INTERIM RECOVERY PLAN NO. 12

KAMBALLUP DRYANDRA (*DRYANDRA IONTHOCARPA*) 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

Kamballup Dryandra, *Dryandra ionthocarpa* **Family:** PROTEACEAE

Flowering period: October

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

Current status: Declared as Rare Flora in July 1989, 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 ionthocarpa is a caespitose, tufted prostrate shrub with long leaves (up to 50 cm), short stems and flowers borne close to the ground. It is known from 1200+ plants in one population consisting of two subpopulations on two Class C reserves in the Kamballup area.

This species was discovered and first collected by P. Luscombe in 1987. It was collected again a year later by M. Pieroni and P. Luscombe from the same locality. Three further collections have been made since then. Despite numerous surveys no other populations have been found.

The two subpopulations are exposed to threats associated with weed invasion, agricultural chemical drift, dieback (*Phytophthora* spp.) and fire. The aim of this Interim Recovery Plan is to abate identified threats and maintain a viable *in situ* population of *D. ionthocarpa* 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:

Essential	Desirable
1. Implement weed control	1. Change vesting and purpose of reserves
2. Develop a fire management plan	2. Preserve genetic diversity of the species
3. Information dissemination	3. Conduct further surveys
4. Monitor population	4. Conduct research
	5. Translocation

1. BACKGROUND

1.1 History, taxonomy and status

The genus *Dryandra* is endemic to south-western Australia, with the highest species richness occurring around Eneabba and the Stirling Range. These areas of richness lie 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 ionthocarpa George is a caespitose, tufted prostrate shrub with a very short stem and leaves up to 30 cm long. The leaf lobes are broadly triangular, up to 8 mm and cut within 1.5 mm of the midrib. This species has characteristic follicles which are about 5 mm in size and covered in 7-8 mm long erect hairs. Pale yellow flowers are borne close to the ground within the leaves. The name is taken from the Greek *ionthas* (shaggy) and *carpos* (a fruit), in reference to the prominent tuft of hairs on the follicle (George 1996).

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

This species was discovered and first collected by P. Luscombe near Kamballup in 1987 and again in 1988. It was also collected in 1988 by M. Pieroni from the same area. C.J. Robinson, during surveys for the Albany District Threatened Flora Management Program, inspected the population and took collections in 1992. J.A. Cochrane from CALM's Threatened Flora Seed Centre (TFSC) collected seed and further specimens in 1993.

Considerable survey effort throughout the surrounding district has failed to find another population despite searches of what appeared to be suitable habitat in Kalgan Plains Nature Reserve.

Due to the relatively low number of plants and the threats associated with a single population in a highly specific habitat, *D. ionthocarpa* was declared as Rare Flora in July 1989 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. ionthocarpa is known from 1200+ plants in a single population consisting of two subpopulations in the Kamballup area. Subpopulation 1a is on a Class C recreation reserve vested in the Shire of Plantagenet and subpopulation 1b in an adjacent unvested Class C reserve for the purpose of public utility. The unvested reserve has in the past been subject to mining for spongolite stone and the mine is in close proximity to the plants. Mining is not currently being undertaken.

The species occurs on gravelly red-brown loam over spongolite in open shrub mallee habitat dominated by *Eucalyptus falcata* and *Eucalyptus tetragona* over a thicket of *Melaleuca* spp. over dwarf scrub of *Allocasuarina thuyoides*, *Beaufortia micrantha*, *Isopogon buxifolius*, *Verticordia chrysantha* and *Xanthorrhoea platyphylla.*

Other associated species are listed in Appendix 2.

Table 1: Summary of population information

Pop no & location	Land status	No of plants	Condition	Threats
1a. North of Kamballup	Shire Recreation Reserve	700+	Moderate	Weeds, fire, dieback, canker, drought
1b. North of Kamballup	Unvested Public Utility Reserve	500+	Moderate	Dieback, fire, canker, drought, future mining

1.3 Biology and ecology

Very little is known about the biology of *D. ionthocarpa*. Currently, a Masters student from Curtin University (L. Monks) is carrying out research. *Dryandra* species in general are highly susceptible to dieback (*Phytophthora* spp.) and it is suspected that *D. ionthocarpa* is also susceptible. The response to fire is unknown, however it is suspected that fire may kill mature plants which rely on the soil seed bank for recruitment. There appears to be a sizeable soil seed bank (L. Monks, pers. comm.).

