

drooping pine

Pherosphaera hookeriana

TASMANIAN THREATENED FLORA LISTING STATEMENT



Image: School of Plant Science, UTAS.

Scientific name: *Pherosphaera hookeriana* W.Archer bis, *Hooker's J. Bot. Kew Gard. Misc. 2: 52 (1850)*

Family: Podocarpaceae

Common name: drooping pine (Wapstra *et al.* 2005)

Name History: *Microstrobos niphophilus*, Mt Mawson pine

Status: *Threatened Species Protection Act 1995: vulnerable*
Environment Protection and Biodiversity Conservation Act 1999: Not Listed
Tasmanian Regional Forest Agreement: **Proposed priority species**

Distribution: Endemic status: **Tasmanian endemic**
Tasmanian NRM Region: **Northern, Southern & Cradle Coast**

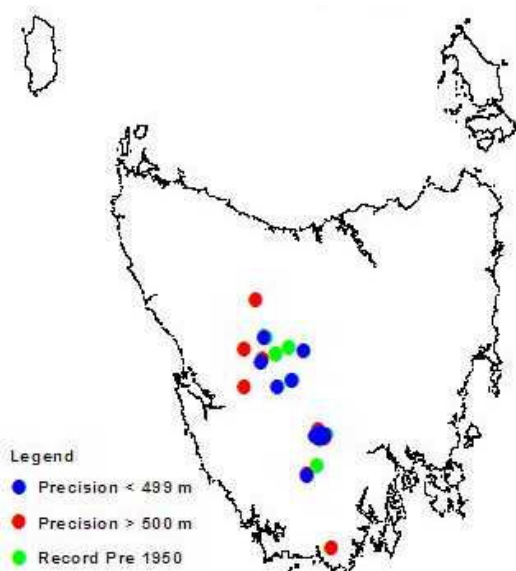


Figure 1. Confirmed distribution of *Pherosphaera hookeriana*.



Plate 1. *Pherosphaera hookeriana* (white arrow) with *Diselma archeri* in the foreground (Image by E. Lazarus).

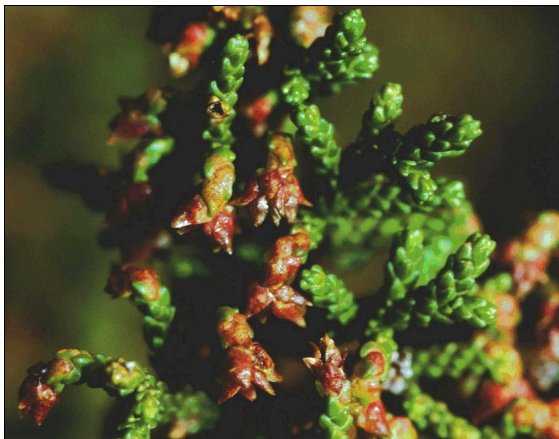


Plate 2. Female cones of *Pherosphaera hookeriana*
(Image by G. Jordan).

DESCRIPTION AND ECOLOGY

Pherosphaera hookeriana of the Podocarpaceae is a small shrubby pine with short rigid branches that can reach 2 to 3 metres in height. The species is dioecious, producing either male or female plants. Cones develop on the branchlets of both male and female plants from October to May, peaking in December.

Recruitment in this species is thought to be largely clonal, through layering. Recruitment from seed has been rarely observed and appears

to be restricted to moist, shady places. Seedlings superficially resemble small lycopods with narrow, spreading leaves (G. Jordan pers. comm.). Seed is locally dispersed via wind or water. Birds may play a role in seed dispersal as they have been observed feeding on plants when in cone.

