INTERIM RECOVERY PLAN NO. 80

# LATE HAMMER ORCHID

## (*DRAKAEA CONFLUENS* MS)

# INTERIM RECOVERY PLAN

## 2001-2003

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Photograph: A. Brown

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Western Australian Threatened Species and Communities Unit
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## 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.

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.

CALM 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This Interim Recovery Plan will operate from January 2001 to December 2003 but will remain in force until withdrawn or replaced. It is intended that, unless the taxon is no longer threatened with extinction, this IRP will be replaced by a full Recovery Plan after three years.

This IRP was approved by the Director of Nature Conservation on 12 April, 2001. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at January 2001.

## SUMMARY

**Scientific Name:** ***Drakaea confluens* ms**
**Common Name:** Late Hammer Orchid
**Family:** Orchidaceae
**Flowering Period:** September to November
**CALM Regions:** South Coast, Central Forest
**CALM Districts:** Albany, Mornington
**Shires:** West Arthur, Gnowangerup

**Recovery Teams**

Albany District Threatened Flora Recovery Team (ADTFRT); Central Forest Region Threatened Flora Recovery Team (CFRTFRT)

**Illustrations and/or further information:** Brown, A., Thomson-Dans, C. and Marchant, N. (Eds) (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Hoffman, N. and Brown, A. (1998) *Orchids of South-west Australia*. Revised 2nd edition with supplement. University of Western Australia Press, Nedlands; Stoutamire, W.P. (1975) Australian Terrestrial Orchids, Thynnid Wasps and Pseudocopulation. *American Orchid Society Bulletin*, 43:13-18.

**Current status:** *Drakaea confluens* ms was declared as Rare Flora in October 1996 and was ranked Critically Endangered (CR) in December 1997. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'CR' under criteria B1+2c due to the severe fragmentation of populations and a decline in the area, extent and quality of habitat. The main threats are inappropriate fire regimes, grazing, firebreak maintenance, recreational activities, weed invasion and disease.

**Habitat requirements:** *Drakaea confluens* ms is endemic to Western Australia where it is found in two widely separated areas, northeast of Boyup Brook and in the Stirling Range National Park. It grows in deep sandy soil in mixed jarrah (*Eucalyptus marginata*) and Banksia (*Banksia attenuata*) woodland (Hoffman and Brown, 1998). It is currently known from eight extant populations with a total of approximately 180 plants and from two populations in which there are no extant plants.

**Critical habitat:** The critical habitat of *Drakaea confluens* ms comprises the area of known populations, adjacent areas of similar habitat within 200 metres of populations, corridors of remnant vegetation that link populations, and other nearby occurrences of suitable habitat that are not currently known to contain populations of the species but which may be suitable for translocations.

**Existing Recovery Actions**: The following recovery actions have been or are currently being implemented:
1. Appropriate land managers have been informed of the species' location and their legal obligations.
2. Declared Rare Flora (DRF) markers have been installed at Population 9.
3. Dashboard stickers and posters that illustrate DRF markers and describe their purpose have been produced and distributed.
4. CALM and members of the WA Native Orchid Study and Conservation Group (WANOSCG) have undertaken many surveys for the species.
5. Populations 4 and 5 were fenced to exclude stock.
6. Control of kangaroos to reduce grazing at Populations 4 and 5 has been ongoing by the landowner.
7. Action is underway to have the tenure and vesting of land containing Population 7 changed to that of conservation.
8. An experimental burn was undertaken on private property (Population 4) in April 2000.
9. The Albany District and Central Forest Region Threatened Flora Recovery Teams are overseeing the implementation of this IRP.
10. CALM staff from the Albany District and Central Forest Region Office's regularly monitor populations.

**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**

**Criteria for success:** The number of individuals within populations and/or the number of populations have increased.

**Criteria for failure:** The number of individuals within populations and/or the number of populations have decreased.

**Recovery actions**

1. Coordinate recovery actions.
2. Develop and implement a fire management strategy.
3. Collect seed and tissue culture material.
4. Monitor and control vertebrate grazing.
5. Conduct further surveys.
6. Undertake weed control.
7. Apply phosphite as required.
8. Monitor the impact of phosphite application.
9. Notify and liaise with relevant land owners.
10. Monitor populations.
11. Protect populations on private land.
12. Obtain biological and ecological information.
13. Promote awareness.
14. Incorporate recovery actions into the Interim Management Guidelines (IMG's) for a new conservation park
15. Write a full Recovery Plan.

