HAIRY MAT CONOSTYLIS

(*Conostylis seorsiflora* subsp. *trichophylla*)

INTERIM RECOVERY PLAN

2008-2013

April 2008

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This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced.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 Endangered (EN), 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

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ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this IRP:

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Heather Taylor	Former Project Officer, Species and Communities Branch, DEC

Thanks also to the 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 Steve Hopper.

CITATION

This IRP should be cited as:

Department of Environment and Conservation (2008) Hairy Mat Conostylis (*Conostylis seorsiflora* subsp. *trichophylla*) Interim Recovery Plan 2008-2013. Interim Recovery Plan No. 258. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name	***Conostylis seorsiflora* subsp. *trichophylla***	**Common Name**	Hairy Mat Conostylis
Family	Haemodoraceae	**Flowering Period**	October - mid November
DEC Region	Wheatbelt	**DEC Districts**	Great Southern
Shires	Wickepin and Dumbleyung	**Recovery Teams**	Great Southern District Threatened Flora Recovery Team

Illustrations and/or further information: Brown, A.P., Thomson-Dans C. and Marchant N. (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 76; Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Accessed 2007. Department of Environment and Conservation, Western Australia. http://florabase.calm.wa.gov.au; Durell, G.S. and Buehrig, R.M. (2001) *Declared Rare and Poorly Known Flora in the Narrogin District*. Department of Conservation and Land Management, Western Australia. pp 33-34; Hopper, S.D. (1987) *Flora of Australia*. Volume 45, Hydatellaceae to Liliaceae. Canberra: Australian Government Publishing Services. pp 85-7.

Current status: *Conostylis seorsiflora* subsp. *trichophylla* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in 1987 and is currently ranked as Endangered (EN) under World Conservation Union (IUCN 1994) Red List criteria B1+2c; C1, due to the subspecies being known from less than five locations, populations being severely fragmented, a continuing decline observed in the quality of habitat, and a projected reduction in population size of at least 20% within two generations. The main threats are firebreak maintenance, weed invasion, grazing by rabbits and kangaroos, inappropriate fire regimes, senescence, habitat fragmentation and siltation. The subspecies is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Conostylis seorsiflora subsp. *trichophylla* is known from three populations (one consisting of two subpopulations) totalling approximately 1,016 mature plants in the Shires of Wickepin and Dumbleyung in the southern Wheatbelt of Western Australia. Populations are located on private property, nature reserve and road reserve.

Description: *Conostylis seorsiflora* subsp. *trichophylla* is a small herb 30 to 40 cm in diameter with flat, silvery grey leaves 2-8 cm long, each covered in dense hairs. Flowers are produced on the end of on a leafless stalk 0.1-5.2 cm in length. There is usually a middle leafy, hairless bract 7 to 18 mm long and two linear bracts beneath the flower. The tubular, yellow flower, 12-15 mm long with six lobes 8 to 10.5 mm long, has short hairs on the outside and is loosely hairy inside (Brown *et al*. 1998).

Conostylis seorsiflora is distinguished from other species of *Conostylis* by its solitary flowers and network of underground and aerial stems (Brown *et al*. 1998). *Conostylis seorsiflora* subsp. *trichophylla* is distinguished from other subspecies of *C. seorsiflora* by its hairy leaves, which give the plant a silvery grey appearance.

Habitat requirements: *Conostylis seorsiflora* subsp. *trichophylla* occurs in sandy soil and seasonally wet, sandy loams in open mallee woodland.

Habitat critical to the survival of the species, and important populations: Habitat critical to the survival of the subspecies includes the area of occupancy of important populations, areas of similar habitat surrounding important populations (these providing potential habitat for population expansion and pollinators), and additional occurrences of similar habitat that may contain important populations or be suitable sites for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Given that the subspecies is listed as Endangered it is considered that all known habitat for wild populations is critical to the survival of the taxon, and that all wild populations are important populations.

Benefits to other species or ecological communities: Two Priority flora species occur with *Conostylis seorsiflora* subsp. *trichophylla* these being *Lechenaultia pulvinaris* (Priority 4) and *Gastrolobium densifolium* (Priority 4). Recovery actions implemented to improve the quality or security of the habitat of *C. seorsiflora* subsp. *trichophylla* will assist in protecting these species.

