Wyalkatchem Foxglove

(*Pityrodia scabra*)

RECOVERY PLAN

Department of Environment and Conservation
Species and Communities Branch (SCB)
Kensington

Australian Government

Government of Western Australia

Department of Environment and Conservation

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 ecological communities, and begin the recovery process.

DEC is committed to ensuring that Threatened taxa 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, always within one year of endorsement of that rank by the Minister.

This IRP replaces the draft IRP for Wyalkatchem Foxglove (*Pityrodia scabra*) prepared by Ken Atkins in 1992.

This IRP will operate from February 2008 to January 2013 but will remain in force until withdrawn or replaced.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

This IRP was given regional approval 17 January 2008 and was approved by the Director of Nature Conservation on 6 February 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 at February 2008.

IRP PREPARATION

This Interim Recovery Plan was prepared by Mia Podesta (nee Morley)[1], Andrew Brown[2] and Ken Atkins[3]

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ACKNOWLEDGMENTS

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

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Mike Hislop	Contract Consultant,Science Division, DEC
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David Jolliffe	District Nature Conservation Officer, Merredin District, DEC

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

Cover photograph by Andrew Brown

CITATION

This Recovery Plan should be cited as:

Department of Environment and Conservation (2009). Wyalkatchem Foxglove (*Pityrodia scabra*) Recovery Plan, Department of Environment and Conservation, Perth, Western Australia.

SUMMARY

Scientific Name:	*Pityrodia scabra*	**Common Name:**	Wyalkatchem Foxglove
Family:	Lamiaceae	**Flowering Period:**	October to November
DEC Region:	Wheatbelt	**DEC District:**	Avon-Mortlock District
Shire:	Wyalkatchem	**Recovery Team:**	Avon-Mortlock District Threatened Flora and Communities Recovery Team (AMDTFCRT)

Illustrations and/or further information*:* Atkins, K. (1992) Draft *Interim Recovery Plan for the Wyalkatchem Foxglove* (*Pityrodia scabra*); Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora.* Department of Conservation and Land Management, Perth, Western Australia; George, A.S. (1967) Journal Royal Society of Western Australia. 50 (4), 103; Elliot & Jones (1997) Encyclopaedia of Australian Plants (7, 352). Munir, A.A (1979) Journal Adelaide Botanical Gardens 2(1), 39; 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: *Pityrodia scabra* was declared as Rare Flora in June 1990 under the Western Australian *Wildlife Conservation Act 1950* and was ranked as Vulnerable (VU) in March 1999 under World Conservation Union (IUCN 1994) Red List criterion C2a. However, following a recent reassessment it now meets Critically Endangered (CR) under IUCN 2001 criteria B1ab(ii,iii,v)+2ab(ii,iii,v); C1; D. The species is listed as Endangered (EN) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats are weed invasion, rail/road maintenance activities, rabbits, inappropriate fire regimes, hydrological change including salinisation, movement of stock on Road Reserve, adverse environmental conditions, (potentially) absence of pollination vectors or seed germination stimuli, habitat loss and lack of disturbance to induce recruitment.

Description: *Pityrodia scabra* is a shrub to 1 m tall that is covered with sticky, branched hairs. Its linear leaves, 5 to 12 mm long, are in whorls of three. They lack stalks and are blunt at the apex, with inrolled margins. The margins have numerous small rounded teeth, and are covered with dense, coarse, short hairs, becoming rough above. Inflorescences are held in the leaf axils. Flowers are white with two upper lobes and three lower lobes (Brown *et al*. 1998). Additional details are available in the taxonomic description provided in Section 6.

Habitat requirements: *Pityrodia scabra* grows in areas of native vegetation comprising *Acacia acuminata, Allocasuarina acutivalvis, Acacia beauverdiana, Melaleuca uncinata* and *Verticordia mitchelliana* on a flat, lateritic substrate with brown to white loamy/sandy soils.

Habitat critical to the survival of the species, and important populations: The habitat critical to the survival of *Pityrodia scabra* comprises the area of occupancy of known populations; remnant vegetation that links populations and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so in the past and may be suitable for translocations. Given that this species is listed as Endangered (EPBC Act) it is considered that all known habitat for wild and translocated populations is habitat critical to their survival and that all populations, including translocated populations, are important.

