Pneumatopteris pennigera

lime fern

TASMANIAN THREATENED FLORA LISTING STATEMENT

Image by Mark Wapstra

Scientific name: ***Pneumatopteris pennigera*** (G.Forst.) Holtt., *Blumea* 21: 305 (1973)
Common name: lime fern (Wapstra et al. 2005)
Group: vascular plant, pteridophyte, family **Thelypteridaceae**

Status: *Threatened Species Protection Act 1995*: **endangered**
Environment Protection and Biodiversity Conservation Act 1999: **Not Listed**

Distribution: Endemic: **Not endemic to Tasmania**
Tasmanian NRM Region: **Cradle Coast & North**

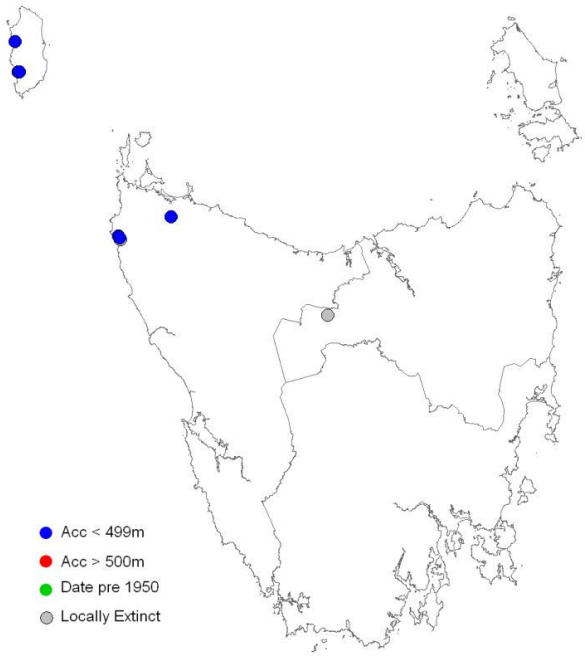

Figure 1. Distribution of *Pneumatopteris pennigera* in Tasmania

Plate 1. *Pneumatopteris pennigera* habit at Copper Creek (image by Matthew Larcombe)

IDENTIFICATION & ECOLOGY

Pneumatopteris pennigera is a terrestrial fern in the Thelypteridaceae family (Baker & Duretto 2011). It is known from several sites in northwest Tasmania and King Island, where it occurs on alluvial flats and the banks of rivers and creeks in association with limey springs (Plate 1).

Recruitment is primarily from spores, with the occasional plant shooting from the base or lower sections of trunks of old or dying specimens (Plate 2). The species' distinctive leaf venation means that it can be identified at any time of year.

Description

The following description is adapted from Duncan & Isaac (1986) and Bostock (1998).

Pneumatopteris pennigera has an erect to oblique rhizome covered with broad, brown scales. Old plants occasionally form a small trunk to 1 m tall. Fronds are tufted, erect and 40 to 110 cm long. The stipe is shorter than the lamina, slightly succulent, glabrous and flattened above with a shallow groove. Scales near the base are broadly ovate with attenuate tips. Scales are also scattered along stipe. The lamina is light green to mid-green, oblong-lanceolate and pinnate with the pinnae deeply lobed, membranous to herbaceous and almost glabrous. Pinnae are more-or-less oblong, with the lower 3 to 4 pairs reduced in length and well separated. The pinnae are cut obliquely to about halfway into broad, rounded lobes with slightly crenate margins. The lobes are pinnately veined with the lowest veins from adjacent lobes uniting to form a single excurrent vein. Sori are usually copious, unprotected and in two rows, nearer the mid-vein than the margin.

Confusing Species

There are no confusing species in Tasmania.

DISTRIBUTION & HABITAT

Pneumatopteris pennigera occurs in Tasmania, Victoria and Queensland, and is also known from New Zealand (Duncan & Isaac 1986, Bostock 1998). Like other species in the family Thelypteridaceae, *Pneumatopteris pennigera* is a terrestrial or swamp fern. In Australia the species occurs primarily on calcareous soils, hence its common name, whereas in New Zealand it shows no such affinity (Garrett, pers. comm.).

Pneumatopteris pennigera is very rare in Victoria, having been first 'discovered' in the Otways as recently as 1943, and is currently known from the Glenelg River region in the State's far southwest, and near Port Campbell (Duncan & Isaac 1986, Walsh & Entwisle 1994).

