INTERIM RECOVERY PLAN NO. 187

CHIDDARCOOPING MYRIOPHYLLUM (*MYRIOPHYLLUM LAPIDICOLA*) INTERIM RECOVERY PLAN 2004-2009

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Photo: Andrew Crawford

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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 IRPs and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This IRP will operate from June 2004 to May 2008 but will remain in force until withdrawn or replaced. It is intended that this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was given regional approval on 2 August 2004 (Goldfields) and 24 December 2004 (Wheatbelt) and was approved by the Director of Nature Conservation on 2 February 2005. The allocation of staff time and provision of funds identified in this IRP 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 June 2004.

ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this IRP:

Dr Stephen Hopper	Kings Park and Botanic Gardens
Kate Brunt	Former Conservation Officer, CALM, Merredin District
Sarah Adriano	Reserves Officer, CALM Goldfields Region
Mark Cowan	Regional Ecologist, CALM Goldfields Region
Bradley Barton	Regional Leader Nature Conservation, CALM Goldfields Region
Andrew Crawford	Senior Technical Officer, CALM's Science Division
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority

Thanks also to 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:	*Myriophyllum lapidicola* Orchard	**Common Name:**	Chiddarcooping Myriophyllum
Family:	Haloragaceae	**Flowering Period:**	September-November
CALM Regions:	Wheatbelt and Goldfields	**CALM District:**	Merredin
Shires:	Westonia, Mukinbuddin, Menzies, Yilgarn	**Recovery Team:**	Merredin District (MDTFRT) and Goldfields Region Threatened Flora Recovery Teams (GRTFRT)

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, Perth, Western Australia; Elliot, WR and Jones DL (1993) *Encyclopedia of Australian plants suitable for cultivation*, Lothian, Melbourne, Victoria; Orchard A.E. (1992) *A new graniticolous species of* Myriophyllum *(Haloragaceae) Nuytsia* 8(2), 237-239; 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/.

Current status: *Myriophyllum lapidicola* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in 1993 and ranked as Critically Endangered (CR) in September 1995. The ranking was downgraded to Vulnerable in September 1999 after the discovery of more populations on other granite outcrops. The species currently meets World Conservation Union (IUCN 2000) Red List Category Vulnerable (VU) under criterion B2ac(iv) as there are just six severely fragmented populations known over a restricted area, with extreme fluctuations in the number of mature individuals. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). The main threats are limited habitat (known from just 6 rock pools), reduction of water runoff into pools due to diversion walls, fragmentation, reduction in water quality caused by stock, goats, rabbits, and recreation, limited gene flow between populations and weed invasion.

Description: *Myriophyllum lapidicola* is a short lived aquatic herb with long weak stems. It has alternate, small, widely-spaced leaves that are confined to the upper parts of the stems and float on the surface of the water. The emergent leaves have a pinkish-brown toning. Very small red flowers form in the axils of the upper leaves.

Habitat requirements: *Myriophyllum lapidicola* is known only from the Mukinbuddin, Westonia, Yilgarn and Menzies area, over a range of 190km where it grows in ephemeral pools 20 to 50 cm deep on granite outcrops.

Critical habitat: The critical habitat for *Myriophyllum lapidicola* comprises of the area of occupancy of the known populations, similar habitat within 200 metres of known populations, remnant vegetation that links populations, additional nearby occurrences of similar habitat that do not currently contain the taxon but may have done so in the past and may be suitable for translocations, and the local catchment for the surface waters that provide the habitat of the taxon.

Habitat critical to the survival of the species, and important populations: Given that this taxon is listed as Vulnerable it is considered that all known habitat is habitat critical.

Benefits to other species/ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Myriophyllum lapidicola* will also improve the status of remnant vegetation in which it is located.

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. *Myriophyllum lapidicola* is not specifically listed under any international treaty, and therefore this plan does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: An Aboriginal Sites Register kept by the Department of Indigenous Affairs lists one historical grinding patch/grooves site and one painting site in the vicinity of *Myriophyllum lapidicola*. As all known populations of *Myriophyllum lapidicola* occur in gnamma holes (holes made by the Aboriginals for collection of water in earlier days) and these are generally regarded as significant sites, it is likely that any new populations of *M. lapidicola* that are found will be located in or near significant Aboriginal sites. Implementation of recovery actions under this plan includes consideration of the role and interests of indigenous communities. The Goldfields Region has a memorandum of Understanding with the Goldfields Land and Sea Council and through this CALM will consult with traditional owners. This is discussed in the recovery actions.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as all populations are located in reserves.