Benefits to other species/ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Pityrodia scabra* will also improve the status of remnant vegetation in which it is located. The species is not located within a Threatened Ecological Community (TEC).

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

Role and interests of indigenous people: Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council (SWALSC) and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Pityrodia scabra,* or indigenous groups with a cultural connection to land that is important for the species' conservation and to determine whether there are issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are no sites of Aboriginal significance at or near the population of the species covered by this IRP. Where no role is identified in the development of the recovery plan for the indigenous community associated with *Pityrodia scabra*, 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: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as both known remaining active populations are located on private property, their protection may potentially affect farming activities. Actions will involve continued liaison and cooperation with all stakeholders with regards to these areas.

Affected interests: Stakeholders potentially affected by the implementation of this plan include the Shire of Wyalkatchem, Department of Environment and Conservation, Conservation Commission of WA, Westnet Rail and the owners of three private property locations.

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

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 species. A formal letter has been sent to the owners of the land on which populations 1B and 14 occur. No formal letter of notification has been sent to the landowners on which the translocated population 1T occurs, however, they were previously notified of the occurrence of population 1B at this site.
2. Declared Rare Flora (DRF) markers have been installed at subpopulations 1A and 1C.
3. Populations on private land have been fenced and subpopulation 1C has also been fenced. Individual plants at population 4T have had rabbit proof fencing erected and the land in which they occur is also fenced. Fencing material has been delivered to the owner of the property on which population 14 occurs. DEC will need to follow this up to see if the fence has been erected.
4. Rabbit proof netting was removed from a number of plants at Cowcowing as it was inhibiting plant growth.
5. Populations are regularly monitored.
6. Liaison is continuing with private landholders.
7. Collections of seed made in 1995 are placed in cryostorage. 119 seedlings, consisting of seven clones from three plants, were translocated to two areas. Seed has been produced by cross pollinating flowers by hand, with almost 100% viability.
8. The Botanic Gardens and Parks Authority (BGPA) currently have 6 plants in their nursery and have seedling cultures *in vitro*.
9. The AMDTFCRT is overseeing the implementation of this IRP and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.
10. Surveys have been carried out in surrounding areas.
11. Information sheets have been distributed and resulted in the discovery of population 14.
12. Scarification and smoke treatment has been carried out at sites within subpopulation 1A where *Pityrodia scabra* was previously known to occur.
13. Hand weeding has been conducted around individual plants at population 14.
14. Reserve 22176 has had its purpose amended to Conservation Site for Re-establishing Native Plant Species.

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 has increased by 10 percent or more over the five year term of this plan.
Criteria for failure: The number of individuals within populations and/or the number of populations has decreased by 10 percent or more over the five year term of this plan.

Recovery actions

1. Coordinate recovery actions.
2. Map habitat critical to survival.
3. Liaise with relevant land managers
4. Collect seed and cutting material
5. Develop and implement a third Translocation.
6. Obtain biological and ecological information.
7. Monitor populations.
8. Stimulate the germination of soil-stored seed.
8. Conduct further surveys surrounding population 14.
9. Implement fire management strategy
10. Undertake weed control and follow up with regular monitoring and additional weed control if required
11. Control rabbits
12. Promote awareness and maintain regular contact (including updates) with landowners
13. Purchase land and transfer care, control and management to Conservation Commission
14. Review the need for a full Recovery Plan.

1. BACKGROUND

History

Pityrodia scabra is endemic to Western Australia and is known only from the Cowcowing area in the central Wheatbelt. The species was first collected in 1959 and was formally described in 1967 (George 1967)

In 1987, management action was recommended to protect the single known population of 11 plants on a roadside (Sub pop. 1A) as they were showing signs of stress during the summer months. Six of the plants were growing over an area of 450 m along the side of the Koorda-Wyalkatchem Road and five were in a clump covering about 2 sq. metres in an area that had been excavated for railway ballast. This was an inhospitable habitat that had largely been cleared of vegetation and contained a hard clayey substrate. Both sites were on shire road reserves and roadside markers had been installed.

In 1989 two plants were killed by roadside herbicide spraying, one died from stress in the excavation area and three were not found. Thus only five plants remained – one in good condition on the edge of the road under a mallee and four in the old excavation area.

