INTERIM RECOVERY PLAN NO. 168

MORESBY RANGE DRUMMONDITA (*DRUMMONDITA ERICOIDES*)

INTERIM RECOVERY PLAN

2004-2009

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Photograph: Andrew Brown

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Natural Heritage Trust
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DEPARTMENT OF Conservation AND LAND MANAGEMENT
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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This Interim Recovery Plan will operate from June 2004 to May 2009 but will remain in force until withdrawn or replaced. It is intended that this IRP will be reviewed after five years.

This IRP was given regional approval on 4 June, 2004 and was approved by the Director of Nature Conservation on 22 June, 2004. The allocation of staff time and 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 in June 2004.

ACKNOWLEDGMENTS

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

Eric Bunn	Senior Research Scientist (Propagation Science), Botanic Garden and Parks Authority
Andrew Crawford	Technical Officer, CALM's Threatened Flora Seed Centre
Anthony Desmond	Regional Leader, Nature Conservation, CALM’s Geraldton District
Greg Keighery	Senior Principal Research Scientist, CALM’s Science Division
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and CALM's Wildlife Branch for assistance.

SUMMARY

Scientific Name:	*Drummondita ericoides*	**Common Name:**	Moresby Range Drummondita
Family:	Rutaceae	**Flowering Period:**	June - October
CALM Region:	Midwest	**CALM District:**	Geraldton
Shire:	Chapman Valley	**Recovery Team:**	Geraldton District Threatened Flora Recovery Team

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; Grieve, B.J. and Blackall, W.E. (1998) *How to know Western Australian wildflowers: a key to the flora of the extratropical regions of Western Australia. Part II, Dicotyledons (Amaranthaceae to Lythraceae). Restructured & rev. 2nd ed.* University of Western Australia Press, Western Australia.

Current status: *Drummondita ericoides* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in March 1982. It currently meets Red List (IUCN 2000) category Vulnerable (VU) under criterion D1+2 due to the relatively low total number of plants (less than 600), restricted area of occupancy and number of locations. *Drummondita ericoides* is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). The main threats are impacts from increased human presence in a residential development near Population 1 and too frequent fire.

Description: *Drummondita ericoides* is a shrub growing 5 to 20 cm tall on ridges, or from 50 cm to 1 m tall in sheltered gullies. Scattered simple leaves are terete, glabrous and approximately 8 mm long. Yellowish-white flowers are usually solitary and occur at the end of branchlets.

Habitat requirements: *Drummondita ericoides* is currently known over a range of approximately 20 km, in an area north of Geraldton. It grows amongst low heath on sandstone and laterite slopes, ridges and gullies of the Moresby Range, in brown loam or sandy loam and clay soils. It is associated with *Melaleuca megacephala*, *M. cardiophylla*, *Acacia blakelyi*, *Hakea pycnoneura* and *Gastrolobium spinosum*.

Critical habitat: The critical habitat for *Drummondita ericoides* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; corridors of remnant vegetation that link populations and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so in the past and may be suitable for translocations.

Habitat critical to the survival of the species, and important populations: Given that this species is Declared Rare Flora, it is considered that all known habitat for wild and translocated populations is habitat critical to its survival, and that all wild and translocated populations are important populations.

Benefits to other species or ecological communities: *Eucalyptus blaxellii* (Howatharra Mallee) is a Declared Rare Flora (DRF) species that occurs in the habitat of *Drummondita ericoides*. *Eucalyptus blaxellii* is ranked as Vulnerable under both the *Wildlife Conservation Act* 1950 and the EPBC Act. *Acacia guinetii* also occurs in this general area, and is listed as Priority 4 on CALM's Priority Flora list (Atkins 2003). All three of these species are components of the Priority 1 Ecological Community '*Melaleuca megacephala* and *Hakea pycnoneura* thickets of Moresby Range'. Recovery actions listed within this IRP such as regenerating natural vegetation in areas previously cleared for agriculture near *Drummondita ericoides* populations will also be of benefit to the ecological community in which the populations are located. Additional DRF and Priority species that may benefit from recovery work in the habitat of *Drummondita ericoides* as they occur in the general area, include *Caladenia hoffmanii* subsp. *hoffmanii* (DRF, ranked as Endangered under both the *Wildlife Conservation Act* 1950 and the EPBC Act), *Leucopogon oblongus* (Priority 2), *Grevillea triloba* (Priority 3) and *Verticordia densiflora* subsp. *roseostella* (Priority 3).

International obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that convention. The taxon is not listed under any specific international treaty, however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: An Aboriginal Sites Register is kept by the Department of Indigenous Affairs, and this lists one burial site and one painting site in the vicinity of *Drummondita ericoides*. Indigenous communities interested or involved in the region affected by this plan have not yet been identified. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *D. ericoides*, and this is discussed in the recovery actions.

Social and economic impact: The implementation of this recovery plan has the potential to have some limited social and economic impact, where populations are located on private property (such as Populations 3 and 4). Recovery actions refer to continued liaison between stakeholders with regard to these areas.

Evaluation of the plan's performance: The Department of Conservation and Land Management in conjunction with the Geraldton District Threatened Flora Recovery Team will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

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

1. Owners of land that contains Population 4 have been notified of the location and threatened status of the species.
2. Land acquisition has increased the security of Populations 1, 2 and 5 through incorporating them within the conservation estate.
3. Approximately 200 seeds were collected from Population 2 in 2001 and are stored in CALM's Threatened Flora Seed Centre.
4. The Botanic Garden and Parks Authority currently hold approximately 250 seeds collected from Population 1 in 1994, but have no live plants in the nursery. Some tissue culture material is also held, although no plants have been successfully grown on yet from this material.
5. An information sheet that describes and illustrates the species has been prepared and will be printed and distributed.
6. Staff from CALM's Geraldton District regularly monitor populations of the species.
7. The Geraldton District Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include information on progress in annual reports to CALM's Corporate Executive and funding bodies.

IRP objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance viable *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 by ten percent or more over the period of the plan's adoption under the EPBC Act.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the period of the plan's adoption under the EPBC Act.

Recovery actions

1. Coordinate recovery actions
2. Map critical habitat
3. Notify landholder
4. Liaise with land managers
5. Monitor populations
6. Conduct further surveys
7. Revegetate areas previously cleared for agriculture
8. Seek long-term protection of habitat
9. Collect seed
10. Develop and implement a fire management strategy
11. Promote awareness
12. Obtain biological and ecological information
13. Review the need for further recovery actions

1. BACKGROUND

History

Drummondita ericoides was described by W.H. Harvey in 1855, who commented on its rarity. It was collected again in 1901 by F.L.E. Diels and E.G. Pritzel, and in 1926 by C.A. Gardner. It was then thought to be extinct until its rediscovery by G.J. Keighery on private property in 1980. This land was gazetted as a nature reserve in 1990. It was only known from this population until 2000, when a second population was discovered on land recently acquired by CALM for conservation. Three more populations have been located since then. This naturally rare plant occurs in habitat that is restricted to the unusual sandstone and laterite slopes of the Moresby Range.

Description

Drummondita ericoides is a shrub growing 5 to 20 cm tall on ridges, or from 50 cm to 1 m tall in sheltered gullies. It has scattered simple leaves which are terete, glabrous and approximately 8 mm long. Yellowish-white flowers are green at the tips, with 5 short sepals and 5 erect concave petals. The 10 staminal filaments are united into a narrow hairy tube which protrudes beyond the petals and is white to violet. A crimson style projects beyond the stamens. Flowers are usually solitary and occur at the end of branchlets.

Distribution and habitat

Drummondita ericoides occurs in the Moresby Range north of Geraldton over a linear range of about 20 km. Five populations are known, containing a total of approximately 580 plants. Populations occur on Nature Reserve, private property and a recent addition to the conservation estate, the tenure of which is yet to be finalised. It is intended that it will be either a Nature Reserve or a Conservation Park.

It grows amongst low heath on sandstone and laterite slopes, ridges and gullies of the Moresby Range, in brown loam or sandy loam and clay soils. It is associated with *Melaleuca megacephala, M. cardiophylla, Acacia blakelyi, Hakea pycnoneura* and *Gastrolobium spinosum*.

Biology and ecology

Very little is known about the biology of *Drummondita ericoides*. The flower structure suggests that they are likely to be insect-pollinated. Seed has been collected from Populations 1 and 2, but the viability of that seed is as yet unknown.

Drummondita ericoides populations currently have a good age structure, with both young plants and mature flowering plants present. The rocky sandstone slope habitat of *Drummondita ericoides* was not a preferred landform and soil type for agriculture, and so was not highly cleared. In addition, the taxon has not been highly impacted by grazing due to its association with *Gastrolobium spinosum*, which is toxic to stock.

