

INTERIM RECOVERY PLAN NO 86

DRUMMOND'S GRASS
(DEYEUXIA DRUMMONDII)

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.

This Interim Recovery Plan will operate from April 2001 to March 2004 but will remain in force until withdrawn or replaced.

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:	<i>Deyeuxia drummondii</i>
Common Name:	Drummond Grass
Family:	Poaceae
Flowering Period:	December to January
CALM Region:	South Coast
CALM District:	Albany
Recovery Team:	Albany District Threatened Flora Recovery Team
Shire:	Gnowangerup

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 <http://www.calm.wa.gov.au/science/>. Department of Conservation and Land Management, Western Australia.

Current status: *Deyeuxia drummondii* was declared as Rare Flora in October 1996 and ranked as Critically Endangered (CR) in December 1997. In November 2000, following surveys of the Stirling Range during which further populations were found, it was downlisted to Vulnerable. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'VU' under criteria D1+2 due to its restricted distribution and less than 1000 mature individuals. The main threats are inappropriate fire regimes and disease.

Habitat requirements: *Deyeuxia drummondii* is endemic to Western Australia where it is restricted to the rocky summits of Stirling Range National Park. Habitat is scrub/heath on shallow, brown, sandy, clay over schist.

Critical habitat: The critical habitat of *Deyeuxia drummondii* comprises the area of known populations, adjacent areas of similar habitat within 200 metres of populations, corridors of remnant vegetation that link populations, and other nearby occurrences of suitable habitat that are not currently known to contain populations of the species but which may be suitable for translocations.

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

1. Seed of *Deyeuxia drummondii* was collected from Populations 2 and 3 in January 2000 and stored in CALM's Threatened Flora Seed Centre (TFSC) at -18°C.
2. The TFSC have established two different trials to stimulate germination of *Deyeuxia drummondii* seed.
3. The Botanic Garden and Parks Authority have eight plants in stock that were propagated in March 2000 from seed collected by TFSC staff.
4. Seedlings germinated by TFSC staff have been submitted for dieback (*Phytophthora cinnamomi*) susceptibility at CALMScience Plant Diseases laboratory.
5. Staff from CALM's Albany District have undertaken several surveys for *Deyeuxia drummondii* and these have led to the discovery of new populations.
6. The Albany District Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive and funding bodies.
7. Staff from CALM's Albany District Office regularly monitor the 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

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. Conduct further surveys.
3. Develop and implement a fire management strategy.
4. Monitor populations.
5. Collect seed.
6. Obtain biological and ecological information.
7. Promote awareness.
8. Write a full Recovery Plan.

1. BACKGROUND**History**

In 1854, James Drummond collected the type of *Deyeuxia drummondii* from somewhere between the Swan River and Cape Riche (the actual location is not known). Mueller made a further collection from the Porongurup Range in 1867, but the identification of this specimen as *Deyeuxia drummondii* is now thought to be doubtful. As it had not been seen for over 100 years the species was presumed extinct until 1995 when S. Barrett collected it on Ellen Peak¹ as part of the 'Biological Survey of Mountains in southern Western Australia' project (Barrett 1996). The specimen did not contain flowering material and was not confirmed as *Deyeuxia drummondii* until 1997 when a second (flowering) specimen was collected. Further surveys by CALM Albany District staff resulted in several new populations being discovered.

The habitat of most populations of *Deyeuxia drummondii* has been burnt in the last 10 years. Populations 3c, 6 and 7 were burnt in 1991, and Populations 5 and 8 in 1996. It is likely that Populations 1, 2, 3a, 3b, 4, probably escaped those fires. However, another fire occurred in October 2000 and again burnt populations of *D. drummondii*. It is currently unknown how many plants escaped the fire. Prior to the most recent fire, 10 populations of *Deyeuxia drummondii* were known and together consisted of around 300 plants.

