CACTUS DRYANDRA

(*DRYANDRA ANATONA*)

INTERIM RECOVERY PLAN

2001-2004

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Photograph: E. Hickman
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Western Australian Threatened Species and Communities Unit (WATSCU)
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Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (the Department) 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.

The Department 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This Interim Recovery Plan will operate from August 2001 to July 2004 but will remain in force until withdrawn or replaced.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.

This IRP was approved by the Acting Director of Nature Conservation on 24 September, 2002. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

Information in this IRP was accurate at August 2001.

SUMMARY

Scientific Name: ***Dryandra anatona*** **Common Name:** Cactus Dryandra
Family: Proteaceae **Flowering Period:** January to June
Departmental Region: South Coast **Departmental District:** Albany
Shire: Gnowangerup **Recovery Team:** Albany District Threatened Flora Recovery Team (ADTFRT)

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

Current status: *Dryandra anatona* was declared as Rare Flora in May 1997 and ranked as Critically Endangered (CR) in September 1999. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria B1ab(i,ii, iii,iv,v)+2ab(i,ii,iii,iv,v), as the species is known from a single area in which there is a continuing decline in habitat quality and the number of mature plants. The main threats are disease and inappropriate fire regimes.

Habitat requirements: *Dryandra anatona* is endemic to Western Australia where it is confined to the Stirling Range National Park. The species grows on slopes in sandy soil over gravelly shale, in thick kwongan vegetation (George, 1996).

- **Critical habitat:** The critical habitat of *Dryandra anatona* comprises the habitat of known populations, similar habitat within 200 metres of known populations and areas of natural vegetation that do not currently contain extant plants but link populations and may have once contained the species (these allow pollinators to move between populations and are areas for future translocation).

Existing Recovery Actions: The following recovery actions have been or are currently being implemented -

1. Approximately 88 seeds were collected from Population 1 in August 1993 and a further 75 seeds collected in September 1994, 47 seeds were collected from Subpopulation 2a in April 1996 and a further 1290 seeds collected in February 1997, and 132 seeds were collected from Subpopulation 2b in February 1997. These are stored in the Department's Threatened Flora Seed Centre (TFSC) at -18°C.
2. The Botanic Garden and Parks Authority (BGPA) currently have two plants of *Dryandra anatona* in cultivation as a result of germinants received from the TFSC in 1996.
3. In testing the *Phytophthora cinnamomi* susceptibility of 123 *Dryandra anatona* plants, the Department's Science Division staff found that 98% died within five weeks of inoculation, placing the species in the most dieback susceptible group.
4. To prevent deaths from *Phytophthora cinnamomi* infection, Subpopulation 2a was sprayed with Phosphite in 1998 and again in March 2000. Subpopulation 4b was sprayed in 1999.
5. Monitoring plots were established at Population 2a and 4b in 1998 and 1999 respectively in order to establish the impact of *P. cinnamomi* on *Dryandra anatona* and the effectiveness of phosphite applications.
6. The Albany District Threatened Flora Recovery Team (ADTFRT) is overseeing the implementation of this IRP and will include it in its annual report to the Department's Corporate Executive and funding bodies.
7. Staff from the Department's Albany District Office regularly monitor populations and conduct field surveys for additional 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 species in the wild.

Recovery criteria

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

Recovery actions
1. Coordinate recovery actions.
2. Apply phosphite.
3. Monitor populations.
4. Develop and implement a fire management strategy.
5. Collect seed and cutting material.
6. Conduct further surveys.
7. Obtain biological and ecological information.
8. Promote awareness.
9. Write a full Recovery Plan.

1. BACKGROUND

History

B. Barnsley first collected *Dryandra anatona* from the Stirling Range National Park in 1976. During annual surveys by Departmental staff, a further four populations were found in each of 1996, 1997, 1999 and 2000. All known populations are located within the Park.

In April and May 1991 a fire burnt most known populations of *Dryandra anatona*. Another fire occurred in October 2000 and again burnt several populations. The species is currently known from five populations with few unburnt plants remaining in any of them. It is unknown to what extent they will regenerate from soil-stored seed.

