INTERIM RECOVERY PLAN NO. 150

BOSCABEL CONOSTYLIS (*CONOSTYLIS SETIGERA* SUBSP. *DASYS*)

INTERIM RECOVERY PLAN

2003-2008

Bethea Loudon

Photo S. Hopper
August 2003

Department of Conservation and Land Management
Katanning District Office
PO Box 811, Katanning, WA 6317

Natural Heritage Trust
Helping Communities Helping Australia

Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (DCLM) Policy Statements Nos. 44 and 50.

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

DCLM is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from August 2003 to July 2008 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was approved by the Director of Nature Conservation 21 September, 2003. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting DCLM, as well as the need to address other priorities.

Information in this IRP was accurate at August 2003.

SUMMARY

Scientific Name:	*Conostylis setigera* subsp. *dasys*	**Common Name:**	Boscabel Conostylis
Family:	Haemodoraceae	**Flowering Period:**	October-November
Dept Region:	Wheatbelt	**Dept District:**	Katanning
Shire:	Shire of Kojonup	**Recovery Team:**	Katanning District Threatened Flora Recovery Team

Illustrations and/or further information: A. Brown, C. Thomson-Dans and N. Marchant (Eds) (1998) *Western Australia's Threatened Flora;* S.D. Hopper, R.W. Purdie, A.S. George and S.J. Patrick (1987), Haemodoraceae - *Conostylis*, *Flora of Australia* 45: 57-110.

Current status: *Conostylis setigera* subsp. *dasys* was declared as Rare Flora and ranked Endangered November 1991. In September 1999 the subspecies was upgraded to Critically Endangered. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria A1(a); B1ab(iii)+2ab(iii) due to an estimated decline in the number of mature individuals of 90% over three generations, a geographic range of less than 100 km^2 and area of occupancy less than 10 km^2, a severe fragmentation of populations (just two known) and a continuing decline in the quality of habitat. The main threats are the taxon's narrow distribution, habitat degradation due to the effects of *Phytophthora cinnamomi*, rabbits and poor seed production/viability.

Critical habitat: The critical habitat for *Conostylis setigera* subsp. *dasys* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; and additional nearby occurrences of similar habitat that do not currently contain the taxon but may have done so and may be suitable for future translocations.

Habitat critical to the survival of the species, and important populations: Given that this subspecies is listed as Critically Endangered it is considered that all known habitat for wild and future translocated populations is habitat critical and that all populations are important.

Benefits to other species/ecological communities: There are no threatened ecological communities or other threatened species in the immediate vicinity of *Conostylis setigera* subsp. *dasys*. However, recovery actions implemented to improve the quality or security of the habitat of the subspecies, such as rabbit control, will benefit the remnant bushland habitat in which it occurs.

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. However, as *Conostylis setigera* subsp. *dasys* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people: There are no known indigenous communities interested or involved in the management of areas affected by this plan.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and/or economic impacts. Populations occur on road reserves, a gravel reserve, unvested crown land and private property. Negotiations have resulted in a voluntary agreement that the area directly supporting the species on private property will be left uncleared.

Evaluation of the Plans Performance: The Department of Conservation and Land Management (DCLM), in conjunction with the Recovery Team 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.

Habitat requirements: *Conostylis setigera* subsp. *dasys* is currently known from just two populations northwest of Kojonup. It grows in gravelly loam, gravelly sand and occasionally gravel, in *Eucalyptus marginata* and *E. wandoo* woodlands with low heath where Jarrah is dominant over Wandoo.

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

1. Managers of land on which Population 1 and 2 occur have been made aware of the location and threatened status of the taxon.

2. Population 1B is a large piece of privately owned bush, fenced for conservation purposes. Other subpopulations of Population 1 and Population 2 are unfenced but are not affected by stock.
3. Some 63 seeds were collected from Population 1C and 70 seeds from Population 2 in December 1999. These are stored in DCLM's Threatened Flora Seed Centre at –18°C. Germination results were poor (0% and 11%).
4. The Botanic Garden and Parks Authority (BGPA) currently have 8 plants (of one clone) of *Conostylis setigera* subsp. *dasys*, and all are growing in the BGPA Nursery.
5. Cuttings were taken by Luke Sweedman (BGPA) in September 1993 from Population 1A.
6. Declared Rare Flora (DRF) markers are in place on road verges for populations 1A and 1D.
7. Environmental markers are present on power poles (Pole #127, 128 & 129) at Population 1B.
8. Staff from DCLM's Katanning District regularly monitor populations of the taxon.
9. The Katanning District Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include information on progress in an annual report to DCLM's Corporate Executive and funding bodies.

