

Interim Recovery Plan No. 13

INTERIM RECOVERY PLAN NO. 13

**STIRLING RANGE DRYANDRA (*DRYANDRA*  
*MONTANA*), INTERIM RECOVERY PLAN**

**1996-1999**

by

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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 are designed to run for three years only and will be replaced by full Recovery Plans where required.

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 IRP was approved by the Director of Nature Conservation on 7 May 1997. Approved IRPs are subject to modification as dictated by new findings, changes in status of the taxon or ecological community and the completion of recovery actions. 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 March, 1997.

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## SUMMARY

**Stirling Range Dryandra, *Dryandra montana*** **Family:** PROTEACEAE

**Flowering period:** November

**CALM Region:** South Coast **CALM District:** Albany **Shire:** Gnowangerup

**Current status:** Declared as Rare Flora in September 1987, ranked as Critically Endangered in September 1995

**Recovery team:** Albany District Threatened Flora Recovery Team

**Illustrations and/or further information:** A.S. George, New taxa and a new infrageneric classification in *Dryandra* R. Br. (Proteaceae: Grevilleoideae) (1996); S.D. Hopper *et al.*, *Western Australia's Endangered Flora* (1990); C.J. Robinson *et al.*, Declared Rare and Poorly Known Flora in the Albany District (1995).

*Dryandra montana* is an erect woody shrub up to 2.5 m high with very dense, rough foliage. Known from 106 plants, in three populations located in the Stirling Range National Park.

The species was first collected from the Stirling Range by F. Lullfitz in 1964 and later by K.R. Newbey from the same locality in 1966. One further collection was made by G.J. Keighery in 1986.

Anne Cochrane from CALM's Threatened Flora Seed Centre (TFSC) found an additional eight plants in February 1996. These were approximately two hundred metres downslope from the previously known plants, making the total population size twenty one plants.

In September 1996 a new population was found, consisting of 61 adults and 8 seedlings. The seedlings were sprayed with Phosphonate using the UVL (Ultra Low Volume) applicator.

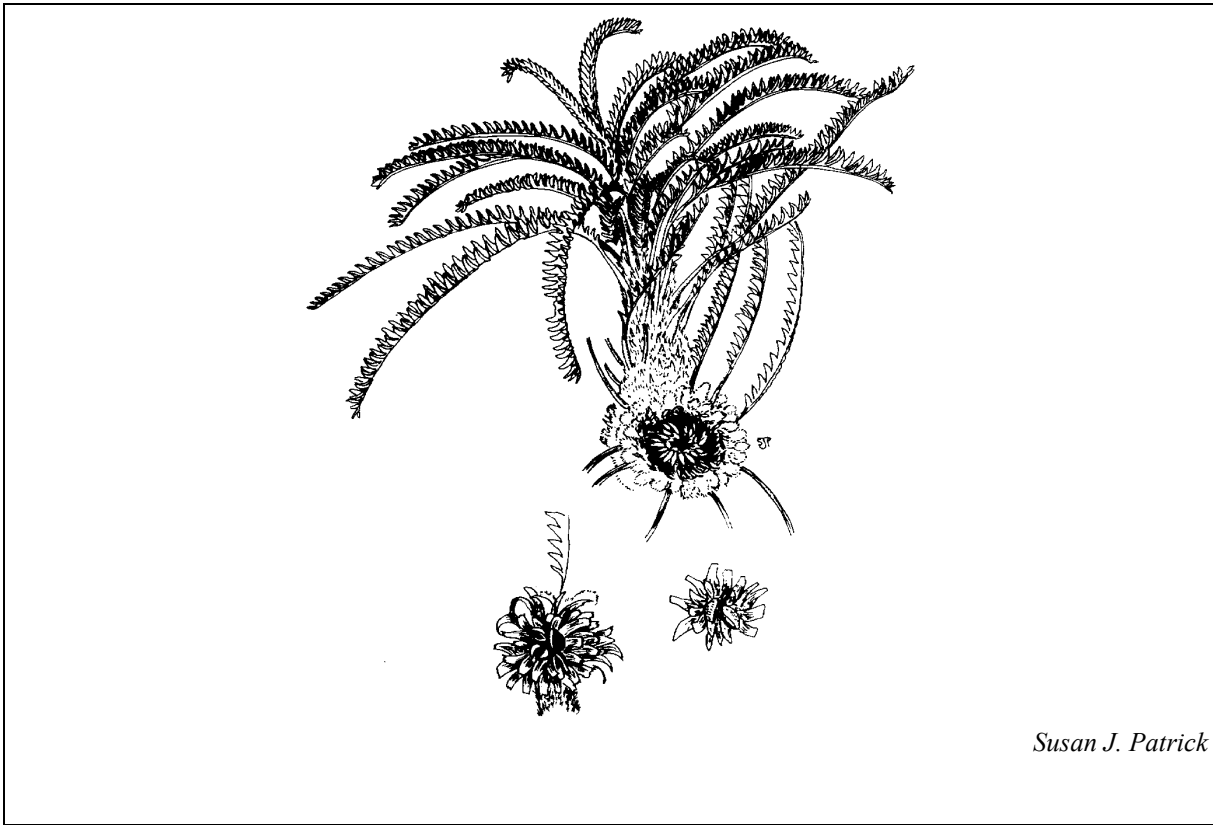
In October 1996 as part of the Ridge Walk survey another new population of 15 plants was found on another peak. One plant had recently died so it is assumed dieback is present at the site.

