Western Cyphanthera

(*Cyphanthera odgersii* subsp. *occidentalis*)

RECOVERY PLAN

Department of Environment and Conservation
Kensington

Australian Government

Government of Western Australia

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 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 IRP No.21 (1999-2001), prepared by Rebecca Evans and Andrew Brown.

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced.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 in 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 Craig Douglas[1], Wendy Johnston[2] and David Jolliffe[3]

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Bob Elkins	Technical Assistant, Botanic Gardens and Parks Authority
Amanda Shade	Assistant curator of displays and development, Botanic Gardens and Parks Authority
Andrew Crawford	Technical Officer, Threatened Flora Seed Centre, DEC
Andrew Brown	Threatened Flora Coordinator, Species and Communities Branch, DEC

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Cover photographs by Kate Brown and Anne Cochrane. Image used with the permission of the Western Australian Herbarium, DEC (http://florabase.calm.wa.gov.au/help/copyright). Accessed July 2007.

CITATION

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SUMMARY

Scientific Name:	***Cyphanthera odgersii* subsp. *occidentalis***	**Common Name:**	Western Cyphanthera
Family:	Solanaceae	**Flowering Period:**	August - November
DEC Region:	Wheatbelt	**DEC District:**	Avon Mortlock
Shire:	Wyalkatchem	**Recovery Team:**	Avon Mortlock District Threatened Flora Recovery Team

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. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 77; Department of Environment and Conservation (2007) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. Accessed 2007; http://www.calm.wa.gov.au/science/.Haegi, L. (1982). Solanaceae. *Flora of Australia* Volume 29. Canberra: Australian Government Publishing Service: pp 27-8; Haegi, L. (1981). A conspectus of Solanaceae, Tribe: Anthocercideae. *Telopea.* **2**: 173-180.

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 21 (1999-2001) prepared by R. Evans and A. Brown.

The criterion for failure in the previous plan (the number of individuals within populations and/or the number of populations has decreased over the term of the plan) has been met as the number of known plants in the wild population has decreased from 145 in 2000 to 66 in 2007. This is believed to have occurred due to senescence and poor recruitment resulting from a lack of suitable disturbance such as fire.

Actions carried out in the previous plan include:

Action 2 Research into the biology and ecology. Research into population structure, soil seed bank dynamics, germination requirements and fire response has been undertaken.

Action 2 and other recovery actions included in the previous plan are ongoing and are included in this revised plan.

New recovery actions included in this plan are:

Action 3 Liaise with relevant land owners.
Action 11 Seek security of tenure for Subpopulation 1b.
Action 12 Map habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis.*

Current status: *Cyphanthera odgersii* subsp. *occidentalis* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act, 1950* in 1997 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 1994) Red List criteria B1+2e; C2b due to there being less than 250 mature individuals, severe fragmentation and the species being known from a single population with continued decline in the number of mature individuals. Main threats are road and rail maintenance, weeds, senescence and lack of suitable disturbance for germination. The subspecies is listed as Endangered (EN) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Cyphanthera odgersii subsp. *occidentalis* is currently known from a single population of 66 mature plants in DEC's Avon Mortlock District. Ninety seven percent of plants are located on WestNet Rail Reserve (Subpopulations 1a and 1c) and three percent of plants are on private property (Subpopulation 1b).

Description: *Cyphanthera odgersii* subsp. *occidentalis* is a greyish shrub to 2.5 m tall. Branches are covered in dense woolly hair that is mainly branched and non-glandular. Leaves are broadly to narrowly ovate to elliptic, almost sessile, 18 to 35 mm long, and covered in dense wooly hairs. Flowers occur in dense clusters, often forming leafy spikes with pedicels 0.5 to 2 mm long. The calyx is 4 to 7 mm long, the lower half covered in short downy hair becoming woolly above. The corolla is 5.5 to 8.5 mm long, white with purple striations, and is sparsely covered in downy hairs outside and densely covered inside, the lobes are broadly ovate and 1.3 to 1.8 mm long. The stamens are 1.3 to 2.5 mm long. The filaments are covered in non-glandular hairs at the base. The capsule is ellipsoid to ovoid, 3 to 5 mm long. The seeds are 2.8 to 3.4 mm long (Haegi 1982).

