

Rare Grevillea

(*Grevillea rara*)

RECOVERY PLAN



Department of Environment and Conservation
Kensington



Australian Government



Department of
Environment and Conservation

Our environment, our future



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. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or threatened ecological communities, and begin the recovery process.

DEC is committed to ensuring that threatened taxa and threatened ecological communities are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) taxa and communities, always within one year of endorsement of that rank by the Minister.

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked CR, this IRP will be reviewed after five years and the need for further recovery actions assessed.

This IRP was approved by the Director of Nature Conservation on 30 April 2008. The allocation of staff time and provision of funds identified in this IRP is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate as at April 2008.

This IRP was prepared with financial support from the Australian Government to be adopted as a National Recovery Plan under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

IRP PREPARATION

This IRP was prepared by Rachel Meissner¹, Tom Kenneally², Val English³ and Kym Pryor⁴

¹ Former Project Officer, Species and Communities Branch, DEC, Locked Bag 104, Bentley Delivery Centre, WA 6983

² Sustainable Forest Management Co-ordinator, Wellington District, , PO Box 809, Collie, WA, 6225.

³ Acting Principle Ecologist, Species and Communities Branch, DEC, Locked Bag 104, Bentley Delivery Centre, WA 6983

⁴ Project Officer, Species and Communities Branch, DEC, Locked Bag 104, Bentley Delivery Centre, WA 6983

ACKNOWLEDGMENTS

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

Andrew Brown	Threatened Flora Coordinator, Species and Communities Branch, DEC
Anne Cochrane	Manager, Threatened Flora Seed Centre, DEC
Wink Lindsay	Assistant Conservation Officer Flora, Wellington District, DEC
John Riley	Administrative Officer, Species and Communities Branch, DEC
Amanda Shade	Assistant Curator, Nursery, Botanic Garden and Parks Authority

We would like to thank the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and DEC's Wildlife Branch for their extensive assistance.

Cover photograph by Diana Papenfus

CITATION

This Recovery Plan should be cited as:

Department of Environment and Conservation. (2009). Rare Grevillea (*Grevillea rara*) Recovery Plan.
Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	<i>Grevillea rara</i>	Common Name:	Rare <i>Grevillea</i>
Family:	Proteaceae	Flowering Period:	August - November
DEC Region:	Southwest	DEC District:	Wellington
Shire:	Collie	Recovery Team:	Southwest Region Threatened Flora and Communities Recovery Team (SWRTFCRT)

Illustrations and/or further information: Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*, Department of Environment and Conservation, Western Australia; Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Western Australian Herbarium (2007). *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. Accessed 2007. <http://www.florabase.calm.wa.gov.au>; Olde, P.M. and Marriott, N.R. (1993) New species and taxonomic changes in *Grevillea* (Proteaceae: Grevilleoideae) from south-west Western Australia. In *Nuytsia*, Vol 9 (2); 244-246; Wilson, *et al.* (2000) *Flora of Australia: Proteaceae 2, Grevillea*. Volume 17A.

Current status: *Grevillea rara* was declared as Rare Flora under the *Western Australian Wildlife Conservation Act 1950* in July 1998 and ranked as Endangered (EN) in September 1999 under World Conservation Union (IUCN 1994) Red List criteria A2c; B1+2d due to a suspected population size reduction of >50% over the last three generations following the damming of the Harris River and its naturally limited geographic range. The main threats are road and firebreak maintenance, weeds and inappropriate fire regimes. The species is listed as Endangered under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Currently, 6 populations and 1515 plants are known.

Description: Growing to a height and width of around 2m, *Grevillea rara* is a sprawling plant, with branches covered in soft hairs, dense foliage, leaves up to 2.5cm long, and white to pale pink floral inflorescences, which appear around October (Brown *et al.* 1998).

The species differs from its nearest relative, *Grevillea curviloba*, in the fine hairs which grow on branchlets and inflorescence stems, narrow leaf lobes, shorter pedicels, and unusual nectary (Olde and Marriot 1993).

Habitat requirements: *Grevillea rara* is currently known from a range of around 4 km in an area north of Collie, with a total of around 1,400 plants in 6 populations. It grows in Jarrah forest in lateritic clay/ loam soils along creek lines. The dominant species are *Eucalyptus marginata* and *Corymbia calophylla*, and associated species include *Banksia grandis*, *Hakea lasiantha*, *Xanthorrhoea preissii*, *Acacia pulchella*, and *A. drummondii*.

