National Recovery Plan for the Maidenhair Spleenwort Asplenium hookerianum

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Australian Government





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## Summary

The Maidenhair Spleenwort (*Asplenium hookerianum*) is a small fern occurring in Victoria and Tasmania, where there are about 700 plants in four wild populations. Little is known of the ecology of, or threats to, the species. It is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, as Threatened under the Victorian *Flora and Fauna Guarantee Act 1988*, and as Vulnerable under the Tasmanian *Threatened Species Protection Act 1995*. This national Recovery Plan for the Maidenhair Spleenwort is the first recovery plan for the species, and details its distribution, habitat, threats and recovery objectives and actions necessary to ensure its long-term survival.

## **Species Information**

#### Description

The Maidenhair Spleenwort (*Asplenium hookerianum*) Colenso is a small fern belonging to the the Familiy Aspleniaceae. It has several tufted fronds 5–15 cm (rarely to 20 cm) long arising from short rhizomes, the stems with scattered scales extending up the stipe and on to rachises. The frond lamina are pinnate to bipinnate and the pinnae have slender stalks. The lamina is oblong-triangular, the pinnae are narrowly triangular, and the pinnules are obovate to triangular, bluntly toothed or deeply lobed. Pinnae are 3–10 cm long, the pinnules 8 mm wide and 12 mm long. The frond upper surface is glabrous, the lower surface partly covered by short and oblong sori, each protected by a membranous indusium (description from Duncan & Isaac 1986).

Asplenium bulbiferum is similar to A. hookerianum but differs in having fronds more than 15 cm long (fronds of A. hookerianum are mostly less than 15 cm long). The stipe and rachises are thicker than in A. hookerianum and secondary pinnae are sessile or shortly stalked (pinnae of A. hookerianum have distinct slender stalks). Juvenile or dwarfed plants of A. bulbiferum, A. terrestre and other ferns such as Polystichum proliferum have been misidentified as A. hookerianum (Garrett 1996).

### **Distribution and Populations**

The Maidenhair Spleenwort occurs in New Zealand, where it is relatively common, and southeastern Australia (Figure 1), where it is confined to Tasmania, in the Tasmanian Northern Slopes IBRA Bioregion (*sensu* DEH 2000) and Victoria, in the Australian Alps bioregion. There are two extant populations in Tasmania: one in the north-west at Hellyer Gorge State Reserve containing seven plants (2009); and another in the central north in Drys Bluff Forest Reserve, containing about 400 plants (2009) (DPIPWE 2009). The two Victorian populations of *A. hookerianum* occur near Licola in central Gippsland, in the Alpine National Park, at Bryces Gorge, containing about 50 plants (2008), and the East Caledonia River, containing about 220 plants (2008).

### Habitat

In Tasmania *A. hookerianum* occupies heavily shaded fissures on watercourse margins within rainforest or in very sheltered gullies within drier forest types (DPIPWE 2009). The plants usually grow on vertical banks, but also occur on rock and the lower trunks of Soft Tree-fern *Dicksonia antarctica*. The Hellyer Gorge population grows on the margins of the Hellyer River under tall rainforest dominated by Mrytle Beech *Nothofagus cunninghamii* at an altitude of 250 m asl. The underlying parent material is Permo-Carboniferous tillite, with extensive areas of Tertiary basalt upstream. Co-occurring ferns include Ground Spleenwort *A. appendiculatum*, Mother Spleenwort *A. bulbiferum*, Necklace Fern *A. flabellifolium*, Narrow Filmy Fern *Hymenophyllum rarum* and Common Filmy Fern *H. cupressiforme*. The Drys Bluff population occurs in wet forest at an altitude of 450–500 m asl and the parent material is Jurassic dolerite.

In Victoria, *A. hookerianum* occurs on rock faces with sheltered east and south-east aspects, and within the rock face habitat the species is confined to cracks in the rock surface under small overhangs and in vertical and horizontal crevices. The populations are at an altitude of 1,200 m and average rainfall is in excess of 1,400 mm/year. The substrate is Lower Carboniferous quartzose and feldspathic sandstone and siltstone (Snowy Plains Formation). Associated flora

species consist of an overstorey containing Candlebark *Eucalyptus rubida* and understorey trees of Mountain Tea-tree *Leptospermum grandifolium*. On the rockface habitat where *A. hookerianum* occurs, the characteristic species are the rare Cliff Cudweed *Euchiton umbricola* and Common Spleenwort *A. trichomanes*. Also common are Necklace Fern *A. flabellifolium*, Slender Tussock-grass *Poa tenera*, Mother Shield-fern *Polystichum proliferum*, Brittle Bladder-fern *Cystopteris tasmanica* and several moss taxa.

Maps showing the distribution of *A. hookerianum* are available from the Department of Primary Industries, Parks, Water and Environment (for Tasmania) and the Department of Sustainability and Environment (for Victoria).