In 1990, a new plant (Sub pop. 1B) was found in adjoining private property. This was subsequently fenced under a fencing agreement with CALM.

The species was declared as rare flora on 1 June 1990.

By 1991 all the plants in the excavation area had died leaving a total extant population of just two plants, one on the road verge and one in the private bushland.

Following the summer of 1991/92 only the plant growing in the private bushland area was still alive.

In 1992 a new plant (Sub pop. 1C) was found in the general area of the known population, on the railway reserve. This plant was crushed by a vehicle in 1996.

Given the precarious status of this species in the wild and its short life cycle, it was considered a suitable candidate for priority management action. Cutting material and seed collected in 1990 were propagated at the Botanic Gardens and Parks Authority (BGPA). The cutting material was grafted onto root stock and, when flowering, was cross-pollinated by hand to produce viable seed. The 119 plants produced for translocation were a mix of seedlings and cuttings, of which the seedlings turned out to be more successful after translocation. Two areas were sourced for suitability of translocation, one on private property where sub population 1B occurred (a population enhancement exercise) and the other (Pop. 4T) in a Nature Reserve 14 km away which was found to have similar habitat to known *P. scabra* populations. Planting was carried out into both areas by CALM staff and local volunteers in June 1995.

In 1997, two new populations of what was thought at that time to be *Pityrodia scabra* were located, one along the rabbit proof fence east of Beacon and the other at Widgiemooltha. Subsequent to these findings further surveys were carried out on nearby mining tenements by CALM and mining staff. Several more new populations of what were believed at that time to be *P. scabra* were located, most in areas that had been disturbed by mining operations. Due to these findings *P. scabra* was re-ranked from Critically Endangered (CR) to Vulnerable (VU). However, research conducted in March 2005 showed that plants in these new populations are different morphologically to those in the type locality near Wyalkatchem and represent a new undescribed species. Consequently, the true *P. scabra* now meets criteria for CR status. The Beacon and Widgiemooltha populations have now been given the phrase name *Pityrodia* sp. Yilgarn and placed on the DEC Priority 3 list.

Following the owner receiving postal drop information on the species, a new population (population 14) of four plants was found on private property in 1998. Three of these subsequently died.

Pityrodia scabra was known at August 2005 from just two extant populations - four mature plants at subpopulation 1T (a translocated population) and one at population 14 (natural population). A draft Recovery Plan for this species was prepared in 1992 for the period 1992 to 1995 (Atkins 1992). The preparation of a new plan is warranted due to small population size, continuing threats, and a decline in the number of mature plants.

Description

Pityrodia scabra is a shrub up to 1m tall that is covered with sticky, branched hairs. Its linear leaves, 5 to 12 mm long, are in whorls of three. They lack stalks and are blunt at the apex, with inrolled margins. The margins have numerous small rounded teeth and are covered with dense, coarse, short hairs, becoming rough above. Inflorescences are held in the leaf axils. Flowers are white with two upper lobes and three lower lobes (Brown *et al*. 1998). Additional details are available in the taxonomic description provided in Section 6.

Pityrodia scabra resembles grey foxglove *(Pityrodia hemigenioides*). However, the covering of coarse, sticky hairs gives it a distinct appearance. Further differences are the larger whorled leaf with inrolled margins and the flowers, which are in small cymes.

Pityrodia scabra has also been recently confused with *Pityrodia* sp. Yilgarn. A key to discern *P*. sp. Yilgarn from *P. scabra* is below:

§ Leaves strictly opposite; calyx 4-5mm; longest dendritic hairs on abaxial sepal surface dichotomously branched with long fine divisions terminating in an acute apex, at least 5mm long usually closer to 1mm = *P*. sp. Yilgarn
§ Leaves ternate or displaced ternate; calyx 6-7mm; longest dendritic hairs thick, shortly branched with a glandular or at least obtuse apex, 2-3mm long = *P. scabra*. (M. Hislop[1] personal communication).