IRP Objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the taxon in the wild.

Recovery criteria
Criterion for success: The number of individuals within populations and/or the number of populations have increased by 10% or more.
Criterion for failure: The number of individuals within populations and/or the number of populations have decreased by 10% or more.

Recovery actions
1. Coordinate recovery actions
2. Liaise with land managers
3. Establish DRF markers
4. Collect seed and cutting material
5. Control rabbits, monitor rabbit activity & numbers
6. Monitor populations
7. Conduct further surveys
8. Promote awareness, disseminate information
9. Obtain biological and ecological information
10. Conduct weed control
11. Develop a fire management strategy
12. Review this IRP and revise it or prepare a full Recovery Plan if necessary

1. BACKGROUND

History

S.D. Hopper first collected *Conostylis setigera* subsp. *dasys* from a road reserve north of Kojonup in October 1976. The holotype was collected in November 1985 from the same location, also by Hopper. Several subpopulations were located in close proximity in the following years and a second population almost 2km to the west, in November 1990.

The subspecies was named after the Greek word *dasys* meaning 'shaggy', referring to the leaf hairs (Hopper *et al* 1987).

In a number of locations where the soil type changes to white sand with some gravel on lower slopes, *Conostylis drummondii*, also Declared Rare Flora, can be found growing with *Conostylis setigera* subsp. *dasys.*

Description

Conostylis setigera subsp. *dasys* is a tufted perennial herb 15-30cm in height. The distinctive leaves are flat with rough, white shaggy hairs over the entire surface and margins, and are coarse to touch. The typical yellow *Conostylis* inflorescence appears on stalks that are usually shorter than the leaves, in heads of 5-10 flowers. Flowering occurs between October and November with flowers changing to red with age (Hopper *et al* 1987).

Conostylis setigera subsp. *dasys* differs from subsp. *setigera* in its later flowering season and the condition and/or presence of hairs on the leaf lamina (subsp. *setigera* flowers August to October and has glabrous leaf lamina except for the margins or with sparse fine hairs, compared to the presence of shaggy, scabrid hairs over entire leaf surface of subsp. *dasys*) (Hopper *et al* 1987).

It is possible that subsp. *dasys* may be elevated to species level some time in the future based on recent molecular work (pers. comm. S. Hopper[1] via A. Brown[2], 2003).

Distribution and habitat

Conostylis setigera subsp. *dasys* is currently known from just two populations north-northwest of Kojonup. At both locations it grows with *Allocasuarina humilis, Eucalyptus marginata, E. wandoo, Dryandra nivea* and *Petrophile serruriae* in gravelly loam or gravelly sand.

Biology and ecology

Only small amounts of seed could be collected from plants in December 1999. Many fruits were predated and seed aborted (pers. comm. A. Cochrane[3], 2002). Initial germination results recorded 0% and 11%, indicating that seed set and viability may be low in this species, however the low seed numbers (~10 from each site) used in the tests may also have had an affect on this outcome. Cochrane stated that Conostylis release their seed at any time once mature, making it difficult to collect - a case of needing to be in the right place at the right time. It would appear that the species produces low amounts of seed that are passively dispersed each season, as well as being subject to high rates of abortion and predation. High rates of predation are seen in other Genera of the Haemodoraceae Family (pers. comm. A. Cochrane[3], 2002/2003).

Flower colour and size would indicate that *Conostylis setigera* subsp. *dasys* is insect pollinated. Hopper suggested that the species would almost certainly be pollinated by native bees (Halactid). Other Conostylis species are pollinated by these bees (pers. comm. S. Hopper[1] via A. Brown[2], 2003).

It is difficult to determine plant ages due to the varying heights of flowering plants; on occasion even some small plants with only a few leaves had evidence of flowering in the past season. There is also a limited few that are obviously of considerable age being quite dense clumps. There appears to be a mixture of young, small plants as well as mature dense tufts of plants.

