



Pterostylis squamata

ruddy greenhood

TASMANIAN THREATENED SPECIES NOTESHEET

Image by Mark Wapstra

- Scientific name:** *Pterostylis squamata* R.Br., *Prodr.* 327 (1810)
- Common name:** ruddy greenhood (Wapstra et al. 2005)
- Name history:** *Oligochaetochilus squamatus*
- Group:** vascular plant, monocotyledon, family **Orchidaceae**
- Status:** *Threatened Species Protection Act 1995*: **vulnerable**
Environment Protection and Biodiversity Conservation Act 1999: **Not listed**
- Distribution:** Endemic status: **not endemic to Tasmania**
Tasmanian NRM Regions: **Cradle Coast, North, South**

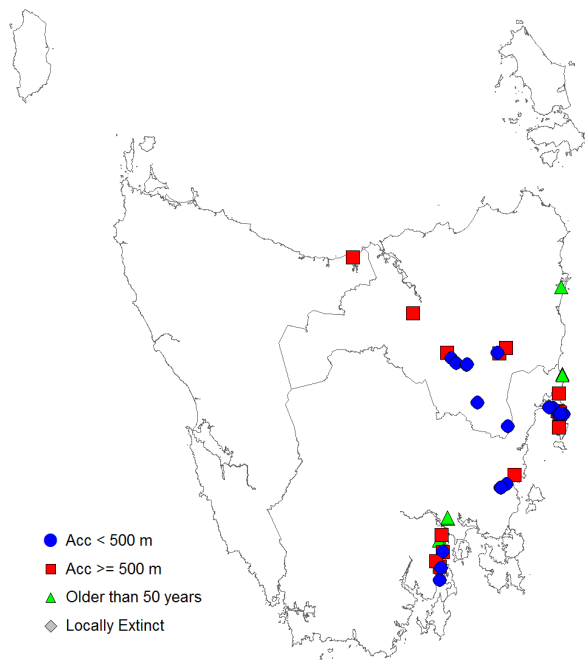


Figure 1. Distribution of *Pterostylis squamata* in Tasmania, showing Natural Resource Management regions



Plate 1. Inflorescence of *Pterostylis squamata* (image by Mark Wapstra)

SUMMARY: *Pterostylis squamata* is a terrestrial orchid, which in Tasmania, is found mainly in grassy and heathy eucalypt woodland in lowland areas in the north, east, southeast and the Midlands. The species has a widespread but fragmented distribution, represented by about 30 subpopulations, although the majority have not been observed for decades. The limited data available suggest that the total population in Tasmania is small (estimated to be fewer than 1,000 individuals and likely to occupy less than 5 ha). The number of plants in each of the 7 subpopulations with abundance data did not exceed 11. Loss of habitat through historical clearing, or more likely the sporadic flowering habit in response to infrequent disturbance events may explain the fragmented distribution of the species in Tasmania. The most important needs of the species are to prevent the destruction and degradation of known and potential habitat.

IDENTIFICATION AND ECOLOGY

Pterostylis squamata is a multi-flowered tall herb in a group of plants known as greenhoods. The name greenhood arises because the dorsal sepal and petals are united to form a predominantly green, hood-like structure that dominates the flower. 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. 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 squamata belongs to the subgenus *Oligochaetochilus* (Jones & Clements 2002, Janes & Duretto 2010, Janes et al. 2010), although the precise placement of *Oligochaetochilus* within the traditional circumscription of *Pterostylis* remains under review (e.g. Clements et al. 2011). The subgenus comprises about 80 species (only about half of which have been described) and all are endemic to Australia (Jones 2006). It is distinguished by the stalkless leaves, multi-flowered inflorescence, deflexed lateral sepals that often have thread-like tips, and an unlobed labellum covered in short to long silica-cells, with a swollen basal mound and prominent spreading white bristles. The insect-like

labellum is highly irritable: species are pollinated by small male gnats that attempt to mate with the labellum (Jones 2006).

Pterostylis squamata reproduces from seed. It is a summer- to early autumn-flowering greenhood, with the majority of flowering between December and March (Wapstra et al. 2012). On emergence mature plants flower for a short period, in the order of weeks, before being fertilised and dying back to underground tubers which survive into subsequent years (Jones et al. 1999). Natural mortality of the above-ground parts is expected to be low and caused by grazing (native marsupials or stock), drought and fire.

The response of *Pterostylis squamata* to disturbance is largely undocumented, but its preferred habitats are relatively fire-prone. The pattern of observations of the species are suggestive of sporadic flowering, probably in response to infrequent disturbance events. Occurrences are often highly localised and can occur on thin soils, so that some forms of disturbance such as intensive grazing and soil compaction are likely to be unfavourable.