Populations 2 and 5 occur on land that was burnt approximately 20 years ago in a summer wildfire, but whether the populations re-established from rootstock or seed is unknown. *Drummondita ericoides* does have the ability to re-sprout from rootstock (A. Brown[1], personal communication), but as it occurs on shallow soils the rootstock may not always be deep enough to survive fire. The wide range of plant ages present at Populations 2 and 5, combined with the health of other long unburnt populations, suggests that the species does not depend on fire for regeneration, but has the ability to recover satisfactorily from a fire event.

Rising salinity is threatening vegetation on the lower slopes nearby, but does not affect the rocky hilltops and slopes on which *Drummondita ericoides* occurs.

Threats

Drummondita ericoides was declared as Rare Flora in March 1982. It currently meets World Conservation Union (IUCN) Red List Category Vulnerable (VU) under criterion D1+2 (IUCN 2000) due to the relatively low total number of plants (less than 600), restricted area of occupancy and number of populations. The main threats

[1] Andrew Brown, Coordinator (Threatened Flora) Western Australian Threatened Species & Communities Unit.

are inappropriate fire regimes and potential impacts from high human presence due to residential areas occurring close to populations. These impacts most prominently include increased risk of fire and weed invasion, as well as rubbish dumping and trampling due to recreational use.

- **Inappropriate fire regimes** may affect the viability of populations if fires recur before the population can re-establish. *Drummondita ericoides* can resprout following fire, although the survival of rootstock of individual plants may depend on the depth of soil in which they occur. This species is not fire-dependent for germination, as a range of different aged plants occur in each population, including those long unburnt. However, an additional consideration is the role of fire in facilitating weed invasion.

- **High levels of human use of the area** increase the risk of fire occurring in the habitat due to additional sources of ignition including arson. They may also increase the threat of weed invasion into the habitat through propagules within garden waste which is often dumped in bush reserves, and possibly through adding fertility to the soil. Vehicle, horse and foot traffic are all more likely in reserves near residential areas, and rubbish dumping also often occurs. The presence of domestic cats and dogs may also affect the fauna in the habitat, although they are unlikely to impact on the *Drummondita ericoides* particularly, as the species is likely to be insect pollinated.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. N of Geraldton	Nature Reserve	1981 293* 1993 90* 2000 42 2003 52	Healthy	High human presence (increased risk of fire, weed invasion), wildfire
1b. N of Geraldton	Nature Reserve	1981 * 1993 * 2000 98 2003 135	Healthy	High human presence (increased risk of fire, weed invasion), wildfire
2a. N of Geraldton	CALM Estate (tenure not finalised)	2000 36 2001 20 2003 49*	Healthy	Inappropriate fire regimes
2b. N of Geraldton	CALM Estate	2000 16 2001 29 2003 *	Healthy	Inappropriate fire regimes
2c. N of Geraldton	CALM Estate	2000 100+	Healthy	Inappropriate fire regimes
3. N of Geraldton	Private Property	2001 16 2003 16	Healthy	Inappropriate fire regimes
4. N of Geraldton	Private Property	2003 20	Healthy	Inappropriate fire regimes
5. N of Geraldton	CALM Estate	2003 200+	Healthy	Inappropriate fire regimes

* = total for both subpopulations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks etc) in the immediate vicinity of *Drummondita ericoides* will require assessment. On-ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the species, its habitat or potential habitat.

Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms or 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)).

It is considered that all known habitat for wild and translocated populations of *Drummondita ericoides* is critical habitat. This includes:

- the area of occupancy of known populations;

- areas of similar habitat within 200 metres of known populations, i.e. low heath on sandstone and laterite slopes with brown loam or sandy loam soils (these provide potential habitat for natural range extension);
- corridors of remnant vegetation that link populations (these are necessary to allow pollinators to move between populations and are usually road and rail reserves); and
- additional occurrences of similar habitat that do not currently contain the species but may have done so in the past (these represent possible translocation sites).