[1] Steve Hopper, Chief Executive Officer, Botanic Parks and Gardens Authority
[2] Andrew Brown, Coordinator Threatened Flora, WATSCU
[3] Anne Cochrane, Manager, the Department's Threatened Flora Seed Centre

A study on the germination of four native species of Western Australia using plant-derived smoke, found that the application of diluted and full strength smoke water substantially improved the germination of *Conostylis setigera* (subsp. *setigera*) (Tieu and Dixon, 1990). It is quite possible that the same results would be seen in *C. setigera* subsp. *dasys*, suggesting that the taxon may respond well to fire.

Factors and constraints relevant to the long-term survival and future population growth of the taxon may include the species' breeding system/pollinator activity or vector, seed production/viability and predation, along with grazing by rabbits, and restriction to the particular soil/slope/topography and vegetation types (ie *C. setigera* subsp. *dasys* appears to be excluded from heavy loamy soils and deep sand).

Threats

Conostylis setigera subsp. *dasys* was declared as Rare Flora and ranked Endangered November 1991. In September 1999 the subspecies was upgraded to Critically Endangered. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria A1(a); B1ab(iii)+2ab(iii) due to an estimated decline in the number of mature individuals of 90% over three generations, a geographic range of less than 100 km^2 and area of occupancy less than 10 km^2, a severe fragmentation of populations (just two known) and a continuing decline in the quality of habitat. The main threats are the taxon's narrow distribution, habitat degradation due to the effects of *Phytophthora cinnamomi*, rabbits and poor seed production/viability.

- **Limited geographical range** is a threat to the taxon as single catastrophic events have the potential to cause extinction.
- **Insecure tenure** could result in a change of land ownership and may place populations at risk from inappropriate future management practices.
- **Rabbits** appear abundant in the vicinity of the west portion of Population 1B and at 1D where grazing of plants is evident. Lower plant numbers in the vicinity of powerlines (west portion of Population 1B) may be the result of rabbits as high grazing pressure and evidence of higher rabbit numbers is clearly visible where the vegetation is quite open with considerable bare ground. High levels of grazing of native grasses and sedges was observed with plants chewed back to small, dense clumps at ground level. Where plants occur in natural, undisturbed bush that is denser, the rare species was not grazed. Numerous rabbit warrens occur near Population 1D. Rabbit control should be undertaken at 1D and west part of 1B near powerlines, with monitoring of other areas for evidence of increased rabbit numbers and grazing. Kangaroos do not appear to be a problem, although numbers may be high, as grazing of the Declared rare Flora (DRF) is linked to high incidence of rabbit activity.
- **Fire** response of *Conostylis setigera* subsp. *dasys* plants is not known. The rest area/parking bay adjacent to Population 1C has evidence of campfires which may pose a threat if they escape, both directly to individual plants and by altering the habitat through the establishment of weeds. Research into fire response is required to determine effects on mature plants.
- **Road maintenance** such as road widening, slashing of road verge vegetation, weed control, grading of road shoulders and backslopes and construction of drains have the potential to affect Populations 1A and 1D. Relevant management authorities have been informed of the location of the populations and the threatened nature of the species.
- **Powerline maintenance** including vegetation pruning or removal from beneath powerlines and vehicular access directly beneath poles and overhead wires have the potential to impact on the western portion of Population 1B. The respective management authority is aware of the presence of the DRF and its threatened nature. Environmentally Sensitive Area (ESA) markers have been placed on power poles in the vicinity of the plants and special management instructions provided by a consultant to the managing authority during a recent investigation involving the occurrence of DRF beneath power lines.
- **Rest area/parking bay maintenance** such as grading, widening and weed control have the potential to impact on the species at Population 1C. The relevant land manager has been informed of the location of the population and the threatened nature of the species.
- **Phytophthora cinnamomi** or possibly **Armillaria** may be impacting on the Jarrah (*Eucalyptus marginata*) and parrot bush (*Dryandra sessilis*). There are localised signs of recent and old deaths of these species, indicating that a pathogen of some sort may be involved. It is not known whether or not *Conostylis setigera* subsp. *dasys* is susceptible to *Phytophthora cinnamomi.* Testing of the species' susceptibility to this

pathogen is required. However, at present it does not appear to be affected with only one dead plant observed at Population 2. Even if the *Conostylis* is not directly susceptible, a decline and degradation of the vegetation and habitat in which it occurs may impact on the rare species in the long term. Interpretation and testing for the presence of *Phytophthora cinnamomi* or *Armillaria* at all sites is required.