Evaluation of the plans performance: CALM, in conjunction with relevant Recovery Teams will evaluate the performance of this IRP. This plan will be reviewed within five years.

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

1. Relevant land managers have been notified of the presence of *Myriophyllum lapidicola.*
2. An A4 information sheet that provides a description of *Myriophyllum lapidicola* and information about threats and recovery actions has been produced.
3. Over 40 granite outcrops in areas surrounding the known habitat of *Myriophyllum lapidicola* have been surveyed for new populations.
4. Seed and cutting material has been collected from populations 1and 4 for propagation by staff of the Botanic Gardens and Parks Authority (BGPA).
5. *Myriophyllum lapidicola* has been successfully grown by BGPA staff using tissue culture techniques.
6. Grazing by goats was noted as a threat to Population 1 in 1989 and 1990. Goats were controlled by CALM officers in February 1991 and since then no destruction of plants has been noted.
7. The Merredin District Threatened Flora Recovery Team (MDTFRT) and Goldfields Region Threatened Flora Recovery Team (GRTFRT) are overseeing the implementation of this IRP and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.
8. Staff from CALM's Merredin District and Goldfields Region monitor populations of *Myriophyllum lapidicola* with assistance from WATSCU.

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 taxon 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. Monitor populations
4. Conduct further surveys
5. Collect seed and cutting material
6. Obtain biological and ecological information
7. Seek to remove diversion walls
8. Control weeds if required
9. Control introduced animals as required
10. Promote awareness
11. Liaise with relevant land managers
12. Begin the translocation process
13. Review this IRP

1. BACKGROUND

History

The first collection of *Myriophyllum lapidicola* was made from a granite outcrop in a Class A Reserve north of Merredin by Ray Cranfield and Phil Spencer of the Western Australian Herbarium in 1989. Over 100 plants were found in a pool of water 70 cm long x 50 cm wide and 20-30 cm deep. For some years, below average rainfall in the region resulted in insufficient water runoff to fill the pool and plants were not relocated. However, in August 1996 after a wet winter, plants were found by Dr Stephen Hopper of the Botanic Garden and Parks Authority in the same pool in which it was originally located. Approximately 2000 plants were observed in a dense mat that covered 80% of the pool's surface. In 1997 two additional populations were located in the Hunt ranges by Andrew Brown from the Western Australian Threatened Species and Communities Unit (WATSCU). Searches in subsequent years resulted in the discovery of a new population in 1998 and two more in 1999, bringing the total number of known populations to six. However, with the exception of one rock where two pools were located, each of these populations is limited to single pools on each rock.

Description

Myriophyllum lapidicola is an ephemeral aquatic herb with long weak stems. Small, alternate, widely spaced leaves are confined to the upper parts of the stems and float on the surface of the water. The emergent leaves have pinkish, brown toning. Very small red flowers are located in the axils of the upper leaves. *Myriophyllum lapidicola* is closely allied to granite myriophyllum *M. petraeum* but differs in fruit shape, size and number of stamens, and leaf shape (Brown *et al* 1998).

Distribution and habitat

Myriophyllum lapidicola is known from six populations over a range of 190 km in the Mukinbuddin, Westonia, Yilgarn and Menzies areas where it grows in ephemeral pools 20 to 50 cm deep on granite outcrops. Associated species include *Kunzea pulchella*, *Melaleuca radula* and algae. The weed species *Crassula natans* and *Callitriche* sp. have also been found in the same habitat.

Populations 1, 4, 5 and 6 are located in CALM's Merredin district (Wheatbelt Region), whilst Populations 2 and 3 are located in CALM's Goldfields Region.

Biology and ecology

Whilst the genus *Myriophyllum* (commonly known as 'water milfoils') has an almost cosmopolitan distribution, very little is known about its biology and ecology. The flowers of *M. lapidicola* float on the surface of the water to allow aerial pollination but the vectors are unknown. Fruits develop quickly, apparently underwater (Orchard 1992).

Myriophyllum species are not usually prone to pests but the emergent leaves of some are attacked by small black beetles (Elliot and Jones 1993).