Habitat critical to the survival of the species, and important populations: Given that *Grevillea rara* is ranked as Endangered, it is considered that all known habitat for wild and translocated populations (i.e. Jarrah forest in lateritic clay/loam soils along creek lines) is critical to the survival of the subspecies, and that all wild populations are important populations.

Benefits to other species/ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Grevillea rara* will also improve the status of remnant vegetation in which it is located. The species is not known to occur in association with any other Threatened or Priority species or ecological communities.

International obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity that was ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that convention. *Grevillea involucrata* is not listed under any specific international treaty however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Indigenous Consultation: Involvement of the Indigenous community is being sought through the Chairperson and members of the Ngalang Boodja council, the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Grevillea rara*, or groups with a cultural connection to land that is important for the species' conservation and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are four registered artefacts sites in the vicinity of the Harris River Dam Populations (Populations 1-4).

Implementation of recovery actions under this plan includes consideration of the role and interests of indigenous communities in the region. Where no role is identified for the indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impact: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as no populations thus far have been identified on private property.

Affected Interests: Populations of *Grevillea rara* occur on lands managed by the Collie Shire (Road Reserve), Water Corporation (Harris River Dam Wall) and Department of Environment and Conservation (State Forest).

Evaluation of the Plan's Performance: The Department of Environment and Conservation (DEC), in conjunction with the Southwest Region Threatened Flora and Communities Recovery Team (SWRTFCRT) will evaluate the performance of this IRP. In addition to annual reporting on progress of listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Completed recovery actions

1. Land managers and adjacent landowners have been made aware of the location and threatened status of the species.
2. Declared Rare Flora (DRF) markers have been erected for all road reserve populations (2 and 3).
3. 765 seeds, collected in 1996, are in storage at the DEC's TFSC, with germination rates of 96 and 95% at 0 and 7 years respectively.
4. The BGPA currently has 5 live specimens in their gardens.
5. In 1997, extensive surveys of populations and surrounding habitats were undertaken by DEC and Herbarium staff over the course of the year.

Ongoing and future recovery actions

1. The Southwest Region Threatened Flora and Communities Recovery Team (SWRTFCRT) are overseeing the implementation of this IRP and will include information on progress in annual reports to DEC's Corporate Executive and funding bodies.

IRP Objective: The objective of this IRP 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 over the five year term of this IRP.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the five year term of this IRP.

Recovery actions

- | | |
|--------------------------------------|---|
| 1. Coordinate Recovery Actions | 6. Liaise with land managers |
| 2. Map habitat critical to survival | 7. Promote awareness |
| 3. Collect seed and cutting material | 8. Obtain biological and ecological information |
| 4. Monitor populations | 9. Develop and implement a fire management strategy |
| 5. Conduct further surveys | 10. Review IRP |

1. BACKGROUND

History

The species was first collected north of Collie in 1988 from two locations, which have since been flooded as part of the construction of Harris Dam. In 1994, the species was rediscovered growing on the Harris Dam wall, adjacent to the car park. Since rediscovery, five additional populations have been located in State Forest surrounding the Harris Dam. It was named in reference to the conservation status of the species.

Currently, 6 populations and 1515 plants are known.

Description

When young, *Grevillea rara* is prostrate and sprawling plant, which grows to a height and width of about 2m. Branches are usually circular in cross-section, covered in soft white hairs, and with dense foliage. Adult leaves are erect and irregular, 2-2.5cm long, and have lobes with weakly pointed tips. Inflorescences 1-2cm by 1-1.5cm, are generally crowded in the upper part of the leaf axils, although they scarcely extend beyond the foliage. *G. rara* flowers in October, and the flowers are white to pale pink (Brown *et al.* 1998).

The closest known genetic relation to *Grevillea rara* is *Grevillea curviloba*, and *G. curviloba* var. *incurva* in particular. The two are distinguishable in that *G. rara* has branchlets and inflorescence stems densely covered with short hairs, narrow leaf lobes (0.3 – 0.8mm wide), and shorter pedicels (3.5 – 5mm long), the lamina under the leaf is not exposed, and in its unusual nectary (Olde and Marriot 1993).

