

INTERIM RECOVERY PLAN NO. 30

GIANT ANDERSONIA
(ANDERSONIA AXILLIFLORA)
INTERIM RECOVERY PLAN
1999-2002

by

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Photograph: Stephen Hopper

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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

CALM is committed to ensuring that 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This Interim Recovery Plan will operate from May 1999 to April 2002 but will remain in force until withdrawn or replaced. It is intended that, unless the taxon is no longer ranked as Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

This IRP was approved by the Director of Nature Conservation on 31 August 1999. 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 May 1999.

SUMMARY

Scientific Name:	<i>Andersonia axilliflora</i>
Common Name:	Giant Andersonia
Family:	Epacridaceae
Flowering Period:	October to November
CALM Region:	South Coast
CALM District:	Albany
Shire:	Gnowangerup
Recovery Team:	Albany District Threatened Flora Recovery Team (ADTFRT)

Illustrations and/or further information: Barrett, S. (1996). *A Biological Survey of the Mountains in Southern Western Australia*. Department of Conservation and Land Management, unpublished report; Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Druce, G. C. (1917). *Nomenclatorial notes: chiefly African and Australian*, Reprinted from: Report of the Botanical Society and Exchange Club of the British Isles (1916, suppl., 2): 604(1917), Fig. 21, p. 122; Menet, K. A., Nielsse, G. M., and Dixon, K. W. (1994). *Seed bank patterns in Restionaceae and Epacridaceae after wildfire in kwongan in southwestern Australia*, Journal of Vegetation Science, 5: 5-12.

Current status: *Andersonia axilliflora* was declared as Rare Flora in October 1996 and was ranked in November 1998 as Critically Endangered (CR). It currently meets IUCN Red List Category CR under World Conservation Union (IUCN) Red List Criterion A2ac, C2b and B1+2ce (IUCN 1994), due to there being less than 250 mature individuals in a restricted habitat, with plant numbers in serious decline from degradation of its habitat and continuing deaths from *P. cinnamomi*. This IRP will be implemented in conjunction with the "Eastern Stirling Range Montane Heath Community" IRP (Barrett 1999) and the IRP for *Persoonia micranthera* (Evans *et al.* 1999). It will be incorporated into the Stirling Range and Porongurup National Parks Draft Management Plan (CALM 1997).

Habitat requirements:

Andersonia axilliflora is confined to the upper slopes and summits of the eastern peaks of the Stirling Range National Park, where it occurs in shallow rocky soil over schist, supporting heath and scrub. The species is also a component part of the broader Critically Endangered Eastern Stirling Range Montane Heath Community (Barrett 1999)

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

1. Seed collections have been made by CALM's Threatened Flora Seed Centre (TFSC).
2. Propagation from seed and cuttings has been conducted by Kings Park and Botanic Garden (KPBG).
3. Aerial spraying of phosphite has been conducted.
4. An IRP for the Ecological Community in which *Andersonia axilliflora* occurs has been prepared.
5. Regular monitoring has been conducted.

IRP Objective: The objective of this Interim Recovery Plan (IRP) is to abate identified threats and maintain viable *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.

Future recovery actions

1. Apply phosphite.	5. Collect seed.
2. Monitor the impact of phosphite application.	6. Monitor populations.
3. Develop a fire management strategy.	7. Disseminate information.
4. Obtain biological and ecological information	8. Write a full Recovery Plan.

1. BACKGROUND

History

Andersonia axilliflora was collected and described in 1917 by G. C. Druce, however, records of this and previous collections have been lost. At present, a total of 11 collections that were made between 1926 and 1997 are held at the Regional Herbarium at Albany and the Western Australian Herbarium in Perth.

Surveys of the Stirling Range by CALM, Kings Park and Botanic Garden (KPBG) and others have resulted in the discovery of populations on Bluff Knoll, Ellen Peak and Isongerup Peak.