Distribution and habitat

Pityrodia scabra has a small distribution range, with historically a population comprising three sub populations occurring in close proximity to the town of Cowcowing, a population closer to the town of Wyalkatchem and two populations North West of Cowcowing. These populations occurred within Nature Reserves, private property, rail reserves and shire road reserve. Currently just two extant populations are known, one natural and one translocated. *Pityrodia scabra* grows in areas of disturbed native vegetation comprising *Acacia acuminata, Allocasuarina acutivalvis, Acacia beauverdiana, Melaleuca uncinata* and *Verticordia mitchelliana* on a flat, lateritic substrate with brown to white loamy/sandy soils.

Summary of population land vesting, purpose and tenure

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Tenure
1a. S of Cowcowing Townsite	Avon-Mortlock	Wyalkatchem	Shire of Wyalkatchem	Road Reserve	
1b. S of Cowcowing Townsite	Avon-Mortlock	Wyalkatchem		Private property	Private property
1c. NE of Wyalkatchem Townsite	Avon-Mortlock	Wyalkatchem	WestNet Rail	Rail Reserve	
1T. S of Cowcowing Townsite [First site for 1995 translocations]			Freehold	Private property	Private property
4T. NW of Cowcowing Townsite [2nd site for 1995 translocations]	Avon-Mortlock	Wyalkatchem	Conservation Commission	Conservation and Site For Re-establishing Native Plant Species	5(g) Reserve
14 NW of Cowcowing Townsite	Avon-Mortlock	Wyalkatchem	Freehold	Private property	Private property

Populations in **bold text** are considered to be Important Populations.

[1] Mike Hislop, DEC Science Division

Biology and ecology

Very little is known about the biology and ecology of *Pityrodia scabra*, however the appearance of seedlings following road and rail works indicates that the germination of seed is likely to be stimulated by disturbance such as fire and light grading. In addition, population monitoring reveals that the number of mature plants decline with time after disturbance.

Flowers were seen to be pollinated by native bees at subpopulation 1B.

Plants from cuttings have been known to live for up to eight years *ex situ.*

No *Phytophthora* species have been found in the Avon-Mortlock District and no special management for the disease has been carried out in relation to this species.

Threats

The main threats are weed invasion, rail and road maintenance activities, rabbits, inappropriate fire regimes, hydrological change including salinisation, movement of stock on Road Reserve, adverse environmental conditions, (potentially) absence of pollination vectors or seed germination stimuli, habitat loss and lack of disturbance to induce recruitment.

- **Low genetic diversity** may result from the low number of plants in the wild population. There are currently just one wild and four translocated plants known and six plants *ex-situ*; this represents an extremely limited gene pool (although there may be additional genetic variation in the soil-stored seed bank). Low genetic diversity may lower the species' ability to adapt to changes in its environment.

- **Lack of suitable disturbance** Following some disturbance events, seedlings appear, mature and then steadily decline. Appropriate disturbance regimes are therefore essential for recruitment and the long-term viability of populations. Information relating to seed viability in the soil would be useful for future management. *Pityrodia scabra* presents management difficulties due to its critically low number of individuals and may require special monitoring to determine its longevity and to maintain appropriate disturbance regimes.

- **Weed invasion** is a threat to all populations. Weeds recorded at population sites include *Tripteris clandestina* (Stinking Roger), *Hypochaeris radicata* (Flatweed), introduced grasses and *Arctotheca calendula* (Capeweed). Competition from introduced grasses and broadleaf weeds significantly reduces regeneration ability of most native plant species. 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. However weed control methods for use near threatened flora populations still requires research. Assessment of selective herbicides and removal by hand should be investigated. The use of non-selective herbicides near populations of DRF or priority flora should be avoided.

- **Rail and road maintenance activities** threaten Subpopulation 1C and 1A. Although these subpopulations are not extant, sites are still being managed for potential regeneration from seed stored in the soil. Most road/rail reserves are only one or two chains (20-40m) wide, which includes the rail line or road itself. These narrow reserves are affected, both directly and indirectly, by the use and nature of adjoining lands (predominantly agriculture). Threats include weed invasion, periodic grazing (road reserves are often used as stock routes), drift of long-life, non-specific herbicides and fertilisers, fence line maintenance and periodic burning. Being access routes, the vegetation on road reserves can also be affected by rubbish dumping, uncontrolled vehicle access and wildflower picking. The majority of road reserves are vested in Local Authorities or the Main Roads Department, and rail reserves in Westnet Rail. DRF can be accidentally damaged during road works, minor and major road/rail upgrading, metal dumps and gravel/sand extraction. Road and rail management authorities all use contract personnel and equipment as well as permanent staff for these operations.

