the EPBC Act), *Dryandra nivea* subsp. *uliginosa* (Endangered under both under the *Wildlife Conservation Act* 1950 and the EPBC Act), *Calothamnus* sp. Scott River (aff. *crassus*) (Priority 2), *Chordifex isomorphus* (Priority 4) and *Loxocarya magna* (Priority 3). Recovery actions implemented to improve the quality or security of the habitat of the population of *B. verecundus* are likely to improve the status of the TEC in which the population is located, as well as that of the other rare and Priority flora.

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. The taxon is not listed under any specific international treaty, however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites have been discovered near the *Brachyscias verecundus* population. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *B. verecundus*, and this is discussed in the recovery actions.

Social and economic impacts

The implementation of this recovery plan has the potential to have some limited social and economic impact, as one subpopulation is located on private property and the other on a disused rail reserve. Areas on private land that are considered to be 'habitat critical' may be regarded as having potential for uses other than conservation by landholders. Approaches that may minimise this potential impact could include covenants, management agreements or land acquisition. There is a mineral exploration and extraction lease over the area of land containing Population 2 of *Brachyscias verecundus*. Recovery actions refer to continued liaison between stakeholders with regard to these areas.

Evaluation of the Plans Performance

CALM, in conjunction with the South West Region Threatened Flora and Communities Recovery Team will evaluate the performance of this Interim Recovery Plan. The plan is to be reviewed within five years of its implementation. Any changes to management / recovery actions will be documented accordingly.

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*).

The critical habitat for *Brachyscias verecundus* comprises:

- the area of occupancy of the known population;
- areas of similar habitat within 200 metres of the known population, ie. winter-wet clay over ironstone in open to tall shrubland (these provide potential habitat for natural range extension);
- remnant vegetation that surrounds or links subpopulations (this is necessary to allow pollinators to move between subpopulations);
- additional occurrences of similar habitat that do not currently contain the taxon but may have done so in the past (these represent possible translocation sites); and
- the local catchment for the surface and possibly ground waters that maintain the winter-wet habitat of the taxon (the taxon occurs on ironstones that are seasonally inundated and are dependent on the local hydrology).

Biology and ecology

Brachyscias verecundus was named from the Latin *brachys* which means short, and *skias* (an umbel) referring to the small size of this genus. The Latin *verecundus* means shy or bashful and refers to the difficulty in relocating this species (Hart and Henwood 1999).

The taxon is an annual, that appears in November and has no visible above ground parts by January (pers comm. M. Spencer[1]). Its above-ground presence is possibly linked to fire or other disturbance (Hart and Henwood 1999). This was evident in 2000 and 2001 when the species germinated following the grading of a firebreak. Seed of Apiaceae is long lived and is hard coated and therefore requires breaking of the seed coat for germination to occur. However an attempt to germinate seed collected in 2002 by nicking to break the seed coat has yet to result in any germination (pers comm. A. Crawford[2]). Therefore it is thought that the seed may have a mechanism where it remains dormant following dispersal (pers comm. G. Keighery[3]).

It is not known whether *Brachyscias verecundus* is susceptible to the plant pathogen *Phytophthora cinnamomi* (dieback). However as the Apiaceae family is not generally susceptible it is unlikely for this species (pers comm. G. Keighery).

Threats

Brachyscias verecundus (previously known as *Apiaceae* sp. Shannon) was initially ranked as Priority 1. The taxon was then declared as Rare Flora in 2002 under the Western Australian *Wildlife Conservation Act 1950* and ranked as Critically Endangered (CR). It currently meets World Conservation Union (IUCN 2000) Red List Category Critically Endangered (CR) under criteria B1ab(iii,v)+2ab(iii,v); C2a(i,ii)b; and D as there is only a single population with extreme fluctuations in the number of mature individuals, and a continuing decline in the quality of habitat. The main threats are firebreak maintenance activities, lack of disturbance, inappropriate fire regimes, mineral exploration, hydrological changes, weed invasion and rabbits.