Propagation of *Myriophyllum* species is from seed or cutting or by dividing clumps. Little is known about seed germination but best results are likely to be from fresh seed (Elliot and Jones 1993).

Myriophyllum lapidicola is an ephemeral aquatic herb that germinates, grows and flowers in seasons where there has been sufficient rain to fill rock pools for an extended time. As these events are episodic, the seeds are probably long-lived and are able to persist in the soil during dry seasons. At Population 1, seeds remained dormant for 6 years before germinating following good winter

rains. The length of time they remain viable beyond this period is unknown. *M. lapidicola* only inhabits rock pools 20-50 cm deep, and has not been located in shallower more ephemeral rock pools.

Threats

Myriophyllum lapidicola was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 in 1993 and ranked as Critically Endangered (CR) in September 1995. The ranking was downgraded to Vulnerable in September 1999 after the discovery of more populations on other granite outcrops. The species currently meets World Conservation Union (IUCN 2000) Red List Category Vulnerable (VU) under criterion B2ac(iv) as there are just six severely fragmented populations known over a restricted area, with extreme fluctuations in the number of mature individuals. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). The main threats are limited habitat (known from just 6 rock pools), reduction of water runoff into pools due to diversion walls, fragmentation, reduction in water quality caused by stock, goats, rabbits, and recreation, limited gene flow between populations and weed invasion.

- **Limited habitat** is a serious threat to the long term survival of *Myriophyllum lapidicola* as it occurs on just 6 granite outcrops in 20 – 50 cm deep rock pools. Rock pools of this depth are very uncommon.

- **Habitat fragmentation** limits gene flow between *Myriophyllum lapidicola* populations. All exist in single (or at Population 6, two) rock pools on widely separated granite outcrops.

- **Extended drought** may be a long-term threat to all populations. Successive dry winters have caused the rock pools inhabited by *Myriophyllum lapidicola* to contain insufficient water for the species to regenerate. At Population 1 no plants were found from 1990 to 1996 due to unfavorable seasonal conditions. It is suspected that the seeds can remain dormant during dry years, however, how long they remain viable is unknown.

- **Diversion walls on granite outcrops** erected to channel water into dams are a threat to populations of *Myriophyllum lapidicola* as they result in decreased runoff into rock pools.

- **Lack of community awareness** may be a threat to populations of the species as populations may be inadvertently damaged or destroyed during recreation activities.

- **Reduction in water quality** through increased nutrient levels from goat and rabbit droppings will result in algal blooms, siltation and introduction of weeds.

- **Weed invasion** is a long-term threat. Two introduced weeds (*Crassula natans* and *Callitriche* sp.) have been located in the vicinity of *Myriophyllum lapidicola*. Although these weeds are not yet known to be competing with *Myriophyllum lapidicola*, they and other weeds may become a threat in the future.

- **Grazing** by goats, sheep and rabbits may impact upon the species. Goats that were present at Population 1 in 1989 and 1990 were controlled by CALM officers in February 1991 and there has been no evidence of grazing by goats since. However, the reserve that contains Population 1 is not fenced and sheep graze at the base of the outcrop. Rabbits have also been observed on the rock.

Summary of population land vesting, purpose and tenure

Population	Vesting	Purpose	Tenure
1. North of Merredin	Water and Rivers Commission	Water and Conservation of Flora and Fauna	Non-CALM Act - General
2. East of Hunt Range	Un-vested	Water	Non-CALM Act - General
3. West of Hunt Range	Conservation Commission	Conservation of Flora and Fauna	Nature Reserve
4. Northeast of Merredin	Conservation Commission	Water and Conservation of Flora and Fauna	Nature Reserve
5. Northwest of Southern Cross	Shire of Westonia	Recreation	Non-CALM Act - General
6. East of Nungarin	Minister for Water Resources	Water	Non-CALM Act - General

Summary of population information and threats

Pop. No. & Location	**Year/No. plants**	**Condition**	**Threats**
1. North of Merredin	1996 1900+ 2003 25	Moderate	Recreational activities, grazing, weeds, deterioration of water quality, goats, drought
2. East of Hunt Range	1997 Not counted	Unknown	Recreational activities
3. West of Hunt Range	1997 Not counted	Unknown	Recreational activities
4. Northeast of Merredin	1998 35	Moderate	Recreational activities weeds, weeds, deterioration of water quality
5. Northwest of Southern Cross	1999 100	Moderate	Recreational activities, weeds, deterioration of water quality
6. East of Nungarin	1999 13	Moderate	Water diversion walls, weeds, deterioration of water quality

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined critical habitat of *Myriophyllum lapidicola* require assessment. No developments should be approved unless the proponents can demonstrate that they will not have a significant impact on the taxon, or its habitat or potential habitat, or the local surface hydrology.