*D. montana* was distributed over a relatively large area in the late 1980s but is now known from just three populations, probably due to the impacts of dieback (*Phytophthora* spp.) and fire. All are exposed to threats associated with fire and plant pathogens. The aim of this Interim Recovery Plan is to abate identified threats and maintain viable *in situ* populations of *D. montana* in order to conserve the wild genetic stock of this species. To achieve this aim the following essential and desirable recovery actions are prescribed.

**Recovery actions:**

<b>Essential</b>		<b>Desirable</b>	
1.	Phosphonate spraying	1.	Information dissemination
2.	Preserve genetic diversity of the species	2.	Conduct further surveys
3.	Develop a fire management plan	3.	Conduct research
4.	Monitor populations	4.	Translocation

*Dryandra montana*



*Susan J. Patrick*

**Distribution of *Dryandra montana***  
*Illustration not available*

## 1. BACKGROUND

### 1.1 History, taxonomy and status

The genus *Dryandra* is restricted to south-western Australia, with the highest species richness occurring around Eneabba and the Stirling Range. These areas of richness fall in the 400 to 600 mm annual rainfall zone, where they are closely correlated with extensive areas of Kwongan or sclerophyllous shrublands (Griffin 1985).

*Dryandra montana* George is an erect woody shrub to 2.5 m high with very dense, rough foliage. The leaves are up to 18 cm long, with elongated, triangular, close fitting 5-8 mm lobes, cut to the midrib and pointing towards the apex. The flowers are yellow and are borne on the old wood, inside the foliage. The upper stems and fruits are covered by short red hairs. The oval follicles are about 9 mm tall and 7-8 mm broad with a hairy base at the point of attachment (Robinson *et al.* 1995). Named from the Latin *montanus* (of mountains) in reference to the habitat (George 1996).

A full taxonomic description by A.S. George (1996) is included in Appendix 1.

*D. montana* was distributed over a relatively large area in the late 1980s, but is now known from just three populations, probably due to the impacts of dieback (*Phytophthora* spp.) and fire.

The species was first collected by F. Lullfitz in the Stirling Range in 1964 and again by K.R. Newbey in 1966 from the same area. One further collection was made by G.J. Keighery in 1986, also from the same locality. Some 13 plants were known from this site in 1995.

A. Cochrane from CALM's Threatened Flora Seed Centre (TFSC) found an additional eight plants in February 1996. These were approximately two hundred metres downslope from the previously known plants, making the total population size 21 plants. Additional seed collections were also made at this time.

In September 1996 a new population was found, consisting of 61 adults and 8 seedlings. The seedlings were sprayed with Phosphonate using the UVL (Ultra Low Volume) applicator.

In October 1996, as part of the Ridge Walk survey, a second new population of 15 plants was found on another peak. One plant had recently died and it is assumed dieback is present at the site.

Due to the low number of plants and the threats associated with a highly specific habitat, *D. montana* was declared as Rare Flora in September 1987 and ranked as Critically Endangered in September 1995. An Albany District Threatened Flora Recovery Team (ADTFRT) has been established.

### 1.2 Distribution and habitat

*D. montana* is currently known from 106 plants (95 adults, 11 seedlings) in three populations on plateaus in the Stirling Range National Park.

