

INTERIM RECOVERY PLAN NO. 135

REMOTE THORNY LIGNUM

(MUEHLENBECKIA HORRIDA SUBSP. ABDITA)

INTERIM RECOVERY PLAN

2003-2008

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Photograph Bethea Loudon
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Western Australian Threatened Species and Communities Unit (WATSCU)
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FOREWORD

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

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

The Department is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from May 2003 to April 2008 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was approved by the Director of Nature Conservation on 11 July 2003. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

Information in this IRP was accurate at May 2003.

SUMMARY

Scientific Name: *Muehlenbeckia horrida* subsp. *abdita* **Common Name:** Remote thorny lignum
Family: Polygonaceae **Flowering Period:** July to August
Dept Region: Wheatbelt **Dept District:** Katanning
Shire: Kent, Lake Grace **Recovery Team:** Katanning District Threatened Flora Recovery Team (KDTFRT)

Illustrations and/or further information: Hamilton-Brown, S. and Blyth, J. (1999) Interim Recovery Plan 48, Unwooded fresh water wetlands of the southern Wheatbelt of Western Australia, dominated by *Muehlenbeckia horrida* subspecies *abdita* and *Tecticornia verrucosa* across the lake floor. Department of Conservation and Land Management, Western Australia; 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/>; Wilson, K. (1996) A new subspecies in *Muehlenbeckia horrida* (Polygonaceae) from Western Australia. *Nuytsia* 11(1), 133-138.

Current status: *Muehlenbeckia horrida* subsp. *abdita* was listed as Priority 1 in 1996 and declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in October 1999. The subspecies currently meets World Conservation Union (IUCN 2000) Red List Category Critically Endangered (CR) under criteria A2c,B1ab(iii)+B2ab(iii) due to a reduction in population size, the subspecies existing at just three locations, and a continuing decline in the area, extent and quality of habitat. The main threats are salinity and inundation, recreational activities and poor recruitment.

Distribution and habitat: *Muehlenbeckia horrida* subsp. *abdita* is endemic to Western Australia where it is restricted to three locations south west of Newdegate. The subspecies grows in clay and silt depressions in freshwater wetlands.

Critical habitat: The critical habitat for *Muehlenbeckia horrida* subsp. *abdita* comprises 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 subspecies but may have done so in the past and may be suitable for translocations; and the local catchment for the surface and ground waters that provide the wetland habitat of the subspecies.

Habitat critical to the survival of the subspecies, and important populations: Given that this subspecies is listed as threatened it is considered that all known habitat for wild and translocated populations is habitat critical.

Benefits to other species/ecological communities: All populations are located within a Threatened Ecological Community (TEC) that is listed as Critically Endangered in Western Australia. Recovery actions implemented to improve the quality or security of the habitat of *Muehlenbeckia horrida* subsp. *abdita* are likely to improve the status of the TEC in which populations are 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. However, as *Muehlenbeckia horrida* subsp. *abdita* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people: There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this subspecies.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts.

Evaluation of the Plans Performance: The Department of Conservation and Land Management, in conjunction with the Recovery Team will evaluate the performance of this IRP. 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. Many surveys for *Muehlenbeckia horrida* subsp. *abdita* have been undertaken by staff from DCLM's Katanning District and Science Division, volunteers and private consultancies.
2. Staff from DCLM's Threatened Flora Seed Centre (TFSC) collected 2336 fruits (~747 seeds) from Population 1 and 700 fruits (~297 seeds) from Population 2 in October 2001.
3. The Katanning District Threatened Flora Recovery Team (KDTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to DCLM's Corporate Executive and funding bodies.

4. Staff from DCLM's Katanning District regularly monitor the two extant populations of this species and the apparently dead population that has recently been found in Lakelands Nature Reserve.
5. Many activities relevant to the recovery of *Muehlenbeckia horrida* subsp. *abdit* are being planned and conducted on behalf of the Lake Bryde Natural Diversity Recovery Catchment Recovery Team.

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

Recovery criteria

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more.