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 (EPBC Act).

The critical habitat for *Myriophyllum lapidicola* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, i.e. deep rock pools on granite outcrops (these provide potential habitat for natural range extension);
- remnant vegetation that surrounds and links populations on granite outcrops (this may be necessary to allow pollinators to move between populations);
- additional occurrences of similar habitat that do not currently contain the taxon but may have done so in the past (these represent possible translocation sites); and
- Rock surfaces that form the catchments for rock pools in which the species occurs.

Habitat critical to the survival of the species, and important populations

Given that *Myriophyllum lapidicola* is listed as Declared Rare Flora it is considered that all known habitat is habitat critical. In addition, all populations are considered important to the survival of the taxon. Survey for further populations may lead to the identification of additional habitat critical to their survival.

Benefits to other species/ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Myriophyllum lapidicola* will also improve the status of remnant vegetation in which it is located.

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. *Myriophyllum lapidicola* is not specifically listed under any international treaty, and therefore this plan does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people

An Aboriginal Sites Register kept by the Department of Indigenous Affairs lists one historical grinding patch/grooves site and one painting site in the vicinity of *Myriophyllum lapidicola*. As all known populations of *Myriophyllum lapidicola* occur in gnamma holes (holes made by the Aboriginals for collection of water in earlier days) and these are generally regarded as significant sites, it is likely that any new populations of *M. lapidicola* that are found will be located in or near significant Aboriginal sites. Implementation of recovery actions under this plan includes consideration of the role and interests of indigenous communities. The Goldfields Region has a memorandum of Understanding with the Goldfields Land and Sea Council and through this CALM will consult with traditional owners. This is discussed in the recovery actions.

Social and economic impacts

As known populations are on reserves, the implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts.

Evaluation of the plans performance

CALM, in conjunction with the Merredin District Threatened Flora Recovery Team (MDTFRT) and the Goldfields Threatened Flora Recovery Team (GRTFRT) will evaluate the performance of this Interim Recovery Plan (IRP). In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed within five years. Any changes to management or recovery actions will be documented accordingly.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this IRP is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the taxon 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 despite favorable seasonal conditions over the period of the plan's adoption under the EPBC Act.

3. RECOVERY ACTIONS

Existing recovery actions

Grazing by goats was noted at Population 1 in 1989 and 1990. Control measures were put in place by CALM officers in February 1991 and no destruction of plants has been observed since that time.

Botanic Gardens and Parks Authority (BGPA) staff collected seed and cutting material from Population 1 in September 1996. Further seed was collected from nursery grown plants in September 1997. There is also some dormant seed stored in soil in the bottom of a tub in the BGPA nursery. This seed was produced by plants propagated from cutting material that had been collected from Population 4 in August 1998. Several plants from this source were also planted in the water garden in the Botanic Gardens but have since died. Additional seed was collected in March 2001 from tubs of plants growing in the nursery. Currently, there are 300 seeds stored in the BGPA seed store (A. Shade personal communication[1]).

Myriophyllum lapidicola has been successfully grown by BGPA using tissue culture methods (A. Shade personal communication).

An A4 sized information sheet that provides a description of the species and information about threats and recovery actions has been developed for *Myriophyllum lapidicola*. It is hoped that the poster will result in the discovery of new populations.

Approximately 40 outcrops have been searched throughout the known range of *Myriophyllum lapidicola.*

The Merredin District Threatened Flora Recovery Team (MDTFRT) and Goldfields Region Threatened Flora Recovery Team (GRTFRT) are overseeing the implementation of this IRP and will include information on progress in their annual reports to CALM's Corporate Executive.

Staff from CALM's Merredin District and Goldfields Region monitor populations opportunistically.

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 action if funding is available and the opportunity arises.

