Pterostylis wapstrarum

fleshy greenhood

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Image by Matthew Larcombe

Scientific name:	***Pterostylis wapstrarum*** D.L.Jones, *Austral. Orchid Res.* 3: 156 (1998)
Common Name:	fleshy greenhood (Wapstra et al. 2005)
Name history:	*Hymenochilus wapstrarum* (D.L.Jones) D.L.Jones & M.A.Clem
Group:	vascular plant, monocotyledon, family **Orchidaceae**
Status:	*Threatened Species Protection Act 1995*: **endangered** *Environment Protection and Biodiversity Conservation Act 1999*: **Critically Endangered**
Distribution:	Endemic status: **endemic to Tasmania** Tasmanian NRM regions: **North, South**

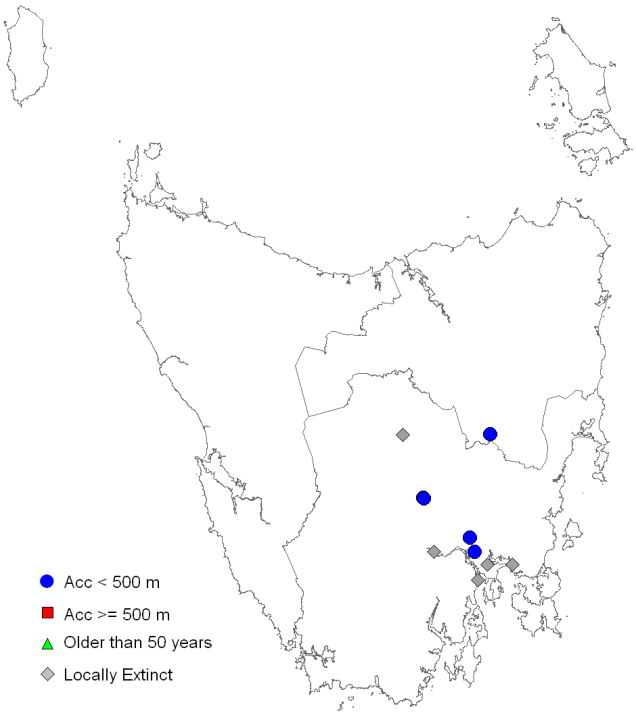

Figure 1. Distribution of *Pterostylis wapstrarum*, showing Natural Resource Management regions

Plate 1. Flower spike of *Pterostylis wapstrarum* (image by Matthew Larcombe)

SUMMARY: *Pterostylis wapstrarum* (fleshy greenhood) is a terrestrial orchid endemic to Tasmania. It is known to be extant at four sites in the southern Midlands, growing in native grasslands and grassy eucalypt woodlands. The species has a linear range of less than 80 km, and the total number of mature plants is estimated to be fewer than 1,000. The species is unreserved. Sites are subject to a narrow range of threats, mainly associated with the maintenance of the species' habitat through appropriate disturbance regimes (grazing and/or fire). Other factors such as climatic conditions and stochastic events are linked to other threatening processes through their impact on emergence, flowering and seed set.

IDENTIFICATION AND ECOLOGY

Pterostylis wapstrarum is a multi-flowered herb in a group of orchids known as greenhoods. In this group the dorsal sepal and petals are united to form a predominantly green, hood-like structure that dominates the flower (Plate 1). Greenhoods are deciduous terrestrials that have fleshy tubers, which are replaced annually. At some stage in their life cycle all greenhoods produce a rosette of leaves.

Pterostylis wapstrarum belongs to the subgenus *Hymenochilus* (Jones et al. 2001). The subgenus is distinguished by a multi-flowered raceme of small mainly green flowers, with short deflexed lateral sepals that form a concave pouch that subtends the labellum (Jones & Clements 2002). The labellum is fully exposed in the set position, and has an unlobed lamina that is membranous. The labellum bears a basal appendage that is held at right angles to the lamina. The morphology of this appendage is distinctive between species. When triggered by touch, the labellum flips inwards towards the column, trapping any insect inside the flower, thereby aiding pollination as the insect struggles to escape.

Pterostylis wapstrarum flowers in late spring, and reproduces solely from seed (Jones & Clements 2002). Seed production and release is likely to follow shortly after fertilisation. Germination and growth is dependent on mycorrhizal fungi. The amount of seed production, dispersal distance and seed longevity is unknown.