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. *Conostylis seorsiflora* subsp. *trichophylla* is not listed under any specific international treaty and this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: 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 populations of the subspecies covered by this IRP. However, 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 *Conostylis seorsiflora* subsp. *trichophylla* or groups with a cultural connection to land that is important for the subspecies' conservation and to determine whether there are any issues or interests identified in the plan. Where no role is identified for the indigenous community associated with this subspecies in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the subspecies. 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 IRP has the potential to cause some social and economic impact as one population and one subpopulation are located on Private Property.

Affected interests: Stakeholders potentially affected by the implementation of this plan include the Shire of Wickepin and the owners of Private Property.

Evaluation of the plan's performance: The Department of Environment and Conservation, in conjunction with the Great Southern District Threatened Flora Recovery Team (GSDTFRT) 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 in the fifth year of implementation.

Completed Recovery Actions: The following recovery actions have been completed:

1. Managers and owners of land containing populations of *Conostylis seorsiflora* subsp. *trichophylla* have been made aware of the threatened nature of the subspecies, its location and their legal obligations to protect it.
2. Declared Rare Flora (DRF) markers have been installed at Populations 1 and 2.
3. Partial fencing of Subpopulation 1b and Population 3 has been undertaken.
4. In 1982, extensive surveys for new populations of *Conostylis seorsiflora* subsp. *trichophylla* were conducted by Sue Patrick from the Western Australian Herbarium.
5. Surveys conducted by Mattiske Consulting Pty Ltd for the Fence Road Catchment Group in 1997 located a new population of *Conostylis seorsiflora* subsp. *trichophylla* (Population 3) on private property.
6. Seed collections are stored with DEC's Threatened Flora Seed Centre (TFSC) and the Botanic Gardens and Parks Authority (BGPA).
7. The BGPA holds fifteen plants of *Conostylis seorsiflora* subsp. *trichophylla* in their nursery.

Ongoing and future recovery actions

8. The GSDTFRT 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.
9. Staff from DEC's Great Southern District are monitoring all known populations.

IRP 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 populations have increased and/or the number of mature individuals have increased by ten percent or more over the term of the plan.

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

Recovery actions

1. Coordinate recovery actions
2. Liaise with relevant land managers
3. Monitor populations
4. Collect seed and other material to preserve genetic diversity
5. Extend and maintain fencing
6. Undertake weed control and follow-up with additional control if required
7. Obtain biological and ecological information
8. Seek security of tenure for Subpopulation 1b
9. Develop and implement fire and disturbance trials
10. Promote awareness
11. Develop and implement a rabbit control strategy
12. Conduct further surveys
13. Develop and implement a fire management strategy
14. Map habitat critical to the survival of *Conostylis seorsiflora* subsp. *trichophylla*
15. Develop and implement a translocation proposal
16. Review the need for further recovery actions

1. BACKGROUND

History

Conostylis seorsiflora subsp. *trichophylla* was first collected by Steve Hopper in 1982 and was formally described in 1987 (Hopper 1987). Mal Graham (formerly of CALM) found a second population near Lake Grace in 1989 and a third population was discovered by Eleanor Bennett while conducting a flora survey on private land northwest of Kukerin in 1997.

Conostylis seorsiflora subsp. *trichophylla* is known from three populations totalling approximately 1,016 plants in the Shires of Wickepin and Dumbleyung in the southern Wheatbelt of Western Australia.

Description

Conostylis seorsiflora subsp. *trichophylla* is a small low growing herb 30 to 40 cm in diameter with flat, silvery grey leaves 2-8 cm long, each covered in dense hairs. Flowers are produced on the end of on a leafless stalk 0.1-5.2 cm in length. There is usually a middle hairless bract, 7 to 18 mm long and two linear bracts beneath the flower. The tubular, yellow flower, 12-15 mm long with six lobes 8 to 10.5 mm long, has short hairs on the outside and is loosely hairy inside (Brown *et al*. 1998).

The plant is distinguished from other subspecies of *Conostylis seorsiflora* by its hairy leaves, which give the plant a silvery grey appearance. *C. seorsiflora* is distinguished from other species of *Conostylis* by its solitary flowers and network of underground and aerial stems (Brown *et al*. 1998).