# 1. BACKGROUND

## History

*Drakaea confluens* ms was first recognised as being distinct by E. Chapman[1], who discovered the species growing in bushland on his farm near Boyup Brook. Further collections of the species, housed at the Western Australian Herbarium, were made by in 1983 by CALM staff from an area near Mondurup Peak in the Stirling Range National Park. Although the Boyup Brook populations flower every year, only one of the Stirling Range populations has been seen since despite numerous subsequent surveys.

Following surveys in the Boyup Brook and Stirling Range National Park areas by CALM staff and orchid enthusiasts, one new population was found in Haddleton Nature Reserve by Mr Chapman in 1990 and another near Lake Ngartiminny by staff from CALM's Collie District in 1992. A survey by members from the Western Australian Native Orchid Study and Conservation Group (WANOSCG) in 1999 also resulted in the discovery of a new population in Camel Lake Nature Reserve north of the Stirling Range. In October 2000 another new population was discovered by orchid enthusiasts in the Stirling Range National Park. Despite these surveys, most *D. confluens* ms populations consist of very few mature plants with only around 180 plants known in total.

In 1999, fire burnt the area containing Population 8 of *Drakaea confluens* ms and the area adjacent to Population 9, within Stirling Range National Park and Camel Lake Nature Reserve. Regeneration of the site will be monitored. Population 1 was also burnt in 1983 and Population 2 in 1996, both in Stirling Range National Park.

## Description

*Drakaea confluens* ms grows 15 to 30 cm high. It has a single greyish-green, heart-shaped leaf, held flat to the ground. The leaf is one to two centimetres across and may either be smooth or covered with short hairs. The flower stem, up to 30 cm long, supports a single flower which is two to four centimetres long and three to five millimetres wide (Brown *et al*., 1998; Hoffman and Brown, 1998).

*Drakaea confluens* ms grows with other hammer orchids such as *D. livida* and *D. glyptodon* but begins flowering when they are finishing. *D. confluens* ms is distinguished easily from related species of hammer orchid by its leaf which if often covered in short dense hairs, and flower which has a two coloured labellum with a straight, rather than upturned, apex (Hoffman and Brown, 1998).

## Distribution and habitat

*Drakaea confluens* ms is endemic to Western Australia where it is found in two widely separated areas, northeast of Boyup Brook and in the Stirling Range National Park. It grows in deep sandy soil in mixed jarrah (*Eucalyptus marginata*) and Banksia (*Banksia attenuata*) woodland (Hoffman and Brown, 1998). The vegetation type at Population 9 differs slightly from that of other populations, consisting mostly of *Melaleuca* and mallee *Eucalyptus* over heath. The species is known from eleven populations and a total of approximately 180 mature plants.

Associated species include *Melaleuca preissiana*, *Leptospermum erubescens*, *Phlebocarya ciliata*, *Hibbertia subvaginata*, *Acacia extensa*, *Drakaea livida*, *D. glyptodon*, *Kunzea ericifolia*, *Jacksonia furcellata*, *Xanthorrhoea preissii*, *Melaleuca scabra*, *Calytrix flavescens*, *Petrophile linearis*, *Adenanthos obovatus*, *Kunzea recurva*, *Xanthorrhoea platyphylla*, *Melaleuca striata*, *Lambertia inermis*, *Conospermum floribundum*, *Regelia inops*, *Paracaleana nigrita*, *Persoonia longifolia*, *Allocasuarina fraseriana* and *Gompholobium scabrum*.

## Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or community. Habitat means the biophysical medium or media: (a) occupied (continuously, periodically or occasionally) by an

[1] Eric Chapman, Orchid enthusiast Boyup Brook

organism or group of organisms; or (b) 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 *Drakaea confluens* ms comprises:

- The habitat of known populations.
- Similar habitat within 200 metres of known populations (these provide potential habitat for natural recruitment).
- Corridors of remnant vegetation that link populations with other nearby areas of apparently suitable habitat that do not currently contain the species.
- Areas of similar habitat that may be used for future translocation.