Little is known about the dispersal of seed which appears to collect at the base of the plant. They are, however, quite different to other *Dryandra* seeds in that they do not have a wing, instead, they have a small tuft of hairs which appears to be designed to stick to fur. Honey Possums (*Tarsipes rostratus*) or other small mammals may be responsible for seed dispersal.

1.4 Threatening processes

1.4.1 Causes of the Critically Endangered status of this species

The rarity of *D. ionthocarpa* is probably due to the amount of clearing that has occurred for agricultural purposes in the Kamballup area. Another possible cause may be the loss of suitable habitat due to the introduction of *Phytophthora* spp. (dieback).

There has been a continuing decline in the size of the population for some 3-5 years. R. Wills[1] has discovered aerial cankers on this species and this may have been a compounding influence on their decline. This species also favours shallow sandy loams over spongolite. These sites appear to be drought prone during the summer months (M. Grant. pers. comm.). Observations made by L. Monks indicate that yellow coloured plants in summer show signs of drought stress. Dieback has not been identified with any plant deaths.

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

- **Weed invasion** is a threat to subpopulation 1a. Weeds suppress early plant growth by competing for soil moisture, nutrients and light, and are blown in from adjoining pasture. Subpopulation 1a is subjected to influences from adjacent cleared farmland, commonly referred to as edge effects (Lynch 1987, Saunders *et al*. 1987, Taylor 1987). This includes increased fertiliser runoff, modified hydrology and altered disturbance and fire regimes.

- **Dieback** (*Phytophthora* spp.) is a pathogen which causes the roots to rot and results in the plant dying of drought stress. *D. ionthocarpa* is suspected to be susceptible to this pathogen. As this is the last known *in situ* population, the prevention of the spread of dieback into the area is important.

- **Fire** must be excluded from the population as little is known about its effect on either adult plants of *D. ionthocarpa* or the soil seed bank. High fire frequency may also lead to the degradation of the habitat of *D. ionthocarpa* due to a depletion of soil seed banks and a temporary increase in the availability of nutrients for weed establishment (Panetta and Hopkins 1991). It is recommended that firebreaks be regularly maintained and a fire management plan put in place for both reserves. It is important that relevant authorities and adjacent landowners are informed of the presence of this species and are involved in the fire management plan.

[1] Ray Wills formerly of CALM, now at Kings Park and Botanic Garden

1.5 Conservation status

D. ionthocarpa is known from two subpopulations, one on a recreation reserve vested in the Shire of Plantagenet and the other on an unvested reserve for the purpose of public utility. No plants are known to occur on conservation reserves.

1.6 Strategy for recovery

The following essential strategies will be implemented:

1. Control the most threatening factors currently affecting *D. ionthocarpa* as outlined in 3.2.
2. Ensure that relevant land managers and CALM personnel are aware of the presence of *D. ionthocarpa*, and the need to protect it (eg. notification) and ensure that all are familiar with the threatening processes identified in these guidelines (see 3.2.3).

The following desirable strategies will be implemented if resources permit:

1. Protect *D. ionthocarpa* from possible future threats (eg. dieback) by appropriate management practices (see 3.3).
2. Conserve the genetic resource of *D. ionthocarpa* by including it in a seed bank, cryostorage and/or *ex situ* cultivation (see 3.3.2).
3. Conduct research into the biology, ecology and management of *D. ionthocarpa* (see 3.3.4).
4. Enhance plant numbers eg. by removal of limiting factors, direct propagation or translocation, see CALM Policy Statement No 29, Translocation of Threatened Flora and Fauna (see 3.3.5).

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 or there has been a substantial decrease in the number of mature plants within the three year period of this IRP.

3. RECOVERY ACTIONS

3.1 Existing recovery actions

Staff from CALM's Threatened Flora Seed Centre (TFSC) collected seed in 1990 and 1993. Approximately 3000 seeds were collected and have been stored at -18°C. As a result of germination of seed by A. Cochrane 62 plants are held in the Kings Park and Botanic Garden (KPBG) nursery.

L. Monks, a masters student at Curtin University, is currently carrying out research on this species. This includes estimating the size of the potential seed bank and estimating the age of plants at each subpopulation to determine when seed germinated. It also involves conducting prescribed burns on individual plants to determine their fire response. Transplant studies will be undertaken to determine other suitable substrates and habitats for this species. The effects of granivores on the seeds of *D. ionthocarpa* will be also determined.

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

The Albany District Threatened Flora Recovery Team (ADTFRT) oversees the implementation of this IRP and reports annually to CALM's Corporate Executive.

