INTERIM RECOVERY PLAN NO 87

SOUTH STIRLING MORNING IRIS

(*ORTHROSANTHUS MUELLERI*)

INTERIM RECOVERY PLAN

2001-2004

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Photograph: E. Hickman

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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 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This Interim Recovery Plan will operate from November 2000 to October 2003 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked 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 4 May 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 April 2001.

SUMMARY

Scientific Name: ***Orthrosanthus muelleri***
Common Name: South Stirling Morning Iris
Family: Iridaceae
Flowering Period: October
CALM Region: South Coast and Wheatbelt
CALM District: Albany and Katanning
Shires: Plantagenet, Cranbrook, Gnowangerup
Recovery Team: Albany and Katanning Districts Threatened Flora Recovery Team (ADTFRT; KDTFRT)

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; Western Australian Herbarium (1998) FloraBase. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/

Current status: *Orthrosanthus muelleri* was declared as Rare Flora in February 1996 and was ranked as Critically Endangered (CR) in May 1997. It is currently ranked 'EN' under IUCN Red List criteria B1 + 2ce (IUCN, 1994) due to the severe fragmentation of populations and decline in area, quality of habitat and number of mature individuals. The main threats are weed invasion, road and track maintenance, chemical drift, inappropriate fire and salinity.

Habitat requirements *Orthrosanthus muelleri* is known from the Ongerup, Kendenup, and Gnowangerup areas. The species grows in *Eucalyptus wandoo* woodland where introduced grasses often dominate the understory. Soils are shallow brown to grey gravelly loam.

Critical habitat: The critical habitat for *Orthrosanthus muelleri* is the area of habitat in which it occurs, similar habitat within 200 metres of known populations, corridors of vegetation that are linked to populations and additional occurrences of appropriate habitat that do not currently contain the species.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. Land managers and adjacent landowners have been made aware of the threatened nature of the species and its location.
1. Declared Rare Flora (DRF) markers have been installed at Populations 3 and 10, and Subpopulations 1a, 1b, 1c, 4b, 7b and 7c.
2. Dashboard stickers and posters have been produced and distributed.
3. A reply paid postal drop illustrating *Orthrosanthus muelleri* and describing its distinctive features and habitat was distributed by CALM's Albany District office in 1998 and 1999.
4. Seed was collected from Populations 1 in 1996, 3 in 1997, and 10 in 1999 and is stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C.
5. The Botanic Gardens and Parks Authority (BGPA) have received 44 *Orthrosanthus muelleri* germinants from seed collected by staff of the TFSC.
6. Weed control trials were conducted at Population 1 during 1998.
7. Staff from CALM's Albany District office have undertaken surveys for *Orthrosanthus muelleri* and these have resulted in a number of new populations being found.
8. The Albany and Katanning Districts Threatened Flora Recovery Teams are overseeing the implementation of this IRP.
9. Staff from CALM's Albany and Katanning District offices annually 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
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. Install Declared Rare Flora markers at Population 6.
3. Undertake weed control.
4. Conduct further surveys.
5. Monitor populations.
6. Develop and implement a fire management strategy.
7. Notify and liaise with relevant land managers.
8. Collect seed.
9. Promote awareness.
10. Obtain biological and ecological information.
11. Write a full Recovery Plan.

1. BACKGROUND

History

James Drummond, who recorded the location as 'Swan River', was the first to collect *Orthrosanthus muelleri* in 1840. Ferdinand von Mueller then collected it from the Stirling Range in the 1860s. Specimens were sent to Europe and the plant was subsequently named in honour of Mueller by Bentham. The species was not collected again until 1962, when found in the Kendenup area, and in 1964 when found near Ongerup.

Annual surveys have been conducted by CALM staff and volunteers and these have resulted in the discovery of new populations, two of which occur in CALM's Katanning District. With 10 populations, consisting of a total of around 5000+ plants, currently known, *Orthrosanthus muelleri* has been downgraded from Critically Endangered to Endangered.

Description

Orthrosanthus muelleri is a small tufted plant with stems that are rarely more than 30 cm high. Stems are, glabrous or slightly woolly towards the base. Leaves, which are shorter than the stems, are broad and woolly on the keel and inner margin when young. There are 2 to 4 spikes to each stem, all pedunculate or the lower one sessile, resembling those of *O. multiflorus* in the brown scarious apices of the bracts, but rather smaller. There are usually 3 or 4 flowers in the spike. The capsule is obtuse, not longer than the bracts (Bentham 1873).