- **Firebreak maintenance activities** threaten the population. Threats include grading, chemical spraying, and the mowing of roadside vegetation. Several of these actions also encourage weed invasion.

- **Lack of disturbance** is a threat to the species. The species is an annual and germinates following disturbance. It is not certain how long-lived the seed is in the soil but without germination the seed stored in the soil is not replenished.

[1] Meredith Spencer, Previously, Conservation Officer, CALM's Blackwood District
[2] Andrew Crawford, Technical Officer, CALM's Science Division
[3] Greg Keighery, Principal Research Scientist, CALM's Science Division

- **Inappropriate fire regimes** would affect the viability of the populations, as *Brachyscias verecundus* appears to be an obligate seeder that germinates following fire. As the species is an annual, fires during the growing phase prior to seed production (possibly October or November to January) would rapidly deplete the soil seed bank. However, occasional fires or other disturbances are likely to be required for the taxon to propagate from soil stored seed whilst the seed remains viable. This species only appears to germinate in the year immediately following disturbance.

- **Mineral exploration** and extraction leases exist over the area of land in which Population 2 of *Brachyscias verecundus* occurs.

- **Hydrological changes** are likely threats to vegetation on the ironstone soil type in which *Brachyscias verecundus* occurs (Tille and Lantzke 1990). Extensive clearing for agriculture in the area is likely to have increased surface runoff and recharge of the groundwater. Waterlogging and salinity will require monitoring. Hirschberg (1989) measured levels of salinity in the groundwater in the Blackwood area, and found the water near the populations ranged between 200-400 parts per litre total dissolved solids, which is quite fresh. Adjacent land developments such as mining also have the potential to alter hydrological processes, and therefore to threaten the population.

- **Weed invasion** is a threat to the population. As the taxon occurs on a firebreak, any disturbance or management actions will encourage weed invasion. 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 weed species.

- **Rabbits** (*Oryctolagus cuniculus*) have been observed at Population 2, and although there is no evidence that the *Brachyscias verecundus* is being grazed, rabbits are impacting on the habitat by causing soil disturbance. Increased nutrient levels in the soil from rabbit droppings is also likely, and this results in increased weed invasion. Grazing may have an impact on the establishment of plants of *B. verecundus* thereby limiting natural recruitment.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Habitat Condition	Threats
**1. N of Shannon	National Park	1986 25		
2A. E of Busselton	Rail Reserve	11/2000 *32 12/2000 *9 dying 2001 34 2002 0 2003 0	Healthy	Firebreak maintenance, lack of appropriate disturbance, inappropriate fire regimes, mineral exploration, hydrological changes, weed invasion, rabbits
2B. E of Busselton	Private Property	11/2000 *32 12/2000 *9 dying 2001 26 2002 31 2003 0	Healthy	Firebreak maintenance, lack of disturbance, inappropriate fire regimes, mineral exploration, hydrological changes, weed invasion, rabbits

**= Herbarium collection never relocated and location appears unreliable
*= total for subpopulations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined critical habitat of *Brachyscias verecundus* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the taxon, or its habitat or potential habitat, or the local surface or ground water hydrology.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery Plan is to abate identified threats to improve the conservation status of the taxon in the wild over the period of the plan's adoption under the EPBC Act.

Recovery criteria
Criteria for success:
1. An increase in the area of the habitat of this species under conservation management.
2. Maintenance in terms of diversity and basic composition of native species in the habitat (as described in Gibson *et al* 1994) and of hydrological and biological processes, taking account of natural change in the community and its habitat over time.
3. Improvement in terms of reduction of numbers of exotic species and of other threatening processes in the habitat as defined in this document.

Criteria for failure: Significant loss of area or further significant modification of the immediate TEC habitat of the species.

3. RECOVERY ACTIONS

Existing recovery actions

Land managers have been notified of the location and threatened status of the taxon. The notification details the Declared Rare status of *Brachyscias verecundus* and the legal responsibility to protect it.