Recovery actions

1. Coordinate recovery actions.
2. Conduct further surveys.
3. Monitor populations.
4. Collect seed and cutting material.
5. Promote awareness.
6. Care, control and management of Lake Bryde Nature Reserve.
7. Obtain biological and ecological information.
8. Review the need for a full Recovery Plan

1. BACKGROUND

History

Muehlenbeckia horrida was considered to be restricted to inland south-eastern Australia. However, in 1973 it was collected by K. Newbey, from Lake Bryde near Newdegate in Western Australia and split into two subspecies, with the Western Australian taxon named *abdita* after the Latin *abditus* meaning secret or hidden. This refers to the geographic isolation of this subspecies (Wilson 1996).

A number of surveys have since been undertaken by staff from DCLM's Katanning District, volunteers and during vegetation surveys and mapping projects (Halse *et al.* 1993; Watkins and McNee 1987). Recently, a new population was discovered while undertaking an assessment of the catchment (Viv Read and Associates 2002). Unfortunately, all plants in the new population were recorded as being dead as they appeared woody and defoliated at the time of the survey. However, it is possible that these plants may reshoot following good rains. The subspecies is currently known from three populations consisting of around 2500 mature plants.

Description

Muehlenbeckia horrida subsp. *abdita* is a spreading to more or less erect, divaricately to intricately branched subshrub 0.6-1.2 m high. Flowers have 5 perianth segments, very rarely 4 and are rare on each plant (Wilson 1996). It differs from *M. horrida* subsp. *horrida* in; the number of perianth segments, with four in *horrida* and usually five in *abdita*; the stem surfaces, with *abdita* lacking the warty protuberances seen on *horrida*; and appearance, with *abdita* having a more divaricate and intricate branching habit and tending to have few or no leaves at the time of flowering, whereas *horrida* is more erect and less divaricately branched and usually has numerous leaves associated with the flowering branches (Wilson 1996).

Biology and ecology

Commonly known as lignums, *Muehlenbeckia* is a small genus of 19 species, 14 of which are found in Australia (Wilson 2000). While the biology of some of the eastern states *Muehlenbeckia* species are well researched, the biology of *M. horrida* subsp. *abdita* is not well known. In particular, seed and flowering phenology are poorly known. Flowering season is dependent on a cycle of water inundation and subsequent drying. The life cycle of the plant is unknown although post-disturbance recruitment in other *Muehlenbeckia* species suggests that the genus has a long-lived soil seed bank (Mallinson *et al.* 1998).

Like its closest relative *Muehlenbeckia horrida* subsp. *horrida*, *M. horrida* subsp. *abdita* is restricted to seasonally inundated fresh water areas and can survive prolonged inundation as long as it does not continue for more than a year (pers obs. K. Wilson¹). Flowering of *M. horrida* subsp. *abdita* appears to be earlier in plants that are on the edge of the lake, and hence not inundated, compared to plants that are in the middle of the lake and inundated longer (pers obs. B. Loudon²).

Distribution and habitat

Muehlenbeckia horrida subsp. *abdita* is endemic to Western Australia where it is restricted to a small area south west of Newdegate. The subspecies grows in clay and silt depressions within the Swan Avon System and the community in which it grows was ranked as Critically Endangered in November 1998. This shrub-dominated community is characterised by intermittent fresh water inundation and sometimes holds little water for several consecutive years. The major components of the community and other biota depend on relatively fresh water and regular drying out of the wetland bed for survival. In addition to *M. horrida* subsp. *abdita* and *Tecticornia verrucosa*, the wetlands support a fringing open woodland of *Eucalyptus occidentalis* over *Melaleuca strobophylla* dominated scrub. *M. horrida* subsp. *abdita* is known only from the three lakes that support this community.

¹ Karen Wilson, Botanist, Royal Botanical Gardens, Sydney, New South Wales

² Bethea Loudon, Conservation Officer, DCLM's Katanning District

This Interim Recovery Plan will be implemented in conjunction with the IRP for the ‘Unwooded fresh water wetlands of the southern Wheatbelt of Western Australia, dominated by *Muehlenbeckia horrida* subspecies *abdita* and *Tecticornia verrucosa* across the lake floor’ IRP (Hamilton-Brown and Blyth 1999). Close contact will be maintained with the Lake Bryde Recovery Catchment Recovery Team.