Management and field personnel within road and rail management authorities need to know where populations of DRF occur to avoid accidental destruction of plants. Any maintenance, upgrading or management of utilities close to known populations can potentially damage plants. This will generally be in the form of mechanical damage to plants by machinery and equipment. Liaison with relevant authorities will continue to ensure protection against these threats. See action 3.

- **Rabbits** *Oryctolagus cuniculus* have been observed at the translocated population 4T and were responsible for the deaths of at least 14 translocated seedlings. Rabbits are impacting on the habitat by causing soil disturbance. Increased nutrient levels in the soil from rabbit droppings can also occur, and result in increased weed invasion. Grazing has shown to have an impact on the establishment of young shoots of *Pityrodia scabra* thereby limiting natural regeneration.

- **Inappropriate fire regimes** may affect the viability of populations of *Pityrodia scabra*. Very little research has been conducted on the fire sensitivity and post-fire regeneration strategies of this species. Specifically tailored fire regimes need to be developed by both research and regional staff. As there are only 5 remaining plants in two populations of *P. scabra* some 3 km apart, it is a concern that a wildfire could kill all known extant plants and subsequent frequent fire may kill seedlings before they reach maturity and replenish the soil seed bank. Construction and maintenance of firebreaks should take into account the location of rare flora. District information systems should provide population details once a fire is detected. Appropriate fire suppression can then be implemented.

- **Hydrological change including salinisation** may be impacting on the species. Salinisation can occur as a consequence of evaporation of increased levels of surface water resulting in salt residues on the soil. If not addressed, this threat appears likely to continue in the medium to long term. Salinity is a growing problem in the Wheatbelt where this species occurs. A desktop assessment has revealed that Population 1T is in close proximity (approximately 500 metres) from an area designated as salt affected. Population 14 in turn occurs within 2 km from a salt affected area.

- **Movement of stock on Road Reserve** is a threat to Subpopulation 1A. It is thought that stock movement may occur across the area that contains this subpopulation. Cattle and sheep exacerbate the deterioration of the bushland through the spread of weeds and disease, and the trampling of vegetation.

- **Adverse environmental conditions** such as drought may be a factor in population decline. Some species are likely to suffer as a result of a general continuing decline in rainfall or localised drought conditions. The management options here are somewhat limited, but this is nonetheless an important management consideration.

- **Absence of pollination vectors or seed germination stimuli** may be a factor in population decline although not enough is known about the native bee pollinators of this species to determine if this is a problem.

- **Habitat loss** due to the level of broad scale agricultural clearing that has occurred in the central Wheatbelt, means that there is little natural habitat left for threatened flora such as *Pityrodia scabra*.

Summary of population information and threats

Pop. No. & Location	Year/No. plants	Condition	Threats
1A. Wyalkatchem	1993 0 2005 0	Thought to be represented in seed stock	Weeds, grazing, fire breaks, road works, rabbits, chemical weed control, no recruitment
1B. Wyalkatchem	06/1993 1 11/1993 1 06/1994 1 08/1994 2 1996 0 2005 0 2008 34	Thought to be represented in seed stock	Weeds, introduced grasses, no recruitment
1C. Wyalkatchem	06/1993 (1) 11/1993 (1) 06/1994 (1) 08/1994 (1) 1996 1 2005 0	Thought to be represented in seed stock	Weeds, clearing, vehicles on railway reserve, rabbits, herbicides, no recruitment
1T. Wyalkatchem	06/1995 (50) 11/1995 (50) 11/1995 25 1997 20 2005 4	Moderate	Weeds, Grazing, no recruitment, Occurs in close proximity to a salt affected area
4T. Koorda	06/1995 (69) 07/1995 (69) 08/1995 (55) 11/1995 (21) 2005 0 2008 0	Thought to be represented in seed stock	Cape weed invasion, rabbits, no recruitment
14. Koorda	1998 4 2005 1 2008 1	Poor	Weeds, Grazing, no recruitment. Occurs in close proximity to a salt affected area

Numbers in brackets = number of seedlings.