Aerial spraying of phosphite has been undertaken in the Busselton ironstone community (including the habitat of *Brachyscias verecundus*) and will be repeated every second year. Monitoring of deaths that are likely to be due to dieback for a number of other Declared Rare Flora species is being undertaken (Smith *et al*. 2002; Smith *et al*. 2001; Smith *et al*. 2000).

Disease hygiene measures are implemented at all locations, including limiting vehicle access to tracks.

The ironstone area that contains Population 2b has been fenced by the land owners to protect the habitat.

A fire response strategy for areas that contain the *Brachyscias verecundus* has been prepared and incorporated into the Blackwood District's Fire Control Working Plan.

Implementation of the recovery actions outlined in the IRP for the community 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999) has commenced, and recovery actions that benefit the TEC habitat will also benefit *Brachyscias verecundus*.

A brochure about the values of Abba Plains vegetation has also been produced by local catchment group Geocatch, with Departmental assistance, in support of landholders protecting their remnant vegetation. This includes details of the 'Shrublands on southern Swan Coastal Plain Ironstones' threatened ecological community and photos of other significant species.

There have been two collections of *Brachyscias verecundus* seed. Approximately 66 seeds were collected from Population 2a in December 2000 and 330 seeds from Population 2b in December 2002 and stored in CALM's TFSC at –18°C. The TFSC test the viability of the seed initially, after one year in storage and then after five years in storage. Germination testing of *B. verecundus* seed collected in 2002 with the seed being nicked was initiated in March 2003 but to date there has been no germination. There was insufficient material from the collection in 2000 for germination testing (unpublished data, A. Cochrane[4]).

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

Staff from CALM's Blackwood District monitor populations of this taxon.

[4] Anne Cochrane, Senior Research Scientist, CALM's Science Division

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken. The following recovery actions are roughly in order of descending priority; however this should not constrain addressing any of the priorities if funding is available for 'lower' priorities and other opportunities arise.

1. Coordinate recovery actions

The South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT) will continue to coordinate recovery actions for *Brachyscias verecundus* and other Declared Rare Flora and threatened ecological communities in their region. They will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $2,100 per year

2. 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: CALM (Blackwood District, WATSCU) through the SWRTFCRT
Cost: $2,000 in the first year

3. Stimulate the germination of soil-stored seed

Burning, smokewater and soil disturbance may be effective in stimulating the germination of soil-stored seed. These trials will be conducted near the existing population in areas cleared of weeds, and/or in areas where *Brachyscias verecundus* was known to occur previously but is no longer present above ground. It is intended that, if trials successfully result in mature plants that produce seed, seed will then be collected and stored (see recovery action 4). If germination occurs monitoring will record the time to first flowering and seed production and the age of plants when they senesce. This will enable the optimal interval time for disturbances to be established (eg after seed has been produced and dehisced and prior to major rainfall events).

Action: Stimulate the germination of soil-stored seed
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $2,400 in first, second and third years.

4. Collect seed

Preservation of germplasm is essential to guard against extinction if the wild population is lost. More seed is required from both subpopulations to maximise the genetic diversity of the *ex situ* material.

Action: Collect seed
Responsibility: CALM (TFSC) through the SWRTFCRT
Cost: $3,000 in first, second, third and fourth years.

5. Install Declared Rare Flora markers

Declared Rare Flora (DRF) markers are required for both subpopulations along the firebreaks. Their purpose is to alert people operating in the area to the presence of DRF and to help prevent habitat disturbance.

Action: Install DRF markers
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $400 in first year

6. Conduct further surveys

Although the community type in which *Brachyscias verecundus* occurs has been extensively surveyed over the last decade it is possible that populations of this species may not have been present at the time above ground and therefore not have been located. Further surveys will be conducted for this taxon during its flowering period (November), following any disturbance events (fire, soil disturbance). Volunteers from the local community, Wildflower Societies and Naturalist Clubs will be encouraged to be involved in surveys supervised by CALM staff.