Distribution and habitat

Conostylis seorsiflora subsp. *trichophylla* has a restricted geographic range of approximately 68 km^2 in the Shires of Wickepin and Dumbleyung.

The subspecies is found in seasonally wet, sandy loams in open mallee woodland, in areas of open scrub and also in more open areas amongst other herbaceous species. Associated species include *Eucalyptus wandoo, E. loxophleba, Leptospermum erubescens, Eremaea pauciflora, Grevillea hookeriana, Acacia microbotrya, Melaleuca pentagona, M. urceolaris* and *Allocasuarina huegeliana*.

Summary of population land vesting, purpose and tenure

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1a. Southeast of Tincurrin	Great Southern	Wickepin	Unvested Reserve	Road Reserve	Shire of Wickepin
1b. Southeast of Tincurrin	Great Southern	Wickepin	Freehold	Private Property	Landholders
2. Southwest of Lake Grace	Great Southern	Dumbleyung	Water and Rivers Commission	Water and Conservation of Flora	DEC
3. Northwest of Kukerin	Great Southern	Dumbleyung	Freehold	Private Property	Landholders

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

Biology and ecology

Conostylis seorsiflora subsp. *trichophylla* flowers between October and November. Immature fruit has been recorded in November.

The genus *Conostylis* contains a mixture of insect and bird pollinated species (Hopper 1987). However, little information is available on the pollination biology of *C. seorsiflora* subsp. *trichophylla*.

Whilst studying the germination of four species of *Conostylis* using plant-derived smoke it was found that the application of diluted and full strength smoke water substantially improved the germination of seed (Tieu and Dixon 1990). It is likely therefore that seed of *C. seorsiflora* subsp. *trichophylla* germinates following fire.

Conostylis seeds germinate easily in cultivation if mature seed is used. The Botanic Gardens and Parks Authority (BGPA) have also grown *Conostylis seorsiflora* subsp. *trichophylla* successfully from cutting material but strike rates were variable ~10-60% (Amanda Shade[1] pers. comm.).

Threats

Conostylis seorsiflora subsp. *trichophylla* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in 1987 and is currently ranked as Endangered (EN) under World Conservation Union (IUCN 1994) Red List criteria B1+2c; C1, due to populations being severely fragmented, the subspecies being known from less than five locations, a continuing decline observed in the quality of habitat and a projected reduction in population size of at least 20% within two generations. The main threats are firebreak maintenance, weed invasion, grazing, inappropriate fire regimes, senescence, fragmentation of natural habitat and siltation. The subspecies is listed as Endangered (EN) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

- **Firebreak maintenance** is a threat to Population 2 as plants are located within 2 m of the maintenance track.
- **Weed invasion** is a threat to all populations.
- **Grazing** by rabbits (*Oryctolagus cuniculus*) and/or kangaroos threatens Populations 1 and 2.
- **Inappropriate fire regimes** may adversely affect populations. Although its response to fire has not been documented the subspecies is likely to require fire to stimulate the germination of soil stored seed. The current lack of recruitment is possibly due to the absence of fire.
- **Senescence** of mature plants potentially threatens all populations as seed longevity and recruitment success is unknown.
- **Fragmentation of natural habitat.** Due to clearing for agriculture *Conostylis seorsiflora* subsp. *trichophylla* is confined to relatively small areas of remnant natural vegetation subject to edge effects that include herbicide overspray, fertilisers and weed encroachment.
- **Siltation** is a minor threat to Population 2. The population is located near a drain that periodically floods.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Current Condition	Threats
1a. NW of Kukerin	Shire Road Verge	1982 9 1988 9 1994 1,000*	Healthy	Weeds, grazing, inappropriate fire regimes, senescence, habitat fragmentation
1b. NW of Kukerin	Private Property	1982 1,000 1988 1,000 1994 1,000*	Healthy	Weeds, grazing, inappropriate fire regimes, senescence, habitat fragmentation
2. SE of Kukerin	Nature Reserve	1990 6 1997 47 1999 14	Poor	Weeds, grazing, firebreak maintenance, inappropriate fire regimes, ,senescence, habitat fragmentation, siltation
3. NW of Kukerin	Private Property	1997 2	Moderate	Weeds, inappropriate fire regimes, senescence, habitat fragmentation

Populations in **bold text** are considered to be Important Populations; * = total for both subpopulations

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments and/or land clearing in the immediate vicinity of populations of *Conostylis seorsiflora* subsp. *trichophylla* require assessment. No developments or clearing should be approved unless the proponents can demonstrate that their actions will not have a significant impact on the subspecies, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the subspecies would be altered.