Survey techniques

Surveys should be conducted during the species' peak flowering period. However, given the variable flowering period in different parts of the State (Wapstra et al. 2012), local records should be checked prior to undertaking a survey to maximise the opportunity of detection. Detecting the rosette of leaves prior to flowering amongst dense shrubs is very difficult, even at marked sites. Detection of *Pterostylis squamata* 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 1 to 2 weeks, depending on seasonal and local conditions.

Description

The growth habit of fertile and sterile plants is described as dissimilar, meaning that sterile plants are represented by a rosette of basal leaves only, and fertile plants have flowering scapes but the rosette of basal leaves is absent or at least senescent. The 6 to 12 rosette leaves encircle the base of the scape (Plate 2), are

ovate to elliptical, dull green to grey-green, have entire margins and a subacute apex, and are 12 to 30 mm long and 7 to 12 mm wide. The flowering scape is 10 to 30 cm tall, relatively thick, green and smooth. The inflorescence consists of 1 to 10 moderately crowded flowers that are 10 to 14 mm long and 6 to 8 mm wide. The flowers are dull to shiny, reddish brown, with translucent markings in the dorsal sepal. The dorsal sepal is 10 to 13 mm long, obliquely erect and abruptly decurved near the apex, with an apical point 1 to 3 mm long. The lateral sepals are deflexed, wholly reddish brown or with translucent markings towards the base, shallowly concave with incurved and hairy margins. The fused part of the lateral sepals is 4 to 5 mm long and 7 to 9 mm wide, and about 2 mm across at the base. The apices of the lateral sepals are free and widely divergent, 5 to 7 mm long and 6 to 9 mm apart at the tips. The petals are lanceolate, 8 to 10 mm long and 3 to 4 mm wide, reddish brown with two darker lines. The labellum is oblong, 4 to 4.5 mm long and 2.5 mm wide, reddish brown, thickest towards the base, the apex notched, margins with 5 to 7 pairs of white setae to 2 mm long and a few fine cilia towards the apex. The column is 10 to 11 mm long.

[description based on Jones 1998, Jones et al. 1999, Jones 2006]



Plate 2. *Pterostylis squamata*: Senescent basal rosette of leaves on younger flowering scape (left); older flowering scape with basal leaves fully withered (right) (images by Mark Wapstra)

Confusing species

There are no confusing species in Tasmania.

DISTRIBUTION AND HABITAT

Pterostylis squamata occurs in Tasmania, Victoria, New South Wales and the Australian Capital Territory (Jones 1998). In Tasmania the species has a scattered distribution, occurring in the northeast, east, southeast and Midlands (Figure 1). The species grows in open forest, woodland and heathland with a sparse to dense heathy to grassy understorey, often in proximity to rock outcrops (Jones 1998, Jones et al. 1999). Vegetation types supporting the species include heathy-grassy *Eucalyptus amygdalina* forest/woodland on sandstone or granite, grassy *Eucalyptus pulchella* – *Eucalyptus globulus* forest/woodland on dolerite, grassy-saggy *Eucalyptus viminalis* coastal forest/woodland on sands, and grassy-heathy *Eucalyptus amygdalina* – *Eucalyptus pauciflora* – *Eucalyptus viminalis* woodland on sands in inland areas. All sites in Tasmania are at relatively low elevations. Soils are usually well-drained and include sands, clay loams, shales and gravelly loams (Jones 1998, Jones et al. 1999). Geology does not appear to control occurrence with records from sandstone, dolerite and granite substrates.

POPULATION PARAMETERS

In Tasmania, *Pterostylis squamata* has been recorded from 31 subpopulations (Table 1), but there is very little information available on most subpopulations, and many have not been formally observed for many decades, with only 6 being recorded in the 2000s (Table 1). The species' extent of occurrence within Tasmania is 19,425 km² and the linear extent 230 km. Available information suggests that Tasmanian subpopulations are all small, often not exceeding 10 individuals within a small area (often within about 10 m of one another) making it reasonable to assume that the total population does not exceed 1,000 mature individuals and occupies less than 5 ha.

The likelihood of further subpopulations being detected is relatively high, based on the extent of potential habitat and the species' apparently widespread and disjunct distribution, meaning that range extensions and infillings are likely. However, discovery is likely to be serendipitous due to the species' usually localised occurrence in sometimes cryptic habitat.

