INTERIM RECOVERY PLAN NO. 45

CINNAMON SUN ORCHID
(*THELYMITRA MANGINII* MS)
(name change *Thelymitra manginiorum* ms)

INTERIM RECOVERY PLAN

1999-2002

by

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Photograph: Noel Hoffman

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Natural Heritage Trust
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Department of Conservation and Land Management

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This Interim Recovery Plan will operate from November 1999 to October 2002 but will remain in force until withdrawn or replaced.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.

This IRP was approved by the Director of Nature Conservation on 24 October 1999. 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 October 1999.

SUMMARY

Scientific Name: *Thelymitra manginii* ms
Common Name: Cinnamon Sun Orchid
Family: Orchidaceae
Flowering Period: Late October-November
CALM Region: Swan
CALM District: Mundaring
Shire: Swan
Recovery Team: Swan Region Threatened Flora Recovery Team (SRTFRT)

Illustrations and/or further information: Erickson, R. (1978). *Orchids of the West*. 3rd edition. University of Western Australia Press, Nedlands; Hoffman, N. and Brown, A. (1998). *Orchids of South-west Australia*. Revised 2nd edition with supplement. University of Western Australia Press, Nedlands; Brown, A., Thomson-Dans, C. and Marchant, N. (Eds.) (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia.

Current status: *Thelymitra manginii* ms was declared as Rare Flora in November 1997 and was ranked as Critically Endangered (CR) in March 1999. It currently meets World Conservation Union (IUCN) Red List category 'CR' under criteria B2ce+3bd and C2a (IUCN 1994) as it is known from only two populations totalling 26 mature individuals, with continued degradation of habitat and declining numbers of plants. The main threats include accidental destruction, grazing, fire, weeds, feral pigs, trampling and picking.

Habitat requirements: *Thelymitra manginii* ms is known from two populations north east of Perth, where it is confined to open wandoo woodland on red/brown sandy loam associated with dolerite and granite outcropping. The associated vegetation consists of *Eucalyptus wandoo*, *E. accedens* and *E. calophylla*, over low scrub of *Acacia pulchella*, *A. saligna*, *Calothamnus quadrifidus*, *Melaleuca radula* and *Hakea lissocarpha*.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. All appropriate land managers have been informed of the species' location and the associated legal obligations
2. Declared Rare Flora (DRF) markers have been installed at Populations 1b and 1g.
3. Dashboard stickers and posters that indicate the meaning of DRF markers have been produced and distributed.
4. Control of wild oats using fusilade was undertaken in 1997 at a road verge population.
5. The Botanic Gardens and Parks Authority (BGPA) are currently carrying out genetic and propagation research on *Thelymitra manginii* ms, and have successfully propagated the species *ex situ*.
6. BGPA have undertaken a research translocation, planting back into the existing population.
7. The Swan Region Threatened Flora Recovery Team (SRTFRT) is overseeing the implementation of this IRP.
8. CALM staff from the Mundaring District Office regularly monitor the population.

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

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

Recovery actions
1. Coordinate recovery actions.
2. Undertake weed control.
3. Determine techniques to control diggings.
4. Develop and implement a fire management strategy.
5. Promote awareness.
6. Monitor populations.
7. Collect seed and cutting material.
8. Control feral animals.
9. Conduct further surveys.
10. Obtain biological and ecological information.
11. Liaise with relevant land managers.
12. Propagate plants for translocation.
13. Start translocation process.
14. Monitor translocation.
15. Write full Recovery Plan.

1. BACKGROUND

History

Thelymitra manginii ms was first found growing in Gidgegannup, near Walyunga National Park north east of Perth in 1981 and was brought to CALM's attention by W. Mangini in 1985. Further survey revealed two populations (Populations 1 and 2).

Until recently, *Thelymitra manginii* ms was confused with *Thelymitra dedmaniarum*, which was first collected near York in 1934. In 1987, a specimen taken from Gidgegannup was compared with the type specimen at the Adelaide Herbarium, and it was determined as *T. dedmaniae* (now *T. dedmaniarum*). It was not until 1996 when F. Hort located populations of the true *T. dedmaniarum* that it was realised that the Gidgegannup populations were of an undescribed taxon.