Explanatory Note: Adjacent uncleared vegetation linked to the known habitat of the species and additional occurrences of the habitat are potential areas for the species and provide opportunities for reintroduction, re-invasion and translocation. They may also provide habitat for the orchid's pollinator.

**Biology and ecology**

*Drakaea* is a small genus of nine species, all of which are endemic to the south-west of Western Australia (Hoffman and Brown, 1998). They are commonly known as hammer orchids because of unusual hammer-like shape of the labellum found in all species. The labellum approximates a female Thynnid wasp in scent and appearance and attracts male wasps. The male wasp attempts to fly away holding the labellum but because it is hinged the wasp comes into contact with the column picking up or depositing pollen (Stoutamire, 1974).

Preliminary observations of pollinator activity by staff of the Botanic Garden and Parks Authority (BGPA) suggest hand pollination is required to secure further seed and to improve natural recruitment (personal observation K. Dixon[2]).

The flowering time of *Drakaea confluens* ms differs between Stirling Range populations, which start flowering in September, and Boyup Brook populations, which begin flowering in October.

It is likely that the orchid would be killed by fire if burnt during its active growing period (late April to late November) but that fires during its dormancy period (December to early April) would cause no damage to plants. An experimental burn was undertaken in April 2000 at Population 4 to assess fire response and to develop operational scale fire regimes. The area will continue to be closely monitored.

Like other *Drakaea* species, *D. confluens* ms colonises disturbed areas, such as old firebreaks. Once the canopy cover becomes enclosed, the orchid gradually disappears. However, continued disturbance, such as annual grading of firebreaks, is known to kill plants of *Drakaea* species.

**Threats**

*Drakaea confluens* ms was declared as Rare Flora in October 1996 and was ranked Critically Endangered (CR) in December 1997. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'CR' under criteria B1+2c due to the severe fragmentation of populations and a decline in the area, extent and quality of habitat. The main threats are inappropriate fire regimes, grazing, firebreak maintenance, recreational activities, weed invasion and disease.

- **Inappropriate fire** during late Autumn, Winter and Spring can adversely affect the viability of populations by killing flowering plants and preventing seed set. Fire during the summer when plants are dormant has no detrimental effect. Most orchid species emerge from the soil by mid-April and dehisce their seed by late November. The optimum time for fire is therefore from December to mid April. Proliferation of weeds is

[2] Kingsley Dixon, Botanic Garden and Parks Authority

often a consequence of burning. These produce an annual fuel load that is usually more combustible than the original native vegetation.

- **Grazing** of *Drakaea confluens* ms by kangaroos (*Macropus fuliginosus*) has been recorded at Populations 4, 5 and 7. Grazing and trampling may damage *D. confluens* plants thereby limiting natural recruitment.

- **Firebreak maintenance** may threaten Population 9 (see Biology and ecology). The land manager is aware of the location of the population and Declared Rare Flora markers are installed to prevent possible damage.

- **Weed invasion** is a threat to Population 5. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species (Lynch 1987; Saunders *et al*. 1987; Taylor 1987). In addition to the proximity of a weed seed source, effects include increased wind speed, modified hydrology and altered disturbance regimes, including fire.

- **Disease** may indirectly threaten all populations. Although it is unlikely that *Drakaea confluens* ms is susceptible to dieback, the habitat is highly susceptible and therefore impacts directly on the species. Deaths due to Dieback results in the removal of the upper canopy cover and change the vegetation structure of the lower canopy. Species that are resistant to dieback (eg, sedges) take over, resulting in a thickening of the canopy floor. Hammer orchids usually grow in open sandy patches between shrubs and cannot survive under a thick canopy. Sites within the Stirling Range National Park have been assessed for the presence of dieback. Populations 1 and 2 contain linear infections of dieback near an adjacent road, and Population 8 is dieback free.