In April 1991 an intense fire burnt all the known populations of *Andersonia axilliflora* and a large portion of the eastern Stirling Range. Only a small number of adult plants escaped the fire, however, recruitment of seedlings was observed during the following year. Pre-fire adult plants exceeded 1 m tall, while eight year old post-fire seedlings range from 20-40cm in height and have not flowered. There are currently (1999) some 700+ seedlings and less than 200 mature plants. All populations are in serious decline from dieback (*Phytophthora cinnamomi*).

Sarah Barrett assessed threats to the species during a survey of Bluff Knoll and Ellen Peak between 1994 and 1996. Ellen Hickman undertook a further survey of the eastern Stirling Range in the spring of 1996, during which she found several more populations. Due to its restricted nature and the impact of dieback on the populations the species was ranked as Critically Endangered in November 1998.

The Eastern Peak Route was developed in the 1930s and runs from Bluff Knoll to Ellen Peak. Use of this track may have hastened the spread of dieback into the area. The alignment of the route needs to be assessed in relation to any dieback-free remnants that may exist.

A draft Interim Recovery Plan (IRP) has been written by Sarah Barrett for the Critically Endangered, 'Montane thicket and heath of the South-West Botanical Province above approximately 900 m above sea level' (hereafter abbreviated to 'Eastern Stirling Range Montane Heath and Thicket Community'), of which *Andersonia axilliflora* is the key indicator species. This Threatened Ecological Community (TEC) IRP outlines many of the same processes that are threatening *A. axilliflora* and both IRPs should be taken into account when management actions are implemented.

The Albany District Threatened Flora Recovery Team (ADTFRT) was established in 1994 and is overseeing the implementation of this IRP. It will include recovery progress in its annual report to CALM's Corporate Executive and funding agencies.

Description

Andersonia axilliflora is a tall sturdy shrub to 3 m with crowded leaves and is the largest *Andersonia* in the genus. The erect to spreading leaves are elongate triangular, broad and stem clasping at the base, tapering to a point. The floral leaves at the ends of the branches are creamy white, and extend beyond the thirty or so hidden flowers. Each cream flower, about 10 mm long, is enclosed in stiff acuminate calyx lobes.

Distribution and habitat

Andersonia axilliflora has been identified as the key indicator species for the Critically Endangered Eastern Stirling Range Montane Heath and Thicket Community (Barrett 1999). The species occurs in the eastern section of the Stirling Range, at the summit or at high altitudes between Mt Success and Ellen Peak.

Andersonia axilliflora grows in low, dense heath and scrub on a rocky shallow soil over schist. The community is characterised by having species such as *Kunzea montana*, *Beaufortia anisandra*, *Sphenotoma* sp. Stirling Range, *Andersonia echinocephala*, several *Darwinia* species, *Banksia solandri*, *Banksia brownii* and *Dryandra concinna* (Barrett 1999).

Several other threatened flora species also occur within the community. These include *Dryandra montana*, *Sphenotoma drummondii*, *Darwinia collina*, *D. squarrosa*, *Lambertia fairallii*, *Banksia brownii* and *Persoonia micranthera* (Barrett 1999).

Biology and ecology

Very little is known about the biology and ecology of *Andersonia axilliflora*, and what is known has come from field observations rather than definitive research. *A. axilliflora* is known to be very susceptible to *P. cinnamomi*, ranking 9 on a

scale of 1 to 10 where 7 is considered a significant risk (Keighery 1988). The species is killed but recruits from soil stored seed after fire. It would therefore be detrimental to the species if fire destroys the population again before seedlings reach maturity. Unfortunately the species is slow growing, taking longer than eight years to produce seed (personal communication S. Barrett¹).

Similarly, there is little known about the genus *Andersonia*, however, research on the Epacridaceae family provides some information on its likely biology and ecology. A study by G. Keighery (1996) on Western Australian Epacridaceae details the biology and conservation of the family. This study reports that *Andersonia* is endemic to Western Australia, showing greatest species diversity in the Albany district. Two *Andersonia* species are listed as being pollinated by birds, but Keighery suggests that insects, possibly moths, and butterflies, pollinate most species. Seed is probably dispersed by gravity or wind. Most genera are susceptible to dieback disease, and taxa most at threat include species that are geographically localised including *A. axilliflora* (Keighery 1996).