Description

The name *Thelymitra* is derived from the Greek *Thelys*, feminine and *mitra*, a turban or head dress, and refers to the ornate hood on the column of all species (Cady and Rotherham 1970). Species of *Thelymitra* are known as Sun Orchids because their flowers remain closed at night or during cool, cloudy weather and open only on warm sunny days when there is little wind (Hoffman and Brown 1998).

Growing to 40 cm high, *Thelymitra manginii* ms has a broad-ovate acute leaf to 15 cm long and has up to 10 or more sweetly scented golden-bronze flowers to 5 cm across. The flowers have a distinctive, strong cinnamon odour and this has resulted in the species being given the common name of the Cinnamon Sun Orchid (Hopper *et al.* 1990). *T. manginii* ms is similar in appearance to *T. stellata*, *T. dedmaniarum* and *T. jacksonii* but is taller, and has predominantly golden-yellow flowers.

Distribution and habitat

Thelymitra manginii ms is confirmed from two populations north east of Perth, where it is confined to open wandoo woodland on red/brown sandy loam associated with dolerite and granite outcropping. The associated vegetation consists of *Eucalyptus wandoo*, *E. accedens* and *E. calophylla*, over low scrub of *Acacia pulchella*, *A. saligna*, *Calothamnus quadrifidus*, *Melaleuca radula* and *Hakea lissocarpha*.

Biology and ecology

As with other Western Australian terrestrial orchids, seed germination and seedling growth of *T. manginii* ms are reliant upon an interaction with symbiotic soil fungi. This association continues into adulthood. A suspected pollinator is a beetle, the common Chrysomelid (*Diaphanops westermanni*). However, this beetle is not believed to be a specific pollinator as it will visit most flowering plants.

Threats

Thelymitra manginii ms was declared as Rare Flora in November 1997. It is now recognised as a separate taxon and is currently ranked as Critically Endangered under IUCN Red List criteria B2ce+3bd and C2a (IUCN 1994) due to the small number of populations, restricted distribution and declining quality of the habitat. The species was probably naturally restricted to a specific habitat type consisting of open wandoo woodland on red/brown sandy loam associated with dolerite and granite outcropping. The main threats include accidental destruction, fire, weeds, feral pigs, trampling and picking.

- **Grazing – digging up of tubers** (possibly by bandicoots) has impacted Subpopulation 1a. Numerous diggings were noted in November 1998 in an area where the plants had previously been recorded.

- **Road and firebreak maintenance activities** threaten plants and habitat at road verge populations of *Thelymitra manginii* ms. These include actions such as grading the road verge, constructing drainage channels and mowing the roadside vegetation to improve visibility. These disturbance events also often

encourage weed invasion into adjacent habitat. Relevant authorities need to be informed of recently discovered road reserve subpopulations so that appropriate protective measures may be implemented. The adjacent landowners should also be informed of this species' presence to prevent possible grazing damage.

- **Inappropriate fire regimes** may interfere with the reproduction phase of the orchid (flowering, pollination, seed growth, seed dispersal) resulting in low or no seedling recruitment. Seedlings can be destroyed by inappropriate timing of fires in the first couple of years of growth. Due to the species' restricted distribution and low numbers, it is thought that the populations may be seriously impacted or destroyed if burnt in the late autumn through to spring (late April-early December).

- **Weed invasion** is a threat to all populations. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure, and increase the fire hazard as a consequence of large amounts of flammable growth produced annually by many grass weed species. Narrow linear populations such as road reserves are severely affected by influences from adjacent cleared land, commonly referred to as edge effects (Lynch 1987; Saunders *et al*. 1987; Taylor 1987). In addition to the proximity of a weed seed source, these effects include increased wind speed, increased fertiliser runoff, modified hydrology and altered disturbance regimes, including fire.

- **Feral pig** activity has been observed in the area of Subpopulations 1d and 1e. As well as grazing the orchids themselves, pigs can destroy the underground tubers of the orchid and also affect the growth of symbiotic fungi that are essential for germination and to providing starches for the plant (Hoffman and Brown 1992).