Distribution and habitat

Orthrosanthus muelleri is known from the Ongerup, Kendenup, and Gnowangerup areas. The species grows under open *Eucalyptus wandoo* woodland where introduced grasses dominate the understory. Soils are shallow brown to grey gravelly loams. Associated species include *Acacia glaucoptera*, *Eucalyptus cornuta*, *Eucalyptus goniantha*, *Eucalyptus spathulata*, *Chamaexeros serra*, *Thomasia angustifolia*, *Leucopogon gibbosus*, *Hakea cucullata*, *Xanthorrhoea platyphylla* and *Boronia crenulata*.

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 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 *Orthrosanthus muelleri* 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 pollinator of *Orthrosanthus muelleri*.

Biology and ecology

Orthrosanthus species have delicate, usually blue to purple flowers that open in early morning and wither during the hot part of the day. Germination of seed occurs easily but plants are slow growing (Blombery 1967). The genus is closely allied to *Patersonia*.

Little is known about the biology of *Orthrosanthus muelleri*, though it is presumed not to be susceptible to dieback (*Phytophthora* spp.) (Robinson and Coates 1995).

Threats

Orthrosanthus muelleri was nominated as Rare Flora in 1994, however due to lack of sufficient threat and population information, was listed as Priority 2, requiring further survey. It was declared as Rare Flora in February 1996 and was ranked as Critically Endangered (CR) in May 1997. It is currently ranked 'EN' under IUCN Red List criteria B1+2ce (IUCN, 1994) due to the severe fragmentation of populations, and continued decline in area, quality of habitat and number of mature individuals. Threats include weed invasion, road and track maintenance, chemical drift, inappropriate fire and salinity.

- **Weed invasion** is the main threat to viable populations. 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 that are produced annually by many grass weed species (Lynch 1987; Saunders *et al*. 1987; Taylor 1987).
- **Road and track maintenance** threatens several populations of *Orthrosanthus muelleri*. Threats include power line maintenance, grading road reserves, road widening, spraying of chemicals, constructing drainage channels and mowing roadside vegetation to improve visibility. These events often encourage weed invasion as well as causing direct damage to actual plants.
- **Chemical drift** from herbicide and fertiliser applications has the potential to impact on populations.
- **Inappropriate fire** may affect the long-term viability of populations. Seed of *Orthrosanthus muelleri* probably germinates following fire and, if this is the case, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reach maturity. On the other hand, it is likely that occasional fires are needed for recruitment. Further investigation is required and will be addressed in management action 10.
- **Salinity**, due to rising water tables following broad scale clearing, is leading to a degradation of the species' habitat at Populations 4 and 9. If not addressed, habitat decline will continue in the medium to long term.

Summary of population information and threats

Pop. No. and Location	Land Status	Year/No. plants	Condition	Threats
1a. West of Stirling Range National Park	Shire Road Reserve	1994 60 1996 100	Healthy	Weed invasion, road maintenance
1b. West of Stirling Range National Park	Shire Road Reserve	1995 60+*	Healthy	Weed invasion, road maintenance
1c. West of Stirling Range National Park	Shire Road Reserve	1995 60+*	Healthy	Weed invasion, road maintenance
1d. West of Stirling Range National Park	Private Property	1996 300+	Healthy	
2. West of Stirling Range National Park	Private Property	1996 150+ 1999 230	Healthy	Weed invasion
3. SE of Ongerup	Shire Road Reserve	1997 40 1998 400+	Healthy	Road maintenance
4a. West of Stirling Range National Park	Private Property	1998 4000*	Healthy	Salinity
4b. West of Stirling Range National Park	Shire Road Reserve	1998 4000*	Healthy	Road maintenance, salinity
5. E of Cranbrook	Water and Parkland Reserve	1998 50+	Healthy	
6. NE of Gnowangerup (Katanning District)	Shire Road Reserve	1999 6	Healthy	Road maintenance, weed invasion
7a. S of Borden (Katanning District)	Water Reserve	1999 10+	Healthy	Weed invasion
7b. S of Borden	Shire Road Reserve	1999 4	Moderate	Road maintenance, weed invasion
7c. S of Borden	Shire Road Reserve	1999 3	Moderate	Road maintenance, weed invasion
8. W of Kamballup	Nature Reserve	1999 350	Healthy	Weed invasion
9a. NE of Carbarup	Private Property	1999 50	Healthy	Weed invasion, salinity
9b. NE of Carbarup	Private Property	1999 3 clumps	Healthy	Weed invasion, salinity
10. SW of Cranbrook	MRWA road reserve	1999 450+	Healthy	Road maintenance, powerline maintenance, weed invasion