Threats

Andersonia axilliflora was declared as Rare Flora in October 1996 and was ranked in November 1998 as Critically Endangered (CR). It currently meets IUCN Red List Category CR under World Conservation Union (IUCN) Red List Criterion A2ac, C2b and B1+2ce (IUCN 1994), due to there being less than 250 mature individuals in a restricted habitat, with plant numbers in serious decline from degradation of its habitat and continuing deaths from *P. cinnamomi*.

- ***Phytophthora*** is a major threat to all known populations of the species. During a fire in 1991 most adult plants were killed, and subsequent seedling survival rates are low with approximately 50% of individuals dying from *P. cinnamomi* infection (personal communication S. Barrett¹).
- **Inappropriate fire regimes** may adversely affect the viability of populations of *Andersonia axilliflora*. A fire in 1991 killed many adult plants but stimulated germination of soil stored seed. Although eight years have passed the seedlings have not yet flowered (personal communication S. Barrett¹). If a further fire occurs before seed is produced there is a significant risk of depleting the soil seed store, and if plant numbers continue to decline, due to *P. cinnamomi* infection, the probability of species extinction is high.
- **Trampling:** Currently visitors do not tend to deviate from the Eastern Peak Route, however the alignment and condition of the route need assessment to ensure *Andersonia axilliflora* populations are not compromised by disease introduction, trampling or track formation.
- **Grazing by herbivores** is having an impact on the habitat and some individual *Andersonia axilliflora* plants, however, the identity of the herbivore is unclear (personal communication S. Barrett¹).

¹ Sarah Barrett, Assistant Conservation Officer, CALM Albany District Office

Summary of population information and threats

Pop. No & Location.*	Land Status	No. of live plants	Condition	Threats
1. Stirling Range, Buff Knoll	National Park	1994 - 5 1996 - 100+ 1997 - 50+ seedlings	Moderate Poor	<i>P. cinnamomi</i> , fire and trampling
2a & b Stirling Range, Ellen Peak	National Park	1995 - 15 1998 - <30 mature plants	Moderate Poor	<i>P. cinnamomi</i> , fire and trampling
3a & b Stirling Range, Bluff Knoll	National Park	1998 - 100+ seedlings	Poor	<i>P. cinnamomi</i> , fire and trampling
4a to e Stirling Range, Isongerup Peak	National Park	1997 - 150+ seedlings and 2 mature plants	Poor	<i>P. cinnamomi</i> , fire and trampling
5. Stirling Range, Ellen & Pyungoorup	National Park	1997 - 25+ seedlings and <10 mature plants	Poor	<i>P. cinnamomi</i> , fire and trampling
6. Stirling Range, Bakers Knob	National Park	1996 - 20-100 1998 - 75 mature plants	Moderate Poor	<i>P. cinnamomi</i> , fire and trampling
7. Stirling Range, 2nd Arrow	National Park	1998 - 20 mature plants	Moderate Poor	<i>P. cinnamomi</i> , fire and trampling
8. Stirling Range, First Arrow	National Park	1998 - 50 mature plants	Poor	<i>P. cinnamomi</i> , fire and trampling
9. Stirling Range, Moongoongoonderup	National Park	1997 - 20+ seedlings and <10 mature plants	Poor	<i>P. cinnamomi</i> , fire and trampling
10. Stirling Range, Mt Success	National Park	1998 - 300+ seedlings & 6 mature plants	Poor	<i>P. cinnamomi</i> , fire and trampling

*These ten populations are likely to have formerly comprised of three major populations, however fragmentation has occurred as a result of dieback. There are currently (in 1999) some 700+ seedlings following fire in 1991 and less than 200 mature plants. All populations are in serious decline from dieback.