Guide for decision-makers

The above table provides details of current and possible future threats. Proposed actions in the immediate vicinity of populations or within the defined habitat critical to the survival of *Pityrodia scabra* require assessment for the potential for a significant level of impact.

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

The habitat critical to the survival of *Pityrodia scabra* comprises the area of occupancy of known populations, remnant vegetation that links populations and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so in the past and may be suitable for translocations. Given that this species has been nominated for upgrading to CR it is considered that all known habitat for wild and translocated populations is habitat critical to their survival and that all populations, including translocated populations, are important.

Benefits to other species/ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Pityrodia scabra* will also improve the status of remnant vegetation in which it is located. The species is not located in a Threatened Ecological Community (TEC).

International Obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993 and will assist in implementing Australia's responsibilities under that Convention. *Pityrodia scabra* is not specifically listed under any international treaty and this plan does not therefore affect Australia's obligations under such agreements.

Role and interests of indigenous people

Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council (SWALSC) and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Pityrodia scabra*, or indigenous groups with a cultural connection to land that is important for the species' conservation and to determine whether there are issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are no sites of Aboriginal significance at or near the population of the species covered by this IRP. Where no role is identified in the development of the recovery plan for the indigenous community associated with *Pityrodia scabra*, 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

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. However, as some of populations of *Pityrodia scabra* are located on private property, their protection may potentially affect farming activities. Actions will involve continued liaison and cooperation with all stakeholders with regards to these areas.

Affected interests

Stakeholders potentially affected by the implementation of this plan include the Shire of Wyalkatchem, Department of Environment and Conservation, Conservation Commission, Westnet Rail and the owners of three private property locations.

Evaluation of the Plan's Performance

The Department of Evnironment and Conservation in conjunction with the Avon-Mortlock District Threatened Flora and Communities Recovery Team (MDTFCRT) will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

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.

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 plan.
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 plan.

3. RECOVERY ACTIONS

Existing recovery actions

Land managers have been notified of the location and threatened status of the species. The notification details the Declared Rare status of *Pityrodia scabra* and the legal responsibility to protect it.

Declared Rare Flora (DRF) markers have been installed along the road and rail reserve at Subpopulations 1a and 1c. These serve to alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage plants or their habitat. Dashboard stickers and posters describing the significance of DRF markers have also been produced and distributed.

Private properties that contain populations of *Pityrodia scabra* have had plants fenced and have been surveyed for additional populations of the species by DEC staff. However, no new populations have been located.

Collections of seed were made by CALM and BGPA staff in 1993 and 1995. Approximately 25 seeds collected in 1993 and 38 collected in 1995 are stored at the BGPA Nursery. No seed is stored at DEC's Threatened Flora Seed Centre (TFSC). Staff from the BGPA test seed viability initially and after one year in storage. The initial germination rate of *Pityrodia scabra* seed was found to be 2%, and viability after one year was 20% (B. Elkins[2] unpublished data)

The Botanic Gardens and Parks Authority (BGPA) currently have approximately 6 plants in their nursery (K. Dixon[3] personal communication).

The Avon-Mortlock District Threatened Flora and Communities Recovery Team (AMRTFCRT) is overseeing the implementation of this IRP and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Staff from DEC's Avon-Mortlock District regularly monitor all populations of this species.

Future recovery actions

Where populations occur on lands other than those managed by DEC, permission has been or will be sought from 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 AMDTFCRT will continue to coordinate recovery actions for *Pityrodia scabra* and other Declared Rare Flora in their district and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies. Input and involvement will also be sought from any indigenous groups that have an active interest in areas that are habitat for *Pityrodia scabra*.

Action: Coordinate recovery actions
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $1,600 per year.

2. Map habitat critical to the survival of the species

Although habitat critical to the survival of the species 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 habitat critical to their survival will also be determined and mapped.

Action: Map habitat critical to the survival of the species
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $2,000 in the first year.

[2] Bob Elkins, BGPA
[3] Kingsley Dixon, BGPA

3. Liaise with relevant land managers

Staff from DEC's Avon-Mortlock District will continue to liaise with relevant land managers and landowners to ensure that populations are not accidentally damaged or destroyed and that current threats are addressed.