- **Weeds** are not a problem at present at either of the populations. However, monitoring needs to continue so that weeds in rest area/parking bay (1C) and along the road reserve of Population 1A (west verge) do not proliferate and impact on the *Conostylis* by competing for space, nutrients and moisture. All other sites are relatively pristine pieces of bush. Liaison with the Shire may be required regarding the issue of weed invasion and control at Population 1C.
- **Gravel extraction** has not occurred near Population 1C for many years (perhaps since before the population was first surveyed in 1988) with old pits immediately to the east of where the plants are currently growing. However, there is a potential for extraction to occur in the future. Liaison with the Shire of Kojonup on the matter may be required.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. NNW of Kojonup	MRWA road reserve	1987/45 1988/17 (partial count) 1993/20 1998/26 1999/24 2003/348	Healthy Healthy Healthy Healthy Healthy	Road maintenance
1b. NNW of Kojonup	Private Property	1987/0 1988/1000 1997/2 1998/0 2001/23 2003/175	 Healthy Healthy	Phytophthora?, powerline maintenance, rabbits
1c. NNW of Kojonup	Shire gravel reserve & rest area	1998/50 1999/31 1999/30 2003/465	Healthy Healthy	Parking bay/rest area maintenance, potentially weeds in centre of rest area, inappropriate fire, Phytophthora?
1d. NNW of Kojonup	Shire road reserve	1992/2 2003/17	Undisturbed Healthy	Road maintenance, rabbits
2. NW of Kojonup	Unvested Crown Land - Townsite	1990/50 1997/100 1998/20 2003/340	Undisturbed Healthy Healthy Healthy	Phytophthora?

Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms or once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced. (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

The critical habitat for *Conostylis setigera* subsp. *dasys* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, i.e. gravelly loam or gravelly sand in *Eucalyptus marginata*(dominant)*/wandoo* woodland over low heath of *Allocasuarina humilis, Dryandra nivea* and *Petrophile serruriae* (these provide potential habitat for natural range extension);
- additional occurrences of similar habitat nearby that do not currently contain the taxon but may have done so in the past (these represent possible translocation sites).

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

Given that this subspecies is listed as Critically Endangered it is considered that all known habitat for wild and any future translocated populations is habitat critical and that all populations are important.

Benefits to other species/ecological communities

There are no threatened ecological communities in the immediate vicinity *Conostylis setigera* subsp. *dasys*. One other threatened plant (*Conostylis drummondii*) is known to occur in the area of both populations. Recovery actions, such as rabbit control, implemented to improve the quality or security of the habitat of *Conostylis setigera* subsp. *dasys*, will also benefit *Conostylis drummondii* and the remnant bushland habitat in which they both occur.

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. However, as *Conostylis setigera* subsp. *dasys* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and/or economic *impacts*. Populations occur on road reserves, a gravel reserve, unvested crown land and private property. Negotiations have resulted in a voluntary agreement that the area directly supporting the species on private property will be left uncleared.

Evaluation of the Plans Performance

The Department of Conservation and Land Management (DCLM), in conjunction with the Recovery Team 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.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks etc) in the immediate vicinity of *Conostylis setigera* subsp. *dasys* will require assessment. On ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the taxon, its habitat or potential habitat.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the taxon in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have increased by 10% or more.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by 10% or more.

3. RECOVERY ACTIONS

Existing recovery actions

The managers of land containing all subpopulations have been notified of the location and threatened status of *Conostylis setigera* subsp. *dasys*. The notification details the Declared Threatened status of the taxon and the associated legal responsibilities.

The large expanse of privately owned natural bushland containing Population 1B has been fenced for a very long time. The current owners have been in possession of the land for almost 20 years and are very conservation minded having purchased the land for its natural bush.

Sixty-three seeds were collected from Population 1C in December 1999 and 70 seeds from Population 2 also in December 1999. Many fruits were reported to be predated and the seed aborted. This, along with low levels of seed production resulted in the low number of seed collected. Seeds are stored in DCLM's Threatened Flora Seed Centre (TFSC) at –18°C. Staff of the TFSC test the viability of seed soon after collection and again after one year in storage. The initial germination rate of *Conostylis setigera* subsp. *dasys* seed was 0% and 11% using a sample from each site consisting of only ~10 seeds. Tests after one year of storage have not been conducted due to the low amount of seed available and the poor germination rates (pers. comm. A. Cochrane[3], 2002).