Cyphanthera odgersii subsp. *occidentalis* differs from the more widespread *Cyphanthera odgersii* subsp. *odgersii* in having smaller corolla lobes and leaves that are 2.3 to 4 times as long as they are wide (Coates *et al*. 1998).

Habitat requirements: *Cyphanthera odgersii* subsp. *occidentalis* grows in orange sandy soils and red-brown sandy and clayey loams in open mallee-heath.

Habitat critical to the survival of the species, and important population: Given that *Cyphanthera odgersii* subsp. *occidentalis* is listed as CR (WA), it is considered that all known habitat for the natural population is critical to the survival of the subspecies, and that the population is an important population. Habitat critical to the survival of *C. odgersii* subsp. *occidentalis* includes the area of occupancy of the extant population, areas of similar habitat (i.e. orange sandy soils and red-brown sandy and clayey loams in open mallee-heath) surrounding the population (this is necessary to provide habitat for pollinators and future population expansion), and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of habitat of *Cyphanthera odgersii* subsp. *occidentalis* will also improve the status of remnant associated vegetation. No other conservation listed flora species are known to occur with *C. odgersii* subsp. *occidentalis*.

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. *Cyphanthera odgersii* subsp. *occidentalis* is not listed under any specific international treaty however, and this recovery plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation: According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the subspecies covered by this recovery plan. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for Indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of the subspecies.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential Indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

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 impact. However, as *Cyphanthera odgersii* subsp. *occidentalis* occurs on land managed by WestNet Rail and also on adjacent private property the protection of the subspecies may potentially affect rail maintenance and farming activities.

Affected interests: Stakeholders potentially affected by the implementation of this plan include WestNet Rail and the owners of the private property.

Evaluation of the plan's performance: The Department of Environment and Conservation, in conjunction with the Avon Mortlock District Threatened Flora Recovery Team (AMDTFRT) will evaluate the performance of this recovery plan. 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.

Completed Recovery Actions

1. Land managers including the private land owner and WestNet Rail with subpopulations on their property have been made aware of the threatened nature of this subspecies, its location and their legal obligations to protect it.
2. Declared Rare Flora (DRF) markers have been installed at Subpopulations 1a and 1c.
3. Fencing of Subpopulation 1a, b and part of 1c has been undertaken.
4. Collections of seed have been stored at the Botanic Gardens and Parks Authority (BGPA) and DEC's Threatened Flora Seed Centre (TFSC).
5. Between 1991 and 1996 surveys were conducted for *Cyphanthera odgersii* subsp. *occidentalis* in the Lake Moore area.
6. A translocation proposal was prepared for this subspecies in 1998.
7. In 2000 research into population structure, soil seed bank dynamics, germination requirements and fire response of *Cyphanthera odgersii* subsp. *occidentalis* was undertaken.

Ongoing and future recovery actions

1. The AMDTFRT is overseeing the implementation of this recovery plan and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.
2. Staff from DEC's Avon-Mortlock District office are monitoring the single known population.

Recovery plan objective: The objective of this recovery plan is to abate identified threats and maintain or enhance a viable *in situ* population to ensure the long-term preservation of the subspecies in the wild.

Recovery criteria
Criteria for success: The number of populations or subpopulations has increased and/or the number of mature individuals has increased by ten percent or more over the term of the plan.
Criteria for failure: The number of populations or subpopulations has decreased and/or the number of mature individuals has decreased by ten percent or more over the term of the plan.

Recovery actions

1. Coordinate recovery actions
2. Monitor population
3. Liaise with land managers
4. Develop and implement a fire management strategy
5. Develop and implement fire and soil disturbance trials
6. Promote awareness
7. Collect seed
8. Undertake translocation
9. Weed control
10. Conduct further surveys
11. Seek security of tenure
12. Map habitat critical to the survival of the subspecies
13. Obtain biological and ecological information
14. Review the plan and need for further recovery actions

1. BACKGROUND

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 21 (1999-2001) prepared by R. Evans and A. Brown.

The criterion for failure in the previous plan (the number of individuals within populations and/or the number of populations has decreased over the term of the plan) has been met, as the number of known plants in the wild population has decreased from 145 in 2000 to 66 in 2007. This is believed to have occurred due to senescence and poor recruitment resulting from a lack of suitable disturbance such as fire.