Distribution and habitat

Grevillea rara is currently known from a range of around 4 km in an area north of Collie, with approximately 1,500 plants in six populations (including two subpopulations). It grows in Jarrah forest in lateritic clay / loam soil along creek lines. It is found growing with *Eucalyptus marginata*, *Corymbia calophylla*, *Banksia grandis*, *Hakea lasiantha*, *Xanthorrhoea preissii*, *Acacia pulchella* and *A. drummondii*.

Summary of population land vesting, purpose and tenure:

Pop. No. & Location	DEC District	Vesting	Purpose	Tenure	Manager
1a. Harris River Dam	Wellington	Lands and Forest Commission	State Forest	State Forest	DEC
1b. Harris River Dam	Wellington	Lands and Forest Commission	State Forest	State Forest	DEC
2. Harris River Dam	Wellington	Shire of Collie	Road Reserve	Non-CALM Act Reserve	Shire of Collie
3. Harris River Dam	Wellington	Shire of Collie	Road Reserve	Non-CALM Act Reserve	Shire of Collie
4. Harris River Dam	Wellington	Lands and Forest Commission	State Forest	State Forest	DEC
5. Lake Ballingall	Wellington	Lands and Forest Commission	State Forest	State Forest	DEC
6. Lake Ballingall	Wellington	Lands and Forest Commission	State Forest	State Forest	DEC

NB: Populations 1a and 1b occur within state forest on the Harris River Dam Wall, the Water Corporation is responsible for maintenance of the dam wall.

Biology and ecology

Grevillea rara is believed to be an obligate seeder, based upon the ecology of its nearest relatives (Greg Keighery, personal communication). Adult plants are apparently killed by fire, though no research has been conducted on the taxon's response. Regeneration is therefore largely from seed and time since fire is important, as intervals between fire need to be sufficient to enable regeneration of the seed bank.

Further reports indicate that the taxon is a disturbance opportunist. Populations 1a and 1b, which grow on the wall of Harris Dam, were reportedly transported in topsoil from the reservoir basin prior to inundation. In addition, several populations have been found in disturbed areas, such as road verges.

Preliminary testing by DEC's Science Division on 16 *Grevillea rara* seedlings indicates that the taxon is susceptible to dieback disease (*Phytophthora* sp.).

Threats

The main threats are road and firebreak maintenance, weeds and inappropriate fire regimes.

- **Road, dam wall and firebreak maintenance** threatens populations growing on the Harris River dam wall and all road reserve populations. Potentially harmful activities include grading, construction of drainage channels and the slashing of roadside or dam wall vegetation. Several of these actions also encourage weed invasion. Past activities have destroyed five plants in Population 3 by grading, and several plants have been slashed during dam maintenance. Liaison with land managers will continue to ensure the species is protected. See action 6.
- **Weed invasion** is a minor threat to all 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 easy ignition of high fuel loads that are produced annually by many grass weed species. Recovery actions to address weeds will be introduced if the threat becomes more severe.
- **Inappropriate fire regimes** may affect the viability of populations. It is not known how the species responds to fire; however an overly frequent fire regime is likely to seriously damage the population by killing plants before they reach maturity and produce seed to start a new generation or recruitment. An approved burn in state forest by the DEC to reduce fuel load and protect adjacent properties, was conducted in spring 2004. Fifteen plants at population 1b and up to 20 plants at population 3 were burnt. While a visual post-burn survey was conducted, indicating that *Grevillea rara* plants were resprouting, a Rare Flora Report Form (RFRF) was not completed, resulting in the species response to fire to remaining largely unknown (Tom Kenneally 2007 pers. comm.).

Summary of population information and threats

Pop. No. & Location	Land status	Year/No. plants	Current Condition	Threats
1a. Harris River Dam	State Forest	1996 50 2000 50 2002 67* 2008 50	Healthy	Weed invasion (minor)
1b. Harris River Dam	State Forest	1996 120 1997 100 2001 100 2002 67* 2008 100	Healthy	Weed invasion (minor)
2. Harris River Dam	Road Reserve	1996 250 1997 100 2000 260 2002 100+ 2004 260 2008 260	Healthy	Road, rail and firebreak maintenance
3. Harris River Dam	Road Reserve	1996 20 2000 17 2001 5 2002 4 2008 5	Healthy	Road, rail and firebreak maintenance
5. Lake Ballingall	State Forest	1996 1000+ 2001 1000 2008 1000	Disturbed	Inappropriate fire regimes, weed invasion (minor)
6. Lake Ballingall	State Forest	2001 200 2008 200	Healthy	Threats unknown

* = total for all subpopulations combined.