Natural mortality in all phases of the orchid's above-ground existence is expected to be low, impacts being caused by grazing (by native marsupials, stock or insects), drought stress and fire. It is noted, however, that the presence of an underground tuber means that the species can survive into subsequent years despite the loss of above-ground parts.

Survey techniques

Surveys for *Pterostylis wapstrarum* should be conducted during its peak flowering period, October to early November (Wapstra et al. 2012) in non-drought years. Identification by a specialist is recommended. Detecting leaves amongst dense grass prior to flowering is virtually impossible, and should not be relied upon, especially as the species may co-occur with similar species. Detection is likely to be most successful when flowers are fully open, though older flowers may still be identifiable, allowing the survey window to be extended for one to two weeks depending on seasonal and local conditions. In grazed pasture, winter surveys can be undertaken to locate rosettes for subsequent assessment.

Description

The growth habit of sterile and fertile plants is similar with sterile plants having a rosette of basal leaves only (Plate 2), while fertile plants have flowering stems (scapes) with the basal leaf rosette still present at the time of flowering, though sometimes senescent. The basal rosette consists of 4 to 7 leaves that encircle the base of the scape. The leaves are sessile and crowded, with an oblong-ovate or oblong-elliptical to almost sagittate lamina, which is 15 to 27 mm long and 8 to 20 mm wide, smooth, dark green, thick-textured and fleshy, with entire margins and a blunt apex. The scape is 8 to 22 cm tall and smooth. The flowering spike consists of 5 to 15 densely crowded flowers that are 9 to 10.5 mm long and 5 mm wide. The flowers are green with darker green veins. The hood has an abruptly decurved apex, and the dorsal sepal and petals are of similar

length. The dorsal sepal is 9.5 to 10.5 mm long and 3.5 to 4.5 mm wide, with a blunt apex. The lateral sepals are about 8 mm long, decurved, and deeply pouched below the labellum, the points about 1 mm apart. The petals are 6.5 to 8 mm long and 4.5 mm wide and light green with darker veins, with the ventral margin irregularly and shortly toothed. The labellum is elliptical-oblong, 2.7 to 3 mm long and 2.3 mm wide and membranous with a notched apex. The basal appendage of the labellum is oblong, dark green, about 1.5 mm long and 1.1 mm wide and slightly recurved, with the margins dark green and thickened and the central ridge narrow and raised above the margins. The column is 7.5 to 8.5 mm long.

[description based on Jones 1996, Jones 1998, Jones et al. 1999]

Confusing species

Pterostylis wapstrarum is part of the *Pterostylis mutica* species-complex that are characterised by an inward pointing labellum appendage (Jones et al. 1999). It is similar to *Pterostylis mutica* but that species has thin-textured leaves, is much taller (to about 35 cm) with widely-spaced flowers, and the central ridge on the labellum ends below the apex and projects as a very short blunt beak (Jones 1998). The occurrence of *Pterostylis mutica* in Tasmania remains in doubt, so care should be taken in differentiating any specimens suspected of being either species. *Pterostylis wapstrarum* also has affinities to *Pterostylis rubenachii* but that species is much less robust and has thin-textured leaves, and occurs only on the State's northwest coast (Jones et al. 1999). Members of the complex also have a superficial resemblance to the *Pterostylis ziegeleri* species-complex but species in the latter group have a labellum with a prominent outward protruding beak (Jones et al. 1999).

DISTRIBUTION AND HABITAT

Pterostylis wapstrarum is endemic to Tasmania, occurring in the southern Midlands, although historical records suggest a wider range, including the Derwent Valley, Central Plateau and southeast near-coastal region (Figure 1).

Plate 2. Leaf rosettes of *Pterostylis wapstrarum* (image by Matthew Larcombe)

Plate 3. Native grassland habitat at Pontville (image by Mark Wapstra)

Plate 4. Grassy woodland habitat at Oakden Hill (image by Matthew Larcombe)

Pterostylis wapstrarum occurs in native grassland and grassy woodland (Plates 3 & 4), the latter being dominated by *Eucalyptus pauciflora* or *Eucalyptus viminalis*. Subpopulations are mostly from low elevations (100 to 380 m), although the Central Plateau site is at about 920 m. Sites occur on variable slopes and aspects, generally on relatively fertile soils derived from Tertiary basalt or Jurassic dolerite.