Actions carried out in the previous plan include:

Action 2 Research into the biology and ecology. Research into population structure, soil seed bank dynamics, germination requirements and fire response has been undertaken.

Action 2 and other recovery actions included in the previous plan are ongoing and are included in this revised plan.

New recovery actions included in this plan are:

Action 3 Liaise with relevant land owners
Action 11 Seek security of tenure for subpopulation 1b
Action 12 Map habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis*

History

Cyphanthera odgersii was named *Anthocercis odgersii* by Baron Ferdinand von Mueller in 1876 from specimens collected at "Ad fontes Victoriae" by Young on an unknown date. In 1981 Laurence Haegi revised the Tribe Anthocerideae and reinstated the genus *Cyphanthera*, including *odgersii* as a species of *Cyphanthera*. He described two subspecies – *C. odgersii* subsp. *odgersii* and *C. odgersii* subsp. *occidentalis* with the type of *occidentalis* collected from Cowcowing in 1976.

The first collection of *Cyphanthera odgersii* subsp. *occidentalis* was made from Cowcowing by Max Koch in 1904. A collection was then made from Lake Moore by Charles Gardner in 1939 but, despite extensive surveys between 1991 and 1996, the population has not been relocated. Details of this location may be an error as Lake Moore has in the past been misidentified as Lake Cowcowing. Charles Gardner then collected specimens from Cowcowing railway siding in 1946 with further collections made from this site by Laurence Haegi in 1976, Frans Mollemans in 1990 and Anne Cochrane in 1997.

Cyphanthera odgersii subsp. *occidentalis* is currently known from one population and three subpopulations totaling 66 plants.

Description

Cyphanthera odgersii subsp. *occidentalis* is a greyish shrub to 2.5 m tall with its branches and its broadly to narrowly ovate to elliptic leaves covered in dense woolly hairs 1 to 6.5 mm long. Flowers occur in dense clusters, often forming leafy spikes, with pedicels 0.5 to 2 mm long. The calyx is 4 to 7 mm long, the lower half covered in short downy hair becoming woolly above. The corolla is 5.5 to 8.5 mm long, white with purple striations, and is sparsely covered in downy hairs outside and densely covered inside, the lobes are broadly ovate and 1.3 to 1.8 mm long. The stamens are 1.3 to 2.5 mm long. The filaments are covered in non-glandular hairs at the base. The capsule is ellipsoid to ovoid, 3 to 5 mm long. The seeds are 2.8 to 3.4 mm long (Haegi 1982).

Cyphanthera odgersii subsp. *odgersii* differs from *C. odgersii* subsp. *occidentalis* in having leaves that are one to two times longer than they are wide, and corolla-lobes 2 to 2.5 mm long. The leaves of *C. odgersii* subsp. *occidentalis* in contrast are 2.3 to 4 times as long as they are wide, and the corolla lobes are smaller than those of *C. odgersii* subsp. *odgersii* (Coates *et al*. 1998).

Distribution and habitat

Cyphanthera odgersii subsp. *occidentalis* is confined to a single population in the central Wheatbelt of Western Australia.

Habitat is orange sandy soils and red-brown sandy and clayey loams in open mallee-heath. Associated species include *Allocasuarina acutivalvis* subsp. *acutivalvis*, *Acacia acuaria*, *A. yorkrakinensis* subsp. *acrita*, *Keraudrenia integrifolia*, *Grevillea pterosperma* and *Waitzia acuminata* var. *acuminata*.

Table 1 - Summary of population land vesting, purpose and tenure

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1a N of Cowcowing	Avon Mortlock	Wyalkatchem	Public Transport Authority	Rail Reserve	WestNet Rail
1b N of Cowcowing	Avon Mortlock	Wyalkatchem	Freehold	Private Property	Landholders
1c N of Cowcowing	Avon Mortlock	Wyalkatchem	Public Transport Authority	Rail Reserve	WestNet Rail

The single known population is considered an Important Population

Biology and ecology

Cyphanthera odgersii subsp. *occidentalis* plants are killed by fire, but populations regenerate from soil-stored seed (Cochrane *et al*. 2000) with seed germinating following grading of rail lines and vehicle access tracks and occasionally also after heavy rains.