Note: * total for both subpopulations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of any of the populations or within the defined critical habitat of *Orthrosanthus muelleri* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the species, and its habitat or potential habitat, or on the local surface hydrology.

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 taxon 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

Land managers and adjacent landowners have been made aware of the location and threatened nature of *Orthrosanthus muelleri*. Private property owners and Shires have been formally notified of populations on their land. The notification details the Declared Rare status of the taxon and relevant legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at Populations 3 and 10, and Subpopulations 1a, 1b, 1c, 4b, 7b and 7c. An increased awareness of these markers is being promoted to relevant land managers such as local authorities. Dashboard stickers and posters have been produced and distributed. These illustrate DRF markers, inform of their purpose and provide a contact telephone number to use if such a marker is encountered.

A reply paid postal drop illustrating *Orthrosanthus muelleri* and describing its distinctive features and habitat was distributed to local farmers and residents in the Plantagenet, Cranbrook and Gnowangerup Shires by CALM's Albany District office in 1998 and 1999. Postal drops aim to provide information about threatened species and a contact name and number. As a result of these postal drops, two new populations have been located.

In 1996, approximately 11517 seeds were collected from Population 1 and stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C. In 1997 a further 2156 seeds were collected from Population 3. A collection of 2678 seeds was made from Population 10 in 1999. Staff from CALM's TFSC test seed viability on collection, after one year in storage and again after five years. The germination rate of *Orthrosanthus muelleri* ranged from 24% to 26% when first collected and 29% after one year in storage (Unpublished data, A. Cochrane[1]).

The Botanic Gardens and Parks Authority (BGPA) have received 44 *Orthrosanthus muelleri* germinants from seed collected by the TFSC. Only 10 plants (23%) have survived (personal communication A. Shade[2]).

Weed control trials were conducted at Population 1 during 1998, with three treatments – (1) nil control, (2) weeding treatment and (3) weeding treatment plus disturbance involving raking. Weeding treatment includes spraying with Fusilade for grass weeds, wick treatment with Roundup for broad leaf weeds and hand weeding. Field observations suggest that flowering of *Orthrosanthus muelleri* progressively decreased with increasing weed levels. Weed control alone, however, provided no clear benefit in terms of plant health or recruitment from seed in *O. muelleri*. The species also had a poor germination response following concentrated smoke treatment (Obbens, 2000). It is likely that the species requires fire or other disturbance for recruitment due to its hard seat coat.

Staff from CALM's Albany District office have undertaken surveys for *Orthrosanthus muelleri* and these have resulted in a many new populations being found.

The Albany District Threatened Flora Recovery Team (ADTFRT) is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive and funding bodies.

Staff from CALM's Albany District office regularly monitor 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 KDTFRT will oversee the implementation of recovery actions for *Orthrosanthus muelleri* and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $400 per year.

2. Install Declared Rare Flora markers at Population 6

Declared Rare Flora (DRF) markers are required for Populations 6.

Action: Install DRF markers at Population 6
Responsibility: CALM (Katanning District) through the KDTFRT
Cost: $700 in first year.

3. Undertake weed control

[1] Anne Cochrane, Manager, CALM Threatened Flora Seed Centre, CALMScience Division
[2] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

Weeds are a major threat to Population 1 and a lesser threat to most other populations, particularly those on road reserves. 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 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 *Orthrosanthus muelleri* is not known and weed control programs will be undertaken in conjunction with research.

Action: Undertake weed control
Responsibility: CALM (Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $900 per year.

4. Conduct further surveys

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

Action: Conduct further surveys
Responsibility: CALM (Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $3,400 per year.