Most populations appear to be in decline from dieback disease (*Phytophthora cinnamomi*) that has damaged their habitat and has directly impacted the species itself.

Description

Growing up to 5 m tall, *Dryandra anatona* has a single main stem with numerous short lateral branches that are covered with felty hairs. Its leaves, which are 3 to 7 cm long by 12 to 22 mm wide when flattened and have 10 to 12 teeth on each side, are hairy above when young but this surface becomes glabrous over time. The underside of the leaf has a white felty covering. The inflorescence is either terminal or on short lateral branchlets and comprises about 170 flowers (Brown *et al*., 1998).

Dryandra anatona resembles *D. falcata* but is hairier, has long (15 to 17 mm) floral bracts and has a different shaped fruit. Also, juvenile leaves are obovate to cuneate and shortly serrate (George, 1996).

Distribution and habitat

Dryandra anatona is endemic to Western Australia where it is confined to the Stirling Range National Park. The species grows on slopes in sandy soil over gravelly shale, in thick kwongan vegetation (George, 1996).

Associated native species include *Daviesia glossosema*, *Eucalyptus marginata*, *Andersonia echinocephala*, *Beaufortia decussata*, *Kingia australis*, *Banksia oreophila*, *Banksia coccinea*, *Lambertia uniflora*, *Hakea baxteri*, *Allocasuarina humilis*, *Conospermum coerulescens*, *Nuytsia floribunda*, *Lambertia ericifolia*, *Eucalyptus staeri*, *Dryandra falcata*, *Dryandra plumosa*, *Anarthria prolifera*, *Banksia sphaerocarpa* and *Isopogon latifolius*.

Dryandra anatona occurs with the Declared Rare Flora species *Banksia brownii*, which is currently ranked as Endangered, and within the Critically Endangered ecological community, 'Montane Thicket of the Eastern Stirling Range'.

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 *Dryandra anatona* comprises:

- The habitat of known populations.
- Similar habitat within 200 metres of known populations (these provide potential habitat for natural recruitment).
- Areas of natural vegetation that do not currently contain extant plants but link populations and may have once contained the species (these allow pollinators to move between populations and are areas for future translocation).

Biology and ecology

Dryandra anatona is known to be extremely susceptible to *Phytophthora cinnamomi* (C. Crane[1] personal communication) and, as such, the species has been identified in the Stirling Range and Porongurup National Parks

[1] Colin Crane, Senior Technical Officer in the Department's Science Division

Management Plan (Conservation and Land Management, 1999) as flora that requires urgent management intervention. Many plants have already died as a result of the disease.

A number of juvenile plants in Population 4 have flowered and set seed, but the resulting soil seed bank does not appear to be as large as in areas where more mature plants occur (S Barrett[2] personal observation). It is not known what response *Dryandra anatona* has to different fire regimes but fire is likely to be detrimental to the long-term viability of populations if it occurs before seedlings have reached maturity.

Threats

Dryandra anatona was declared as Rare Flora in May 1997 and ranked as Critically Endangered (CR) in September 1999. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria B1ab(i,ii, iii,iv,v)+2ab(i,ii,iii,iv,v), as the species is known from a single area in which there is a continuing decline in habitat quality and the number of mature plants. The main threats are disease and inappropriate fire regimes. Management of the species has been incorporated into the Stirling Range and Porongurup National Parks Management Plan.

- **Disease** is a serious threat to all populations. Dieback (*Phytophthora cinnamomi*) is a pathogen that causes root rot, resulting in susceptible plants dying of drought stress. All populations are infected with many deaths occurring. Aerial canker has been visually identified at Subpopulation 2a.