Cochrane *et al*. (2000) conclude that *Cyphanthera odgersii* subsp. *occidentalis* maintains a small (98 seeds/m^2) but moderately viable (mean = 49% germination) soil seed bank which contributes to the genetic diversity and stability of the population. In *ex situ* trials under optimal conditions germination levels of 89% can be attained. Germination success declines rapidly *in situ* from 32% germination 2 months post burial in soil, to 26% germination 8 months post burial in soil (Cochrane *et al*. 2000).

Plants appear to be fast growing and short lived, with seedlings growing up to 34 cm within 8 months, and plants senescing within 10 years of age (Cochrane *et al*. 2000).

The subspecies suffers heavily from seed predation, with approximately half of all seed being predated (Cochrane *et al*. 2000).

Plants have the ability to resprout when damaged (Cochrane *et al*. 2000).

The subspecies flowers between August and November, with mature fruit appearing in February. Cochrane *et al*. (2000) conclude that the fruit to flower ratio is low, with an average of only 3 percent of flowers per plant yielding fruit (700 fruit set from an average of 18,000 flowers). The reason for this low yield is unknown although poor pollination and self-incompatibility may be contributing factors.

Threats

Cyphanthera odgersii subsp. *occidentalis* was declared as Rare Flora in 1997 under the Western Australian *Wildlife Conservation Act, 1950* and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 1994) Red List criteria B1+2e; C2b due to there being less than 250 mature individuals, severe fragmentation and the species being known from a single population with continued decline in the number of mature individuals. Main threats are road and rail maintenance, weeds, senescence and lack of suitable disturbance for germination. The subspecies is listed as Endangered (EN) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

- **Rail maintenance.** Two subpopulations of *Cyphanthera odgersii* subsp. *occidentalis* on rail reserves are threatened by grading and maintenance of access tracks. Land managers have been informed of their location and their legal obligations to protect the subspecies.
- **Weeds** are a minor threat to all subpopulations of *Cyphanthera odgersii* subsp. *occidentalis*.

- **Senescence and lack of suitable disturbance for germination.** The population *Cyphanthera odgersii* subsp. *occidentalis* is in continuing decline. Cochrane *et al*. (2000) and it is thought the subspecies requires disturbance such as fire to stimulate the germination of soil-stored seed.

Table 2 - Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a N of Cowcowing	Rail Reserve	1991 202 2000 138 (12) [3] 2003 96 [5] 2005 60 (1) [24] 2006 51 [10]	Healthy	Rail maintenance, weeds
1b N of Cowcowing	Private Property	1990 2 2000 3 [1] 2003 3 2006 2 (1)	Healthy	Firebreak maintenance, weeds
1c N of Cowcowing	Rail Reserve	1990 9 2001 4 [2] 2005 13 (2) [2] 2006 11 [3]	Healthy	Rail maintenance, weeds

The single known population considered an Important Populations. ( ) = number of seedlings, [ ] = number dead

Guide for decision-makers

Table 2 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis* require assessment for the potential for a significant level of impact.

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

Given that *Cyphanthera odgersii* subsp. *occidentalis* is listed as CR (WA), it is considered that habitat for the natural population is critical to the survival of the subspecies, and that the natural population is an important population. Habitat critical to the survival of *C. odgersii* subsp. *occidentalis* includes the area of occupancy of the population, areas of similar habitat (i.e. orange sandy soils and red-brown sandy and clayey loams in open mallee-heath) surrounding the population (this is necessary to provide habitat for pollinators and future population expansion), and additional occurrences of similar habitat that may contain the subspecies or be suitable for future translocations.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of habitat of *Cyphanthera odgersii* subsp. *occidentalis* will also improve the status of remnant associated vegetation. No other conservation listed flora species are known to occur with *C. odgersii* subsp. *occidentalis*.

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. *Cyphanthera odgersii* subsp. *occidentalis* is not listed under any specific international treaty however, and this recovery plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the subspecies covered by this recovery plan. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues

or interests identified in the Plan. If no role is identified for Indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of the species.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential Indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

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. However, as *Cyphanthera odgersii* subsp. *occidentalis* occurs on WestNet Rail reserve and adjoining private land its protection may potentially affect farming and rail maintenance activities.

Affected interests

Stakeholders potentially affected by the implementation of this plan include WestNet Rail and the owner of the private property.