Identification

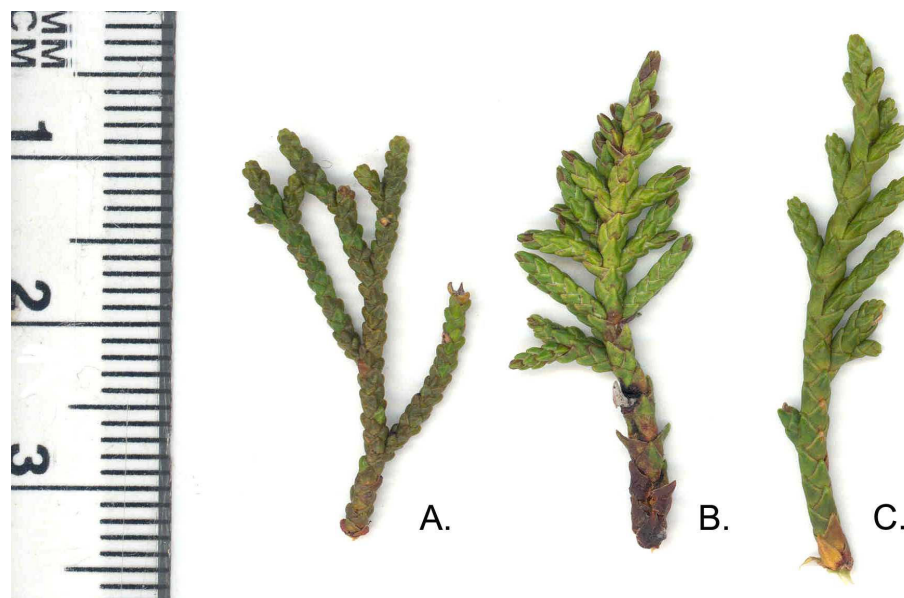
The following description is adapted from Curtis and Morris (1975) and Kirkpatrick (1997).

Branches and leaves: branches are short and rigid with leaves pressed closely to the stem and overlapping. Leaves have a rounded keel and no conspicuous stomata on outer surface. The branchlets are **not** square in cross-section, the foliage not being opposite and decussate as for *Diselma* and *Microcachrys* (see Plate 3).

Cones: Female plants produce 4 to 5 ovules surrounded by thin bracts with the structures often referred to as cones (Plate 2). They are solitary, terminal, pendulous and large in relation to the branchlet. Male cones are solitary, spherical with purplish-brown scales and red in early stages of development.

Seed: Ripens with hard, brown coat.

Plate 3. Foliage of *Pherosphaera hookeriana* (A), *Diselma archeri* (B) and *Microcachrys tetragona* (C).



CONFUSING SPECIES

Plate 3 illustrates the variation between the three small Tasmanian pine species.

Pherosphaera hookeriana can be most readily confused with *Diselma archeri*. The two species often co-occur and produce cones at the same time of year. The most distinguishing feature between the two pines is the arrangement of foliage along the branchlets resulting in *Diselma archeri* having strongly square branchlets in cross section. *Pherosphaera hookeriana* differs subtly from *Diselma archeri* in leaf colour, being dark-green as opposed to slightly yellow-green. *Pherosphaera hookeriana* also tends to have a more upright habit and the branches do not droop consistently as they do in *Diselma*. However, it should be noted that the habit of *Pherosphaera hookeriana* is variable. In some sites the shrub is tall and droopy and in others it can be short, dense and erect (as in Plate 1).

A review of common names in Tasmania lists *Pherosphaera hookeriana* as drooping pine (Wapstra *et al.* 2005). This nomenclature refers to the pendulous nature of the female cones. However, the name is misleading as superficially, the term ‘drooping’ would seem to refer to the habit of the plant, which as discussed previously is not a consistent feature of *Pherosphaera hookeriana* and is more relevant to the habit of *Diselma archeri*.

The other small Tasmanian pine species, *Microcachrys tetragona*, differs from *Pherosphaera hookeriana* by its creeping habit and strongly square branchlets in cross section due to the arrangement of the foliage.

DISTRIBUTION AND HABITAT

Pherosphaera hookeriana is endemic to Tasmania and is known from the Mt Field region and several sites throughout the central mountains (see Table 1). The current geographic distribution of the species is likely a reflection of post-glacial expansion from refugia and subsequent fire events (G. Jordan pers. comm.).

This species occurs in coniferous heath that varies from boggy areas near water bodies to

well drained, exposed and rocky situations near mountain peaks.

Most populations of *Pherosphaera hookeriana* occur on dolerite substrate; however there are exceptions. For example, the Artichoke Valley population near Frenchman’s Cap occurs on sedimentary deposit and, although surrounded by Precambrian quartzite, this small pocket contains vegetation indicative of higher nutrient soils (G. Jordan pers. comm.). *Pherosphaera hookeriana* populations occurring on substrates other than dolerite are usually fewer in number.

POPULATION ESTIMATE

A census undertaken in February 2007 of sites at Mt Field East, Mt Mawson to Tarn Shelf, Wombat Moor and Lake Dobson estimated fewer than 5,000 mature individuals. Survey quadrats recorded between 10 to 25% cover of *Pherosphaera hookeriana*. While the Mt Field region is widely recognised as supporting the major occurrences of this species, the number of mature plants may exceed 10,000 mature individuals in total. Further assessment of abundance and area of occupancy is needed, particularly in large populations outside of the Mt Field region, such as Mt King William II and the Nive River.