Habitat is brown loam on schist/quartz in very dense heath, dominated by *Kunzea montana*, *Banksia oreophila*, *Sphenotoma* aff. *dracophylloides*, *Darwinia collina* (also Declared Rare Flora, DRF), *Hakea varia* and *Andersonia axilliflora* (DRF).

Other associated species are listed in Appendix 2.

**Table 1: Summary of population information**

Pop. No & Location.	Land Status	No. of plants.	Condition	Threats
1. Stirling Range	National Park	22	Healthy	Dieback, inappropriate fire regime
2. Stirling Range	National Park	69	Healthy	Dieback, inappropriate fire regime
3. Stirling Range	National Park	15	Healthy	Dieback, inappropriate fire regime

### 1.3 Biology and ecology

Very little is known about the biology of *D. montana*. It is highly susceptible to the pathogen *Phytophthora* spp. (dieback) and fire appears to kill adult plants.

### 1.4 Threatening processes

#### 1.4.1 Causes of the Critically Endangered status of this species

The rarity of *D. montana* is probably due to the loss of suitable habitat as a result of the introduction of the pathogen *Phytophthora* spp. (dieback), combined with the extremely hot fires of 1991.

In 1992 Kings Park and Botanic Garden (KPBG) staff commented on the high level of insect predation on collected seed. This may be a factor which contributes to the low number of plants.

#### 1.4.2 Threats to the ongoing survival of this species in the wild

- **Dieback** (*Phytophthora* spp.) is a pathogen which causes plants to die from drought stress from root dysfunction. Dieback has been introduced to parts of the Stirling Range by walkers carrying infected soil on their footwear. *D. montana* is known to be susceptible and, as there are just three populations *in situ*, controlling the spread of dieback in the surrounding areas is vital.
- **Fire** is known to kill adult plants and must be excluded from all populations. Since the fire in 1991 there has been no seedling recruitment in areas where this species was previously found and, with the exception of a few plants in an unburnt patch of heath, all adult plants have been killed in population 1.

### 1.5 Conservation status

*D. montana* is known from a three populations in Stirling Range National Park.

### 1.6 Strategy for recovery

The following essential strategies will be implemented:

1. Control the most threatening factors currently affecting *D. montana* as outlined in 3.2.
2. Preserve the genetic resource of *D. montana* by including it in a seed bank, cryostorage and/or *ex situ* cultivation (3.2.2).
3. Protect *D. montana* from possible future threats (eg. fire) by appropriate management practices.

The following desirable strategies will be implemented if resources permit:

1. Ensure that relevant CALM personnel are aware of the presence of *D. montana*, and the need to protect it and ensure that they are familiar with the threatening processes identified in these guidelines (see 3.3.1).
2. Conduct research into the biology, ecology and management of *D. montana* (see 3.3.3).
3. Enhance plant numbers (eg. by removal of limiting factors, propagation or translocation, see CALM Policy Statement No 29, Translocation of Threatened Flora and Fauna (see 3.3.4).



## **2. RECOVERY OBJECTIVE AND CRITERIA**

### **2.1 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 this species in the wild.

### **2.2 Criteria**

#### **2.2.1 Criteria for success**

Recovery will be deemed a success if threatening processes identified within this IRP have been reduced or removed within the three year period.

#### **2.2.2 Criteria for failure**

The recovery process will have been unsuccessful if identified threats have not abated within the three year period of this IRP or there has been a substantial decrease in the number of mature plants.

## **3. RECOVERY ACTIONS**

### **3.1 Existing recovery actions**

Cutting material and seeds were collected by KPBG staff in 1991 and 1993 with the establishment of two plants which are in good health. KPBG collected seed in 1992 and seed germination trials carried out by TFSC have led to the germination of two plants in the nursery at Kings Park, however, these are in poor health.

A. Cochrane from the TFSC collected seed material in April 1994. This seed had an initial germination rate of 18.75%. Twenty six seeds were collected in February 1996.

All relevant authorities know of the existence of *D. montana*.

The ADTFRT oversees the implementation of this IRP and reports annually to CALM's Corporate Executive.

### **3.2 Essential recovery actions**

#### **3.2.1 Phosphonate spraying**

Both *D. montana* and the plant community in which it grows are severely infected with dieback. Recent research in CALM has shown phosphonate to be effective in controlling dieback disease in native plant communities, and aerial application of phosphonate to the summit of Bluff Knoll is recommended. Application to the entire plant community will have the added benefit of protecting a number of endangered plant species endemic to the Knoll and will allow regeneration of the plant community as a whole. Long term protection will result from a decrease in the inoculum level of the pathogen in the soil.