Evaluation of the plan's performance

The Department of Environment and Conservation, in conjunction with the Avon Mortlock District Threatened Flora Recovery Team (AMDTFRT) will evaluate the performance of this recovery plan. 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

Objectives: The objective of this recovery plan is to abate identified threats and maintain or enhance a viable *in situ* population to ensure the long-term preservation of the subspecies in the wild.

Criteria for success: The number of populations or subpopulations has increased and/or the number of mature individuals has increased by ten percent or more over the term of the plan.
Criteria for failure: The number of populations or subpopulations has decreased and/or the number of mature individuals has decreased by ten percent or more over the term of the plan.

3. RECOVERY ACTIONS

Completed recovery actions

- Land managers, including private landowners and WestNet Rail have been made aware of the threatened nature of the subspecies, its location and their legal obligations to protect it.
- Declared Rare Flora (DRF) markers have been installed at Subpopulations 1a and 1c.
- Subpopulation 1a, b and part of 1c have been fenced.
- DEC's Threatened Flora Seed Centre (TFSC) holds 880 seeds collected in 1997.
- Between 1991 and 1996 extensive surveys were conducted around the Lake Moore area for *Cyphanthera odgersii* subsp. *occidentalis*.
- In 1998 a translocation proposal for *Cyphanthera odgersii* subsp. *occidentalis* was prepared identifying Walk Walkin Nature Reserve as a suitable translocation site.
- In 2000 research into population structure, soil seed bank dynamics, germination requirements and fire response of *Cyphanthera odgersii* subsp. *occidentalis* was published.

Ongoing and future recovery actions

- The AMDTFRT is overseeing the implementation of this recovery plan and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

- Staff from DEC's Avon Mortlock District office monitor the population.

Where plants occur on lands other than those managed by DEC, 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, influenced by their timing over the term of the plan. 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 AMDTFRT will continue to coordinate the implementation of recovery actions for *Cyphanthera odgersii* subsp. *occidentalis* and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: AMDTFRT
Cost: $1,400 per year

2. Monitor population

Monitoring of factors such as weed invasion, habitat degradation, population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. The population will be inspected annually and Rare Flora Report Forms completed.

Action: Monitor population
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $500 per year

3. Liaise with land managers

Staff from DEC's Avon Mortlock District will liaise with appropriate land owners to ensure the population is not accidentaly damaged or destroyed. Input and involvement will be sought from any Aboriginal groups that have an active interest in areas inhabited by *Cyphanthera odgersii* subsp. *occidentalis*.

Action: Liaise with land managers
Responsibility: DEC (Avon Mortlock Districts) through the AMDTFRT
Cost: $600 per year

4. Develop and implement fire and soil disturbance trials

Cyphanthera odgersii subsp. *occidentalis* requires fire or soil disturbance to stimulate germination of soil stored seed. Cochrane *et al*. (2000) commented that lack of natural recruitment coupled with a slow decline in plant numbers due to senescence may render the population extinct within the next 30 years unless active management of the population continues. DEC's Avon Mortlock District will, in consultation with private landowners and WestNet Rail, develop and implement fire and soil disturbance trials to stimulate germination. The results of all trials will be monitored and, if successful, a larger scale operation undertaken.

Action: Develop and implement fire and soil disturbance trials
Responsibility: DEC (Science Division, Avon Mortlock District) and relevant authorities, through the AMDTFRT
Cost: $2,700 in the first year, $900 in years 2 and 4, $3,600 in years 3 and 5

5. Develop and implement a fire management strategy

Cyphanthera odgersii subsp. *occidentalis* is killed by fire with post fire recruitment from seed germination. Frequent fires will kill seedlings before they are able to flower and set adequate quantities of seed. The development of a fire management strategy is recommended to ensure fire occurs at a frequency, intensity and season that maximize population size and health. This action will build on the outcomes of action 4.

Action: Develop and implement a fire management strategy
Responsibility: DEC (Avon Mortlock District) and relevant authorities, through the AMDTFRT.
Cost: $2,500 in the first year

6. Promote awareness

The importance of biodiversity conservation and the protection of *Cyphanthera odgersii* subsp. *occidentalis* will be promoted to the public. This will be achieved through an information campaign using the local print and electronic media and by setting up poster displays. This is especially important as there is only one known population of the subspecies and increased awareness may result in the discovery of others.