- **Trampling** by visitors and **picking** of flowers have resulted from an increased public awareness of the location of the species.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. SSE of Jumperkine Hill	Private property	1991 75 1995 83 1996 69 1998 0	Healthy	Weeds, inappropriate fire regimes, grazing (?bandicoots)
1b. SSE of Jumperkine Hill	Shire road reserve	1990 36 1995 11 1996 0	Moderate	Accidental destruction, weeds, inappropriate fire regimes, erosion, feral pigs
1c. SSE of Jumperkine Hill	Shire recreation reserve	1991 2 1995 5 1996 1 1998 0	Healthy	Weeds, inappropriate fire regimes
1d. SSE of Jumperkine Hill	Private property	1991 2 1995 13 1996 8 1998 0	Moderate	Weeds, inappropriate fire regimes
1e. SSE of Jumperkine Hill	Shire recreation reserve	1992 4 1995 20 1996 13	Healthy	Weeds, inappropriate fire regimes, feral pigs, recreational activities
1f. SSE of Jumperkine Hill	Private property	1992 5 1995 9	Healthy	Weeds, inappropriate fire regimes
1g. SSE of Jumperkine Hill	Shire road reserve	1994 2 1995 3 1996 0 1998 0	Poor	Accidental destruction, weeds, inappropriate fire regimes
2. SE of Jumperkine Hill	Shire recreation reserve	1991 11 1995 4	Healthy	Inappropriate fire regimes

2. RECOVERY OBJECTIVE AND CRITERIA

Objective

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

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

3. RECOVERY ACTIONS

Existing recovery actions

All appropriate authorities and land managers have been made aware of the existence of this taxon and where it occurs. Local shires and private property owners have been formally notified of the presence of *Thelymitra manginii* ms populations on their lands. These notifications indicated the Declared Rare status of the taxon and the associated legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at Populations 1b and 1g. These alert people working in the area to the presence of significant flora, helping to prevent accidental damage during maintenance operations. Awareness of the significance of these markers is being promoted to relevant bodies such as Local Authorities. To this end, dashboard stickers and posters have been produced and distributed. These illustrate DRF markers, inform of their purpose and provide a contact telephone number for use if such a marker is encountered.

Control of wild oats using fusilade was undertaken at a road verge population in 1997.

The Botanic Gardens and Parks Authority (BGPA) is currently carrying out genetic and propagation research on *Thelymitra manginii* ms, and has successfully propagated the species *ex situ*.

In 1997 BGPA undertook a research translocation of *Thelymitra manginii* ms. Using material originally collected from a known population, 25 dormant tubers were planted back into the same population. The main aim of this translocation was to establish the necessary protocols for returning orchids to native habitats through controlled trials.

The Swan Region Threatened Flora Recovery Team (SRTFRT) is overseeing the implementation of this IRP and will include information on progress it in its annual report to CALM's Corporate Executive and funding bodies.

CALM staff from the Mundaring District Office regularly monitor the populations.

Future recovery actions

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

1. Coordinate recovery actions

The SRTFRT will continue to oversee the implementation of recovery actions for *Thelymitra manginii* ms and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Mundaring District) through the SRTFRT
Cost: $5800 per year.

2. Undertake weed control

Weeds are a major threat to all populations. The following actions will be implemented:

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

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

Action: Undertake weed control
Responsibility: CALM (Mundaring District, CALMScience) through the SRTFRT
Cost: $1100 per year.

3. Determine techniques to control diggings

The source of diggings at Population 1a will be investigated, and appropriate methods of preventing additional losses of plants determined and instigated.

Action: Determine techniques to control diggings
Responsibility: CALM (Mundaring District) through the SRTFRT
Cost: $1400 in first year.

4. 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 (Mundaring District) through the SRTFRT
Cost: $2000 in first year, and $1000 in subsequent years.

5. Promote awareness

The importance of biodiversity conservation and the protection of the Critically Endangered *Thelymitra manginii* ms will be promoted to the public. An information sheet that includes a description of the plant, its habitat type, threats and management actions, and photos will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: CALM (Mundaring District, Corporate Relations) through the SRTFRT
Cost: $700 per year.