**Summary of population information and threats**

| Pop. No. & Location | Land Status | Year/No. plants | Condition | Threats |
|---|---|---|---|---|
| 1. E of Mondurup Peak | National Park | 1983 2<br>1999 0 | Healthy | Disease, inappropriate fire |
| 2. E of Mondurup Peak | National Park | 1983 1<br>1999 0 | Healthy | Disease, inappropriate fire |
| 4. SSW of Darkan | Private Property | 1983 100+<br>1999 81 (15) | Healthy | Grazing, inappropriate fire |
| 5. SSW of Darkan | Private Property | 1998 34<br>1999 41 | Healthy | Grazing, weeds, disease, inappropriate fire |
| 6. SSW of Cordering | Nature Reserve | 1998 11<br>1999 4 | Healthy | Inappropriate fire, disease |
| 7a. NW of Lake Ngartiminny | Unallocated Crown Land (Proposed Conservation Park) | 1999 53 | Healthy | Powerline maintenance, disease, inappropriate fire |
| 7b. NW of Lake Ngartiminny | Unallocated Crown Land (Proposed Conservation Park) | 1998 1<br>1999 0 | Healthy | Grazing, inappropriate fire, disease |
| 7c. NW of Lake Ngartiminny | Unallocated Crown Land (Proposed Conservation Park) | 1999 2 | Healthy | Grazing, inappropriate fire, disease |
| 8. E of Mondurup Peak | National Park | 1983 2<br>2000 8 | Healthy | Disease, inappropriate fire |
| 9. Camel Lake | Nature Reserve | 2000 1 | Healthy | Firebreak maintenance activities, inappropriate fire, disease |
| 10. N Stirling Range Dve | National Park | 2000 6 | Healthy | Disease, inappropriate fire |
| 11. Porongurups | Private Property | 2000 1 | Healthy | Inappropriate fire |

Note: Numbers in brackets refers to vegetative plants. Population 3 has been confirmed as *Drakaea isolata* ms.

**Guide for decision-makers**

Section 1 provides details of current and possible future threats. Development in the immediate vicinity of the population or within the defined critical habitat of *Drakaea confluens* ms will require assessment. Developments should not be approved unless the proponents can demonstrate that they will not have a negative impact on the species, and its habitat or potential habitat or have the potential to spread or amplify dieback disease caused by the plant pathogen *Phytophthora cinnamomi*.

## 2. RECOVERY OBJECTIVES 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 species in the wild.

**Criteria for success:** The number of individuals within populations and/or the number of populations have increased.
**Criteria for failure:** The number of individuals within populations and/or the number of populations have decreased.

## 3. RECOVERY ACTIONS

**Existing recovery actions**

Appropriate land managers have been informed of the species' location and their legal obligations.

Declared Rare Flora (DRF) markers have been installed at Population 9. Awareness of the significance of Declared Rare Flora (DRF) markers is being promoted to Shires and landowners through the distribution of dashboard stickers and posters. These illustrate DRF markers, describe their purpose and provide a contact telephone number if a marker is encountered during works.

CALM staff and members of WANOSCG have undertaken surveys for the species with several new populations being discovered.

Populations 4 and 5 have been fenced to exclude stock.

Control of kangaroos to reduce grazing at Populations 4 and 5 has been implemented by the landowner.

Population 7 is currently on unallocated Crown land but has been identified under the Regional Forest Agreement as a proposed conservation park. Action is currently being undertaken to have the tenure and vesting changed.

An experimental burn was undertaken at Population 4 in April 2000 by staff from CALM's Central Forest Region and the private property owner. A 5 m by 2 m transect was burnt in an area that had contained seven *Drakaea confluens* ms plants in the past (none seen recently). A nearby same-sized area where four *D. confluens* ms plants had been seen was left unburnt as a control. The burn aimed to assess the use of fire as a population management tool. The site is being monitored to see if plants of *D. confluens* appear and to assess its effect on associated plant species.

The Albany District and Central Forest Region Threatened Flora Recovery Teams (ADTFRT, CFRTFRT) are overseeing the implementation of this IRP and will include it in their annual report to CALM's Corporate Executive and funding bodies.

Staff from the Albany District and Central Forest Region CALM Offices regularly monitor all populations.

**Future recovery actions**

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken.

**1. Coordinate recovery actions**

The ADTFRT and CFRTFRT are overseeing the implementation of recovery actions for *Drakaea confluens* ms and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions
**Responsibility:** CALM (Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $500 per year

**2. Develop and implement a fire management strategy**

A fire management strategy that defines fire control measures, and fire frequency and timing will be developed in consultation with relevant authorities and land managers.