Guide for decision-makers

The above table provides details of current and possible future threats. Proposed actions in the immediate vicinity of populations of *Grevillea rara* require assessment for the potential for a significant level of impact.

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

Habitat critical to the survival of the species includes the area of occupancy of important populations; areas of similar habitat surrounding important populations (i.e. Jarrah forest in lateritic clay/loam soils along creek lines), as these areas provide potential habitat for allowing pollinators or biota essential to the continued existence of the species to move between populations; additional occurrences of similar habitat that may contain important populations of the species or be suitable sites for future translocations; and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Given that this species is listed as Endangered it is considered that all known habitat for wild and translocated populations is habitat critical for its survival. Population 5 is considered the most important population, even though the area is disturbed slightly, due to the size of the population.

Benefits to other species/ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Grevillea rara* will also improve the general condition of remnant vegetation in which populations are located. The species is not known to occur in association with any other Threatened or Priority species or ecological communities.

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. *Grevillea rara* is not specifically listed under any international treaty, however, and this plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation

Involvement of the Indigenous community is being sought through the Chairperson and members of the Ngalang Boodja Council, the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Grevillea rara*, or groups with a cultural connection to land that is important for the species' conservation and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are four registered artefacts sites in the vicinity of the Harris River Dam Populations (Populations 1-4). Implementation of recovery actions under this plan includes consideration of the role and interests of indigenous communities in the region. Where no role is identified for the indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impacts

Populations 1a and 1b occur on the wall of Harris Dam and parts of the populations have previously been slashed for dam safety. However, the implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as no populations thus far have been identified on private property.

Affected Interests

Populations of *Grevillea rara* occur on land managed by the Water Corporation (Pop. 1a & 1b), the Department of Environment and Conservation (Pop 4, 5 & 6) and the Shire of Collie (Pop 2 & 3).

Evaluation of the Plans Performance

The Department of Environment and Conservation, in conjunction with the South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT) will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objective

The objective of this IRP is to abate identified threats and maintain or enhance viable *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 over the five year term of this IRP.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the five year term of this IRP.

3. RECOVERY ACTIONS

Completed recovery actions

Relevant land managers and adjacent landowners have been formally notified of the location and threatened status of the species. Notification details the Declared Threatened status of the taxon and legal responsibilities to protect it.

Declared Rare Flora (DRF) markers have been erected for both road reserve populations. Population 2 occurs on Harris River Dam road, and population 3 occurs on the Collie-Tallanalla road.

DEC's Threatened Flora Seed Centre (TFSC) has 765 *Grevillea rara* seeds, collected on 20th December 1996 and stored at -18°C. Germination rates hardly varied with storage time from the initial rates (96%) to the rates of the germination trial in 2004, after seven years in storage (95%), although a presumed outlying trial was conducted a year after the first in which the germination rate was as low as 76%. Germinants produced were then sent to the Botanical Garden and Parks Authority (BGPA) as live specimens.

BGPA currently has 5 live specimens in their gardens, ranging in age from 2 – 10 years of age (1 ~10yrs, 3 ~3yrs, 1 ~2yr). All came as germinants from DEC's TFSC, and were propagated from seed collected along the Harris River road.

There have been extensive surveys in the vicinity of current populations. In 1997, 26 hours was spent over several days surveying watercourse areas within a radius of 20 km south of Collie by Diana Papenfus and two DEC District staff. There were also opportunistic surveys conducted in the area. Staff from the WA Herbarium conducted a three day flora survey of areas in the Collie Basin in October 1997.

Ongoing and future recovery actions

The Southwest Region Threatened Flora and Communities Recovery Team (SWRTFCRT) are overseeing the implementation of this IRP and will include information on progress in annual reports to DEC's Corporate Executive and funding bodies.