It is recommended that an A4 sized information sheet which includes a description of the plant, its habitat type, status, threats, management actions and photos, be developed for *Cyphanthera odgersii* subsp. *occidentalis* and distributed to local land owners, relevant authorities and volunteer organizations, libraries and schools. The preparation of a poster illustrating all CR flora species in the District is also recommended. Formal links with local naturalist groups and interested individuals is encouraged.

Action: Promote awareness
Responsibility: DEC (Avon Mortlock District, Species and Communities Branch and Strategic Development and Corporate Affairs) through the AMDTFRT
Cost: $1,600 in the first year, $1,000 in years 3 and 5

7. Collect seed

DEC's TFSC holds 880 seeds but more seed should be collected. Collections should aim to sample and preserve the maximum range of genetic diversity possible (determined by an appropriate molecular technique such as genetic fingerprinting) with collection of seed from all subpopulations of *C. odgersii* subsp. *occidentalis*. The "Germplasm Conservation Guidelines for Australia" produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process.

Actions: Collect seed
Responsibility: DEC (Avon Mortlock District, TFSC), and BGPA through the AMDTFRT
Cost: $2,800 in years 1, 3 and 5

8. Undertake translocation

The known population of *Cyphanthera odgersii* subsp. *occidentalis* is in insecure tenure on rail reserve and private property. In 1998 a translocation plan was developed for the subspecies identifying a suitable translocation site. It is recommended under this action that this plan be implemented.

Information on the translocation of threatened animals and plants in the wild is provided in CALM *Policy Statement No. 29: Translocation of Threatened Flora and Fauna*. All translocation proposals require endorsement by the Director of Nature Conservation.

Action: Undertake translocation
Responsibility: DEC (Avon Mortlock District) and BGPA through the AMDTFRT
Cost: $6,700 in the third year

9. Weed control

Weeds are a threat to the population of *Cyphanthera odgersii* subsp. *occidentalis*. The following actions will be implemented:

1. Selection of appropriate herbicides after determining which weeds are present.
2. Controlling invasive weeds by hand removal or spot spraying around plants of the subspecies when weeds first emerge.
3. Scheduling weed control to include spraying at other threatened flora populations within the District.

The tolerance of associated native plant species to herbicides at the site of *C. odgersii* subsp. *occidentalis* is not known and weed control programs will be undertaken in conjunction with research.

Action: Weed control
Responsibility: DEC (Avon Mortlock District, Science Division) through the AMDTFRT
Cost: $1,100 per year

10. Conduct further surveys

It is suggested that surveys be conducted within the Shire of Wyalkatchem and include habitat on private land if possible. Volunteers from the local community, wildflower societies and naturalists clubs could be involved in surveys supervised by DEC staff.

Action: Conduct further surveys
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $1,100 in years 3 and 4

11. Seek security of tenure

Purchase of the area in which *Cyphanthera odgersii* subsp. *occidentalis* Subpopulation 1b occurs on private property will be investigated, and the possibility of additional protection through the reservation system investigated. The possibility of protecting this land parcel through conservation covenants or registration with the Land for Wildlife or other private land conservation schemes will also be investigated.

Action: Seek security of tenure
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $1,700 per year in the first year

12. Map habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis*

Although habitat critical to the survival of the species is described in Section 1, not all areas have been mapped.

Action: Map habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis*
Responsibility: DEC (Avon Mortlock District) through the AMDTFRT
Cost: $3,000 in the second year

13. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Cyphanthera odgersii* subsp. *occidentalis* will provide a better scientific basis for management of the wild populations. An understanding of the following is necessary for effective management:

1. Optimal fire frequency and intensity to maximise population size and health.
2. Appropriate herbicides for weed control that will not adversely affect *C. odgersii occidentalis.*
3. Pollination biology and method of seed dispersal.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Avon Mortlock District) through the AMDTFRT
Cost: $8,000 in years 2 and 3

14. Review the plan and need for further recovery actions

At the end of its five-year term the recovery plan will be reviewed and the need for further recovery actions assessed.