The Botanic Gardens and Parks Authority (BGPA) currently have 8 plants of *Conostylis setigera* subsp. *dasys* growing in their Nursery. These plants originate from a single clone, the original plant being grown from seed in 1993 and the subsequent plant divided. Records of the propagation method used to germinate this seed are not available. Propagation of this taxon by cuttings has resulted in medium success, with results from division having roughly the same rate of success. Apart from the occurrence above, only one other record of propagation from seed exists. The BGPA received one seedling from the TFSC in 2000, however this plant did not survive for long perhaps due to its tiny size and fragility (pers. comm. A. Shade[4], 2003).

Staff from DCLM's Katanning District regularly monitor all populations of this taxon.

The Katanning District Threatened Flora Recovery Team (KDTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to DCLM's Corporate Executive and funding bodies.

Future recovery actions

As all subpopulations occur on non-departmental property, permission has been or will be sought from the land owners/managers prior to recovery actions being undertaken.

1. Coordinate recovery actions

The KDTFRT will continue to oversee the implementation of recovery actions for *Conostylis setigera* subsp. *dasys* and will include information on progress in its annual report to DCLM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $500 per year

2. Liaise with land managers

Renotify or personally liaise with all land owners/managers concerned and reiterate the critical nature and presence of *Conostylis setigera* subsp. *dasys* to ensure its long-term existence.

Action: Liaise with landowners/managers
Responsibility: DCLM (Katanning District) through the KDTFRT

[3]Anne Cochrane, Manager, the Department's Threatened Flora Seed Centre
[4]Amanda Shade, Horticulturist, Botanic Gardens and Parks Authority

Cost: $300 in first year

3. Establish DRF markers

Reposition DRF markers for Population 1D (south verge) and install markers for extension of Population 1A and 1D (north verge).

Action: Reposition and install markers
Responsibility: DCLM (TFSC, Katanning District) through the KDTFRT
Cost: $450 in the first year and $150 in subsequent years

4. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Such collections are also needed to propagate plants for possible future translocations. Some seed has been collected from Population 1C and 2 but further collections from both populations is necessary to expand the range of genetic material available and to ensure the species is adequately represented in storage. At this time cuttings will also be obtained to enhance the living collection at the BGPA.

Action: Collect seed and cutting material
Responsibility: DCLM (TFSC, Katanning District) through the KDTFRT
Cost: $3,000 for the first two years and $1,000 in subsequent years

5. Control rabbits,, monitor rabbit activity and numbers

Rabbit control is required at Population 1D and the west part of 1B near the powerlines. Regular monitoring of other sites for evidence of increased rabbit numbers and grazing is necessary. If the threat increases, rabbit control will be implemented in consultation with the land managers.

Action: Rabbit control and monitoring
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $200 per year

6. Monitor populations

Annual monitoring of factors such as population stability (expansion or decline), habitat degradation, pollinator activity, seed production, recruitment, longevity and predation is essential. Particular attention should be paid to the level of threat posed by weeds and rabbits. If this should increase, appropriate control should be undertaken.

Action: Monitor populations
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $2,000 per year

7. Conduct further surveys

Further surveys by Departmental staff and community volunteers will be conducted during the flowering period of the taxon (October to November). Population 1B and 2 need to be more extensively surveyed to determine the full extent of occurrence and plant numbers of *Conostylis setigera* subsp. *dasys* in these areas.

Action: Conduct further surveys
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $2,500 per year

8. Promote awareness, disseminate information

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this taxon will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged.
An information sheet, which includes a description of the plant, its habitat, threats, recovery actions and photos will be produced.

A reply paid postal drop illustrating *Conostylis setigera* subsp. *dasys* and describing its distinctive features and habitat will also be produced and distributed by DCLM's Katanning District office to local farmers and other residents in Shires containing possible habitat of the taxon. Staff from Katanning District will confirm the identification of any populations found through this action. Postal drops aim to stimulate interest, provide information about threatened species and provide a name and number to contact if new populations are found by members of the community.