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*).

The critical habitat for *Muehlenbeckia horrida* subsp. *abdita* comprises:

- the area of occupancy of the known populations;
- areas of similar habitat (clay and silt depressions within the Swan Avon System that are occasionally inundated with fresh water), within 200 metres of known populations (these provide potential habitat for natural range extension);
- remnant vegetation that surrounds and links several populations (this is necessary to allow pollinators to move between populations);
- 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); and
- the local catchment for the surface and ground waters that provides the habitat of the species (the species occurs on clay and silt depressions that are occasionally inundated with fresh water and is dependent on maintenance of local surface and ground water hydrology).

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

Given that this subspecies is listed as threatened it is considered that all known habitat is habitat critical. In addition all populations, including translocated populations, are considered important to the survival of the subspecies.

Threats

Muehlenbeckia horrida subsp. *abdita* was listed as Priority 1 in 1996 and declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in October 1999. The subspecies currently meets World Conservation Union (IUCN 2000) Red List Category Critically Endangered (CR) under criteria A2c,B1ab(iii)+B2ab(iii) due to a reduction in population size, the subspecies existing at just three locations, and a continuing decline in the area, extent and quality of habitat. The main threats are salinity and inundation, recreational activities and poor recruitment.

In recognition of the high biodiversity values of the whole catchment system of which Lake Bryde and East Lake Bryde are part, and of the significant threats of salinisation and excessive inundation it is facing, the Lake Bryde Recovery Catchment has been established under the State Salinity Strategy.

- **Hydrological changes, salinity:** Monitoring of water quality in Lake Bryde began in 1979, however the first recorded significant inflow occurred in 1983. Since then the salt load within Lake Bryde has increased incrementally to a level almost eight times that in 1983.

Table 1. Salinity and derived salt loads – Lake Bryde.

Year	Salt load	Salinity ppt (@ FSL)	Est. Inflow Salinity mg/L
1983 - 1988	160	0.15	200
1990-1991	350	0.33	900
1993 - 2001	1,100 - 1300	1.3	600 -800

Salt loads and salinity readings are considered indicative only.

An unconfirmed salinity reading of 0.036 ppt (in 1979) for Lake Bryde has been referred to in Hamilton-Brown and Blyth (1999), however this has not been recorded in the official monitoring. A salinity level of 0.036 ppt equates to a salt load of approx. 40 tonnes.

A large percentage of the salt load to Lake Bryde (approx. 800 tonne) occurred in 1992. While the mechanisms of salt accumulation in the lake are not well understood, evidence currently available indicates that the most likely source is from secondary salinisation in the catchment upstream.

The increase in salinity measured within the lake is a matter of considerable concern. However it appears that since the major increase in 1992, there has been a stabilisation in the salt load within the lake. This is most likely due to the export of significant volumes of salt (perhaps in the order of 50% of the salt load) through the bed of the wetland as a result of seepage due to refilling of the lake. Relatively lower rainfall, flushing smaller loads of surface salt into the lake, since 1992 may also be a factor. As Lake Bryde is essentially terminal (ie. fills without flushing), seepage of salts through the bed of the wetland is the major natural mechanism for exporting salt. This is not uncommon in freshwater ephemeral wetlands, however the drying cycle of the lake is critical, as seepage of salt will occur predominantly during the refilling of the wetland. If this is the case, the salinity of Lake Bryde is likely to reflect the salinity of the upstream catchment in the event the lake is able to dry regularly. Conversely, if Lake Bryde were to receive consecutive flows without drying out, as was the case in the period 1991 – 1993, then significant increases in salt load may occur. Further investigations regarding the extent to which vertical flushing occurs within lakes of the catchment is proposed.