2. RECOVERY OBJECTIVE AND CRITERIA**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 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**

CALM's Threatened Flora Seed Centre (TFSC) has in storage over 8,500 seeds of *Andersonia axilliflora* at -18°C from populations 4, 6, 7, and 8 that were collected between October 1996 and February 1997. Initial germination tests resulted in no more than 20% germination. Further tests are being conducted in order to understand more about the germination requirements of the species.

All germinants from the tests were passed to KPBG for further propagation. KPBG now have 12 plants in their collection from seed and cutting material.

Aerial spraying of phosphite for the control of *P. cinnamomi* in the eastern Stirling Range commenced in Autumn 1997, and was later expanded to include other sites for *Andersonia axilliflora* in 1998. This program also covered several other threatened species including *Dryandra montana*, *Sphenatoma drummondii*, *Darwinia collina*, *D. squarrosa*, *Lambertia fairallii*, *Banksia brownii* and *Persoonia micranthera*. The following table outlines the last date at which the populations were sprayed with phosphite.

Population	Peak	Date	Date of next proposed spray
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1	Bluff Knoll	8/5/97	Autumn 2000
2 and 5	Ellen and Pyungoorup	30/3/98 19/3/99	
3	Bluff Knoll	8/5/97	Autumn 2000
4	Isongerup	15/5/97	Autumn 2000
5	Pyungoorup	4/3/98 18/3/99	
6	Bakers Knob	30/3/98 18/3/99	
9	Moongoongoonderup	3/4/98 18/3/99	
10	Mt Success	15/4/97 7/5/97	Autumn 2000

Due to the continuing threat from dieback CALM's Albany District staff will continue spraying these areas as part of CALM's phosphite spraying program.

Stirling Range National Park Rangers are aware of the threatened nature of the species and its locations. CALM staff from the Albany District Office regularly monitor the populations particularly in relation to the effectiveness of phosphite application and the impact of *P. cinnamomi*. Six control and six spray plots are in place on Bluff Knoll and species decline within the plots is being assessed on order to determine the effectiveness of the spray treatment (Barrett 1998). Additional monitoring plots are in place for other populations, although follow up assessments have been limited as access is difficult and time consuming (Hickman, 1997). Further monitoring will require the allocation of additional staff (see Recovery Action 3).

An Interim Recovery Plan for the 'Eastern Stirling Range Montane Heath and Thicket Community' has been drafted by S. Barrett¹. Many of the recovery actions outlined in the IRP can be applied to *Andersonia axilliflora* and implementation of the two plans will be integrated.

Future recovery actions

1. Apply phosphite

Both the species and the ecological community in which it grows are severely infected with *P. cinnamomi*. CALM will continue applying phosphite to the area. Application to the entire community will have the added benefit of protecting a number of other threatened plant species in the area and will allow regeneration of the community as a whole.

Action: Apply phosphite
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: \$31,000 per year for the first and third years.

2. Monitor the impact of phosphite application

Following the application of phosphite, monitoring its impact on the species and the control of *P. cinnamomi* is required.

Action: Monitor the impact of phosphite application
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: \$6,700 per year.

3. Develop a fire management strategy

The development of a fire management strategy has been recommended in the TEC IRP. The same issues also affect the management of fire for *Andersonia axilliflora*. These include the death of adult plants, the recruitment of seedlings following fire and their subsequent death from dieback disease.

CALM, through the ADTFRT, will develop a fire management strategy for the area.

Action: Develop a fire management strategy
Responsibility: CALM (Albany District) through the ADTFRT
Cost: \$1,600 in the first year and \$300 in subsequent years.

4. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Andersonia axilliflora* in the wild. Research will include:

1. Response of *Andersonia axilliflora* and habitat to fire.
2. Role of disturbance in regeneration.
3. Pollination biology and seed set.
4. Factors determining level of flower and fruit abortion.
5. Level of invertebrate grazing or removal of seed.
6. Size and viability of soil seed bank.
7. Seed germination requirements of *A. axilliflora*.
8. Longevity of plants, and time taken to reach maturity.

Action: Obtain biological information
Responsibility: CALM (CALM Science and Albany District) through the ADTFRT
Cost: \$14,200 per year.