Action:	Spray population and community with phosphonate
Responsibility:	CALM (Albany District, Western Australian Threatened Species and Communities Unit (WATSCU))
Cost:	\$25000, every third/fourth year

#### **3.2.2 Preserve genetic diversity of the species**

Due to a high threat of dieback infection and the low number of extant plants, germplasm collections of *D. montana* should be given a high priority as the recovery of this species may in the future be dependant on *ex situ* conservation techniques. The main problem with developing a translocation program for *D. montana* is finding mountain top habitat that is dieback free and is not under threat of becoming infected.

Genetic diversity conservation of the species should be incorporated into the research component (see 3.3.3) and should include collection of seed from all populations, ensuring an adequate representation of genetic diversity.

If it is not possible to collect adequate quantities of viable seed, other more costly germplasm storage methodologies may need to be investigated. These can involve living collections from cutting or other source material, or storage of tissue culture material. If resources are limited these techniques will need to be carefully prioritised in relation to *in situ* conservation. This will be coordinated by the ADTFRT.

It is also important that the size and viability of the soil seed bank is determined and research undertaken to develop techniques for stimulating germination of soil stored seed. Care, however, should be taken as these processes inherently carry a significant risk of depletion of seed bank reserves.

Action: Preserve genetic diversity of the species  
Responsibility: ADTRFT, CALM (TFSC, Albany District, WATSCU), KPBG  
Cost: \$1600

### 3.2.3 Develop a fire management plan

A fire management plan needs to be developed, with particular emphasis being placed on the locality of *D. montana*, and included in the Management Plan for the Stirling Range National Park (in draft).

Action: Develop a fire management plan  
Responsibility: CALM (Albany District), relevant authorities  
Cost: \$200 pa.

### 3.2.4 Monitor populations

Monitoring of factors such as dieback encroachment, habitat degradation, population stability (expanding or declining), pollination activity, seed production, recruitment, and longevity is prescribed.

The known populations will be inspected annually as a requirement under CALM's Policy Statements, No. 9 *Conservation of Threatened Flora in the Wild* and No 28 *Reporting Monitoring and Re-evaluation of Ecosystems and Ecosystem Management*. See also below 3.3.3, *Development of a quadrat/transect based monitoring system for threatened plant species*. Inspection will be subject to dieback hygiene procedures and will be carried out only with permission of CALM South Coast Region.

Monitoring should include post fire regeneration and dieback (*Phytophthora* spp.) impact and spread.

Action: Monitor populations  
Responsibility: CALM (Albany District, WATSCU)  
Cost: \$400 pa.

## 3.3 Desirable recovery actions

### 3.3.1 Information dissemination

To promote an awareness of *D. montana* among relevant CALM staff (Albany District) the production of posters are recommended. Posters should illustrate and provide information on the species.

The importance of biodiversity conservation and the preservation of critically endangered species need to be promoted to the general public, however, it is recommended that the exact location of populations of *D. montana* be kept confidential. Awareness can be encouraged throughout the community by a publicity campaign using the local print and electronic media and by setting up poster displays in venues of high exposure. Formal links with local naturalist groups and interested individuals should also be encouraged. Such activities may lead to the discovery of new populations of the species.

Action: Produce posters, implement a publicity campaign  
Responsibility: CALM (Corporate Relations Division, Albany District, WATSCU)  
Cost: \$500 first year, \$1500 second year

### 3.3.2 Conduct further surveys

Opportunistic surveying by A. Cochrane (TFSC) in February 1996, located eight new plants just downslope from the known population and further surveys in September and October 1996 located two new populations, one of which is on a different mountain peak. It is likely that other populations occur on other peaks and further surveys are recommended.

Action: Conduct further surveys  
 Responsibility: CALM (Albany District, WATSCU)  
 Cost: \$550 pa.

### 3.3.3 Conduct research

Research designed to increase understanding of biology of this species will provide a scientific base for management of *D. montana* in the wild. Research should include:

1. Application strengths of phosphonate in order to assess effectiveness versus phytotoxicity.
2. Factors determining level of flower and fruit abortion.
3. The level of invertebrate grazing of seed.
4. The size and viability of seed bank.
5. Seed germination requirements.
6. The role of disturbance in regeneration.
7. The longevity of plants, and time taken to reach maturity.
8. The extent of genetic variation within and between populations (essential if new populations are to be established).
9. The development of a monitoring system. Specific protocols for rare flora will be outlined in a future CALM discussion paper *Development of a quadrat/transect based monitoring system for threatened plant species*, D. Coates, P. Pigott and A. Brown (in prep).