**Action:** Develop and implement a fire management strategy
**Responsibility:** CALM (Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $2,400 in first year and $1,000 in subsequent years.

**3. Collect seed and tissue culture material**

Neither seed nor tissue culture material has been collected for *Drakaea confluens* ms. Due to the low number of plants and threats from habitat degradation, the recovery of the species in the long-term may require *ex situ*

conservation techniques. From field observations it appears that little natural pollination occurs and it is likely that hand pollination of the orchid is required to increase seed set. If it is not possible to collect adequate quantities of viable seed, other more costly *ex situ* conservation methodologies may need to be investigated. These can involve living collections or storage of tissue culture material. If resources are limited these techniques will need to be carefully prioritised in relation to *in situ* conservation.

**Action:** Collect seed and tissue culture material
**Responsibility:** CALM (Albany District, Central Forest Region, BGPA) through the ADTFRT and CFRTFRT
**Cost:** $3,300 per year

**4. Monitor and control vertebrate grazing**

Monitoring the impact of kangaroos on Populations 4, 5 and 7 should continue and, if necessary, protection or control measures implemented.

**Action:** Monitor populations
**Responsibility:** CALM (Central Forest Region) through the CFRTFRT
**Cost:** $600 per year.

**5. Conduct further surveys**

Further surveys will be conducted during the species' flowering period (October to November). Local volunteers such as members of Naturalists clubs, WANOSCG and wildflower societies will be encouraged to help in surveys supervised by CALM staff.

**Action:** Conduct further surveys
**Responsibility:** CALM (Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $5,000 per year

**6. Undertake weed control**

Weeds are a threat to Population 5. The following actions will be implemented:

1. Appropriate herbicides will be selected after determining which weeds are present.
2. Invasive weeds will be controlled by hand removal or spot spraying around *Drakaea confluens* ms plants when weeds first emerge.
3. Weed control will be scheduled to coincide with spraying of other threatened flora populations within the district.

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

**Action**: Undertake weed control
**Responsibility**: CALM (Central Forest Region, CALMScience) through the CFRTFRT
**Cost**: $700 per year

**7. Apply phosphite as required**

Populations 1 and 2, which contain linear infections of *Phytophthora cinnamomi*, will be sprayed with Phosphite. The extent and impact of dieback on other populations of *Drakaea confluens* ms will also be assessed and the requirements for dieback treatment evaluated.

**Action:** Apply phosphite as required
**Responsibility:** CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
**Cost:** $2,900 in first and third years.

### 8. Monitor the impact of phosphite application

Following the application of phosphite, monitoring its impact on *Drakaea confluens* ms and its effect on *Phytophthora cinnamomi* is required.

**Action**: Monitor the impact of phosphite application
**Responsibility**: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
**Cost**: $1,000 per year

### 9. Notify and liaise with relevant land owners

The owners of private property containing Population 11 will need to be officially notified of its presence. Staff from CALM's Central Forest Region and Albany District will continue liaison with owners of other properties that contain populations of *Drakaea confluens* ms to ensure that they are not damaged or destroyed accidentally. Due to the potential susceptibility of the habitat of this species to dieback, the need for dieback hygiene procedures will be included in information provided to landowners.

**Action:** Liaise with relevant landowners
**Responsibility:** CALM (Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $1,400 per year

### 10. Monitor populations

Annual monitoring of factors such as habitat degradation (including the impact of dieback), population stability (expansion or decline), weed invasion, pollination activity, seed production, recruitment, and longevity is essential.

**Action:** Monitor populations
**Responsibility:** CALM (Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $3,100 per year

### 11. Protect populations on private land

Ways of achieving protection of the land on which Populations 4 and 5 occur will be investigated. Possible methods of achieving future conservation management include covenanting and land purchase.