Action: Promote awareness
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $1,200 in first year and $600 in subsequent years

9. Obtain biological and ecological information

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

1. The soil seed bank dynamics and the role of disturbance (including fire and soil disturbance), competition, rainfall and grazing in recruitment and seedling survival.
2. The effect of *Phytophthora cinnamomi* on the species (whether it is resistant or susceptible to the disease).
3. The pollination biology of the species.
4. The reproductive needs, phenology and seasonal growth of the species.
5. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: DCLM (Science Division, Katanning District) through the KDTFRT
Cost: $6,000 for the first year and $2000 in subsequent years

10. Weed control

Liaison with the Shire may be required regarding the issue of weed invasion and its control at Population 1C. Presently, the level of threat from weeds in all subpopulations is very low. However, if weed numbers increase there is potential that they will impact on *Conostylis setigera* subsp. *dasys* by preventing seed germination, competing for resources, exacerbating grazing pressure, and increasing the risk and severity of fire. If during monitoring it is deemed that the threat from weeds has increased, weed control using appropriate methods will be undertaken in consultation with the land managers.

Action: Weed control
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $500 per year

11. Develop a fire management strategy

There is evidence of fire having occurred within populations of *Conostylis setigera* subsp. *dasys* during the last 50 years, however, the precise effect on mature plants, seedlings and soil-stored seed of is not known. If the subspecies is typical of many other *Conostylis* taxa it is likely that fire will stimulate germination of soil-stored seed. Currently, fire presents a medium level of threat to the taxon as, although the habitat is fire prone, the risk of frequent fire is low and habitat recovery rate moderate-rapid. A fire management strategy will be developed to determine fire control measures and fire frequency.

Action: Develop a fire management strategy
Responsibility: DCLM (Katanning District) through the KDTFRT
Cost: $1,500 for preparation and $500 for implementation in subsequent years

12. Review this IRP and revise it or prepare a full Recovery Plan if necessary

If the taxon is still ranked as Critically Endangered at the end of the fourth year of the five-year term of this Interim Recovery Plan the need to rewrite this IRP or to replace it with a full Recovery Plan (RP) will be determined.

Action: Review this IRP and revise it or prepare a full Recovery Plan if necessary
Responsibility: DCLM (WATSCU, Katanning District) through the KDTFRT
Cost: $20,000 in the fifth year (if required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from August 2003 to July 2008 but will remain in force until withdrawn or replaced. If the taxon is still ranked Critically Endangered after five years, the need to rewrite this IRP or to replace it with a full RP will be determined.

5. ACKNOWLEDGMENTS

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

Anne Cochrane	Manager, DCLM's Threatened Flora Seed Centre
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Steve Hopper	Chief Executive Officer, Botanic Gardens and Parks Authority
Andrew Brown	Coordinator, Threatened Flora, DCLM's WA Threatened Species and Communities Unit

Thanks also to the W.A. Herbarium for providing access to Herbarium databases and specimen information.

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

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***Conostylis setigera* –** Tufts to 20 cm diam., stems short. Leaves flat, 8-36 cm long, 1-4 mm wide, striate, green with white hairs 0.7-4.5 mm long in several ranks on each margin, otherwise glabrous or rarely hairy. Inflorescence capitate, of 5-10 flowers; scape 4-20 cm long, usually shorter than leaves; scapose bracts 1 or 2, 0.9-4.5 cm long and leaf-like; bracts subtending inflorescence short. Perianth 10-15 mm long, yellow, suffused red with age, woolly-tomentose with branched hairs outside, shortly woolly inside; lobes 5-9 mm long. Stamens biseriate; filaments 0.2-1.5 mm long; anthers 2-3.5 mm long. Style 6-11.5 mm long, ± equal to stamens.

***Conostylis setigera* subsp. *dasys* –** Leaves 15-30cm long, 1-2mm wide; lamina with shaggy hairs that are white on new growth, aging to black. A rare taxon with distinctive leaves.
Distribution and habitat. Confined to the Kojonup area of the southern wheatbelt of WA. Grows in gravelly loam and sand in *Eucalyptus marginata* and *E. wandoo* low open woodland and low heath.
Flowering period. October-November.
Etymology. From the Greek *dasys* (shaggy), in reference to the leaf hairs.

***Conostylis setigera* subsp. *setigera* –** Leaves 5-36 cm long 1-4 mm wide; lamina glabrous or with sparse fine hairs; marginal hairs usually white.
Distribution and habitat. Widespread from Gillingarra south to Augusta and east to Cape Arid in southern WA. Grows in various soils and plant communities, from rich gravelly loam in forest to deep sand in woodland and heath. A variable taxon.
Flowering period. August-October.