Description

Deyeuxia drummondii is a small, densely tufted perennial grass that grows to 25 cm tall. Its bright green leaves, up to 5 mm wide, are flat, soft and fairly smooth. There are numerous inflorescences, often 30 to 40 per plant. Each consists of a dense purplish head, usually 20 to 70 mm long, held on a long stem so that they project above the leaves. Spikelets are densely packed in the inflorescence, 5 to 8 mm long, with single-veined glumes, and each spikelet holds a single concealed flower that bears a slightly protruding hair-like bristle (awn) (Brown *et al.*, 1998).

Distribution and habitat

Deyeuxia drummondii is endemic to Western Australia where it is restricted to rocky summit areas in Stirling Range National Park. Habitat is scrub/heath on shallow, brown, sandy, clay over schist.

Associated species include *Calothamnus crassus*, *Kunzea montana*, *Platysace* sp. Stirling, *Actinotus rhomboideus*, *Velleia foliosa*, *Xanthosia rotundifolia* var. *hypoleuca*, *Sollya drummondii*, *Austrodranthonia caespitosa*, *Lepidosperma* sp., *Nemcia vestita*, *Hakea varia*, and *Tetralia capillaris*. *Deyeuxia drummondii* occurs with another Declared Rare Flora species *Sphenotoma drummondii*.

Populations 1, 2, 3, 4, 6, 7 and 9 are also a component part of the Critically Endangered Eastern Stirling Range Montane Heath Community (Barrett 2000).

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 *Deyeuxia drummondii* 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.

¹ Sarah Barrett, Flora Officer, CALM Albany District

Biology and ecology

Little is known about the biology and ecology of *Deyeuxia drummondii*. Unlike many of the larger grasses (wheat and barley), seed of *D. drummondii* does not harden on maturity and remains slightly soft. The fruiting body of *D. drummondii* is made up of a solitary spikelet on a long culm or stalk, which consists of many flowers/fruits, each with a pair of glumes or outer scales. Within the glumes are the lemma and palea (inner scales), and within these is the seed. A small awn or bristle rises from the lemma. Staff from CALM's TFSC found that, in order to stimulate germination in *D. drummondii*, pre-treatments, such as the removal of some of the intricate papery structures that surround the seed itself, were needed. Seeds germinated quicker with the structures (the lemma and palea) removed, and achieved higher germination than seed with the structures still attached (Cochrane & Barrett, in draft).

It is not known how *Deyeuxia drummondii* responds to fire but recruitment following fire has been observed with several age classes apparent in populations that have been burnt in the past (personal communication S. Barrett).

Threats

Deyeuxia drummondii was declared as Rare Flora in October 1996 and ranked as Critically Endangered (CR) in December 1997. In November 2000, following surveys in the Stirling Range during which further populations were found, it was downlisted to Vulnerable. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'VU' under criteria D1+2 due to its restricted distribution and less than 1000 mature individuals. The main threats are inappropriate fire regimes and disease.

- **Inappropriate fire regimes** may adversely affect the viability of populations of *Deyeuxia drummondii*. Although the species probably establishes seed banks quickly (personal communication S. Barrett) the soil seed bank would be depleted if fires recurred before juvenile plants reached maturity. Monitoring of fire response is required and will be addressed in action 4.
- **Disease** may be a threat to all *Deyeuxia drummondii* populations. Dieback (*Phytophthora* spp.) is a pathogen that causes the roots to rot and results in susceptible plants dying of drought stress. Although it is unlikely that the species is susceptible to dieback, the associated habitat is highly susceptible. Further investigation into the susceptibility and possible side affects of dieback is required and will be addressed in action 6.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
*1. Ellen Peak	National Park	1997 16	Burnt	Inappropriate fire, disease
2A. W Bluff Knoll	National Park	1997 6 2000 10+	Healthy	Inappropriate fire, disease
*2B. NW Bluff Knoll	National Park	1999 20+ 2000 0	Burnt	Inappropriate fire, disease
*3A. ESE Bluff Knoll	National Park	1999 75 2000 30 (25) [65% burnt]	Most burnt	Inappropriate fire, disease
*3B. SE Bluff Knoll	National Park	1999 100+ (50+)	Burnt	Inappropriate fire, disease
*3C. E Bluff Knoll	National Park	1999 8	Burnt	Inappropriate fire, disease
*4. First Arrow	National Park	1999 2	Burnt	Inappropriate fire, disease
*5. Toolbrunup Peak	National Park	1999 60+	Burnt	Inappropriate fire, disease
*6A. NW Coyanerup Peak	National Park	1999 3 2000 0	Burnt	Inappropriate fire, disease
*6B. NW Coyanerup Peak	National Park	1999 13 2000 0	Burnt	Inappropriate fire, disease
*6C. NNW Coyanerup Peak	National Park	2000 50+ 2000 0	Burnt	Inappropriate fire, disease
*7A. S Isongerup Peak	National Park	1999 30+	Burnt	Inappropriate fire, disease
*7B. S Isongerup Peak	National Park	1999 10+	Burnt	Inappropriate fire, disease
8. Mt Hassell	National Park	2000 1	Healthy	Inappropriate fire, disease
9. Pyungoorup Peak	National Park	2000 3	Healthy	Inappropriate fire, disease