RESERVATION STATUS

Pterostylis squamata has been recorded from Castle Cary Regional Reserve, Coles Bay Conservation Area, Coningham Nature Recreation Area, Freycinet National Park, Moulting Lagoon Game Reserve, Narawntapu National Park and Tooms Lake Conservation Area. Some subpopulations occur in bushland remnants managed by local government including Hobart City Council and Kingborough Council. One subpopulation on private property is subject to a conservation

covenant under the Tasmanian *Nature Conservation Act 2002*.

CONSERVATION ASSESSMENT

Pterostylis squamata was listed as rare on the original schedules of the Tasmanian *Threatened Species Protect Act 1995* when it was known to occur in 20 or less 10 x 10 km Australian Map Grid Squares in Tasmania. The species was uplisted to vulnerable in October 2016, meeting criterion D1: total population estimated to number fewer than 1000 mature individuals.

Table 1. Population summary for *Pterostylis squamata* in Tasmania

	Subpopulation	Tenure	NRM Region	1:25000 Mapsheet	Year last (first) seen	Area occupied (ha)	Number of individuals
1	Bakers Point Road	Narawntapu National Park	Cradle Coast	Port Sorell	1980	unknown	unknown
2	Hadspen	private land?	North	Prospect	1979	unknown	unknown
3	Epping Forest	private land	North	Cleveland	1974	unknown	unknown
4	Cleveland	private land	North	Cleveland	2011	0.001	3
5	Smiths Lagoon	private land*	North	Cleveland	1993 (1992)	unknown	unknown
6	Esk Main Road	private land	North	Diamond	1987 (1985)	unknown	unknown
7	Near Avoca	unknown	North	Diamond?	1987	unknown	unknown
8	Rajah Rock	Castle Cary Regional Reserve	North	St Pauls Dome	2012	0.001	1
9	St Helens	unknown	North	St Helens	1892	unknown	unknown
10	Bicheno	unknown	South	Bicheno	1959	unknown	unknown
11	Friendly Beaches	Freycinet National Park	South	Friendly	1974	unknown	unknown
12	River and Rocks Road	Moulting Lagoon Game Reserve	South	Coles Bay	2011	0.001	4
13	Coles Bay Road (old caravan park area)	Coles Bay Conservation Area & Public Reserve	South	Coles Bay	1991 (1980)	unknown	unknown
14	Richardsons Beach	Freycinet National Park	South	Coles Bay	1967	unknown	unknown
15	Ranger Creek, old Bluestone Bay Road	Coles Bay Conservation Area	South	Coles Bay	1992	unknown	unknown
16	between Hazards and Cooks beaches	Freycinet National Park	South	Graham	1992	unknown	unknown
17	Dolphin Sands	private land	South	Cranbrook	2006 (2001)	unknown	8
18	Beaufront	private land	South	Ross	1996 (1995)	unknown	unknown
19	Flagstaff Marsh area	Tooms Lake Conservation Area	North	Tooms	1998	unknown	unknown
20	Triabunna	unknown	South	Triabunna	1969	unknown	unknown
21	Paradise Gorge	private land	South	Orford	1993	unknown	unknown

	Subpopulation	Tenure	NRM Region	1:25000 Mapsheet	Year last (first) seen	Area occupied (ha)	Number of individuals
22	Upper Prosser Dam area	private land	South	Orford	1993 (1992)	unknown (2 sites)	unknown
23	Grasstree Hill	unknown	South	Richmond	1952	unknown	unknown
24	Hobart area (Knocklofty?)	unknown	South	Hobart	1967	unknown	unknown
25	Waterworks	Hobart City Council?	South	Taroona	1907	unknown	unknown
26	Boronia Hill	Kingborough Council	South	Taroona	2015 2014 2009 (1980)	0.01	3 9 11
27	Barretta	Kingborough Council	South	Blackmans Bay	1979	unknown	unknown
28	Snug Point	Coningham Nature Recreation Area	South	Blackmans Bay	2010 (1979?)	0.01	7
29	Apollo Bay, Bruny Island	private land	South	Barnes Bay	2006	0.001	3
30	Mt Wellington ^	unknown	South	unknown	1805	unknown	unknown

* covered by a conservation covenant under the Tasmanian *Nature Conservation Act 2002*.

^ Type locality ... given as 'Mt Wellington' probably referring to the foothills of the mountain around Ridgeway–Huon Road as most of the higher slopes of the mountain do not support suitable habitat;



Plate 2. Habitat at River and Rocks, Freycinet Peninsula: the species grows amongst openings in the sward of *Lomandra longifolia* (image by Mark Wapstra)

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Due to the limited amount of information on some subpopulations of *Pterostylis squamata*, it is difficult to assess specific threats and develop appropriate management strategies. However, the threats to the species are similar to those faced by many threatened orchid species with widespread and fragmented distributions and usually low population numbers. The risk to the

species is exacerbated by the dependence on mycorrhizal fungi, which may make the species susceptible to additional factors.