Assessment and monitoring of the populations of *Muehlenbeckia horrida* subsp. *abdit*, in addition to fringing vegetation are also proposed. Previous monitoring at Lake Bryde has indicated a slight increase in soil salinity in the upper slopes of the riparian zone during the period 1997 to 2000, and a visible decline in *Melaleuca* species on the eastern side of the lake is reported to have occurred (Franke *et al.* 2000; Ogden and Froend 1997). Soil salinity monitoring of wetland beds is currently being established by the Lake Bryde Recovery Catchment Recovery Team.

Less is known about changes in the quality of the water within East Lake Bryde. Monitoring associated with the 2000 inflow event indicated the salinity of this lake is approx. one quarter that of Lake Bryde. Although the vegetation on the lake bed is considered to have been in decline over a number of years, East Lake Bryde probably represents the best opportunity for managing *Muehlenbeckia* as its hydrology is far more natural than that for Lake Bryde, or for the Lakeland reserve. Specifically, much of the shedding landscape upstream of East Lake Bryde is contained within the Lake Magenta Nature Reserve, resulting in a more natural hydro-period, and there is less evidence of salt loads to the lake.

There is virtually no information relating to the salinity of the Lakeland Nature Reserve wetlands that support two subpopulations of *Muehlenbeckia horrida* subsp. *abdit*. It is considered likely that lakes within Lakelands Reserve have suffered an increase in salt load and period and frequency of inundation. Work is proposed to assess the vigour, age classes and distribution of all population of *Muehlebeckia*. It is also proposed this assessment be supported by soil salinity sampling and EM 38 surveys in addition to coring of the lake beds. An investigation into the salinity tolerance of *Muehlenbeckia* is proposed to better assess the risk to lake bed populations.

Water-logging and inundation: *Muehlenbeckia horrida* subsp. *abdit* and other components of the lake bed community probably rely on a cycle of flooding and drying out to complete their life-cycles. Since clearing of the catchment 30 years ago, the frequency of inundation of particularly Lake Bryde and the Lakeland reserve has increased considerably (Sinclair Knight Merz 2000). The extent to which this is a threatening process is being investigated through the Lake Bryde Recovery Team, and works are being undertaken within the catchment to reduce the incidence and severity of run off.

- **Recreational activities** have the potential to affect Population 1. Skiing is common on the lake in winter, or when the water level is above a meter and the potential exists for plants to be trampled if the water level lowers.

- **A lack of recruitment** has been observed at Population 1. There are a number of possible causes including high flower, seed and/or seedling predation; and a lack of suitable cyclic events, such as flooding and drying, to stimulate germination.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1. SW of Newdegate	Water Reserve	1996 2000+	Healthy	Hydrological changes, recreational activities, poor recruitment
2. SW of Newdegate	Nature Reserve	1996 424 (96) [1404]	Poor	Hydrological changes
3A. SE of Lake Grace	Nature Reserve	2002 0 [43,750]	Dead	Hydrological changes, poor recruitment
3B. SE of Lake Grace	Nature Reserve	2002 0 [1500]	Dead	Hydrological changes, poor recruitment

Numbers in () = number of seedlings. Numbers in [] = number dead.

Benefits to other species/ecological communities

All populations are located within occurrences of the Threatened Ecological Community (TEC) 'Unwooded fresh water lakes of the southern Wheatbelt of Western Australia, dominated by *M. horrida* subsp. *abdit* and *Tecticornia verrucosa* across the lake floor'. This TEC is listed as Critically Endangered in Western Australia. Recovery actions implemented to improve the quality or security of the habitat of *Muehlenbeckia horrida* subsp. *abdit* populations are also likely to improve the status of the TEC in which the populations are 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. However, as *Muehlenbeckia horrida* subsp. *abdit* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this subspecies.

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts.

Evaluation of the Plan's Performance

The Department of Conservation and Land Management, in conjunction with the Katanning District Threatened Flora Recovery Team will evaluate the performance of this Interim Recovery Plan. The plan is to be reviewed within five years of its implementation. Any changes to management / recovery actions will be documented accordingly.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the population or within the defined critical habitat of *Muehlenbeckia horrida* subsp. *abdit* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the species, or its habitat or potential habitat, or the local surface and ground water hydrology.