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

Habitat critical to the survival of *Conostylis seorsiflora* subsp. *trichophylla* includes the area of occupancy of important populations, areas of similar habitat surrounding important populations (these providing

[1] Amanda Shade, Assistant curator of displays and development, BGPA

habitat for pollinators), additional occurrences of similar habitat that may contain important populations or be suitable sites for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Given that the subspecies is listed as Endangered it is considered that all known habitat for wild populations is critical to its survival, and that all wild populations are important populations.

Benefits to other species or ecological communities

Two Priority flora species that occur with *Conostylis seorsiflora* subsp. *trichophylla* are listed in the table below. Recovery actions implemented to improve the quality and security of the habitat of *C. seorsiflora* subsp. *trichophylla* will assist in protecting them and their associated native vegetation.

Priority flora species found in the habitat of *Conostylis seorsiflora* subsp. *trichophylla*

Species name	Conservation Status (Western Australia)	Conservation Status (EPBC Act, 1999)
Lechenaultia pulvinaris	Priority 4	Endangered
Gastrolobium densifolium	Priority 4	

For a description of the Priority categories see Atkins (2006)

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. *Conostylis seorsiflora* subsp. *trichophylla* is not listed under any specific international treaty and this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people

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 populations of the subspecies covered by this IRP. 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 *Conostylis seorsiflora* subsp. *trichophylla* or groups with a cultural connection to land that is important for the subspecies' conservation and to determine whether there are any issues or interests identified in the plan. Where no role is identified for the indigenous community associated with this subspecies in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the subspecies. 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 IRP is unlikely to cause significant adverse social and economic impact but, as two populations are located on Private Property, their protection has the potential to partially affect farming activities. Where populations are located on Private Property, recovery actions refer to continued liaison between stakeholders with regards to these areas.

Affected interests

Stakeholders potentially affected by the implementation of this plan include the Shire of Wickepin and owners of Private Property.

Evaluation of the plan's performance

The Department of Environment and Conservation, in conjunction with the Great Southern District Threatened Flora Recovery Team (GSDTFRT) 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 four years of implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

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 subspecies in the wild.

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

3. RECOVERY ACTIONS

Completed recovery actions

Land managers, including private land owners and the Shire of Wickepin have been made aware of the threatened nature of this subspecies, its location and their legal obligations to protect it.

Declared Rare Flora (DRF) markers have been installed at Populations 1 and 2.

Partial fencing of Subpopulation 1b and Population 3 has been undertaken to protect plants from stock.

The Botanic Gardens and Parks Authority (BGPA) have fifteen plants in their nursery that are between two and thirteen years old. All plants were grown from seed collected from Population 1 (Carly Naughton pers. comm.).

In 1994, 0.7g of seed was collected from Population 1 and in 1998, 1.12g collected. DEC's Threatened Flora Seed Centre (TFSC) has 2,444 seeds in storage from 50 plants at Population 1. The collection, made in December 2005 has not had germination testing (Andrew Crawford pers. comm.). The BGPA currently holds two collections of seed from *Conostylis seorsiflora* subsp. *trichophylla*.

Ongoing and future recovery actions

The Great Southern District Threatened Flora Recovery Team (GSDTFRT) is overseeing the implementation of this IRP and will include information on progress in an annual report to DEC's Corporate Executive and funding bodies.

Staff from DEC's Great Southern District regularly monitor populations and continue to liaise with relevant land managers.