1. Coordinate recovery actions

The MDTFRT and GRTFRT will coordinate recovery actions for *Myriophyllum lapidicola* and other Declared Rare Flora in their areas and will include information on recovery progress in annual reports to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT

[1] Amanda Shade – Horticulturalist BGPA

Cost: $2,200 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 these areas have not yet been mapped. This will be done under this action and if additional populations are located, critical habitat will be determined and mapped for them also.

Action: Map critical habitat
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $1,500 in the first year

3. Monitor populations

Annual monitoring of factors such as population stability (expansion or decline), habitat degradation, pollinator activity, seed production, recruitment, longevity and predation is essential. Granite outcrops will also be monitored for signs of goat, rabbit or sheep disturbance.

Action: Monitor populations
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $1,000 per year

4. Conduct further surveys

Surveys in the large area of unvested crown land where two new populations were recently located will be conducted following good rainfall events (mainly May to June). Areas considered suitable for possible future translocation will also be noted. Volunteers from the local community, Wildflower Societies and Naturalist Clubs will be encouraged to join surveys supervised by CALM staff.

Action: Conduct further surveys
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $2,100 per year

5. Collect seed and cutting material

Plants collected from populations 1 and 4 are currently being cultivated at the BGPA. However, due to the disjunct distribution of populations and the likelihood of large genetic differences between them, cutting and seed material for cultivation will also be collected from other populations.

Action: Collect seed and cutting material
Responsibility: CALM (TFSC, Merredin District and Goldfields Region) and BGPA through the MDTFRT and GRTFRT
Cost: $3200 in the first year

6. Obtain biological and ecological information

Research designed to increase an understanding of the biology and ecology of *Myriophyllum lapidicola* will provide a scientific base for management of the species in the wild. Research will be undertaken to examine the following:

1. The affect of environmental parameters, particularly rainfall events, on population dynamics.
2. The effect of drought on the long-term viability of populations.
3. The longevity of seed.
4. Seed germination requirements.
5. Pollination biology.
6. Gene flow between populations.

Action: Obtain biological and ecological information
Responsibility: CALM (Merredin District, Goldfields Region and Science Division) through the MDTFRT and GRTFRT

Cost: $18,900 per year for the first three years

7. Seek to remove diversion walls

Diversion walls found on several granite outcrops containing populations of *Myriophyllum lapidicola* divert most water away from rock pools and into dams. *Myriophyllum lapidicola* may have also previously occurred in other rock pools but these have dried out as a consequence of the walls. As dams on these rocks may no longer be required for water collection discussions with the relevant authorities will take place with the view of removing diversion walls.

Action: Seek to remove diversion walls
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: To be determined

8. Control weeds if required

Two weed species have been found in rock pools containing *Myriophyllum lapidicola* and may have a negative impact if they or other weeds increase in number in the future. Weed levels and impacts will be checked when *Myriophyllum lapidicola* is monitored and weeds removed by hand at that time.

Action: **Control** weeds as required
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $100 per year

9. Control introduced animals as required

CALM officers implemented goat control at Population 1 in February 1991 and there has been no further impact by goats on *Myriophyllum lapidicola*. However, the reserve that contains Population 1 is unfenced and sheep graze at the base of the outcrop. Rabbits have also been observed on the rock. If feral animals or stock are found to damage the habitat of the species appropriate control measures will be examined.

Action: Control introduced animals as required
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: To be determined

10. Promote awareness

An A4 sized information sheet that has been prepared and which provides a description of the species and information about threats and recovery actions, requires wider distribution especially in the north eastern areas of the species' distribution. A publicity campaign will also increase local community awareness of the species. Publicity may be in the form of exposure in the local print or electronic media, or production of a poster for display in specific venues. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Promote awareness
Responsibility: CALM (Merredin District and Goldfields Regions, WATSCU) through the MDTFRT and GRTFRT.
Cost: $600 per year

11. Liaise with relevant land owners and land managers

Staff from CALM's Merredin District and Goldfields Region will continue to liaise with landowners and land managers to ensure that populations are not inadvertently damaged or destroyed. Input and involvement will also be sought from any Aboriginal groups that have an active interest in areas that are habitat for *Myriophyllum lapidicola*.

Action: Liaise with relevant land owners and land managers
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $600 per year.