Benefits to other species or ecological communities

Eucalyptus blaxellii (Howatharra Mallee) is a Declared Rare Flora (DRF) species that occurs in the habitat of *Drummondita ericoides*. *Eucalyptus blaxellii* is ranked as Vulnerable under both the *Wildlife Conservation Act* 1950 and the EPBC Act. *Acacia guinetii* also occurs in this general area, and is listed as Priority 4 on CALM's Priority Flora list (Atkins 2003). All three of these species are components of the Priority 1 Ecological Community '*Melaleuca megacephala* and *Hakea pycnoneura* thickets of Moresby Range'. Recovery actions listed within this IRP such as regenerating natural vegetation in areas previously cleared for agriculture near *Drummondita ericoides* populations will also be of benefit to the ecological community in which the populations are located. Additional DRF and Priority species that may benefit from recovery work in the habitat of *Drummondita ericoides* as they occur in the general area, include *Caladenia hoffmanii* subsp. *hoffmanii* (DRF, ranked as Endangered under both the *Wildlife Conservation Act* 1950 and the EPBC Act), *Leucopogon oblongus* (Priority 2), *Grevillea triloba* (Priority 3) and *Verticordia densiflora* subsp. *roseostella* (Priority 3).

International obligations

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Role and interests of indigenous people

An Aboriginal Sites Register is kept by the Department of Indigenous Affairs, and this lists one burial site and one painting site in the vicinity of *Drummondita ericoides*. Indigenous communities interested or involved in the region affected by this plan have not yet been identified. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *D. ericoides*, and this is discussed in the recovery actions.

Social and economic impacts

Some populations of *Drummondita ericoides* occur on private land and negotiations will continue with regard to the future management of these populations. The implementation of this recovery plan has the potential to have some limited social and economic impact, where populations are located on private property. Recovery actions refer to continued liaison between stakeholders with regard to these areas.

Evaluation of the plan's performance

CALM will evaluate the performance of this IRP in conjunction with the Geraldton District Threatened Flora Recovery Team. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

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 by ten percent or more over the period of the plan's adoption under the EPBC Act.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the period of the plan's adoption under the EPBC Act.

3. RECOVERY ACTIONS

Existing recovery actions

The owner of the land on which Population 4 occurs has been notified of the location and threatened status of the species. The notification details the Declared Rare status of *Drummondita ericoides* and associated legal obligations.

Land acquisitions have incorporated habitat of the three largest populations (Populations 1, 2 and 5) into the conservation estate since this species was first declared rare. Population 1 is now within a Nature Reserve, and Populations 2 and 5 occur within an area recently acquired for conservation, although a final determination on tenure has not yet been made. That area will become either a Nature Reserve or a Conservation Park.

Approximately 200 seeds were collected from Population 2 in 2001, but the viability of this seed is as yet unknown. The seed is stored in CALM's Threatened Flora Seed Centre (TFSC) at –18°C.

Propagation by cuttings was undertaken at Botanic Gardens and Parks Authority (BGPA) in 1994 with very low success rates (6-9%). Nine plants resulted from 118 cuttings from two clones. The last of these died in December 2002, and there are currently no living plants at BGPA. Approximately 250 seeds were collected from Population 1 in 1994, and are held in BGPA's Seed Science and Technology Centre (A. Shade[2], personal communication).

Tissue culturing trials were initiated by BGPA (then Kings Park and Botanic Garden) in 1984. Material was successfully cultured, but there was difficulty achieving rooted plantlets, and those plants that were transferred to soil failed to thrive. Additional material was collected in 1985 to broaden the genetic diversity of the collected material, but only two clones remain in culture. Trials have continued over time, and material is currently being bulked up for further attempts at root induction and transfer to soil. This species multiplies adequately in culture, but root initiation under *in vitro* conditions is very slow. Rooted plantlets from tissue culture do not make the transition to soil very well. It is unusual that rooting success has not improved over time as has been noted with other woody plants under *in vitro* conditions. It may be that the species requires as yet unknown specialized conditions for successful micropropagation, or it may simply reflect poor source material. Further *in vitro* research on *Drummondita ericoides* will concentrate on modifying shoot growth and optimising media and culture conditions to achieve successful micropropagation (E. Bunn[3], personal communication).

A double-sided information sheet has been prepared, and includes a description of *D. ericoides*, its habitat, threats, recovery actions and photos. This will be printed in colour, and then distributed. It is hoped that this may result in the discovery of new populations.

Staff from CALM's Geraldton District regularly monitor all populations of this species.