Action: Conduct research  
 Responsibility: CALM (Albany District, Science and Information Division (SID), WATSCU)  
 Cost: \$1000 first year, \$2000 second year

### 3.3.4 Translocation

Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No 29. Surveying for potential habitats for possible future translocation sites is recommended within the scope of IRPs, with actual translocation addressed in full Recovery Plans where necessary. This will be coordinated by the ADTFRT. Any translocation proposals will require endorsement by the Director of Nature Conservation.

Action: Survey potential habitats for translocation  
 Responsibility: ADTFRT, CALM (Albany District, WATSCU)  
 Cost: See Section 3.3.2 (Conduct further surveys)

**Table 2: Summary of recovery actions**

Recovery Actions	Population	Priority	Responsibility	Completion date
<b>Essential</b>				
Phosphonate spraying	1	High.	CALM (Albany District, WATSCU)	April 1996, 97, 98
Preserve genetic diversity of the species	1	High.	ADTFRT, CALM (TFSC, Albany District, WATSCU), KPBG	Ongoing
Develop a fire management plan	1	High.	CALM (Albany District), relevant authorities	Ongoing
Monitor populations	1	High.	CALM (Albany District, WATSCU)	Ongoing

#### Desirable

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Information dissemination	1	Moderate.	CALM (Corporate Relations Division, Albany District, WATSCU)	Ongoing
Conduct further surveys	-	Moderate.	CALM (Albany District, WATSCU)	November 1996/97/98
Conduct research	1	Moderate.	CALM (SID, Albany District, WATSCU)	Oct-Feb 1996-97
Translocation		Low.	ADTFRT, CALM (Albany District, WATSCU)	Ongoing

**3.4 Costs**

**Table 3: Summary of costs for each recovery action**

Recovery Action	1996			1997		1998	
	CALM	EA	KPBG	CALM	EA	CALM	EA
<b>Essential</b>							
Phosphonate spraying	8000	17000					
Preserve genetic diversity of the species		500	1100				
Develop a fire management plan	200			200		200	
Monitor populations	400			400		400	
<b>Sub-total</b>	<b>\$8600</b>	<b>\$17500</b>	<b>\$1100</b>	<b>\$600</b>		<b>\$600</b>	
<b>Desirable</b>							
Information dissemination		500			1500		
Conduct further surveys	550			550		550	
Conduct research	1000			2000			
Translocation							
<b>Sub-total</b>	<b>\$1550</b>	<b>\$500</b>		<b>\$2550</b>	<b>\$1500</b>	<b>\$550</b>	
<b>TOTAL</b>		<b>Year 1 \$ 29250</b>		<b>Year 2 \$ 4650</b>		<b>Year 3 \$ 11550</b>	

EA Environment Australia (formerly ANCA)

**Total of all costs: \$45450**

**ACKNOWLEDGMENTS**

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

Anne Cochrane: CALM Threatened Flora Seed Centre, W.A. Herbarium  
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**Appendix One:** Taxonomic description

George, A.S., (1996). New taxa and a new infrageneric classification in *Dryandra* R. Br. (Proteaceae: Grevilleoideae). *Nuytsia* **10** (3): 313-408.

**Appendix Two:** Associated species

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PROTEACEAE	APIACEAE	MYRTACEAE
<i>Banksia brownii</i>	<i>Xanthosia rotundifolia</i>	<i>Beaufortia decussata</i>
<i>Banksia oreophila</i>		<i>Darwinia collina</i> (DRF)
<i>Hakea varia</i>	PAPILIONACEAE	<i>Kunzea montana</i>
	<i>Aotus genistoides</i>	
GOODENIACEAE	<i>Gastrolobium bilobum</i>	EPACRIDACEAE
<i>Velleia foliosa</i>	<i>Nemcia leakeana</i>	<i>Andersonia axilliflora</i> (DRF).
		<i>Sphenotoma</i> aff. <i>dracophylloides</i>
MIMOSACEAE	RESTIONACEAE	<i>Sphenotoma squarrosus</i>
<i>Acacia drummondii</i> subsp. <i>candolleana</i>	<i>Desmocladius flexuosus</i>	

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DRF- Declared Rare Flora