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.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more.

3. RECOVERY ACTIONS

Existing recovery actions

Many surveys for *Muehlenbeckia horrida* subsp. *abdit* have been undertaken by staff from DCLM's Katanning District, volunteers, Science Division, and private consultancies.

In October 2001 approximately 2336 fruits (~747 seeds) from Population 1 and 700 fruits (~297 seeds) from Population 2 were collected and stored in the Department's TFSC at -18°C. The TFSC test the viability of the seed soon after collection and again after one year in storage. The initial germination rate of *Muehlenbeckia horrida* subsp. *abdit* seed was found to be less than 53% (unpublished data, A. Cochrane³).

The Lake Bryde wetland system has been designated a natural diversity recovery catchment under the State Salinity Strategy, and a Lake Bryde Catchment Recovery Team has been established. Abatement strategies for salinity and water-logging/inundation are being designed under the strategy. The Recovery Team will report annually to the Department's Corporate Executive. Information about the Wetland System that has been obtained includes: a catchment hydrogeological assessment (including modelling the development of shallow saline water tables); valley floor contour mapping and GIS flow characteristics and the catchment crown reserve vegetation survey and assessment. Other investigations in train include soil landscape unit assessment; and catchment surface water management options (personal observation B. Bone⁴).

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

Staff from DCLM's Katanning District regularly monitor all populations of this species.

Future recovery actions

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

1. Coordination

The Katanning District Threatened Flora Recovery Team (KDTFRT), in liaison with the Lake Bryde Recovery Catchment team, will continue to coordinate recovery actions for *Muehlenbeckia horrida* subsp. *abdit* and other Declared Rare Flora in the district. They will include information on progress in their annual report to DCLM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions

Responsibility: The Department (Katanning District) through the KDTFRT

³ Anne Cochrane, Manager, DCLM's Threatened Flora Seed Centre

⁴ Bruce Bone – Previously District Manager, DCLM's Katanning District

Cost: \$1,800 per year.

2. Surveys

Further surveys in appropriate habitat and on private lands will be conducted for this species during its flowering period (July to August). Volunteers from the local community, Wildflower Societies and Naturalist Clubs will be encouraged to be involved in surveys supervised by Departmental staff.

Action: Conduct further surveys

Responsibility: The Department (Katanning District) through the KDTFRT

Cost: \$4,300 per year.

3. Monitoring

Annual monitoring of factors such as habitat degradation (including weed invasion, plant diseases, recreational activity impacts), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. All populations will be inspected annually with special attention given to any impacts from salinity. In areas where salinity is a problem, soil salinity and pH readings will be taken annually during winter and summer.

Action: Monitor populations

Responsibility: The Department (Katanning District) through the KDTFRT

Cost: \$600 per year.

4. Seed and cutting collection

Preservation of germplasm is essential to guard against the possible extinction of wild populations and can be used to propagate plants for future translocations. Some seed has already been collected and stored but additional collections are required to maximise its genetic diversity. Cuttings will also be obtained to establish a living collection at the Botanic Garden and Parks Authority (BGPA).

Action: Collect seed and cutting material

Responsibility: The Department (Katanning District, TFSC) and BGPA, through the KDTFRT

Cost: \$4,600 in year one and \$3,200 in years two and three.

5. Community awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species 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, which includes a description of the plant, its habitat, threats, recovery actions and photos will be produced. A reply paid postal drop illustrating *Muehlenbeckia horrida* subsp. *abdit* and describing its distinctive features and habitat will also be produced and distributed to residents in Shires that contain possible habitat of the species. Postal drops aim to stimulate interest, provide information about threatened species and provide a name and number to contact if new populations are located by members of the community.

Action: Increase community awareness

Responsibility: The Department (Katanning District) through the KDTFRT

Cost: \$2,300 in first year and \$1,500 in second year, \$800 in year three, and \$600 in remaining years.