Action: Liaise with relevant land managers
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $900 per year

4. Collect seed and cutting material

Seed and cuttings should be collected for storage and future use in translocations and as an *ex situ* collection of the genetic diversity of the species. Sixty three seeds have been collected and 6 plants are currently held at the BGPA. There is an urgent need for new cutting and seed collections to be made to increase the diversity of germplasm stored for use in future translocations. Cuttings will also be collected to enhance the living collection at BGPA. 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) and any translocation projects will be consistent with *the Guidelines for the translocation of threatened plants in Australia*, produced by the ANPC (Vallee et al. 2004).

Action: Collect seed and cutting material
Responsibility: DEC (TFSC, Avon-Mortlock District), BGPA through the AMDTFCRT
Cost: $3,800 per year in years 1, 3 and 5.

5. Develop and implement a new Translocation Proposal

Although translocations are generally undertaken under full Recovery Plans, the low population size and ongoing threats to the known wild population of *Pityrodia scabra* requires the implementation of a supplementary Translocation Proposal. This will enable the re-stocking of previous translocations to be carried out over successive years. Information on the translocation of threatened animals and plants in the wild is provided in CALM's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All Translocation Proposals must be approved by DEC's Director of Nature Conservation.

Action: Develop and implement a new Translocation Proposal
Responsibility: DEC (Science Division, Merredin District) through BGPA and the AMDTFCRT
Cost: $9,100 in the second and third years; and $1,700 in the third and fourth years.

6. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Pityrodia scabra* will provide a better scientific basis for management of the wild populations. An understanding of the following is particularly necessary for effective management:

- Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
- The pollination biology of the species, and the requirements of pollinators.
- The reproductive strategies, phenology and seasonal growth of the species.
- The population genetic structure, levels of genetic diversity and minimum viable population size.
- The impact of salinity on *Pityrodia scabra* and its habitat.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Avon-Mortlock District) through the AMDTFCRT
Cost: $17,800 per year in the first, second and third years.

7. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion and plant diseases), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. All populations (natural and translocated) will be inspected annually. Species with small population numbers which require at least annual monitoring as any damage or loss of plants may result in local extinction.

Action: Monitor populations
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $500 per year.

8. Stimulate the germination of soil-stored seed

Fire, use of smoke water and soil disturbance may be effective in stimulating the germination of soil-stored seed. Recruitment trials that included smoke water and soil distribution were implemented in Population 1A, but were unsuccessful in causing plant regeneration. Further trials will be conducted near existing populations and/or in areas where *Pityrodia scabra* was known to occur previously. After treatment, annual monitoring will include recording seedling appearance, plant establishment, the time to first flowering, seed production and the age at which senescence is reached. This will enable formulation of a recommended interval time between disturbances to maintain populations.

Action: Stimulate the germination of soil-stored seed
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $3,500 in second, third and fourth years.

9. Conduct further surveys

Further surveys will be conducted for this species in areas of appropriate habitat, and on private lands wherever possible, during its flowering period (October to November). Volunteers from the local community, local landholders, the Wildflower Society and Naturalist Clubs will be encouraged to be involved in surveys supervised by DEC staff. Areas considered suitable for translocation will also be noted.

Action: Conduct further surveys
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $1,300 per year.

10. Implement fire management strategy

A fire management strategy, developed for the area where both extant and historical populations are known to occur, will be implemented in consultation with private landowners where appropriate and updated as necessary. Fire will be prevented from occurring in the habitat of populations until research has determined its role in regeneration of the species from seed.

Action: Implement fire management strategy
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $1,000 per year.

11. Undertake weed control

Weed control will be undertaken in consultation with land managers as required for populations of *Pityrodia scabra*. 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, and the effect on *Pityrodia scabra* and associated native plant species. It is anticipated that native species in the habitat will regenerate after weed competition is removed.

Action: Undertake weed control
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $500 per year.

12. Control rabbits

Population 4T (translocated) has been affected by rabbits. There has been evidence of grazing on the plants themselves, young shoots are 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. Control, including the use of rabbit fumigation such as Phostoxin; 1080 laced-oats or Pindone or trapping, will be undertaken in the habitat of *Pityrodia scabra*. The terrain will determine which of the above chemicals will be used, i.e. if rabbit burrows can be found, then Phostoxin is the preferred option. If burrows are not evident, the use of 1080-laced oats or Pindone can be considered.