Land clearing: In Tasmania, threats to *Pterostylis squamata* may have included extensive historical land clearing, but the extent to which this factor has, and continues to, operate is unknown. The pattern of land clearing associated with urban sprawl may explain the contemporary distribution of the species in Tasmania, especially in areas such as the greater Hobart region and parts of the east coast (e.g. Dolphin Sands, Coles Bay, Bicheno), with the species now occurring in remnant patches of suitable habitat. Similarly, the extensive clearing of grassy forests and woodlands in the Midlands and surrounding areas may explain the patchy distribution of the species in this part of Tasmania. Land clearing is not identified as a specific threat to any subpopulations at present.

Modification of habitat: The majority of sites within Tasmania supporting *Pterostylis squamata* are in good ecological condition with few weeds, although many (especially those on private property) have been, and continue to be, subject to agricultural practices including fertilising and grazing by stock.

Inappropriate disturbance: *Pterostylis squamata* requires light and some space to allow annual emergence, growth and seed-set, although some subpopulations have been long persistent in the absence of specific disturbance events (e.g. Boronia Hill). Orchid species such as *Pterostylis squamata* may be out-competed as their heathy/grassy habitat becomes dense over time in the absence of disturbance. The habitat of *Pterostylis squamata* is fire-prone and has a natural fire frequency in the order of decades. A more frequent lower intensity fuel reduction fire regime is unlikely to benefit the species and in the long term may reduce habitat quality.

Forestry activities: Large areas of potential habitat of *Pterostylis squamata* occur within potential wood production forests, although most sites suitable for the species are unlikely to be highly suitable for commercial forestry and are likely to be excluded informally from forestry operations. There is no evidence that forestry has resulted in the loss of any subpopulations.

***Phytophthora cinnamomi*:** No subpopulations of *Pterostylis squamata* are currently affected by the exotic soil-borne *Phytophthora cinnamomi* and there are no records of direct effects of the pathogen on orchids. However, activities at some sites (e.g. heathy woodlands in the Freycinet area) have the potential to introduce or spread the pathogen further. This may affect the species indirectly through modification of habitat, especially the understorey.

Climate change: The potential impact of climate change on *Pterostylis squamata* is difficult to quantify but it is possible that even minor shifts in average seasonal conditions may have an adverse impact on locally restricted species, especially if other ecological factors such as appropriate fire/disturbance regimes are absent.

Stochastic risk: The species' widespread and disjunct distribution provides a degree of security to the population as a whole. However, the small size of subpopulations exposes them to a risk of extinction due to chance events. Small populations separated by long distances of unsuitable habitat are also not conducive to genetic exchange and potentially exacerbate the risks of stochastic events. Poor knowledge of

the precise location of subpopulations coupled with few recent sightings and seemingly sporadic and infrequent flowering increases the risk of inadvertent losses.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the recovery of *Pterostylis squamata* are to prevent the loss or degradation of known subpopulations, and increase the number of known subpopulations through survey.

What has been done?

- *Pterostylis squamata* was included in the *Flora Recovery Plan: Threatened Tasmanian Orchids 2006–2010* (Threatened Species Unit 2006). The Recovery Plan is in the process of being revised.
- The majority of subpopulations are known from detection by orchid enthusiasts. Some subpopulations have been detected as part of surveys of development proposals. Some known sites were searched for in 2006 (Janes et al. 2008) but the species was only detected at the Dolphin Sands site.

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, development proponents and the local community on the locality, significance and management of the known subpopulations and potential habitat;
- implement the *Threatened Tasmanian Orchids Recovery Plan* and incorporate the management requirements of the species into relevant reserve management plans and fire management plans;
- undertake surveys of poorly known subpopulations to determine their status,

precise location and extent, and identify relevant management issues;

- monitor a subset of the known subpopulations for health, recruitment and response to disturbance;
- liaise with reserve managers of sites supporting the species to develop the most appropriate management regime and update any relevant management plans;
- encourage private landowners to consider protection and management of the habitat of the species through either perpetual covenants or vegetation management agreements under the Tasmanian *Nature Conservation Act 2002*;
- collect seed and associated mycorrhizal fungi for long-term storage at the Tasmanian Seed Conservation Centre based at the Royal Tasmanian Botanical Gardens, Hobart.

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Prepared in 2014 with status updated in October 2016.

Cite as: Threatened Species Section (2016). *Notesheet for Pterostylis squamata (ruddy greenhood)*. Department of Primary Industries, Parks, Water and Environment, Tasmania.

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