**Figure 1.** Distribution of *Asplenium hookerianum* (Tasmanian data from TSS 2008)

## **Decline and Threats**

Little is known of the previous distribution and abundance of *A. hookerianum*. A small population near Orford on Tasmania's east coast was last seen in 1996 and is now presumed extinct, while the status of a population on the Picton River in the State's south is unknown (collected in 1874). The population at Hellyer Gorge may have declined, as it had an estimated 100–200 plants in 1991, but only seven were found in 2009 (DPIPWE 2009).

Current threats to populations are not clear, although they appear to be minimal at present. Intensifying land use, particularly forestry, upstream of the sites may also have an impact. The habitat of *A. hookerianum* being largely confined to cracks and crevices in rock faces, plants may be adversely affected by rock climbing or abseiling activities for the Bryces Gorge population. It is unknown how *A. hookerianum* responds to wildfire. Since *A. hookerianum* is shortly rhizomic and is often growing in the protection of cracks of rockfaces, plants may be able to resprout after fires. With *A. hookerianum* restricted to moderately cold and wet environments in Tasmania and Victoria, it is reasonable to assume that it is threatened by long-term climate change, with projected impacts of decreasing rainfall and increasing temperatures and drying. A recovery action is to determine threats more clearly.

## **Recovery Information**

#### **Recovery Objectives**

The overall objective of recovery is to minimise the probability of extinction of *A. hookerianum* in the wild and to increase the probability of important populations becoming self-sustaining in the long term. Within the life span of this Recovery Plan (5 years), the specific objectives of recovery for *A. hookerianum* are to:

- 1. Determine distribution, abundance and population structure
- 2. Determine habitat requirements
- 3. Determine and manage threats to populations
- 4. Identify key biological functions
- 5. Determine growth rates and viability of populations
- 6. Establish a population in cultivation
- 7. Build community support for conservation-

#### **Program Implementation and Evaluation**

This Recovery Plan guides recovery actions for *A. hookerianum* and will be managed by the Department of Primary Industries, Parks, Water and Environment (for Tasmania) and the Department of Sustainability and Environment (for Victoria), who will maintain liaison with each other over implementation. The Recovery Plan will run for five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption.

### **Recovery Actions and Performance Criteria**

Action	Description	Performance Criteria					
Specific Objective 1: Determine distribution, abundance and population structure							
1.1	Undertake surveys to determine the area and extent of populations, the number, size and structure of populations, and inference or estimation of population change. Responsibility: DSE, PV, DPIPWE	<ul> <li>All current population sites searched; sites mapped for population size, condition and habitat.</li> </ul>					
Specific Objective 2: Determine habitat requirements							
2.1	Survey known habitat and collect floristic and environmental information relevant to community ecology and condition. Responsibility: DSE, PV, DPIPWE	<ul> <li>Species/habitat specific survey design prepared.</li> <li>Habitat critical to survival mapped for any extant populations.</li> </ul>					
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference. <b>Responsibility: DSE, DPIPWE</b>	<ul> <li>Potential habitat in Vic &amp; Tas surveyed.</li> <li>Predictive model for potential habitat developed &amp; tested at two sites.</li> <li>Status of the Picton &amp; Franklin Rivers records determined.</li> </ul>					
Specific Objective 3: Determine and manage threats to populations							
3.1	Control weed invasion by blackberry at Hellyer Gorge site to determine if adverse effect on habitat. Responsibility: DPIPWE	Reduction in cover of blackberry at/near all sites.					
3.2	Determine need for additional streamside buffers upstream of Hellyer Gorge. Responsibility: DPIPWE	<ul> <li>Investigation and negotiation (if required) with Forestry Tasmania Plan for adequate streamside buffers.</li> </ul>					
3.3	Determine and control the threat of direct damage by human activities. Responsibility: PV	<ul> <li>Impact of rock climbing monitored and reduced if required within the Bryces Gorge special protection zone through park management plan.</li> </ul>					

- **3.4** If severe wildfire occurs in an area of a population, monitor its effect.
- Monitoring program set up and completed post severe wildfire.

	Responsibility: DSE, PV, DPIPWE						
Specific Objective 4: Identify key biological functions							
4.1	Evaluate current reproductive status, seed (spore) bank status, longevity, fecundity and recruitment levels. Responsibility: DSE, DPIPWE	Reproductive ecology and regenerative potential quantified for four representative sites.					
Specific Objective 5: Determine the growth rates and viability of populations							
5.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. Responsibility: DSE, PV, DPIPWE	<ul> <li>Techniques for monitoring developed and implemented.</li> <li>Population growth rates determined and Population Viability Analysis completed for all populations.</li> </ul>					
Specific Objective 6: Establish a population in cultivation							
6.1	Establish plants in cultivation to provide a research population and potentially for reintroductions. <b>Responsibility: RBG-M, RBG-T</b>	<ul> <li>Development of effective propagation and cultivation techniques.</li> <li>At least 30 healthy, genetically diverse, mature plants in cultivation.</li> </ul>					
Specific	Objective 7: Build community support for conservation						
7.1	Identify opportunities for community involvement in the conservation of the <i>A. hookerianum</i> . Responsibility: DSE, PV, DPIPWE	Community nature conservation and Landcare groups aware of the species and support its conservation.					