- **Inappropriate fire regimes** may adversely affect the long-term viability of populations. Fires that occurred in 1991 and 2000 killed many adult plants. If further fires occur before seedlings reach maturity there is a significant risk of depleting the soil seed store.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1. Base Talyuberlup Peak	National Park	1993 6 2000 0	Poor	Disease, inappropriate fire
*2A. E South Bluff	National Park	1997 2000+ 2000 ?	Burnt	Disease, inappropriate fire
*2B. E South Bluff	National Park	1997 50 2000 ?	Burnt	Disease, inappropriate fire
*3. S Mount Success	National Park	1999 1000+	Burnt	Disease, inappropriate fire
*4A. SE Ellen Peak	National Park	1997 300+ 2000 0	Burnt	Disease, inappropriate fire
*4B. SE Ellen Peak	National Park	1999 300 (700) 2000 (3)	Burnt	Disease, inappropriate fire
*4C. SE Ellen Peak	National Park	1999 (90+) 2000 0	Burnt	Disease, inappropriate fire
*5. N Ellen Track	National Park	2000 7	Burnt	Disease, inappropriate fire

Notes: Numbers in (.) refer to seedlings. *refers to populations that were burnt in the October/November 2000 fire. Some burnt populations have not yet been surveyed to ascertain numbers of surviving plants.

[2] Sarah Barrett, Conservation Officer in the Department's Albany District

Guide for decision-makers

Section 1 provides details of current and possible future threats. Development in the immediate vicinity of populations or within the defined critical habitat of *Dryandra anatona* will require assessment. Fuel reduction burns and developments including walk trails, signage and fire breaks should not be approved unless the proponents can demonstrate that they will not have a negative impact on the species, and its habitat or potential habitat or have the potential to spread or amplify dieback disease caused by the plant pathogen *Phytophthora cinnamomi*.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

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

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

Approximately 88 seeds were collected from Population 1 in August 1993 and a further 75 seeds collected in September 1994, 47 seeds were collected from Subpopulation 2a in April 1996 and a further 1 290 seeds collected in February 1997, and 132 seeds were collected from Subpopulation 2b in February 1997. These are stored in the Department's Threatened Flora Seed Centre (TFSC) at -18°C.

The Botanic Garden and Parks Authority (BGPA) currently have two plants of *Dryandra anatona* in cultivation from seedlings germinated by the TFSC in 1996. Other seedlings germinated from seed collected in 1993 and 1997 have since died (A. Shade[3] personal communication).

In testing the *Phytophthora cinnamomi* susceptibility of 123 *Dryandra anatona* plants, the Department's Science Division staff found that 98% died within five weeks of inoculation, placing the species in the most dieback susceptible group (personal communication C. Crane).

To prevent deaths from *Phytophthora cinnamomi* infection, Subpopulation 2a was sprayed with Phosphite in 1998 and again in March 2000. Subpopulation 4b was sprayed in 1999.

In order to establish the impact of *P. cinnamomi* on *Dryandra anatona* and the effectiveness of phosphite applications, monitoring plots were established at Population 2a and 4b in 1998 and 1999 respectively.

The ADTFRT is overseeing the implementation of this IRP and reports annually to the Department's Corporate Executive and funding bodies.

Staff from the Department's Albany District Office regularly monitor populations and conduct field surveys for additional populations.

Future recovery actions

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

1. Coordinate recovery actions

The ADTFRT will continue to oversee the implementation of recovery actions for *Dryandra anatona* and to report on progress annually to the Department's Corporate Executive and funding bodies.

[3] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

Action: Coordinate recovery actions
Responsibility: The Department (Albany District) through the ADTFRT
Cost: $600 per year.

2. Apply phosphite

As *Dryandra anatona* and the Critically Endangered community in which it grows are both severely infected with the pathogen *Phytophthora cinnamomi* the Department will apply Phosphite as a protective measure. This will also protect *Banksia brownii*, another threatened plant species known to occur in the same community. Note: the cost of applying Phosphite is based on two sprays per year and will be spread across several threatened species that occur in the same community. The full cost of spraying will not need to be met for each species.

Action: Apply phosphite
Responsibility: The Department (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: $20,800 in the first year, $1,800 in the second year and $38,200 in the third year.