POPULATION PARAMETERS

Pterostylis wapstrarum is known from four extant subpopulations and a further five subpopulations now presumed to be extinct (Table 1). The total population is estimated to be fewer than 500 plants, with numbers known to fluctuate considerably from year to year in response to poorly known climatic factors. For example, targeted surveys in 2012 and 2013 failed to locate any plants at the Pontville Small Arms Range complex. The linear range of the extant subpopulations is 76 km and the extent of occurrence about 1,400 km^2. If presumed extinct subpopulations are included in these estimates, then the linear range would be 108 km, and the extent of occurrence 4,435 km^2 suggesting a decline of about 30% in the linear range and 70% in the extent of occurrence.

Only one extant subpopulation was known at the time the species was listed at the State level in 2000, that at the Pontville Small Arms Range Complex (Table 1). The discovery of three additional subpopulations in the interim has meant a significant increase in the extant extent of occurrence and an increased variety of potential habitats, now including grassy woodlands. The likelihood of detecting novel sites within, and even outside, the current extent of occurrence is considered to be moderately high. However, the species appears to occur as highly localised subpopulations with small numbers so that new occurrences would be unlikely to greatly impact the extinction risk of the species.

RESERVATION STATUS

Pterostylis wapstrarum is not known from any formal reserve. The subpopulation at Pontville is on land owned and managed by the Commonwealth Department of Defence, which places certain legislative obligations on the site's management (North Barker Ecosystem Services 2012).

CONSERVATION ASSESSMENT

Pterostylis wapstrarum was listed as endangered on the Tasmanian *Threatened Species Protection Act 1995* in 2000, meeting the following criteria:

Table 1. Population summary for *Pterostylis wapstrarum*

	Subpopulation	Tenure	NRM region	1:25000 mapsheet	Year last (first) recorded	Area occupied (ha)	Number of individuals
1	Oakden Hill	private land	North	Ellinthorp	2008 (2005)	0.005 – 0.01	50 to 80
2	Pontville Small Arms Range Complex	Commonwealth (Department of Defence)	South	Tea Tree	2009 (1996)	<1	120 to 200
3	Hollow Tree Road	private land	South	Cawood	2009	0.005	c. 50
4	Quoin Ridge	private land	South	Richmond	2000	<0.1	30 to 40
5	Mt Nelson	private land	South	Taroona	1955	presumed extinct	
6	Penstock	private land	South	Wihareja	1929	presumed extinct	
7	Lewisham	private land	South	Carlton	1925	presumed extinct	
8	Cambridge	private land	South	Hobart	1890	presumed extinct	
9	Glen Leith	private land	South	New Norfolk	1840	presumed extinct	

- D1. Total population estimated to number fewer than 250 mature individuals;
- D2. Extent of occurrence estimated to be less than 500 km^2 or area of occupancy less than 10 hectares, and known to exist at no more than five locations, with a continuing decline, inferred, observed or projected in the area, extent and/or quality of habitat, and the number of mature individuals.

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Risks to the species are exacerbated by the dependence on mycorrhizal fungi, which may limit where the species can grow and make it susceptible to additional factors.

Land clearing and/or habitat modification: Native vegetation has been extensively cleared and/or modified over much of the low-lying fertile valley floors and adjacent grassy hills of the Midlands, where *Pterostylis wapstrarum* appears to have its stronghold. It is certain that the species was once more widespread (Figure 1). While *Pterostylis wapstrarum* may have a naturally scattered distribution, the contemporary occurrences in southern Tasmania appear to be, at least partially, the result of habitat loss and/or modification (e.g. agricultural intensification in the Midlands, and urban and industrial sprawl through the greater Hobart to Brighton area). The risk from land clearing as an imminent threat is currently reduced due to the legislative and policy framework designed to protect and manage threatened species and vegetation types. A recently detected subpopulation in the Hollow Tree Road area was in the vicinity of a proposed major water distribution pipeline. Management prescriptions ensured that *Pterostylis wapstrarum* was protected, but the event highlights the possible discovery of new sites and the risks presented by poorly-timed surveys (either out of season, or within season but in poor seasonal conditions) that may overlook new subpopulations.

Inappropriate grazing and disturbance regime: *Pterostylis wapstrarum* occurs in native grasslands and grassy woodlands, all of which are subject to grazing by native mammals and/or stock, deer and rabbit. Orchids in grassy ecosystems would be naturally adapted to some level of grazing pressure but when the balance is shifted beyond the point where plants emerge, flower and set seed, significant risks to the subpopulations arise. Intensive stock grazing during the peak flowering and fruiting period is a direct threat to the species, especially if accompanied by trampling in dry conditions potentially affecting the underground tubers. More intensive primary production (e.g. ploughing, fertiliser application, sowing) would almost certainly lead to local extinctions. Shifting to a cattle-dominated grazing regime from a sheep-dominated regime presents increased soil compaction and enrichment risks.