Abbreviations: DPIPWE – Department of Primary Industries, Parks, Water and Environment; DSE – Department of Sustainability and Environment (Victoria); PV – Parks Victoria; RBG – Royal Botanic Gardens, Melbourne & Tasmania

#### **Management Practices**

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of *A. hookerianum*. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are primarily structured to (i) acquire baseline data, (ii) assess habitat condition including ecological and biological function, (iii) protect populations to maintain or improve population growth and (iv) to engage the community in recovery actions.

On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction and competition from pest plants. A range of strategies will be necessary to alleviate these threats including weed control, prohibition of abseiling on cliff walls where the species occurs and ongoing monitoring to assess possible adverse affects from fire and climate change. Broad scale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers. In addition, searches of known and potential habitat should continue to better define the distribution and size of populations.

The Recovery Plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of the mechanisms underlying recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between *A. hookerianum* and associated flora, and its response to environmental processes. These are directly linked to biological function and are thus vital to recovery. Demographic censusing will be necessary to gather life history information and to monitor the success of particular management actions.

In addition to the above, *ex situ* conservation measures will be required and will include plant cultivation. Cultivating *ex situ* populations will also aim to provide a store of plants in reserve as a precaution to wild populations being destroyed. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

#### Affected Interests

The organisations responsible for management are the Department of Primary Industries and Water in Tasmania and the Department of Sustainability and Environment and Parks Victoria in Victoria.

#### **Role and Interests of Indigenous People**

Indigenous communities on whose traditional lands the *A. hookerianum* occurs are being advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and invited to provide comments and be involved in the implementation of the plan.

#### **Biodiversity Benefits**

The Recovery Plan includes a number of potential biodiversity benefits for other species and vegetation communities. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with *A. hookerianum*, particularly those species with similar life forms and/or flowering responses.

The Recovery Plan will also provide an important public education role as threatened flora have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation.

### **Social and Economic Impacts**

The implementation of this Recovery Plan is unlikely to cause any significant social or economical impacts as all populations occur in parks and reserves.

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### References

- DEH 2000. Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1. Summary Report. Department of Environment and Heritage, Canberra.
- Duncan, B.D. and Isaac, G. 1986. Ferns and Allied Plants of Victoria, Tasmania and South Australia. Melbourne University Press, Melbourne.
- Garrett, M. 1996. The Ferns of Tasmania. Their ecology and distribution. Tasmanian Forest Research Council, Hobart.
- DPIPWE 2009. Listing Statement for Asplenium hookerianum.(maidenhair spleenwort). Department of Primary Industries, Parks, Water and Environment, Tasmania.

# Priority, Feasibility and Estimated Costs of Recovery Actions

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Distribution, abundance									
1.1	Surveys	1	100%	DSE, PV, DPIPWE	\$8,000	\$0	\$8,000	\$0	\$8,000	\$24,000
2	Habitat requirements									
2.1	Known habitat	1	100%	DSE, PV, DPIPWE	\$8,000	\$8,000	\$0	\$0	\$0	\$16,000
2.2	Potential habitat	2	75%	DSE, DPIPWE	\$0	\$0	\$10,000	\$10,000	\$0	\$20,000
3	Threat management									
3.1	Pest plants	1	100%	DPIPWE	\$5,000	\$5,000	\$5,000	\$0	\$0	\$15,000
3.2	Upstream buffers	1	100%	DPIPWE	\$2,000	\$0	\$0	\$0	\$0	\$2,000
3.3	Human damage	1	100%	PV	\$2,000	\$0	\$0	\$0	\$0	\$2,000
3.4	Wildfire	2	100%	DSE, PV, DPIPWE	\$0	\$0	\$0	\$0	\$5,000	\$5,000
4	<b>Biological functions</b>									
4.1	Reproductive status	2	75%	DSE, PV, DPIPWE	\$8,000	\$0	\$8,000	\$0	\$8,000	\$24,000
5	Population viability									
5.1	Censusing	1	75%	DSE, PV, DPIPWE	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$30,000
6	Cultivation									
6.1	Cultivated plants	2	100%	RBG	\$5,000	\$3,000	\$1,000	\$1,000	\$1,000	\$11,000
7	Community support									
7.1	Community extension	3	50%	DSE, PV, DPIPWE	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
				TOTALS	\$46,000	\$24,000	\$40,000	\$19,000	\$30,000	\$159,000