Note: Numbers in brackets () refers to seedlings. *refers to populations that may have been burnt in the October/November 2000 fire. Some populations have yet to be visited to ascertain if any plants escaped the fire.

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 *Deyeuxia drummondii* will require assessment. Developments 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.

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.

3. RECOVERY ACTIONS**Existing recovery actions**

In January 2000, approximately 155 seeds of *Deyeuxia drummondii* from Population 2 and 5945 seeds from Population 3 were collected and stored in CALM's TFSC at -18°C. Two different trials were established in order to stimulate germination of seed. The first consisted of seeds with the covering structures (palea and lemma) intact, and the second with seeds having had both the lemma and palea removed. Results show that *D. drummondii* seeds germinate quicker with the lemma and palea removed and achieve a higher germination rate than seed with the structures still attached (84% germination in 20 days compared to 24% germination in 90 days) (Cochrane & Barrett, in draft). Germination trials for seed collected from Population 2 have not yet been done (unpublished data, A. Cochrane²).

The Botanic Gardens and Parks Authority (BGPA) currently have eight *Deyeuxia drummondii* plants in stock from seed germinated at the TFSC (personal communication A. Shade³).

² Anne Cochrane, Manager, Threatened Flora Seed Centre, CALM Science Division

³ Amanda Shade, Horticulturist, Botanic Garden and Parks Authority

Seedlings from the TFSC have been sent for dieback (*Phytophthora cinnamomi*) testing at CALMScience Plant Diseases laboratories (personal communication A. Cochrane).

Staff from CALM Albany District have undertaken surveys for *Deyeuxia drummondii* that have resulted in a number of new populations being found.

This IRP will be implemented in conjunction with the “Eastern Stirling Range Montane Heath Community” IRP (Barrett, 2000) and the IRP for *Sphenotoma drummondii* (Holland *et al.*, 1999). Management of the species has also been incorporated into the Stirling Range and Porongurup National Parks Management Plan (CALM, 1999).

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.

CALM staff from Albany District Office regularly monitor the 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 will continue to oversee the implementation of recovery actions for *Deyeuxia drummondii* 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 District) through the ADTFRT
Cost: \$400 per year.

2. Conduct further surveys

Further surveys will be conducted during the species’ flowering period (December to January). Local volunteers such as members of naturalists clubs and wildflower societies will be encouraged to help in surveys supervised by CALM staff.

Action: Conduct further surveys
Responsibility: CALM (Albany District) through the ADTFRT
Cost: \$3,400 per year.

3. Develop and implement a fire management strategy

It is not known how *Deyeuxia drummondii* responds to fire and different fire regimes. Frequent fire may result in the accumulation of insufficient soil-stored seed for regeneration. Fire should, if possible, be prevented from occurring in areas that have been burnt recently. The development of a fire management strategy has been recommended in the Threatened Ecological Community IRP and the same issues affect *D. drummondii*. The fire management strategy will define fire control measures, fire frequency and timing, and will be developed in consultation with relevant authorities and land managers.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Albany District) through the ADTFRT
Cost: \$2,300 in first year and \$1,000 in subsequent years.