Action: Review the plan and need for further recovery actions
Responsibility: DEC (Species and Communities Branch, Avon Mortlock District) through the AMDTFRT
Cost: $1,500 in the fifth year

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	AMDTFRT	Ongoing
Monitor population	High	DEC (Avon Mortlock District) through the AMDTFRT	Ongoing
Liaise with relevant land managers	High	DEC (Avon Mortlock Districts) through the AMDTFRT	Ongoing
Develop and implement fire and soil disturbance trials	High	DEC (Science Division, Avon Mortlock District) and relevant authorities, through the AMDTFRT	Ongoing
Develop and implement a fire management strategy	High	DEC (Avon Mortlock District) and relevant authorities, through the AMDTFRT.	Strategy developed by 2009 with implementation ongoing
Promote awareness	High	DEC (Avon Mortlock District, Species and Communities Branch and Strategic Development and Corporate Affairs) through the AMDTFRT	Ongoing
Collect seed	High	DEC (Avon Mortlock District, TFSC), and BGPA through the AMDTFRT	2013
Undertake translocation	High	DEC (Avon Mortlock District) and BGPA through the AMDTFRT	2011
Undertake weed control	High	DEC (Avon Mortlock District, Science Division) through the AMDTFRT	Ongoing
Conduct further surveys	Moderate	DEC (Avon Mortlock District) through the AMDTFRT	Ongoing
Seek security of tenure	Moderate	DEC (Avon Mortlock District) through the AMDTFRT	2009
Map habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis.*	Moderate	DEC (Avon Mortlock District) through the AMDTFRT	2010
Obtain biological and ecological information	Moderate	DEC (Science Division, Avon Mortlock District) through the AMDTFRT	2010
Review the plan and need for further recovery actions	Moderate	DEC (Species and Communities Branch, Avon Mortlock District) through the AMDTFRT	2013

4. TERM OF PLAN

Western Australia

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If the species is still ranked CR (WA) 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* (EPBC Act) this adopted recovery plan will remain in force until revoked.

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

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6. TAXONOMIC DESCRIPTION

Excerpt from: Haegi, L. (1982). *Solanaceae. Flora of Australia Volume 29*. Canberra: Australian Government Publishing Service: pp 27-8.

Shrub to 2.5 m, grayish. *Branches* densely wooly-tomentose, 1-6.5 mm long, with mainly branched, non-glandular hairs, with some glandular hairs. *Leaves* broadly to narrowly ovate-elliptic, almost sessile, 18-35 mm long, woolly-tomentose. *Flowers* in dense clusters, often forming leafy spikes; *pedicels* 0.5-2 mm long. *Calyx* 4-7 mm long, pubescent in lower half, woolly above. *Corolla* 5.5-8.5 mm long, sparsely pubescent outside, densely pubescent inside, whit, the striations purple; lobes broadly ovate, 1.3-1.8 mm long. *Stamens* 1.3-3 mm long. *Filaments* pubescent at base with non-glandular hairs only. *Capsule* ellipsoid to ovoid, 3-5 mm long. *Seeds* 2.8-3.4 mm long.

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	1,000	300	100	1,000	300	100	1,000	300	100	1,000	300	100	1,000	300	100
Monitor populations	300		200	300		200	300		200	300		200	300		200
Liaise with relevant land managers	300		300	300		300	300		300	300		300	300		300
Develop and implement a fire management strategy	1,000	1,000	500												
Develop and implement fire and disturbance trials	1,300	800	600	500		400	1,800	800	1,000	500		400	1,800	800	1,000
Promote awareness	1,000		600				1,000						1,000		
Collect seed and other material to preserve genetic diversity	1,800		1,000				1,800		1,000				1,800		1,000
Undertake translocation							2,600	1,000	3,100						
Undertake weed control and follow-up with regular monitoring and additional control if required	600		500	600		500	600		500	600		500	600		500
Conduct further surveys							800		300	800		300			
Seek security of tenure for subpopulation	1,000	500	200												
Map habitat critical to the survival of *Cyphanthera odgersii* subsp. *occidentalis*				900		2,100									
Obtain biological and ecological information				1,500	2,500	4,000	1,500	2,500	4,000						
Review the need for further recovery actions										1,500					
Total	8,300	2,600	4,000	5,100	2,800	7,600	11,700	4,600	10,500	5,000	300	1,800	6,800	1,100	3,100
Yearly Total	14,900			15,500			26,800			7,100			11,000		

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

Total DEC: $36,900
Total Other: $11,400
Total External Funding: $27,000
Total Costs: $75,300