Action: Conduct further surveys
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $2,600 per year

7. Seek improved security for the population

Ways and means of improving the security of the subpopulations and their habitat will be investigated. This may include conservation covenants with a range of agencies, the Land for Wildlife scheme, or possibly acquisition.

Action: Seek improved security for subpopulations
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $350 per year

8. Maintain disease hygiene

The ironstone habitat in which *Brachyscias verecundus* occurs is inundated over the winter months, and this favours the establishment and spread of *Phytophthora* species. Although the taxon is presumed not to be susceptible to this disease, many plant species in the ironstone community are susceptible. Dieback hygiene (outlined in CALM 2003) will therefore be adhered to for activities such as installation and maintenance of firebreaks and walking into the population in wet soil conditions.

Action: Maintain disease hygiene
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $400 per year

9. Develop and implement a fire management strategy

It appears that fire kills most adult plants of the species and regeneration is largely from seed. However, frequent fire or burns occurring while the taxon has above ground parts but has not produced seed may prevent the accumulation of sufficient soil-stored seed for recruitment to occur. Fire should therefore be prevented from occurring in the habitat of the population, except where it is being used experimentally as a recovery tool. A fire response plan has been developed and 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: Develop and implement a fire management strategy
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $2,500 in first year; $1,000 per year thereafter

10. Undertake weed control

Weed control will be undertaken in consultation with the land managers. Appropriate methods of weed control are found in Brown and Brooks (2002) and may include hand weeding or localised application of herbicide. All applications of weed control will be followed by a report on the method, timing and success of the treatment against weeds, and the effect on *Brachyscias verecundus* and associated native plant species.

Action: Undertake weed control
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $1,100 per year

11. Monitor the population

Annual monitoring of factors such as habitat degradation (including weed invasion), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. All populations will be inspected annually with special attention given to any impacts from increased salinisation. In areas that are possibly under threat from salinisation, soil salinity and pH readings will be taken annually during winter.

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

Action: Monitor the population
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $1,000 per year

12. Liaise with land managers

Staff from CALM's Blackwood District will continue to liaise with land managers and landowners, including mining companies that are active in the area, to ensure that Population 2 is not accidentally damaged or destroyed. Input and involvement will also be sought from any indigenous groups that have an active interest in areas that are habitat for *Brachyscias verecundus*.

Action: Liaise with land managers
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $350 per year

13. Promote awareness

The importance of biodiversity conservation and the need for long-term protection of the wild population of this taxon 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. An information sheet, which includes photos and a description of the plant, and description of its habitat, threats, and recovery actions will be produced.

Action: Promote awareness
Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $1,400 in first year; and $600 in remaining years

14. Control rabbits

Population 2 is affected by rabbits. Although there is no evidence of grazing on the plants themselves, they are likely to be extremely vulnerable to grazing. In addition, the soil is being disturbed, and this combined with the increased nutrient levels and the presence of weed seed in rabbit droppings is introducing weeds into the habitat. Baiting or trapping will be undertaken in and around the habitat of *Brachyscias verecundus* as required.

Action: Control rabbits

Responsibility: CALM (Blackwood District) through the SWRTFCRT
Cost: $800 per year

15. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Brachyscias verecundus* will provide a better scientific basis for management of the wild population. An understanding of the following is particularly 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 taxon, and the requirements of pollinators.
3. The reproductive strategies, phenology and seasonal growth of the taxon.
4. The population genetic structure, levels of genetic diversity and minimum viable population size.
5. The impact of salinity on *Brachyscias verecundus* and its habitat.
6. Investigation of the impacts of dieback disease and control techniques on *Brachyscias verecundus* and its habitat.