Inappropriate fire regimes: The response of *Pterostylis wapstrarum* to various fire regimes is not known but it is likely to persist and re-emerge after infrequent fires, although the burning would need to be carefully timed to minimise the loss of flowering and fruiting plants to maximise the opportunity for seed set in any particular year.

Insect herbivory: In 2007 a new threat to Tasmanian grassland orchids was detected at Pontville (Norris 2007), where the introduced red-legged earth-mite (*Halotydeus destructor*) was found to be having a devastating impact on the flowers of *Pterostylis ziegeleri* (and therefore presumably *Pterostylis wapstrarum*, which flowers a little later). The earth-mite starts by grazing on the rosette leaves, and when the flower emerges appears to wholly consume the pollen mass and other internal and external flower parts. Recruitment from seed is therefore virtually impossible. The degree of impact is yet to be fully determined.

Weeds: The native grasslands and grassy woodlands that support *Pterostylis wapstrarum* are currently in relatively good ecological condition with few highly competitive herbaceous weeds or woody weeds. However, even minor changes in climatic conditions, grazing regimes, poorly-timed fires or other disturbance events could shift the delicate balance of conditions in favour of competitive weeds.

Stochastic risk: The low numbers of individuals in only a few highly localised subpopulations exposes the species to the risk of local extinctions due to unforeseen human

activities or stochastic events.

Climate change: A warmer climate may impact deleteriously on the habitat of *Pterostylis wapstrarum*, although the mechanisms for impact and the degree of threat have not been quantified. Changes to rainfall patterns may affect environmental-habitat conditions required for the species' persistence, such as the composition of grassland flora (e.g. types of grasses, both native and exotic, and diversity and abundance of woody and herbaceous weeds), fauna (e.g. diversity and abundance of predators of herbivores), and soil conditions. For example, it is known that grassland orchids do not emerge (or only emerge in low numbers and subsequently abort before fertilisation) in drought years. Damage to populations in a year of good emergence, flowering and seed set, would have serious long-term effects by reducing recruitment from seed.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the recovery of *Pterostylis wapstrarum* are to prevent the inadvertent destruction of subpopulations, maintain the viability of existing subpopulations, and promote conditions for its successful recruitment.

What has been done?

Survey and monitoring: The native grassland habitats of the Pontville Small Arms Range Complex have been subject to various ecological studies (e.g. Verrier 1999, Verrier & Kirkpatrick 2001) and is subject to ongoing monitoring (North Barker Ecosystem Services 2012). Norris (unpublished data) undertook detailed surveys in 2007 of *Pterostylis* rosettes and the degree of damage by earth mites, some of which was included in Norris (2007).

Management planning: *Pterostylis wapstrarum* was included in the *Flora Recovery Plan: Threatened Tasmanian Orchids 2006–2010* (Threatened Species Section 2006). Environmental management and monitoring plans have been prepared and are being implemented for the Pontville Small Arms Range Complex (North Barker Ecosystem Services 2012).

What is needed?

Agencies, groups or individuals may assist with some or all of the following recovery actions. Coordinated efforts may achieve the best and most efficient results.

- provide information and extension support to relevant Natural Resource Management committees, local councils, government agencies, the local community and development proponents on the locality, significance and management of known subpopulations and potential habitat of *Pterostylis wapstrarum*;
- undertake extension surveys radiating out from the known sites into areas of potential habitat;
- undertake surveys to verify the status of all subpopulations without detailed data;
- monitor all subpopulations to better understand the response of the species to management actions, disturbance regimes and threats (e.g. grazing, fire, mite herbivory, climatic conditions) to guide future recovery work;
- liaise with the Department of Defence to collate results of the monitoring plan for the Pontville site and adapt management accordingly;
- ensure that private landholders are aware of any extant occurrences on their land;
- develop management agreements with private landowners to ensure that the species' habitat is maintained;
- collect seed for long-term conservation storage at the Tasmanian Seed Conservation Centre (Royal Tasmanian Botanical Gardens, Hobart).

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Cite as: Threatened Species Section (2014). *Listing Statement for* Pterostylis wapstrarum *(fleshy greenhood)*. Department of Primary Industries, Parks, Water and Environment, Tasmania.

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