6. Care, control and management of Lake Bryde Nature Reserve

Negotiations with the Water Corporation will be undertaken to transfer the care, control and management of Lake Bryde Nature Reserve to the Conservation Commission of Western Australia, to be managed by the Department of Conservation and Land Management.

Action: Seek a change in care, control and management for Lake Bryde
Responsibility: The Department (Katanning District) through the KDTFRT
Cost: \$500 in first, second and third years.

7. Biology and ecology

Better knowledge of the biology and ecology of *Muehlenbeckia horrida* subsp. *abdita* will provide a scientific basis for management of the wild populations. An understanding of the following is particularly necessary for effective management:

1. Soil seed bank dynamics and the role of various disturbances (including inundation), competition, rainfall and grazing in germination and recruitment.
2. The pollination biology of the subspecies, and the requirements of pollinators.
3. The reproductive strategies, phenology and seasonal growth of the species.
4. The population genetic structure, levels of genetic diversity and minimum viable population size.
5. The impact of salinity and long-term inundation on *Muehlenbeckia horrida* subsp. *abdita* and its habitat.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division, Katanning District) through the KDTFRT
Cost: \$20,800 per year for the first three years.

8. Full Recovery Plan

If the taxon is still ranked as Critically Endangered at the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for a full Recovery Plan or a review of this IRP will be assessed and a plan prepared if necessary.

Action: Review the need for a full Recovery Plan
Responsibility: The Department (WATSCU, Katanning District) through the KDTFRT
Cost: \$22,200 in the fifth year (if required).

4. TERM OF PLAN

This Interim Recovery Plan will operate from May 2003 to April 2008 but will remain in force until withdrawn or replaced. If the taxon is still ranked Critically Endangered after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. ACKNOWLEDGMENTS

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

Bruce Bone	Regional Manager, DCLM's Wheatbelt Region
Anne Cochrane	Manager, DCLM,s Threatened Flora Seed Centre
Andrew Crawford	Technical Officer, DCLM's Science Division
Stuart Halse	Principal Research Scientist, DCLM's Science Division
Jim Lane	Principal Research Scientist, DCLM's Science Division
Sheila Hamilton-Brown	Former Project Officer, DCLM's Threatened Species and Communities Unit
Betha Loudon	Conservation Officer, DCLM's Katanning District
Mike Lyons	Research Scientist, DCLM's Science Division
Arletta Ralph	Former Lake Grace Community Landcare Coordinator, Shire of Lake Grace
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Karen Wilson	Botanist, Royal Botanical Gardens, Sydney, New South Wales

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

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7. TAXONOMIC DESCRIPTION

Wilson, K. (1996) A new subspecies in *Muehlenbeckia horrida* (Polygonaceae) from Western Australia. *Nuytsia* 11(1), 133-138.

***Muehlenbeckia horrida* H. Gross** is a depauperate erect to divaricate-intricate *subshrub* 0.3-1.2 m high, suckering to c. 2 m diameter. *Older stems* grey-white and glaucous, with age becoming brown with flaky or corky bark; younger stems pale to reddish, often somewhat glaucous, irregularly striate or verrucose; branchlets sometimes terminally spinescent. *Leaves* usually densely crowded on short (c. 2 m long) lateral branchlets, eventually deciduous, semi-succulent, rarely glaucous, simple, sessile; blade linear with abaxial groove, 10-55 mm long, 0.7-1.5 mm wide; base truncate; margins rounded, flat to recurved; apex acute. *Flowers* 3-5 per cluster at stem nodes or on short lateral branchlets. *Perianth* in fruiting stage much thickened, mostly 4-angled,

tough and corky when dry. *Stamens* 6-8; anthers 0.8-1.5 mm long. *Nut* trigonous, 2.0-3.0 mm long, dark brown, shining, smooth.

***Muehlenbeckia horrida* subsp. *abdita* K.L. Wilson** plants 0.6-1.2 m high. *Main stems* spreading to more or less erect but divaricately to intricately branched; stems not minutely warty. *Perianth segments* 5, rarely 4 in a few flowers on a plant.