12. Begin the translocation process

Although translocations are generally undertaken under full Recovery Plans it is possible to develop a translocation proposal, survey potential habitat and start propagating plants for translocation as an action under an IRP. Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No 29. Any translocations will be coordinated by CALM's Merredin District, Goldfields Region and respective Threatened Flora Recovery Teams. All translocation proposals require endorsement of the Director of Nature Conservation.

Action: Begin the translocation process
Responsibility: CALM (Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $5300 in fifth year.

13. Review this IRP

If the species is still listed as DRF at the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for further recovery actions and an update to this IRP will be assessed.

Action: Review this IRP
Responsibility: CALM (WATSCU, Merredin District and Goldfields Region) through the MDTFRT and GRTFRT
Cost: $23,000 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 ranked as DRF after five years, the need for further recovery actions and an update to this IRP will be assessed.

5. REFERENCES

Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Perth, Western Australia.

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Orchard A.E. (1992) *A new graniticolous species of* Myriophyllum *(Haloragaceae) Nuytsia* 8(2), 237-239.

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/.

6. TAXONOMIC DESCRIPTION

Orchard AE, in *Nuytsia* Vol. 8 (2) 1992 *A new graniticolous species of Myriophyllum (Haloragaceae).*

Myriophyllum lapidicola

Annual aquatic *herb*. *Stems* weak, sparsely branched, 25-30 cm long, rooting at the nodes. *Leaves* alternate, widely spaced, confined to the upper parts of the stems and floating on the surface of the water. *Petioles* c. 7-10 mm long; lamina entire, semi-succulent, obovate, 7-10 x 4-7 mm, with a distinct terminal hydathode and obscure ± parallel venation. *Flowers* solitary in the axils of the upper leaves, bisexual. *Bracteoles* green-hyaline, ovate, c. 0.6 mm long. *Sepals* 4, green to reddish, ovate, 0.4 x 0.25 mm. *Petals* 4, red, hooded, c. 1.2 mm long, becoming reflexed, persistent on the developing fruit until near maturity. *Stamens* 4, antisepalous; filamentous 0.4 - 0.6 mm long; anthers red, oblong, c. 0.9 x 0.4 m. *Styles* 4, c. 0.15 mm long, extending with age, stigma fimbriate. *Ovary* green, ovoid, c. 0.6 - 0.7 mm long. *Fruit* green, cylindrical, 3.3 mm long, 1.6 mm in diameter, splitting at maturity into 4 mericarps. *Mericarps* cylindrical with a faint dorsal rib, weakly tuberculate at base, base of the persistent style thickening to form a woody terminal tooth.

SUMMARY OF RECOVERY ACTIONS AND COSTS

Recovery Action	Year 1			Year 2			Year 3			Year 4			Year 5		
	CALM	Other	Ext.	CALM	Other	Ext.	CALM	Other	Ext.	CALM	Other	Ext.	CALM	Other	Ext.
Coordinate recovery actions	1200	500	500	1200	500	500	1200	500	500	1200	500	500	1200	500	500
Map critical habitat	500	0	1000	0	0	0	0	0	0	0	0	0	0	0	0
Monitor populations	500	0	500	500	0	500	500	0	500	500	0	500	500	0	500
Conduct further surveys	700	300	1100	700	300	1100	700	300	1100	700	300	1100	700	300	1100
Collect seed and cutting material	1400	0	1800	0	0	0	0	0	0	0	0	0	0	0	0
Obtain biological and ecological information	9500	0	9400	9500	0	9400	9500	0	9400	0	0	0	0	0	0
Seek to remove diversion walls*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Control weeds if required	100	0	0	100	0	0	100	0	0	100	0	0	100	0	300
Controlintroduced animals as required*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Promote awareness	600	0	0	600	0	0	600	0	0	600	0	0	600	0	0
Liaise with relevant land managers	100	0	500	100	0	500	100	0	500	100	0	500	100	0	500
Begin the translocation process	0	0	0	0	0	0	0	0	0	0	0	0	1400	0	3900
Review this IRP	0	0	0	0	0	0	0	0	0	0	0	0	15300	0	7700
Total	**14600**	**800**	**14800**	**12700**	**800**	**12000**	**12700**	**800**	**12000**	**3200**	**800**	**2600**	**19900**	**800**	**14500**
Yearly Total		**30200**			**25500**			**25500**			**6600**			**35200**	

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

Total CALM	$63,100
Total External	$4,000
Total Other	$55,900
Total Costs	**$123,000**