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 GSDTFRT will continue coordinating implementation of recovery actions for *Conostylis seorsiflora* subsp. *trichophylla* and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

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

2. Liaise with relevant land managers

Staff from DEC's Great Southern District office will liaise with appropriate land managers to ensure that populations are not accidentaly damaged or destroyed. Input and involvement will also be sought from any Aboriginal groups that have an active interest in areas that are habitat for *Conostylis seorsiflora* subsp. *trichophylla*.

Action: Liaise with relevant land managers
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $700 per year

3. Monitor populations

Monitoring of factors such as weed invasion, habitat degradation, population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. Populations will be inspected bi-annually if possible and Rare Flora Report Forms completed. All populations of *Conostylis seorsiflora* subsp. *trichophylla* are in urgent need of re-survey with the most recent past surveys taking place between 8 and 13 years ago. GPS readings are also required for all populations and this will also be addressed under this action.

Action: Monitor populations
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $1,400 per year

4. Collect seed and other material to preserve genetic diversity

Preservation of seed, cutting and tissue material is essential to guard against extinction of the subspecies if the wild populations are lost. It is recommended that seed and cuttings be collected and stored by DEC's TFSC and the BGPA. Consideration should be given to holding material in a variety of forms, including seed storage, living collections and tissue collections. Collections should aim to sample and preserve the maximum range of genetic diversity possible. The "Germplasm Conservation Guidelines for Australia" produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process.

Action: Collect seed and other material to preserve genetic diversity
Responsibility: DEC (TFSC, Great Southern District) and the BGPA, through the GSDTFRT
Cost: $2,900 per year for the first three years

5. Extend and maintain fencing

Fencing around Population 1 needs to be upgraded from ringlock to rabbit netting to prevent grazing and also needs to be extended to include an extension of the population. Remnant vegetation that contains Population 2 and 3 should also be fenced to reduce grazing pressure.

Action: Extend and maintain fencing
Responsibility: DEC (Great Southern District) through the GSDTFRT

Cost: $3,500 in the first year

6. Undertake weed control and follow up with additional control if required

As Population 3 and Subpopulations 1a and 1b are subject to weed invasion, weed control should be implemented. The tolerance of native plant species to herbicides at *Conostylis seorsiflora* subsp. *trichophylla* sites is unknown and it is recommended that weed control programs be undertaken once appropriate research has been completed.

Weed control will include:
1. Accurately mapping the boundaries of populations.
2. Selecting an appropriate herbicide.
3. Controlling invasive weeds by hand removal or spot spraying when weeds first emerge.

Action: Undertake weed control and follow-up with additional control if required
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $2,400 in years 1-5

7. Obtain biological and ecological information

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

1. Longevity of plants, and time taken to reach maturity.
2. The reproductive strategies, phenology and seasonal growth of the species
3. Soil seed bank dynamics.
4. Conditions necessary for germination and the role of various disturbances such as fire and soil disturbance in germination and recruitment.
5. The susceptibility of *Conostylis seorsiflora* subsp. *trichophylla* to *Phytophthora* spp.
6. Appropriate herbicides for weed control that will not adversely affect *Conostylis seorsiflora* subsp. *trichophylla*.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Great Southern District) through the GSDTFRT
Cost: $5,000 per year for the first two years; $3,800 in year 3 and $500 in years 4 and 5.

8. Seek security of tenure for Subpopulation 1b

The conservation status of a portion of remnant vegetation on Private Property supporting Subpopulation 1b will be reviewed and the possibility of additional protection through the reservation system investigated. Protection of this large subpopulation through conservation covenants or registration with the Land for Wildlife or other schemes will also be investigated.

Action: Seek security of tenure for Subpopulation 1b
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $1,600 in the first year

9. Develop and implement fire and disturbance trials

Considering the positive response to smoke that Tieu and Dixon (1990) found in other species of *Conostylis*, it is likely that fire and smoke water will prompt a similar germination response in *C. seorsiflora* subsp. *trichophylla*. DEC's Great Southern District will, in consultation with relevant authorities, conduct research into the effectiveness of fire, smoke water, and mechanical disturbance in stimulating germination of soil stored *C. seorsiflora* subsp. *trichophylla* seed. Care will be taken to avoid stimulating competition with existing *C. seorsiflora* subsp. *trichophylla* plants. The results of all trials will be monitored regularly and, if successful, a larger scale operation undertaken. Attention will be given to

each of the following to ensure maximum recruitment, while at the same time maintaining the integrity of the population:

a) burning discrete dead plants
b) raking of the soil near dead plants

Action: Develop and implement fire and disturbance trials
Responsibility: DEC (Science Division, Great Southern District) through the GSDTFRT and relevant authorities
Cost: $2,400 in the first year; $1,700 annually in years 2-5