Where recovery actions are implemented on lands other than those managed by DEC, permission has been or will be sought from the appropriate land managers prior to actions being undertaken. The following recovery actions are roughly in order of descending priority, influenced by their timing over the term of the plan. However this should not constrain addressing any recovery action if funding is available and other opportunities arise.

1. Coordinate recovery actions

The Southwest Region Threatened Flora and Communities Recovery Team (SWRTFCRT) will coordinate recovery actions for *Grevillea rara* and includes information on progress in annual reports to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions.
Responsibility: DEC (Wellington District) through the SWRTFCRT.
Cost: \$1,500 per year.

2. Map habitat critical to survival

Although habitat critical to survival is described in Section 1, an improved and more targeted description of habitat characteristics needs to be developed. With this completed the spatial extent of habitat critical to survival for this species can be captured and mapped. If additional populations are located, then habitat will be determined and mapped for them also.

Action: Map total habitat
Responsibility: DEC (Wellington District) through the SWRTFCRT
Cost: \$1,800 in the first year

3. Collect seed and cutting material

Although seed has been collected in the past, further collection is highly desirable. Collecting seed from all populations and from a range of plants will ensure an adequate representation of genetic diversity. Further collections of cutting material are also desirable, and should be used for propagation of live specimens at the Botanical Gardens and Parks Authority (BGPA). It is also important that the size and viability of the soil seed bank is determined and further research is undertaken to develop techniques for stimulating germination of soil-stored seed. The *Germplasm Conservation Guidelines for Australia* produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process (Offord & Meagher 2009).

Action: Collect seed and cutting material.
Responsibility: DEC (Wellington District, TFSC) and BGPA through the SWRTFCRT.
Cost: \$2,900 Year 2 and 4

4. Monitor populations

Populations are monitored on an annual basis by district conservation staff. This effort should be maintained during for the life of this plan. Monitoring of factors such as habitat degradation, salinity, wind damage, population stability (expansion or decline), weed invasion, pollinator activity, seed production, recruitment, longevity and predation is essential. Surveys should be conducted every 2 years.

Action: Monitor populations.
Responsibility: DEC (Wellington District) through the SWRTFCRT.
Cost: \$1200 Year 1, 3 and 5.

5. Conduct further surveys

All *Grevillea rara* populations were last surveyed between August 2000 and September 2001. As the most comprehensive surveys of habitat surrounding the populations were undertaken almost 10 years ago, and the

most recent 7 years ago, additional surveys should now be conducted by DEC staff and community volunteers during the flowering period of the species (August - November). Surveys should utilise critical habitat identified in Action 2.

Action: Conduct further surveys.
Responsibility: DEC (Wellington District), volunteers through the SWRTFCRT.
Cost: \$1,200 Years 1, 3 and 5.

6. Liaise with land managers

Staff from DEC's Wellington District will continue liaising with the land managers and landowners to ensure that populations are not accidentally damaged or destroyed. Input and involvement will also be sought from Aboriginal groups that have an active interest in areas that are habitat for *Grevillea rara*.

Action: Liaise with land managers
Responsibility: DEC (Wellington District) through the SWRTFCRT
Cost: \$600 per year.

7. 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 the local print and electronic media, and poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet, which includes a description of the plant, its habitat, threats, recovery actions and photos will be produced.

A reply-paid postal drop illustrating *Grevillea rara* and describing its distinctive features and habitat will be produced by the Species and Communities Branch (SCB) and distributed by DEC's Wellington District office to local farmers and other residents in Shires containing possible habitat of the species. Postal drops aim to provide information about threatened species and a contact name and number if new populations are found.

Action: Promote awareness
Responsibility: DEC (Wellington District, WA Species and Communities Branch and Corporate Relations) through the SWRTFCRT
Cost: \$2,600 in first year and \$600 in subsequent years.

8. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Grevillea rara* will provide a better scientific basis for its management in the wild and will include:

1. Studying the soil seed bank dynamics and the role of various disturbance (such as fire), competition, rainfall and grazing in recruitment and seedling survival.
2. Investigating the pollination biology of the species.
3. Determining the reproductive methodology, phenology and seasonal growth of the species.
4. Investigating the population genetic structure, levels of genetic diversity and minimum viable population size.
5. Studying the impact of increased water levels due to the Harris River Dam on *Grevillea rara* and its habitat.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Wellington District) through the SWRTFCRT
Cost: \$12,000 years 2,3 and 4

9. Develop and implement a fire management strategy

It is thought that fire kills adult plants of the species and regeneration is largely from seed. However, frequent fire may prevent the accumulation of sufficient soil-stored seed for recruitment to occur. Fire should therefore

be prevented from occurring in the area of populations, except where it is being used as a recovery tool. A fire management strategy will be developed to determine fire control measures and fire frequency.

Action: Develop and implement a fire management strategy.
Responsibility: DEC (Wellington District) through the SWRTFCRT.
Cost: \$2,000 in first year and \$1,300 in subsequent years.

10. Review this IRP

The status of *Grevillea rara* will be analysed at the end of the five-year term of this IRP, and the need for further recovery or a revision of this IRP will be assessed with a plan prepared if necessary.

Action: Review this IRP
Responsibility: DEC (WA Species & Communities Branch, Wellington District) through the SWRTFCRT
Cost: \$1,500 in the fifth year.

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate Recovery Actions	High	DEC (Wellington District) through the SWRTFCRT	Ongoing
Map total habitat	High	DEC (Wellington District) through the SWRTFCRT	Ongoing
Collect Seed and cutting material	High	DEC (Wellington District, TFSC) and BGPA through the SWRTFCRT	Ongoing
Monitor populations	High	DEC (Wellington District) through the SWRTFCRT	Ongoing
Conduct further surveys	High	DEC (Wellington District) through the SWRTFCRT	Ongoing
Liaise with land managers	High	DEC (Wellington District) through the SWRTFCRT	Ongoing
Promote awareness	High	DEC (Wellington District, Species and Communities Branch and Corporate Relations) through the SWRTFCRT	Ongoing
Obtain biological and ecological information	High	DEC (Science Division, Wellington District) through the SWRTFCRT	Ongoing
Develop and implement a fire management strategy	High	DEC (Wellington District) through the SWRTFCRT	Developed by 2009 with implementation ongoing
Review this IRP	Moderate	DEC (Species & Communities Branch, Wellington District) through the SWRTFCRT	2013

4. TERM OF PLAN

Western Australia

This Interim Recovery Plan will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If the species is still ranked as Endangered after five years, the need to review this IRP will be determined.

Commonwealth

In accordance with the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* this adopted recovery plan will remain in force until revoked.

The recovery plan must be reviewed at intervals of not longer than 5 years.

REFERENCES

- Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Western Australia.
- Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1994) Policy Statement No. 50 Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1992) Policy Statement No. 44 Wildlife Management Programs. 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. In *Nuytsia*, Vol 9 (2); 244-246.
- Offord, C.A. and Meagher, P.F. 2009. Plant germplasm conservation in Australia: strategies and guidelines for developing, managing an utilizing ex situ collections. Australian Network for Plant Conservation Inc., Canberra
- Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. Accessed 2007.
<http://www.florabase.calm.wa.gov.au>
- Wilson, A., Orchard, A., Thompson, H. and McCarthy, P. (Eds.) (2000) *Flora of Australia: Proteaceae 2, Grevillea*. Volume 17A, CSIRO Publishing, Collingwood, Australia.
- World Conservation Union (2001) *IUCN red list categories prepared by the IUCN Species Survival Commission*, as approved by the 51st meeting of the IUCN Council. Gland, Switzerland.

5. TAXONOMIC DESCRIPTION

Olde, P.M. and Marriott, N.R. (1993) New species and taxonomic changes in *Grevillea* (Proteaceae: Grevilleoideae) from south-west Western Australia. In *Nuytsia*, Vol 9 (2); 244-246.