Until recently, the largest *Pneumatopteris pennigera* population in Tasmania occurred at Copper Creek (a tributary of the Duck River), with smaller stands along two creeks flowing into the Arthur River, and along the lower reaches of the Ettrick and Pass Rivers on King Island. The species was collected from the Duck River and Mole Creek areas in the early 1900s, though searches by fern enthusiasts in the period since have failed to relocate the latter population.

The linear range of the extant sites in Tasmania is 165 km, with an extent of occurrence 3,900 km^2 (which includes large areas of sea), and an area of occupancy of less than 2.5 ha.

Plate 2. Resprouting trunks at Copper Creek (Image by Matthew Larcombe)

Table 1. Population summary for *Pneumatopteris pennigera* in Tasmania

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen	Area occupied (ha)	Number of plants
1	Copper Creek	Private	Cradle Coast	Lileah	2009 # 1996 * (1948?)	0.5 5–6	55–70 > 2500
2	Arthur River (Sawards Creek)	Arthur-Pieman Conservation Area	Cradle Coast	Bluff	2011 # (2005)	< 0.1	60–70
3	Arthur River (Lime Fern Creek)	Arthur-Pieman Conservation Area	Cradle Coast	Bluff	2011 # (1996)	< 1	150–170
4	Ettrick River (King Island)	Public Reserve	Cradle Coast	Pearshape	2009 # (1966)	< 0.1	38
5	Pass River (King Island)	Public Reserve	Cradle Coast	Loorana	2007 # (1960s?)	0.00001	5
6	Arthur River (south)	Arthur-Pieman Conservation Area	Cradle Coast	Bluff	1996 * (1980s)	–	Presumed extinct #
7	Mole Creek	Private	North	Mole Creek	1907? (1907?)	–	Presumed extinct

NRM region = Natural Resource Management region; * = Garrett (1997, unpublished data), # = Threatened Species Section surveys 2005–2011.

In Tasmania *Pneumatopteris pennigera* occurs on sandy calcareous soils or limestone, in areas of moderate rainfall below elevations of 45 m. The species grows on alluvial flats or the banks of rivers and creeks, typically in wet sclerophyll forest or beneath a canopy of tea-tree, paperbark or dogwood. Co-occurring ferns include *Pteris comans*, *Pteris tremula*, *Blechnum wattsii*, *Blechnum nudum*, *Polystichum proliferum* and *Dicksonia antarctica* (Fountain 1982, Garrett 1984).

POPULATION ESTIMATE

There are five extant *Pneumatopteris pennigera* subpopulations in Tasmania, and a further two historic records. In total, the extant subpopulations support fewer than 400 plants (Table 1).

The Copper Creek subpopulation has declined from about 2500 to 55–70 plants since the mid 2000s (Larcombe & Garrett 2009, Gaffney pers. comm.), while the more southerly of the three Arthur River stands could not be relocated during TSS surveys in 2005 and 2009 and is presumed to be extinct. The reasons for these declines remain unknown, though drought, hydrological changes and possibly thrip infestations have been suggested as causal factors (Larcombe & Garrett 2009). The Pass River subpopulation on King Island is also close to extinction, supporting only five plants in degraded habitat, and is not considered viable (Garrett 1997).

The likelihood of additional sites being found in Tasmania is considered low, and given the collection history any new sites are likely to arise from opportunistic rather than targeted surveys.

RESERVATION STATUS

The Arthur River populations occur within the Arthur-Pieman Conservation Area. The Ettrick River and Pass River populations are within Public Reserves that are being considered for Nature Reserve status under the Tasmanian *Nature Conservation Act 2002* as part of the Crown Land Assessment and Classification project (DPIWE 2005).

CONSERVATION ASSESSMENT

Pneumatopteris pennigera was listing as endangered on the original schedules of the Tasmanian *Threatened Species Protection Act 1995*. It satisfies criterion A1, B2 and C2a:

- an observed reduction of at least 50% in

number of mature individuals over the last 10 years;

- area of occupancy less than 0.1 km^2 (10 hectares), known to exist at no more than five locations and a continuing decline in number of mature individuals;
- a continuing decline observed in the numbers of mature individuals and population structure, with no subpopulation estimated to contain more than 250 mature individuals.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

Land clearance & hydrological changes: Clearance of vegetation for agricultural purposes or dams is considered a significant threat to *Pneumatopteris pennigera* in Tasmania. The potential impact on the species' riparian habitat at Copper Creek, Ettrick River, Pass River and Saward Creek includes an increase in flood events, higher nutrient and sediment loadings, and possible herbicide contamination. The Ettrick River subpopulation has been under threat in recent years from a proposed dam some distance upstream. Subsequent changes to the flow regime of the river have the potential to impact on the fern's recolonisation opportunities due to changes in deposition and scouring levels.