The Geraldton District Threatened Flora Recovery Team is overseeing the implementation of this IRP and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken. The following recovery actions are roughly in order of descending priority; however this should not constrain addressing any of the priorities if funding is available for 'lower' priorities and other opportunities arise.

[2] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority
[3] Eric Bunn, Senior Research Scientist (Propagation Science), Botanic Garden and Parks Authority

1. Coordinate recovery actions

The Geraldton District Threatened Flora Recovery Team will coordinate recovery actions for *Drummondita ericoides* and other Declared Rare Flora in their district. They will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $1,000 per year

2. Map critical habitat

It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas as described have not yet been mapped and that will be redressed under this action. If any additional populations are located, then critical habitat will also be determined and mapped for these locations.

Action: Map critical habitat
Responsibility: CALM (Geraldton District, WATSCU) through GDTFRT
Cost: $2,000 in the first year

3. Notify landholder

Staff from CALM's Wildlife Branch will formally notify the owner of the land on which Population 3 occurs following further survey of that land.

Action: Notify landholder
Responsibility: CALM (Wildlife Branch)
Cost: $100 in the first year

4. Liaise with land managers

Staff from CALM's Geraldton District will continue to liaise with relevant land managers and landowners to ensure that populations are not accidentally damaged or destroyed. Two significant sites that occur in the vicinity of *Drummondita ericoides* are listed on the Aboriginal Sites Register maintained by the Department of Indigenous Affairs. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *Drummondita ericoides*.

Action: Liaise with land managers
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $1500 per year

5. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion), population stability (expansion or decline), pollinator activity, seed production, recruitment, longevity and predation is essential. Particular note will be made of the level of threat posed by the increased human presence due to the residential development adjacent to Population 1. Possible threats arising are dumping of rubbish and garden waste, damage through recreational activities and increased risk of fire.

Action: Monitor populations
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $1,000 per year

6. Conduct further surveys

Community volunteers will be encouraged to be involved in further surveys supervised by CALM staff that will be conducted during the flowering period of the species (August-October). Records of areas surveyed will be sent to Wildlife Branch and retained at the District, even if *Drummondita ericoides* is not located. Where possible, surveys that may clarify the status of the Priority 1 Ecological Community '*Melaleuca megacephala* and *Hakea pycnoneura* thickets of Moresby Range' should be included with surveys for *Drummondita ericoides*.

Action: Conduct further surveys
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $2,500 per year in the first, third and fifth years

7. Revegetate areas previously cleared for agriculture

Some of the land supporting Populations 2 and 5 (newly acquired for the conservation estate) contains areas previously cleared for agriculture. These areas will be revegetated using common habitat species sourced from the local area. This process will continue over several years, and will include weed control as appropriate. The improvement in habitat condition will provide a vegetated buffer that will help to protect populations from weed invasion and other edge effects.

Action: Revegetate areas previously cleared for agriculture
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $15,000 per year

8. Seek long-term protection of habitat

Ways and means of improving the security of populations and their habitat on private land will be sought. This may include conservation covenants with a range of agencies or registration through the Land for Wildlife scheme. Population 3 occurs in vegetation in excellent condition adjacent to a Nature Reserve. The possibility of incorporating this area into the Nature Reserve will be investigated.

Action: Seek long-term protection of habitat
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $1,500 in the second and fourth years

9. Collect seed

It is necessary to store germplasm as a genetic resource, ready for use in translocations and as an *ex situ* genetic 'blueprint' of the species. The germplasm stored will include seed and tissue culture material. Some seed has been collected from Population 1 and 2 but additional collections are required from both those and other populations to maintain adequate representation of the genetic diversity of this species. The patterns of viability that emerge from standard tests on seed collected may indicate the need for other recovery actions. Some tissue culture material of two clones sourced from Population 1 is in storage, but this species has proved difficult to micropropagate to the planting-out stage, so this material does not yet represent a resource for translocations.