**Action:** Protect populations on private land
**Responsibility:** CALM (Central Forest Region) through the CFRTFRT
**Cost:** To be determined

### 12. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Drakaea confluens* ms in the wild. Investigations will include:

1. A study of the soil seed bank dynamics and the role of various factors including disturbance (eg fire), competition, and rainfall, grazing in recruitment and seedling survival.
2. Determination of reproductive strategies, phenology and seasonal growth.
3. Investigation of the mating system and pollination biology.
4. Investigation of population genetic structure, levels of genetic diversity and minimum viable population size.
5. Investigation of the impacts of dieback disease and control techniques on *Drakaea confluens* ms and its habitat.

**Action:** Obtain biological and ecological information

**Responsibility:** CALM (CALMScience, Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $18,200 per year

### 13. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Drakaea confluens* ms in the wild will be promoted to the public through the local print and electronic media and through poster displays. An information sheet that includes a description of the plant, its habitat type, threats and management actions will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

A poster for *Drakaea confluens* ms will be produced and distributed. It will include photographs of the species and its habitat, a description of the plant, and a description of its habitat, threats and management actions. The exact location of the species will remain confidential.

**Action:** Promote awareness
**Responsibility:** CALM (Albany District, Central Forest Region, Corporate Relations) through the ADTFRT and CFRTFRT
**Cost:** $1,100 in first year and $900 in subsequent years

### 14. Incorporate recovery actions into the Interim Management Guidelines (IMGs) for a new conservation park

Recovery actions for *Drakaea confluens* ms will need to be addressed in the IMG for the new conservation park (Population 7c).

**Action**: Incorporate recovery actions into the IMGs for a new conservation park
**Responsibility**: CALM (Central Forest Region) through the CFRTFRT
**Cost**: $400 in third year

### 15. Write a full Recovery Plan

At the end of the second-year of this IRP, the need for further recovery will be assessed. If *Drakaea confluens* ms is still ranked Critically Endangered at that time a full Recovery Plan will be developed that prescribes actions required for the long-term recovery of the species.

**Action:** Write a full Recovery Plan
**Responsibility:** CALM (WATSCU, Albany District, Central Forest Region) through the ADTFRT and CFRTFRT
**Cost:** $18,100 in third year

## 4. TERM OF PLAN

This Interim Recovery Plan will operate from January 2001 to December 2003 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 replaced by a full Recovery Plan after three years.

## 5. ACKNOWLEDGMENTS

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

Sarah Barrett Flora Officer, CALM Albany District
Andrew Batty Botanic Gardens and Parks Authority
Kinglsey Dixon Botanic Gardens and Parks Authority
Rebecca Evans Former Project Officer, WA Threatened Species and Communities Unit

Andrew Horan Regional Wildlife Officer, CALM Central Forest Region
Gillian Stack Former Project Officer, WA Threatened Species and Communities Unit
Kim Williams Program Leader Nature Conservation, CALM Central Forest Region

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

## 6. REFERENCES

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## 7. TAXONOMIC DESCRIPTION

Hoffman, N. and Brown, A. (1998) *Orchids of South-west Australia*. Revised 2nd edition with supplement. University of Western Australia Press, Nedlands.

*Drakaea confluens* ms grows 15 to 30 cm high. Its uniformly green leaf is often covered in short dense hairs and is one to two centimetres long and one to two centimetres wide. The single flower is two to four centimetres long and three to five millimetres wide. The two-coloured labellum is distinctive and has a straight rather than upturned apex.

Hopper and Brown Taxanomic paper in ed

**Drakaea confluens** Hopper and A.P. Brown, sp. nov.

Differs from *D. livida* J. Drummond in its uniformly green scabrous leaf, and its two-coloured labellum lamina lacking an upturned apex. Differs from *D. isolata* in its larger flowers and two-coloured labellum with conspicuous spots and its enlarged abdomen in side view with a steep curve up to a short tail.

*D. confluens* has a labellum similar in structure to that of *D. isolata*, and also has a similar minutely papillate scabrous leaf. However, *D. confluens* differs in its larger flowers and two-coloured labellum with conspicuous spots and its enlarged abdomen in side view with a steep curve up to a short tail. It differs from *D. livida* in its scabrous minutely papillate leaf and in the labellum lamina with a straight or slightly upturned tail.

*Derivation of name*. Named from the Latin *confluens* (confluent, running together), alluding to the labellum which has features of both *D. livida* (e.g. conspicuous spots) and of *D. elastica* (e.g. straight or slightly upturned tail).