Action: Control rabbits
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $500 in first, second and third years.

13. Promote awareness

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

Action: Promote awareness
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: $600 per year.

14. Purchase land and transfer care, control and management to the Conservation Commission

The land that contains extant populations of *Pityrodia scabra* will be purchased if possible and listed as a Class A reserve for the purpose of 'Conservation of Flora and Fauna'. If purchased, the land will be managed by DEC on behalf of the Conservation Commission of Western Australia.

Action: Purchase land and transfer care, control and management to Conservation Commission
Responsibility: DEC (Avon-Mortlock District; Land Administration) through the AMDTFCRT
Cost: Price to be negotiated with landowner if interested in selling.

15. Review the need for further recovery actions and an update of this IRP

At the end of the fourth year of its five-year term this IRP will be reviewed and the need for an update of this IRP and/or further recovery actions assessed.

Action: Review the need for further recovery actions and an update of this IRP
Responsibility: DEC (Species and Communities Branch, Avon-Mortlock District) through the AMDTFCRT
Cost: $22,700 in the fifth year (if required).

4. TERM OF PLAN

Western Australia

This IRP will operate from February 2008 to January 2013 but will remain in force until withdrawn or replaced. If the species is still ranked CR after five years, the need for further recovery actions and an update of this IRP will be assessed.

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 five years.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

George, A.S. (1967) Journal of the Royal Society of Western Australia. 50 (4), 103.

Shrub about 1m tall, with a viscid, golden indumentum of branched hairs. Leaves in whorls of 3, 0.5-1.2cm long, linear, obtuse, sessile, margins revolute, +/- crenulate so as to appear bullate; coarsely tomentose, becoming scabrous above. Flowers axillary, shortly cymose. Bracteoles linear. Calyx 5mm long, glandular-pubescent, lobes slightly shorter than the tube, involute with prominent midribs. Corolla 7-8mm long, the tube narrow, longer than the lobes; upper lip of 2 obtuse lobes, lower lip 3-lobed, the central one larger than the others; throat hirsute around the base of the filaments and along the lower mid-lobe; corolla otherwise glabrous. Stamens shortly exserted; anthers shortly appendiculate. Style glabrous. Ovary densely hirsute, the ovules attached to short funicles; hypogynous disc slightly lobed.

The species appears closest to *P. hemigeniodes* (F. Muell) Benth. However the coarse viscid indumentum gives it an entirely distinct appearance; further differences are the larger whorled leaves with somewhat bullate margins and the flowers in small cymes.

SUMMARY OF RECOVERY ACTIONS AND COSTS

	Year 1			Year 2			Year 3			Year 4			Year 5		
Recovery Action	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**
Coordinate recovery actions	1200	300	100	1200	300	100	1200	300	100	1200	300	100	1200	300	100
Maphabitat critical to survival	500		1500												
Collect seed and cutting material	1400	400	2000				1400	400	2000				1400	400	2000
Liaise with relevant land managers	900			900			900			900			900		
Develop and implement a second translocation proposal.				3300		5800	3300		5800	1000		700	1000		700
Obtain biological and ecological information	10800		7000	10800		7000	10800		7000						
Monitor populations	300		200	300		200	300		200	300		200	300		200
Stimulate the germination of soil-stored seed				500		3000	500		3000	500		3000			
Conduct further surveys	500	500	300	500	500	300	500	500	300	500	500	300	500	500	300
Implement fire management strategy	200		800	200		800	200		800	200		800	200		800
Undertake weed control	300		200	300		200	300		200	300		200	300		200
Control rabbits	200		300	200		300	200		300						
Promote awareness	600			600			600			600			600		
Purchase land and transfer care, control and management to Conservation Commission															
Review the need for a full Recovery Plan													15300		7400
Total	16,900	1,200	12,400	18,800	800	17,700	20,200	1,200	19,700	5,500	800	5,300	21,700	1,200	11,700
Yearly Total	**29,600**			**36,400**			**40,200**			**10,700**			**33,700**		

Ext. = External funding (funding to be sought),

DEC786Total DEC: $83,900
Total Other: $5,200
Total External Funding: $66,800
TOTAL COSTS: $155,100