Action: Collect seed
Responsibility: CALM (TFSC, Geraldton District) through GDTFRT
Cost: $2,200 in the first, third and fifth years

10. Develop and implement a fire management strategy

D. ericoides has the ability to resprout from rootstock after fire, although individual plant survival may depend on the depth of the roostock in shallow soils over rock. Population age structures suggest that this species is not fire dependent for regeneration, and long unburnt populations are healthy. Frequent fire may prevent the accumulation of soil-stored seed, and may also deplete the resources of the rootstock. Fire also promotes the introduction and proliferation of weed species, and by removing vegetation may accelerate erosion on the rocky slopes that *D. ericoides* inhabits. Fire should therefore be prevented from occurring in the habitat of populations except where being used as a recovery tool. A fire management strategy will be developed in consultation with land managers to determine fire control measures, and a recommended burning frequency, seasonality and intensity.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $2,500 in first year, and $1,700 in subsequent years

11. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species and the associated Priority 1 Ecological Community will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested

individuals will also be encouraged. An information sheet has been developed, and includes a description of the plant, its habitat, threats, recovery actions and photos. This will be printed, and distributed to the public through CALM's Geraldton District office and at the office and library of the Shire of Chapman Valley. This distribution of information may lead to the discovery of new populations.

Action: Promote awareness
Responsibility: CALM (Geraldton District) through GDTFRT
Cost: $1,700 in first year, and $700 per year thereafter

12. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Drummondita ericoides* will provide a scientific basis for its management in the wild. An understanding of the following is desirable for effective management:

1. Soil seed bank dynamics, including seedbank location and viability.
2. The role of competition, rainfall and grazing in germination and recruitment.
3. The pollination biology of the species.
4. The requirements of pollinators.
5. The reproductive strategies, phenology and seasonal growth of the species.
6. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: CALM (Science Division, Geraldton District) through GDTFRT
Cost: $12,000 per year in the second, third and fourth years

13. Review the need for further recovery actions

At the end of the fourth year of its five-year term this Interim Recovery Plan will be reviewed and the need for further recovery actions will be assessed.

Action: Review the need for further recovery actions
Responsibility: CALM (WATSCU, Geraldton District) through GDTFRT
Cost: $200 in the fifth year

4. TERM OF PLAN

This Interim Recovery Plan will operate from June 2004 to May 2009 but will remain in force until withdrawn or replaced. If the taxon is still Declared Rare Flora after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

From Grieve and Blackall (1998).
Excerpts from the Key to Drummondita:

A. Leaves with a dark coloured tip; base of stamens glabrous within.
B. Leaves glabrous; sepals glabrous.
C. Leaves slender-terete, ± 8 mm long.

D. ericoides. Habit: Much-branched shrub to 1m; leaves crowded, erect, ± 8 mm long; petals yellow with green tips; staminal tube white with violet lobes.
Distribn: Ir (near Geraldton)
Flg: Jun.-Oct.

C. Leaves clavate, 3-6 mm long.
B. Leaves club-shaped, minutely woolly when young; sepals sparsely woolly.
A. Leaves not dark coloured at apex but frequently with a short point, glabrous; base of stamens densely bearded within.

SUMMARY OF RECOVERY ACTIONS AND COSTS (not for publication)

Recovery Action	Year 1			Year 2			Year 3			Year 4			Year 5		
	Dept	**Other**	**Ext.**	**Dept**	**Other**	**Ext.**	**Dept**	**Other**	**Ext.**	**Dept**	**Other**	**Ext.**	**Dept**	**Other**	**Ext.**
Coordinate recovery actions	500	500		500	500		500	500		500	500		500	500	
Map critical habitat	1500		500												
Notify landholder	100														
Liaise with land managers	500		1000	500		1000	500		1000	500		1000	500		1000
Monitor populations	600		400	600		400	600		400	600		400	600		400
Conduct further surveys	1100	300	1100				1100	300	1100				1100	300	1100
Revegetate areas previously cleared	15000			15000			15000			15000			15000		
Seek long-term protection of habitat				1000		500				1000		500			
Collect seed	1200		1000				1200		1000				1200		1000
Develop and implement a fire management strategy	1000	1000	500	600	600	500	600	600	500	600	600	500	600	600	500
Promote awareness	1100		600	700			700			700			700		
Obtain biological and ecological information				5000		7000	5000		7000	5000		7000			
Review the need for further recovery actions													200		
Total	22,600	1,800	5,100	23,900	1,100	9,400	25,200	1,400	11,000	23,900	1,100	9,400	20,400	1,400	4,000
Yearly Total		**29,500**			**34,400**			**37,600**			**34,400**			**25,800**	

NHT = External funding (funding to be sought), Other = funds contributed by NHT, in-kind contribution and BGPA.

Total Department: $116,000
Total Other: $6,800
Total External Funding: $38,900
Total Costs: $161,700