3.2 Essential recovery actions

3.2.1 Implement weed control

The western edge of subpopulation 1a is extremely weedy. *D. ionthocarpa* may have once extended to that edge of the reserve but has since disappeared. Effective weed control with the use of herbicides and hand pulling is required and will involve:

1. Accurately mapping the boundaries of subpopulation 1a.
2. Selection of an appropriate herbicide or other method of weed control after determining which weeds are present.
3. Controlling invasive weeds internal to the boundary by hand removal and spot spraying around individual *D. ionthocarpa* plants when weeds first emerge.
4. Scheduling to include weed spraying of other Declared Rare Flora populations requiring weed control within the Albany District.

As one of the subpopulations is on land vested in the Shire of Plantagenet a weed control program will be developed in consultation with the Shire.

Action:	Control weeds in subpopulation 1a
Responsibility:	CALM (Albany District, Western Australian Threatened Species and Communities Unit (WATSCU))
Cost:	$500 pa.

3.2.2 Develop a fire management plan

CALM Albany personnel will hold an on-site meeting with representatives from relevant authorities and land managers to outline the problems associated with inappropriate fire and develop a fire management plan. This should involve the maintenance of firebreaks in both reserves and the establishment and maintenance of firebreaks on adjoining land.

Action:	Develop a fire management plan
Responsibility:	CALM (Albany District, WATSCU), relevant authorities, land managers
Cost	$1200 pa.

3.2.3 Information dissemination

To promote an awareness of *D. ionthocarpa* among relevant CALM staff and staff of the Department of Minerals and Energy and Shire of Plantagenet, the production of vehicle dashboard stickers and posters is recommended. Dashboard stickers should illustrate a rare flora marker and provide a contact telephone number if one is encountered. Posters should illustrate and provide information on the species. Liaison between CALM, the landowners and the Shire of Plantagenet will be necessary to implement appropriate protective measures, especially in relation to fire management and dieback hygiene. Shire staff should be briefed about the need to check threatened flora records before arranging burns or undertaking clearing operations.

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. ionthocarpa* remain 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

3.2.4 Monitor population

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

The population will be inspected annually as a requirement under CALM's Policy Statement 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 3.3.4 (8) *Development of a Quadrat/Transect Based Monitoring System For Threatened Plant Species*.

Action:	Monitor population
Responsibility:	CALM (Albany District, WATSCU)
Cost:	$350 pa.

3.3 Desirable recovery actions

3.3.1 Change vesting and purpose of reserves

It is recommended that CALM and the Shire of Plantagenet discuss the possibility of vesting the reserves with the National Parks and Nature Conservation Authority (NPNCA) as Class A for the purpose of Conservation of Flora and Fauna. Apart from containing the only known population of *D. ionthocarpa*, the reserves have high conservation value with several species of flora at the limits of their range and one unnamed *Eucalyptus* species. Ideally, the area should become a nature reserve, however, use by the local community and future quarrying activities (soapstone) may necessitate some other designation under the CALM Act (K. Atkins[2] pers comm.).

Action:	Liaise with the Shire of Plantagenet re: changing of vesting and purposes of the reserves
Responsibility:	CALM (Land Administration, Albany District, WATSCU) Shire of Plantagenet
Cost:	$350

3.3.2 Preserve genetic diversity of the species

[2] Dr Ken Atkins, Senior Botanist, CALM Wildlife Branch

Germplasm collections should be given a high priority if the extinction of the single known population of *D. ionthocarpa* is considered a high probability through disease, its limited distribution or low number of plants. If this is deemed to be the case, recovery of the species is likely to need *ex situ* conservation techniques.

Genetic diversity conservation of the species should be incorporated into the research component (see 3.3.4) and should include collection of seed from both subpopulations, 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:	Collect seed and / or genetic material from both subpopulations
Responsibility:	ADTFRT, CALM (TFSC, Albany District), KPBG
Cost:	$1600

3.3.3 Conduct further surveys

It is recommended that reserves containing areas of suitable habitat in the Shire be surveyed on a systematic basis for the presence of this species. *D. ionthocarpa* is associated with sandy loams over spongolite and areas containing this soil type should be surveyed. M. Pieroni believes a population may be present on a spongolitic plateau in otherwise cleared farmland north east of Kamballup; this would be worth investigation even though there has been further clearing in that area (Robinson & Coates 1995).

Action:	Conduct further surveys
Responsibility:	CALM (Albany District, WATSCU)
Cost:	$500 pa.