4. Monitor populations

Following the October 2000 fire, populations that were burnt will be monitored for post fire recruitment. Habitat degradation (including the impact of dieback), population stability (expansion or decline), weed invasion, pollination activity, recruitment, seed production and longevity will also be monitored at least annually.

Action: Monitor populations
Responsibility: CALM (Albany District) through the ADTFRT
Cost: \$1,800 per year.

5. Collect seed

Preservation of germplasm is essential to guard against the possible extinction of wild populations. Seed has been collected from Populations 2 and 3 but is also required from other populations. Due to the recent fire, it may not be possible to collect seed from some populations until plants again reach maturity.

Action: Collect seed
Responsibility: CALM (Albany District, TFSC) through the ADTFRT
Cost: \$2,700 per year.

6. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Deyeuxia drummondii* 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' 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 *Deyeuxia drummondii* and its habitat.

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

7. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Deyeuxia drummondii* 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 the habitat of this species to dieback the need for dieback hygiene procedures will be included in information provided to visitors to the sites.

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

8. Write a full Recovery Plan

In the third-year of this IRP, the need for further recovery will be assessed. If, following the recent fires, *Deyeuxia drummondii* has not regenerated well and is ranked as Critically Endangered, 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: CALM (WATSCU, Albany District) through the ADTFRT
Cost: \$18,100 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
Rebecca Evans	Former Project Officer, WA Threatened Species and Communities Unit, CALM

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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- Vickery, J.W., (1940) A Revision of the Australian Species of *Deyeuxia* Clar. ex Beauv., with Notes on the Status of the Genera *Calamagrostis* and *Deyeuxia*, Natl. Herb. 1: 49-53.
- Western Australian Herbarium (1998) FloraBase – Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. <http://www.calm.wa.gov.au/science/>
- World Conservation Union (1994) *IUCN red list categories prepared by the IUCN Species Survival Commission*, as approved by the 40th meeting of the IUCN Council. Gland, Switzerland.

7. TAXONOMIC DESCRIPTION

Vickery, J.W., (1940) A Revision of the Australian Species of *Deyeuxia* Clar. ex Beauv., with Notes on the Status of the Genera *Calamagrostis* and *Deyeuxia*, Natl. Herb. 1: 49-53.

Deyeuxia drummondii (Steud.) n. comb. Small, decumbent, glabrous annual, 5-25 cm high; culms slender, 2-3 noded, the internodes shortly exceeding the sheaths; sheaths appressed, or slightly loose at the top, smooth; ligule membranous, 2-3.5 mm long, jagged at the apex, lacinate smooth; blade flat, linear, acuminate, 1-8 cm x 1-1.5 mm, fairly smooth; panicle long to narrow oblong, 1.5-4 cm x 0.7-1 cm, with loosely imbricate spikelets born on short, appressed glabrous or scaberulous branches, the lower internode about 8 mm long; pedicels sub-clavate, 1-3 mm long, very finely and sparsely scabrous, spikelets 7-8 mm long, greenish or purplish, strongly laterally compressed; glumes unequal, the lower glume about 1 mm longer than the upper, 1-nerved, keeled, scabrous on the keel, very sparsely and finely scaberulous on the sides, greenish towards the centre, scarious and faintly purplish towards the margins, acuminate, rather widely gaping; lemma about 3.5 mm long, distinctly 4-toothed at the apex, distinctly and closely scaberulous but slightly furrowed and smooth between the veins just below the apex, 4-nerved above the middle, the nerves conspicuous, with a dorsal awn attached about 1 mm from the base, furrowed above the awn; awn 4-5 mm long, strongly exceeding the lemma but not exceeding the glumes, geniculate, twisted in the lower part; callus shortly barbed with hairs 0.2-0.6 mm long; palea shorter than the lemma, thin, membranous, 2 keeled, minutely scaberulous on the keels in the upper part, narrowly truncate, minutely 2 fid and finely ciliolate at the base; rachilla not or scarcely produced; anthers 3, 0.7-1 mm long.