Juveniles: prostrate sprawling densely foliated shrubs with young leaves sericeous. Adults: dense, prickly, irregular shrubs to 2 m high, 1 m wide; branches irregularly spreading, dense to the ground; brachlets angular to smoothly rounded, densely tomentose-pubescent. Leaves 1.5-2.5 cm long, 1.5 cm wide, ascending to erect, sessile to shortly petiolate, crowded, secund-subpinnatisect, sometimes the apical lobe divaricate; leaf rachis medially and longitudinally channelled, straight to slightly incurved along its axis or very often slightly refracted or recurved at the junction of the nodes, the axis between the nodes slightly incurved; primary leaf lobes 3-5, ascending, sometimes with secondary bi- or tripartite division, the apical lobe simple; ultimate lobes 0.4-2 cm long, 0.3-0.8 mm wide, narrow-linear, straight to very slightly incurved, apex scarcely pungent, the basal lobes 5-7 mm from the axis of attachment and with a narrow, tightly revolute margin abutting the rachis on wither side; upper surface smooth, glabrous, the venation obscure; lower surface bisulcate, the lamina enclosed by the margin, the grooves glabrous, the midvein rounded, level with or raised slightly above the abutting margin; margin smoothly revolute. Conflorescence 1-2 cm long, 1-1.5 cm wide, sessile to shortly pendunculate, terminal or axillary and crowded in the upper axils, simple, shortly cylindrical to subglobose, dense, scarcely to not exceeding the foliage, development acropetal; floral rachis 1-1.5 cm long, tomentose; floral bracts 1.2 mm long, 1.2-1.8 mm wide, imbricate, broadly ovate-cupuliform to almost square, tomentose or sparsely so outside with ciliate margins, caducous. Flowers glabrous; pedicel 3.5-5 mm long; torus 0.5 mm across, oblique at c. 10-30°; nectary obscure, extending 0.1 mm above the toral rim; perianth white to pale pink. All white at anthesis, 3-3.5 mm long, 0.8 mm wide, actinomorphic, narrowly oblong-obovoid, slightly constricted below the much broader limb; tepals medially ribbed, separating below the lob before anthesis, becoming free to the base and rolling independently back after; limb 1 mm long, 1.3-1.5 mm wide, spheroidal, apically depressed, the segments ribbed, firmly enclosing the style-end before anthesis; pistil 3.5 mm long; stipe 1.5 mm long, flexuous, inserted on the dorsal rim of the torus; ovary 0.8 mm long, subglobose; style white with occasional pink tinges on the pollen-presenter, constricted for 0.2-0.5 mm above the ovary, then dilating 0.3-0.5 mm wide, the dilation ovoid to almost cylindrical, tapered to 0.3 mm wide just below the style-end; pollen-presenter 0.5-0.7 mm long, erect, truncate-conic to subcylindrical, the base 0.5 mm wide, slightly oblique and scarcely broader than the style; stigma 0.3 mm wide. Fruits oblong-ellipsoid, rugose on young fertilised ovaries.

SUMMARY OF RECOVERY ACTIONS AND COSTS

Recovery Actions	Year 1			Year 2			Year 3			Year 4			Year 5		
	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.	DEC	Other	Ext.
1. Coordinate Recovery Actions	1,000	0	500	1,000	0	500	1,000	0	500	1,000	0	500	1,000	0	500
2. Map habitat critical to survival	1,300	0	500	0	0	0	0	0	0	0	0	0	0	0	0
3. Collect seed and cutting material	0	0	0	1,300	0	1,600	0	0	0	1,300	0	1,600	0	0	0
4. Monitor populations	1,000	0	200	0	0	0	1,000	0	200	0	0	0	1,000	0	200
5. Conduct further surveys	1,000	0	200	0	0	0	1,000	0	200	0	0	0	1,000	0	200
6. Liaise with land managers	500	0	100	500	0	100	500	0	100	500	0	100	500	0	100
7. Promote awareness	1,000	0	1,600	600	0	0	600	0	0	600	0	0	600	0	0
8. Obtain biological and ecological information	0	0	0	5,000	0	7,000	5,000	0	7,000	5,000	0	7,000	0	0	0
9. Develop and implement a fire management strategy	1,500	200	300	800	200	300	800	200	300	800	200	300	800	200	300
10. Review IRP	0	0	0	0	0	0	0	0	0	0	0	0	900	600	0
Total	7,300	200	3,400	9,200	200	9,500	9,900	200	8,300	9,200	200	9,500	5,800	800	1,300
Yearly Total	10,900			18,900			18,400			18,900			7,900		

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

Total DEC:	\$41,400
Total Other:	\$1,600
Total Ext.:	\$32,000
Total costs:	\$75,000