6. Monitor populations

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

Action: Monitor populations
Responsibility: CALM (Mundaring District) through the SRTFRT
Cost: $900 per year.

7. Collect seed and cutting material

Collection of germplasm will be given a high priority as there is a possibility of extinction of wild populations, and recovery of the species in the long-term may require *ex situ* conservation techniques.

Seed will be collected from as many populations and individuals as possible, to ensure maximum representation of genetic diversity. If it is not feasible to collect adequate quantities of viable seed other, more costly germplasm storage methods may need to be investigated. These can involve living collections from other source material (tubers etc), 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 cutting material
Responsibility: CALM (Mundaring District, Threatened Flora Seed Centre) and BGPA, through the SRTFRT
Cost: $2800 per year.

8. Control feral animals

Disturbance by pigs will be monitored at Populations 1b and 1e, and if necessary numbers will be controlled through baiting or other alternative methods.

Action: Control feral animals
Responsibility: CALM (Mundaring District) through the SRTFRT
Cost: $700 per year.

9. Conduct further surveys

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

Action: Conduct further surveys
Responsibility: CALM (Mundaring District) through the SRTFRT
Cost: $1700 per year.

10. Obtain biological and ecological information

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

1. Study of the soil seed bank dynamics and the role of various factors including disturbance, competition, rainfall, and 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 *Thelymitra manginii* ms and its habitat.

Action: Obtain biological and ecological information
Responsibility: CALM (CALMScience, Mundaring District) through the SRTFRT
Cost: $14,700 per year.

11. Liaise with relevant land managers

Staff from CALM's Mundaring District will continue to liaise with relevant landowners to ensure the populations are not accidentally damaged or destroyed.

Action: Liaise with relevant land managers
Responsibility: CALM (Mundaring District) through the SRTFRT
Cost: $600 per year.

12. Propagate plants for translocation

The propagation of plants in readiness for translocation is essential as the only known populations are under threat in the wild.

Action: Propagate plants for translocation
Responsibility: CALM (Mundaring District) and BGPA through the SRTFRT
Cost: $2100 for first and second years.

13. Start translocation process

Translocation is essential for the conservation of this species, as the total number of extant plants is low, and the only known populations are not secure. Although translocations are generally undertaken under full Recovery Plans, it is possible to develop a Translocation Proposal and start propagating plants within the time frame of an Interim Recovery Plan. This will be coordinated by the SRTFRT. Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No. 29 *Translocation of Threatened Flora and Fauna.* All Translocation Proposals require endorsement by the Director of Nature Conservation.

Action: Start translocation process
Responsibility: CALM (CALMScience, Mundaring District) through the SRTFRT
Cost: $11,800 in first year.

14. Monitor translocation

The monitoring of experimental translocations is essential and will occur during the flowering period of this species.

Action: Monitor translocation
Responsibility: CALM (CALMScience, Mundaring District) through the SRTFRT
Cost: $4,800 in the second and third years.

15. Write full Recovery Plan

At the end of the three year term of this Interim Recovery Plan, the need for further recovery will be assessed. If the species is still ranked Critically Endangered, a full Recovery Plan will be developed to describe action required for long-term maintenance. A Recovery Plan will be prepared with the benefit of knowledge gained over the time frame of this Interim Recovery Plan.

Action: Write full Recovery Plan
Responsibility: CALM (WATSCU, Mundaring District) through the SRTFRT
Cost: $19,000 in year three.

4. TERM OF PLAN

This Interim Recovery Plan will operate from October 1999 to September 2002 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

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Andrew Batty	Botanic Gardens and Parks Authority
John Carter	Senior Reserves Officer, CALM Mundaring District
Rebecca Evans	Previously Project Officer, CALM's W.A. Threatened Species and Communities Unit
Brian Hannich	Entomology Department, Museum of Western Australia
Fred Hort	CALM Volunteer, Mundaring District
Bill Mangini	Landholder
Les Robson	Operations Officer, CALM Swan Region
Alan Wright	Forest Ranger, CALM Jarrahdale District

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