Records representing the northern and southern extent of the distribution of *Pherosphaera hookeriana* require field verification. They are not shown in Figure 1 though details are included in Table 1.

RESERVATION STATUS

Pherosphaera hookeriana is reserved in the Mt Field, Franklin-Gordon Wild Rivers, Southwest and Cradle Mountain-Lake St Clair National Parks. Almost all known occurrences are within formal conservation reserves.

CONSERVATION ASSESSMENT

Pherosphaera hookeriana was uplisted to vulnerable from rare on schedules of the Tasmanian *Threatened Species Protection Act 1995* in 2001. This was because of the threat of fire and the largely irreversible impact of fire due to the poor regenerative capacity of the species.

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 Listing Statement for *Ptherosphaera hookeriana* (drooping pine)

The schedule change is further justified by the increased threat from wildfire and drought with current climate change trends. The species may meet Criterion D of the guidelines for listing as

vulnerable should further assessment indicate that the number of mature individuals *Ptherosphaera hookeriana* plants is less than the threshold of 10,000 individuals.

Table 1. Population summary of *Ptherosphaera hookeriana*.

No.	Subpopulation	Tenure	NRM region *	1:25 000 map sheet	Year last record	Area of occupancy (ha) **	No. of plants	Comments
1	Mt Field East 3 sites	National Park	Southern	Dobson	2007	26	< 2000	
2	Mt Mawson to Tarn Shelf Several sites	National Park	Southern	Dobson	2007	100	< 3000	
3	Wombat Moor One site	National Park	Southern	Dobson	2007	1	~ 200	
4	Lake Dobson 2 sites (1 surveyed 2007)	National Park	Southern	Dobson	2007	0.0001	20	
5	Newdegate Pass Several sites	National Park	Southern	Dobson	1977			
6	Broad River	National Park	Southern	Dobson	1986			
7	Rodway Range Several sites	National Park	Southern	Dobson	–			No records but known to occur on range
8	Lightning Ridge/Eliza Plateau	National Park	Southern	Anne	1983			
9	Jubilee Range	National Park	Southern	Skeleton	1928			
10	Artichoke Valley - Frenchman's Cap 1 site	National Park	Cradle Coast	Vera	–	0.01		“Small numbers” G. Jordan
11	Deception Range	National Park	Cradle Coast	Vera	1983			Requires verification
12	Lake Richmond	National Park	Southern	Majors	1982			
13	King William II	National Park	Southern	Majors	–	100		Large pop. – Unquantified S. Corbett
14	Butler's Gorge Rd	Informal reserve	Southern	Tarraleah	2000			
15	Camp Hill region	National Park	Cradle Coast	Goulds	1983			
16	Lake Ina	National Park	Southern	Ina	1992			
17	Nive River Several sites	Private reserve	Southern	Ina	–			Large pop. – Unquantified G. Jordan
18	Cheyne Range	National Park	Cradle Coast	Collingwood	1992			
19	Du Cane Range/Mt Gould/ Labyrinth	National Park	Northern	Du Cane	1993			
20	Junction Lake 1 site	National Park	Northern	Du Cane	–			“Around lake edge” A. Pyrke
	Cradle Mountain	National Park	Northern	Cradle	1983			Unlikely – requires verification
	Maxwell Ridge/La Peruse	National Park	Southern	Precipitous	1983			Unlikely – as record from pollen

*NRM region = Natural Resource Management region.

** Area of occupancy = the smallest area that contains all known individuals of the population.

THREATS AND LIMITING FACTORS

The key threat to *Pherosphaera hookeriana* is fire. Given the fire sensitive nature and poor regenerative capacity of the species, fire will lead to largely irreversible declines and fragmentation of populations. Climate change will likely increase the risk of fire and associated drier conditions will further limit seedling recruitment. Known threats and limiting factors for the species are detailed below.

Fire: *Pherosphaera hookeriana* is a fire sensitive species that has poor regenerative capacity through resprouting or seedling establishment after fire. Fire events may cause local extinctions or fragment populations creating geographical isolation.