3.3.4 Conduct research

In collaboration with existing research being conducted by L. Monks (see 3.1), research designed to increase understanding of the biology of *D. ionthocarpa* will provide a scientific base for management of the species in the wild. Research should include:

1. Habitat response to herbicide treatments.
2. The effect of weeds on recruitment and establishment.
3. The factors determining level of flower and fruit abortion.
4. Seed germination requirements.
5. The role of disturbance in regeneration.
6. Longevity of plants, and time taken to reach maturity.
7. The extent of genetic variation within and between populations (essential if new populations are to be established).
8. The development of a suitable 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 (Science and Information Division (SID), Albany District, WATSCU)
Cost:	$1000 first year, $2000 second year

3.3.5 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: ADTRFT, CALM (Albany District, WATSCU)
Cost: See Section 3.3.3 (Conduct further surveys)

Table 2: Summary of recovery actions

Recovery Actions	Population	Priority	Responsibility	Completion date
Essential				
Implement weed control	1a	High	CALM (Albany District, WATSCU)	June 1996/97/98
Develop a fire management plan	1a, 1b	High	CALM (Albany District, WATSCU) relevant authorities, land managers	August 1996
Information dissemination	1a, 1b	High	CALM (Corporate Relations Division, Albany District, WATSCU)	Ongoing
Monitor population	1a, 1b	High	CALM (Albany District, WATSCU)	October-February 1996/97/98
Desirable				
Change vesting and purpose of Reserves	1a, 1b	Moderate	CALM (Land Administration, Albany District, WATSCU), Shire of Plantagenet	Ongoing
Preserve genetic diversity of the species	1a, 1b	Moderate	ADTFRT, CALM (TFSC, Albany District, WATSCU), KPBG	Ongoing
Conduct further surveys	-	Moderate	CALM (Albany District, WATSCU)	1997/98
Conduct research	1a, 1b	Moderate	CALM (Albany District, SID, WATSCU	Ongoing
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
Essential							
Implement weed control		500			500		500
Develop a fire management plan	1200			1200		1200	
Information dissemination		500			1500		
Monitor population		400			400		400
Sub-total	**$1200**	**$1400**		**$1200**	**$2400**	**$1200**	**$900**
Desirable							
Change vesting and purpose of Reserves	350						
Preserve genetic diversity of the species		500	1100				
Conduct further surveys	500			500		500	
Conduct research	1000			2000			
Sub-total	**$1850**	**$500**	**$1100**	**$2500**		**$500**	
Total	**$3050**	**$1900**	**$1100**	**$3700**	**$2400**	**$1700**	**$900**

EA Environment Australia (formerly ANCA)

Total of all Costs: $14750

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Dr Ken Atkins	Senior Botanist, Wildlife Branch, CALM Como
Ellen Hickman	Assistant Conservation Officer, CALM Albany District
Leonie Monks	Masters Student, Curtin University

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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

CYPERACEAE
Lepidosperma brunonianum
Mesomelaena stygia subsp. *stygia*

ANTHERIACEAE
Borya sp.
Thysanotus gageoides

HAEMODORACEAE
Conostylis setigera subsp. *setigera*
Conostylis pusilla

CASUARINACEAE
Allocasuarina microstachya
Allocasuarina trichodon

PROTEACEAE
Adenanthos sp.
Banksia caleyi
Dryandra nivea
Dryandra tenuifolia
Isopogon buxifolius
Petrophile squamata
Petrophile teretifolia

SANTALACEAE
Choretrum lateriflorum

MIMOSACEAE
Acacia assimilis
Acacia nervosa
Acacia sulcata var. *planoconvexa*

PAPILIONACEAE
Bossiaea preissii
Daviesia dilatata
Gastrolobium bilobum
Jacksonia humulis

TREMANDRACEAE
Tetratheca hirsuta

MYRTACEAE
Agonis spathulata
Astartea fascicularis
Beaufortia micrantha
Beaufortia schaueri
Beaufortia sp.
Calothamnus microcarpus (Priority 3)

MYRTACEAE (cont.)
Eucalyptus falcata
Eucalyptus redunca
Eucalyptus tetragona
Eucalyptus wandoo
Melaleuca pentagona
Verticordia chrysantha
Verticordia pennigera

EPACRIDACEAE
Acrotriche plurilocularis
Astroloma compactum
Astroloma pallidum
Leucopogon cymbiformis
Leucopogon ? *polymorphus*
Leucopogon reflexus

GOODENIACEAE
Coopernookia polygalacea

ASTERACEAE
Argentipallum niveum