3. Monitor populations

Following the application of phosphite, monitoring its impact (if any) on *Dryandra anatona* and its effectiveness in controlling *Phytophthora cinnamomi* is required. Also, following the fire in October 2000, populations will need to be monitored for possible post fire recruitment from soil-stored seed and to determine the fire response of adult plants (killed or resprouts). Other factors will also need to be monitored, such as habitat degradation (including the impact of dieback), population stability (expansion or decline), pollination activity, recruitment, seed production and longevity.

Action: Monitor populations
Responsibility: The Department (Albany District, Dieback Disease Coordinator, Science Division) through the ADTFRT
Cost: $2,900 per year.

4. Develop and implement a fire management strategy

Fire may kill adult plants of the species with most regeneration likely to be from soil-stored seed. Frequent fire, prior to plants reaching maturity, is likely to result in there being insufficient soil stored seed for successful regeneration. Fire should therefore be prevented from occurring if possible, at least in the short term. A fire management strategy will be developed to determine fire control measures and fire frequency.

Action: Develop and implement a fire management strategy
Responsibility: The Department (Albany District) through the ADTFRT
Cost: $2,400 in first year and $1,000 in subsequent years.

5. Collect seed and cutting material

Preservation of germplasm is essential to guard against the possible future extinction of wild populations. Seed collections are also needed to propagate plants for translocations. A small quantity of seed has been collected from Populations 1 and 2 but additional seed is required from all populations. Cuttings will also be collected to further establish a living collection of genetic material at the BGPA.

Action: Collect seed and cutting material
Responsibility: The Department (Albany District, TFSC) and the BGPA, through the ADTFRT
Cost: $3,300 per year.

6. Conduct further surveys

Further surveys, supervised by Departmental staff with assistance from local naturalists and wildflower society members, will be conducted during the species' flowering period (January to June).

Action: Conduct further surveys
Responsibility: The Department (Albany District) through the ADTFRT
Cost: $3,200 per year.

7. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Dryandra anatona* 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.

Investigating the impacts of dieback disease and control techniques (Phosphite) on *Dryandra anatona* and its habitat (see Recovery action 3).

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division, Albany District) through the ADTFRT
Cost: $17,700 per year.

8. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Dryandra anatona* 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.

Due to the susceptibility of this species and its habitat to dieback, the need for dieback hygiene procedures will be included in information provided to visitors to areas where it occurs.

Action: Promote awareness
Responsibility: The Department (Albany District, Corporate Relations) through the ADTFRT
Cost: $1,100 in first year and $700 in subsequent years.

9. Write a full Recovery Plan

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

Action: Write a full Recovery Plan
Responsibility: The Department (WATSCU, Albany District) through the ADTFRT
Cost: $18,000 in third year.

4. TERM OF PLAN

This Interim Recovery Plan will operate from August 2001 to July 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 in the Department's Albany District
Colin Crane	Senior Technical Officer in the Department's Science Division
Anne Cochrane	Manager of the Department's Threatened Flora Seed Centre
Amanda Shade	Horticulturist at the Botanic Garden and Parks Authority
Russell Smith	Ecologist in the Department's Central Forest Region

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

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

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

Dryandra anatona is a shrub to 5 m with one main stem and short laterals, without lignotuber. Stems are tomentose and hirsute. Leaves are cuneate, obtuse to acute, irregularly serrate, mucronate, undulate; lamina 3 to 7 cm long, 12 to 22 mm wide, hirsute and glabrescent above, white-tomentose blow, margins recurved; teeth 10 to 12 each side; petiole 3 to 7 mm long, hirsute. Inflorescence is terminal or on short lateral branchlet; receptacle T-shaped; involucral bracts linear-lanceolate, acute to acuminate, the outer ones squarrose, pubescent with hirsute margins, the innermost 20 to 25 mm long; flowers c. 170 per head. Perianth is 39 to 40 mm long, hirsute above base, then pubescent; limb 5.5 to 6 mm long, acute, hirsute, the apical hairs coarser. Pistil is 49 to 50 mm long, glabrous; ovary long-hirsute; pollen presenter narrow above slender neck, ribbed, 2 to 3 mm long. Follicles are obovoid, pubescent, 23 to 24 mm long, hirsute.