10. Promote awareness

The importance of biodiversity conservation and the protection of *Conostylis seorsiflora* subsp. *trichophylla* will be promoted to the public. This will be achieved through an information campaign using local print and electronic media and by setting up poster displays. An A4 sized information sheet that provides a description of the subspecies and information about threats and recovery actions, will be developed for *C. seorsiflora* subsp. *trichophylla* and distributed to local land owners, relevant authorities, volunteer organisations, libraries and schools. It is hoped that the poster will result in the discovery of new populations. Formal links with local naturalist groups and interested individuals should also be encouraged.

To minimize the risk of accidental or deliberate destruction, the exact location of *Conostylis seorsiflora* subsp. *trichophylla* will be kept from the general public. Such information should, however, be given to relevant landowners, Shire staff and government authorities.

Action: Promote awareness
Responsibility: DEC (Great Southern District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the GSDTFRT
Cost: $1,600 in the first year, $1000 in years 3 and 5.

11. Develop and implement a rabbit control strategy

Rabbits (*Oryctolagus cuniculus*) are a threat to all populations of *Conostylis seorsiflora* subsp. *trichophylla*. In addition to grazing, rabbits also impact on populations by causing erosion, addition of nutrients, damaging root systems through burrowing, and introducing weed species and assisting the invasion through soil digging.

Control strategies will be developed and implemented in consultation with relevant land managers.

Action: Develop and implement a rabbit control strategy
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $2,400 per year

12. Conduct further surveys

All known populations of *Conostylis seorsiflora* subsp. *trichophylla* will be resurveyed to ascertain accurate boundaries and ensure that no plants have been missed during previous surveys.

Surveys will also be undertaken in other areas of suitable habitat, including habitat on private land, but will focus on lands with secure tenure. Surveys will be done during the subspecies' flowering period between October and November. Volunteers from the local community, wildflower societies and naturalists clubs will be invited to become involved in surveys, supervised by DEC staff.

Action: Conduct further surveys
Responsibility: DEC (Great Southern District) and volunteers through the GSDTFRT
Cost $1,500 per year

13. Develop and implement a fire management strategy

It is important that a fire regime with appropriate fire intensity, frequency and seasonality be developed to maximise population size and health, and minimise the risk of population senescence. The construction of a fire management strategy, including recommendations on prescription fire frequency, intensity and seasonality, precautions to prevent wildfire and a strategy for reacting to wildfire, will be completed. It will also contain details on the need, method of construction, and maintenance of firebreaks.

Action: Develop and implement a fire management strategy
Responsibility: DEC (Great Southern District) through the GSDTFRT and relevant authorities
Cost: $2,500 in first year and $1,000 in subsequent years

14. Map habitat critical to the survival of *Conostylis seorsiflora* subsp. *trichophylla*

It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas described have not yet been mapped and that will be redressed under this action.

Action: Map habitat critical to the survival of *Conostylis seorsiflora* subsp. *trichophylla*
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $3,000 in the second year

15. Develop and implement a translocation proposal

Translocations may be essential for the long-term conservation of this subspecies, due to the few locations in which it is found and the insecurity of tenures on which Populations 1 and 3 occur. 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* (adopted by DEC). Surveying of suitable habitat for potential translocation sites is required.

Translocation will be addressed in a full Recovery Plan if deemed necessary. Translocations will be coordinated by the GSDTFRT. All translocation proposals require endorsement by the Director of Nature Conservation.