5. Monitor populations

Monitoring of factors such as grazing, weed invasion, habitat degradation, salinity, and population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity are essential. All populations, including those that are no longer extant will be inspected annually.

Action: Monitor population
Responsibility: CALM (Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $2,200 per year.

6. Develop and implement a fire management strategy

A fire management strategy that defines fire control measures, 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 and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $2,500 in first year and $1,100 in subsequent years.

7. Notify and liaise with relevant land managers

The owners of the property adjacent to Population 6 and MRWA and Western Power (Population 10) need to be officially notified of the presence of DRF adjacent and on their land. Staff from CALM's Albany District will continue to liaise with landowners and other relevant parties to ensure that populations are not damaged or destroyed accidentally. An information kit will be developed that contains contact names and numbers and specific information about this species.

Action: Notify and liaise with land managers
Responsibility: CALM (Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $1,000 per year.

8. Collect seed

A quantity of seed has been collected from Populations 1, 3 and 10. Additional seed will be collected as required.

Action: Collect seed

Responsibility: CALM (Albany and Katanning Districts, TFSC) and the BGPA, through the ADTFRT and KDTFRT
Cost: $3,400 per year.

9. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Orthrosanthus muelleri* 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.

Action: Promote awareness
Responsibility: CALM (Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $1,400 in first year and $900 in subsequent years.

10. Obtain biological and ecological information

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

1. Studying the soil seed bank dynamics and the effect of disturbance (such as fire), competition, grazing and rainfall on recruitment and seedling survival.
2. Determining reproductive strategies, phenology and seasonal growth.
3. Investigating the species' reproductive system and pollination biology.
4. Investigating population genetic structure, levels of genetic diversity and minimum viable population size.
5. Investigating the impacts of dieback disease and control techniques (Phosphite) on *Orthrosanthus muelleri* and its habitat.
6. The impact of changes in the level of salinity in the habitat.

Action: Obtain biological and ecological information
Responsibility: CALM (CALMScience, Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $18,200 per year.

11. Write a full Recovery Plan

At the end of the third-year of this IRP, the need for further recovery will be assessed. If *Orthrosanthus muelleri* 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 full Recovery Plan
Responsibility: CALM (WATSCU, Albany and Katanning Districts) through the ADTFRT and KDTFRT
Cost: $18,200 in third year.

4. TERM OF PLAN

This Interim Recovery Plan will operate from April 2001 to March 2004 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	Conservation Officer, CALM Albany District
Anne Cochrane	Manager, CALM Threatened Flora Seed Centre, CALMScience Division
Greg Keighery	Senior Research Scientist, CALMScience Division
Chris Robinson	Consultant Botanist
Kelly Gillen	Former Program Leader, Nature Conservation, CALM Albany District
Ellen Hickman	Former Conservation Officer, CALM Albany District
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority

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

Bentham, G. (1873) *Flora Australiensis*: *a description of the plants of the Australian Territory*. Vol 6, (Thymeleae to Dioscorideae), p411.

Orthrosanthus muelleri is a small, slender species, the stems rarely 1 foot high, glabrous or slightly woolly towards the base. Leaves are shorter than the stems, 1 to 1.5 lines broad, woolly on the keel and inner margin when young. Spikes 2 to 4 on the stem, all pedunculate or the lower one sessile, resembling those of *O. multiflorus* in the brown scarious apices of the bracts, but rather smaller. Flowers usually 3 or 4 in the spike. Capsule obtuse, not longer than the bracts.

Cooke, D.A. (1986) *Flora of Australia*. Vol 46, (Iridaceae to Dioscoreaceae). Australian Government Publishing Service, Canberra.

Orthrosanthus muelleri is a herb 20 to 30 cm tall. Leaves rigidly erect, 10 to 20 cm long, 1.5 to 2.5 mm wide, margins densely pubescent to tomentose. Inflorescence few-branched, with 1 or 2 scape bracts each subtending 2 or 3 rhipidia on peduncles 1 to 5 cm long, rarely also 1 sessile rhipidium. Rhipidia 4 to 6 flowered, enclosed by ovate spathes 10 to 13 mm long with broad scarious margins and apices. Flowers separated by hyaline bracteoles. Mature flowers not seen. Capsule acute, 8 to 10 mm long, subsessile, included in spathe.