5. Collect seed

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Seed collections are also needed to propagate plants for translocations. The collections made by the TFSC in 1996 and 1997 are quite large. However, as only 20% of the seed collected germinated in the initial tests, further collections should be made.

Action: Collect seed
Responsibility: CALM (TFSC, Albany District) through the ADTFRT
Cost: \$8,000 per year.

6. Monitor populations

Annual monitoring of factors such as habitat degradation, population stability (expansion or decline), pollination activity, seed production, recruitment, and longevity is essential. Herbivores are also having an impact on some populations of *Andersonia axilliflora* and continued monitoring of this threat is needed in order to assess if action will be required in the future.

Action: Monitor populations
Responsibility: CALM (Albany District), through the ADTFRT
Cost: \$1,200 per year.

7. Disseminate information

Users of the Eastern Peak Route in the Stirling Range may damage populations of *Andersonia axilliflora* close to the track through disease introduction or trampling. Education will be achieved by providing an information sheet on the need to preserve the habitat. A review of the 'code of conduct' for backpacking in the Stirling Range National Park is addressed in the IRP for the Stirling Range Montane Heath and Thicket Community, which contains *A. axilliflora*.

An information sheet, which includes a description of the plant, its habitat type, threats, management actions and photos will be produced.

Action: Disseminate information
Responsibility: CALM (Albany District and Corporate Relations Division) through the ADTFRT
Cost: \$1,000 in the first year and \$400 in subsequent years.

8. Write a full Recovery Plan

At the end of the three-year term of this Interim Recovery Plan, the need for further recovery should be assessed. If the species is still ranked Critically Endangered, a full Recovery Plan will be written.

Action: Write a full Recovery Plan
Responsibility: CALM (Albany District and WATSCU) through the ADTFRT
Cost: \$17,500 in the third year.

4 TERM OF PLAN

This Interim Recovery Plan will operate from April 1999 to March 2002 but will remain in force until withdrawn or replaced. It is intended that, unless the taxon is no longer Ranked as 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:

Anne Cochrane	Manager, Threatened Flora Seed Centre, CALM
Val English	Ecologist, Western Australian Threatened Species and Communities Unit, CALM
Ian Herford	Regional Leader, Planning and External Resources, Albany Region, CALM
Ellen Hickman	Conservation Officer, Albany District, CALM
Sophie Juskiewicz	Propagator, Kings Park and Botanic Garden
Russell Smith	Ecologist, Phosphite Program, CALM

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

6 REFERENCES

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7 TAXONOMIC DESCRIPTION (Druce (1917))

Andersonia axilliflora is a robust shrub, often exceeding 2 m in height. Leaves 20 -35 mm long, 8 - 15 mm wide at base, increasing in size acropetally to the bracts, lanceolate, usually erect and concave, sometimes undulate and subspirally twisted, grooved, glabrous. Inflorescences terminal often \pm oblong, often containing more than 30 flowers flattened in the axils of their bracts, terminating the shoots, with the apex withering after anthesis; bracts lanceolate and concave, usually erect often twice as long as the subtended flower; bracteoles often as long as sepals, carinate, acuminate, considerably flattened laterally. Sepals c. 12 mm long in the larger flowers, lanceolate -acuminate, those opposite the bracteoles usually complicate, usually glabrous, creamy white. Corolla somewhat shorter than calyx; lobes c. twice as long as tube, glabrous, usually acuminate, erect at the time of anther dehiscence; tube pubescent above the middle, often sparingly so. Stamens c. 3/4 as long as corolla, far exceeding tube, not becoming exerted by filament elongation, filaments glabrous, stout, flattened; anthers linear, c. 6 mm long, often about twice as long as filaments, attached at base, with the prominent connective continuing to the apex; pollen in tetrads. Ovary c. 2 mm high; loculi rather rounded, puberulent above; hypogynous scales rather less than 1/2 as long as ovary, often \pm united; style cylindrical, not becoming exerted beyond the calyx, scabridulous; stigma truncate or slightly clavate.