Poor recruitment: Anecdotal observations suggest the rate of seedling establishment is extremely low and restricted to wet sites. Unlike many related Tasmanian conifers, which produce cones in specific years (mast years), it has been noted that the ratio of coning female to male plants varies from season to season. *Pherosphaera hookeriana* produces seed annually though a large proportion of this appears to be non-viable (Greg Jordan & Tim Brodribb pers. comm., UTAS), possibly as a result of fragmentation and the largely clonal reproductive nature of the species or imbalance in the ratio of coning female to male plants. Laboratory trials have so far been unsuccessful in the germination of seed of *Pherosphaera hookeriana* despite numerous treatments including different temperature regimes and chemical scarification.

Habitat requirements: *Pherosphaera hookeriana* has extremely fine roots and may require specific edaphic conditions to maintain long-term health. This is supported by the observation that plants initially grow well from cuttings but prove difficult to maintain for more than 10 to 15 years (Tim Brodribb, A. Gray, N. Papworth & W. Fletcher pers. comm.).

Climate change: The trend towards a warmer climate may adversely affect this species. An increase in severe fire or drought events is expected to augment decline or cause local extinctions. Seedling recruitment of *Pherosphaera hookeriana* is likely to be further limited by drier conditions. As relictual species sensitive to

hydrological and temperature changes, some Tasmanian alpine conifers are currently exhibiting symptoms of poor health relating to drought or sustained high temperatures in parts of the State.

MANAGEMENT STRATEGY

The main objective for recovery of *Pherosphaera hookeriana* is to ensure there is no decline in populations. This will be achieved through effective management and an improved understanding of recruitment requirements.

What has been done?

Surveys for *Pherosphaera hookeriana* were conducted in February 2007, with population information collected at several sites in the Mt Field region. The surveys were funded by the Tasmanian Wilderness World Heritage Area Program.

Research at the University of Tasmania has been undertaken on seedling germination.

The Royal Tasmanian Botanical Gardens maintain fourteen plants from three genotypes as *ex situ* holdings. Four plants are from 2000 stock and nine are from 2006 stock. The Plants of Tasmania nursery also have stock and sale plants of *Pherosphaera hookeriana*.

Potential habitat for *Pherosphaera hookeriana* is described in the Tasmanian Wilderness World Heritage Area (TWWHA) Management Plan. The TWWHA Tactical Fire Management Plan outlines a strategic approach to fire management, taking into account fire sensitive communities.

What is needed?

Recovery actions necessary to decrease the extinction risk to *Pherosphaera hookeriana* include:

- Implement the Tasmanian Wilderness World Heritage Area (TWWHA) Tactical Fire Management Plan to protect occurrences from wildfire.
- Assist land managers and landowners in managing habitat of *Pherosphaera hookeriana*, in particular, developing a management plan

for the Mt Field National Park in conjunction with Parks and Wildlife to abate threats.

- Ensure known occurrences are protected against possible changes in land use that would be detrimental to the species.
- Conduct extension surveys of potential habitat.
- Collect abundance and area of occupancy data at previously unsurveyed populations and verify records from Cradle Mountain and the Deception and Southern Ranges.
- Implement a monitoring program to assess health, declines, seedling recruitment and reproductive fitness including the ratio of male to female coning and seed production.
- Assess genetic diversity within and between populations with a focus on determining the level of clonality. Further research into germination and recruitment requirements is also needed. This could be conducted as part of a research project through the University of Tasmania.
- Confirm that *Pherosphaera hookeriana* is identified as a plant threatened by climate change.
- Investigate the species' long-term cultivation requirements and increase *ex situ* stock held at the Royal Tasmanian Botanical Gardens with a focus of maintaining genetic diversity.

- Collect seed for long-term storage as part of the Millennium Seedbank (SeedSafe) Conservation Project.

BIBLIOGRAPHY

Curtis, W.M., and Morris, D.I. (1975). *The Student's Flora of Tasmania, Part 1. Second edition*. Government Printer, Hobart.

Kirkpatrick, J.B. (1997). *Alpine Tasmania: An Illustrated Guide to the Flora and Vegetation*. Oxford University Press, Melbourne.

Wapstra, H., Wapstra, A., Wapstra, M., and Gilfedder, L. (2005). *The Little Book of Common Names for Tasmanian Plants*. Department of Primary Industries, Water and Environment, Hobart.

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View:

<http://www.dpiw.tas.gov.au/threatenedspecieslists>

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Permit: It is an offence to collect, disturb, damage or destroy this species unless under permit.