Action: Develop and implement a translocation proposal
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: $13,300 in third year and $6,200 in years 4 and 5

16. Review the need for further recovery actions

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

Action: Review the need for further recovery actions
Responsibility: DEC (SCB, Great Southern District) through the GSDTFRT
Cost: $1,500 in the fourth year

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	GSDTFRT	Ongoing
Liaise with relevant land managers	High	DEC (Great Southern District) through the GSDTFRT	Ongoing
Monitor populations	High	DEC (Great Southern District) through the GSDTFRT	Ongoing
Collect seed and other material to preserve genetic diversity	High	DEC (TFSC, Great Southern District) and BGPA, through the GSDTFRT	Ongoing
Extend and maintain fencing	High	DEC (Great Southern District) through the	2008

Recovery Actions	Priority	Responsibility	Completion date
		GSDTFRT	
Undertake weed control and follow-up with additional control if required	High	DEC (Great Southern District) through the GSDTFRT	Ongoing
Obtain biological and ecological information	High	DEC (Science Division, Great Southern District) through the GSDTFRT	2012
Seek security of tenure for Subpopulation 1b	High	DEC (Great Southern District) through the GSDTFRT	2008
Develop and implement fire and disturbance trials	High	DEC (Science Division, Great Southern District) through the GSDTFRT, and relevant authorities	Develop by 2008 with implementation ongoing
Promote awareness	High	DEC (Great Southern District, SCB and Strategic Development and Corporate Affairs Division) through the GSDTFRT	Ongoing
Develop and implement a rabbit control strategy	Moderate	DEC (Great Southern District) through the GSDTFRT	Develop by 2008 with implementation ongoing
Conduct further surveys	Moderate	DEC (Great Southern District) through the GSDTFRT	Ongoing
Develop and implement a fire management strategy	Moderate	DEC (Great Southern District) through the GSDTFRT and relevant authorities	Develop by 2008 with implementation ongoing
Map habitat critical to the survival of *Conostylis seorsiflora* subsp. *trichophylla*	Moderate	DEC (Great Southern District) through the GSDTFRT	2009
Develop and implement a translocation proposal	Moderate	DEC (Great Southern District) through the GSDTFRT	2012
Review the need for further recovery actions	Moderate	DEC (SCB, Great Southern District) through the GSDTFRT	2011

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 taxon is still ranked EN 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.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Excerpt from: Hopper, S.D. (1987) *Flora of Australia*. Volume 45, Hydatellaceae to Liliaceae. Canberra: Australian Government Publishing Services. pp 85-7.

Conostylis seorsiflora

Plant forming prostrate mats 3-4 cm diam., connected by stoloniferous stems in network up to 40 cm across. Leaves flat, 2-16 cm long, 0.6-1.6 mm wide, glabrous, rarely tomentose. Flowers solitary; scape 0.1-5.2 cm long, usually with a median leafy glabrous bract 7-18 mm long, and 2 linear bracts subtending flower. Perianth 12-15 mm long, yellow, tomentose outside with branched hairs less than 1 mm long, loosely hairy inside; lobes 8-10.5 mm long. Stamens erect; filaments short; anthers 4-5.5 mm long. Style 7.5-10.5 mm long, ± equal to the stamens. *n* = 8, J.W. Green, *Proc. Linn. Soc. New South Wales* 85: 338 (1961).

Widespread near the south coast of W.A., from Tambellup to Cape Arid, with an outlier near Tincurrin.

The proliferous habit and solitary flowers are diagnostic. Related to *C. misera* rather than to *C. stylidioides sensu* J.W. Green, *op. cit.* 353-354.

There are 3 subspecies.

1. Leaves tomentose, silvery-grey ..... **Conostylis seorsiflora subsp. trichophylla**

1. Leaves glabrous except basal marginal hairs, green 2

    2. Leaves 2-9 cm long; pedicels 1-4.5 mm long ..... **Conostylis seorsiflora subsp. seorsiflora**

    2. Leaves 8-16 cm long; pedicels 2-12 mm long ..... **Conostylis seorsiflora subsp. longissima**

Conostylis seorsiflora subsp. trichophylla

Stems 2-6 cm long. Leaves 2-8 cm long, densely tomentose, silvery-grey. Pedicels 1-3 mm long.

Known only from type locality, where it grows in a seepage in dark brown sandy loam beneath an open woodland of *Eucalyptus* wandoo and open scrub. Flowers Oct.-Nov.

[*]

The silvery tomentose leaves are diagnostic. Disjunct and to the north of the species' main range.