Browsing by native animals: The Lime Fern Creek subpopulation has been badly affected by native-animal browsing (possums or wallabies), with a dramatic increase in browsing activity between 2009 and 2011. The result has been a decimation of fertile material and reduced opportunities for recruitment.

Stock: Trampling by cattle has been an ongoing issue for the Pass River and Ettrick River sites, with clear signs of disturbance at the latter site in early 2009 (Wapstra et al. 2009). The river reserves on King Island that support the Pass River and Ettrick River subpopulations are typically 50 m wide, and until recently were mostly unfenced.

Weed invasion: Alluvial flats at the Pass River site have been overrun by dense infestations of the introduced grass *Festuca arundinacea* (tall fescue) — the subpopulation is not considered viable due to the level of habitat degradation and the low plant numbers. Areas adjacent to the Copper Creek subpopulation are infested with pasture grasses and blackberry, but these are not considered a direct threat to the remaining lime ferns (Larcombe & Garrett 2009).

Climate change & stochastic events: Drying conditions associated with climate change may lead to a diminution of available habitat for the species, while the small size of the extant subpopulations means that the risk of extinction from stochastic events is high. Thrips were implicated in the calamitous decline of the population in Glenelg River National Park in southwestern Victoria in the 1980s (Cropper 1993, Walsh 2009 pers. comm.); their role, if any, in the decline of the Tasmanian population remains to be determined (Larcombe & Garrett 2009).

MANAGEMENT STRATEGY

What has been done?

Pneumatopteris pennigera is listed as a priority species requiring consideration in the development of the private land component of the Tasmanian CAR reserve system (DPIWE 1998). Attempts by the Private Forest Reserves Program to negotiate a covenant for properties supporting the Copper Creek subpopulation have been unsuccessful to date.

The Arthur River subpopulations have been considered in the development of fire management plans for the Arthur-Pieman Conservation Area: Hazard reduction and ecological burns have been excluded from the two known sites for the period of the plan, 2003 to 2013 (Parks & Wildlife Service 2003).

Surveys were conducted and management prescriptions prepared for *Pneumatopteris pennigera* in preparatory studies for the Regional Forest Agreement (Garrett 1997), and targeted surveys for the species were undertaken in 2007 and 2009 under the auspices of NRM-funded threatened flora projects (Larcombe & Garrett 2009, Wapstra et al. 2009).

Fencing was erected on the southern side of the Ettrick River in 2010 to prevent stock access to

the lime fern sites, with funding from the Cradle Coast NRM.

Collections from the Copper Creek site have been cultivated at the Royal Tasmanian Botanical Gardens, with plants now growing in the Gardens' fernery.

Management Objectives

The main objectives for the recovery of *Pneumatopteris pennigera* are to minimise the probability of extinction of the wild population by ensuring habitat protection, and to secure all key subpopulations under effective management regimes within the next five years. These objectives are consistent with the *Draft Recovery Plan for Tasmanian Threatened Ferns* (Threatened Species Section 2011).

What is needed?

Recovery actions necessary to improve the conservation status of *Pneumatopteris pennigera* include:

- monitor the known subpopulations at two yearly in intervals to determine trends and any new threats;
- investigate the factors behind the decline of the Copper Creek and Arthur River (south) subpopulations, and the poor health of the Lime Fern Creek subpopulation;
- encourage owners of private land supporting the species to enter into formal land management agreements that incorporate longer-term habitat maintenance objectives and actions as a high priority
- erect fences around subpopulations subject to stock trampling;
- control blackberries and other weeds threatening the species;
- upgrade the status of the Crown Land River Reserves along the Pass and Ettrick Rivers to Nature Reserves under the Tasmanian *Nature Conservation Act 2002;*
- investigate the feasibility of propagating plants from spores collected from the Ettrick River site and supplementing the wild subpopulation;
- provide information and extension support to Natural Resource Management committees, local councils, government agencies and the local community on the locality, significance and management of known *Pneumatopteris pennigera* subpopulations and areas of potential habitat.

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Prepared in 2006 under the provisions of the Tasmanian *Threatened Species Protection Act 1995,* with specialist advice from Mike Garrett. Reviewed in April 2011.

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View:
www.dpipwe.tas.gov.au/threatenedspecieslists

Contact details: Threatened Species Section, Department of Primary Industries, Parks, Water and Environment, GPO Box 44 Hobart Tasmania Australia 7001. Phone (03) 6233 6556; fax (03) 6233 3477.

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