Action: Obtain biological and ecological information
Responsibility: CALM (Science Division, Blackwood District) through the SWRTFCRT
Cost: $21,000 per year for the first three years

16. Review the need for a full Recovery Plan

At the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for further recovery will be assessed.

Action: Review the need for a full Recovery Plan
Responsibility: CALM (WATSCU, Blackwood District) through the SWRTFCRT
Cost: $23,700 in the fifth year (if required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from July 2004 to June 2009 but will remain in force until withdrawn or replaced. After five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

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6. TAXONOMIC DESCRIPTION

Hart, J.M. and Henwood, M.J. (1999) *Brachyscias* (Apiaceae): a New Genus from South-west Western Australia. *Australian Systematic Botany* 12, 175-179.

Brachyscias verecundus J.M. Hart & M.J. Henwood is an annual or ephemeral herb, 12-22 mm high, entirely glabrous. Leaves basal, ternately divided, the lateral segments sometimes again divided. Petiole sheathing only shortly at the base, flattened, 5-10 mm long. Leaflets linear, 5-14 mm long, segments c. 1 mm wide, margins entire, apex acute.

Inflorescence a compound umbel with three rays each with 3-6 bisexual and/or male flowers and up to three flowers between the rays. Rays flattened, 1.5-2.5 mm long. Involucral bracts three, linear, longer than the rays, 6-8 mm long, 1 mm wide, apex acute. Bracteoles two or three, ovate, 304 mm long, c. 1.5 mm wide, apex acute, the lateral ones asymmetrical. Inflorescences sessile or pedunculate to 2 mm long.

Flowers pedicellate, minute, mostly male. Sepals absent. Petals five, free, ovate, c. 0.7 mm long, c. 0.5 mm wide, white or cream, inflexed. Stamens five, anthers black. Nectaries flat, adnate to the styles. Ovary bicarpellate, laterally flattened. Male flowers differ from the bisexual flowers in having an undeveloped, inconspicuous ovary.

Fruit (possibly immature) pale yellow, with undulate-striate surface, broadly ovate, c. 0.55 mm long, c. 0.9 mm wide. The scarcity of material prevented anatomical investigation of the species.

SUMMARY OF RECOVERY ACTIONS AND COSTS

Recovery Action	Year 1			Year 2			Year 3			Year 4			Year 5		
	CALM	Other	Ext.	CALM	Other	Ext.	CALM	Other	Ext.	CALM	Other	Ext.	CALM	Other	Ext.
Coordinate recovery actions	1400	300	400	1400	300	400	1400	300	400	1400	300	400	1400	300	400
Map critical habitat	500		1500												
Stimulate the germination of soil-stored seed	500		1900	500		1900	500		1900						
Collect seed	1400		1600	1400		1600	1400		1600	1400		1600			
Install DRF markers	200		200												
Conduct further surveys	1200	500	900	1200	500	900	1200	500	900	1200	500	900	1200	500	900
Seek improved security for the population	350			350			350			350			350		
Maintain disease hygiene	200		200	200		200	200		200	200		200	200		200
Develop and implement a fire management strategy	1400		1100	200		800	200		800	200		800	200		800
Undertake weed control	700		400	700		400	700		400	700		400	700		400
Monitor the population	500		500	500		500	500		500	500		500	500		500
Liaise with land managers	350			350			350			350			350		
Promote awareness	600		800	600			600			600			600		
Control rabbits	300		500	300		500	300		500	300		500	300		500
Obtain biological and ecological information	10800		10200	10800		10200	10800		10200						
Review the need for a full Recovery Plan													15300		8400
Total	20400	800	20200	18500	800	17400	18500	800	17400	7200	800	5300	21100	800	12100
Yearly Total		**41,400**			**36,700**			**36,700**			**13,300**			**34,000**	

NHT = External funding (funding to be sought), Other = funds contributed by NHT, in-kind contribution and BGPA.

Total CALM:	$85,700
Total Other:	$4,000
Total External Funding:	$72,400
TOTAL COSTS:	**$162,100**