Image by Eve Lazarus

Hardenbergia violacea

purple coralpea

TASMANIAN THREATENED FLORA LISTING STATEMENT

Scientific name: ***Hardenbergia violacea*** (Schneev.) Stearn, *J. Bot.* 78: 70 (1940)
Common name: purple coralpea (Wapstra et al. 2005)
Group: vascular plant, dicotyledon, family **Fabaceae**

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

Distribution: Tasmanian NRM Regions: **South**
Endemic status: **Not endemic to Tasmania**

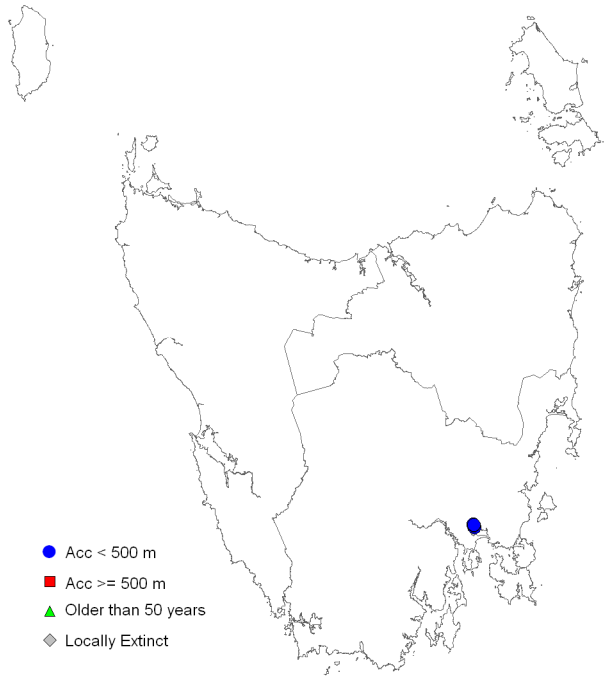

Figure 1. Distribution of *Hardenbergia violacea* in Tasmania, showing NRM regions

Plate 1. *Hardenbergia violacea:* foliage & flowers (images by Rob Wiltshire & Eve Lazarus)

SUMMARY: *Hardenbergia violacea* is a scrambling perennial in the Fabaceae family. In Tasmania it is restricted to a few sandstone outcrops in the State's southeast where it grows in dry eucalypt woodland. The total wild population in Tasmania consists of fewer than 100 mature plants, with a linear range of less than one kilometre. The species is at risk from grazing (stock, native animals, rabbits) and drought, with a high risk of extinction in the wild due to the population's small size. Grazing, weed and fire management would benefit known occurrences.

IDENTIFICATION AND ECOLOGY

Hardenbergia violacea flowers in Tasmania from July to late November, with fruit developing through December (Lynch 1993). Pollination is likely to be due to bees (Hingston & McQuillan 2000). Plants begin to produce seed when about 4 to 7 years old (Knox & Clarke 2004). The seed do not exhibit any mechanisms for long-distance dispersal, though they do possess a fleshy oily appendage (elaiosome), consistent with dispersal by ants (Larcombe 2006). Seed may remain viable in the soil for many years, germinating in response to fire or physical disturbance. Plants also have the capacity to resprout from rootstock after physical damage (Lynch 1993).

Survey techniques

Hardenbergia violacea can be identified at any time of year due to its distinctive foliage, though the presence of flowers will aid detection.

Description

Hardenbergia violacea is a scrambling or trailing perennial. It grows from a woody rootstock and produces long wiry (reddish) stems that may climb on other plants or trail over rocky outcrops. Its leaves are leathery, glabrous, ovate to lanceolate in shape, up to 10 cm long, and arranged alternately along the stem on stalks to 4 cm long. The upper leaf surface is dark green, the lower surface somewhat glaucous; both leaf surfaces have strongly reticulate venation. The leaf tips are rounded but have an extended midrib forming a narrow, hard point. Flowers are grouped in twos or threes on axillary peduncles in long racemes (Plate 1); they are pea-like, about 8 mm long, violet to royal purple (rarely pink or white), with a yellow flare at the base of the standard (the largest petal). The fruit is a flattened oblong-shaped pod, 20 to 50 mm long by 8 mm broad, with 6 to 8 seeds separated by pithy partitions.

[Description from Curtis & Morris 1975, Lynch 1993, and personal observation.]

Taxonomic Issues

Curtis & Morris (1975) noted that *Hardenbergia violacea* may have been introduced to Tasmania. At that time the species was known in Tasmania from a single collection dating to 1857: 'Rocky hills, near Frogmore, Richmond', the presumption being that it had originated from mainland Australia in the early days of European settlement. Lynch (1993) and Buchanan (1994) argued that the species was indigenous to Tasmania, a view substantiated by the genetic studies of Larcombe et al. (2010). The latter authors suggested that the Tasmanian population of *Hardenbergia violacea* was likely to be '… a relict of a once continuous distribution that extended south from the mainland of Australia during past glacial maxima, when land bridges formed between Tasmania and Victoria'.

Confusing species

None in Tasmania. A popular garden variety of *Hardenbergia violacea* originating from mainland Australia, 'Happy Wanderer', is sold in commercial nurseries. Indigenous Tasmanian plants tend to be less vigorous and are more prostrate than cultivated varieties.

DISTRIBUTION AND HABITAT

On the Australian mainland *Hardenbergia violacea* occurs in the Australian Capital Territory, Victoria, New South Wales, Queensland and South Australia (Walsh & Entwisle 1996).

In Tasmania *Hardenbergia violacea* is known from the eastern flanks of the Pontos Hills between Richmond and Penna. It grows in grassy *Eucalyptus viminalis* (white gum) woodland on outcrops of Triassic sandstone (Lynch 1993; Plate 2), in a region with a mean annual rainfall of less than 550 mm.

Table 1. Population summary for *Hardenbergia violacea* in Tasmania

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen ^	Area occupied (ha)	Number of mature plants
1a	Pontos Hills (north_a)	Private land *	South	Sorell	2011 (2010)	0.1	25–30
1b	Pontos Hills (north_b)	Private land *	South	Sorell	2010 2006 1993 (1981)	0.8 0.8	30–35 40–45 < 20 (30)
2	Pontos Hills (south)	Private land	South	Sorell	 2006 1993 (1981)	 0.0001 < 0.5 < 0.5	Possibly extinct 1 < 10 (8)

* = covered by a conservation covenant under the Tasmanian *Nature Conservation Act 2002;* ^ first recorded in the 1830s.

Note: Mature plant numbers represent discrete clumps, though some clumps may consist of more than one individual and nearby clumps may represent clones of the same individual with no obvious above ground connection (Larcombe 2006).

Plate 2. *Hardenbergia violacea* : dry woodland habitat (image by Oberon Carter)

Plate 3. *Hardenbergia violacea:* growing under a fallen sheoak (image by Matt Larcombe)

Associated species include the small trees *Allocasuarina verticillata* and *Dodonaea viscosa*, the shrubs *Ozothamnus obcordatus*, *Boronia anemonifolia* var. *variabilis* and *Astroloma humifusum*, and the graminoids *Dianella revoluta* and *Lomandra longifolia.* Plants have been recorded in the altitude range 95 to 180 metres above sea level, have an apparent preference for northeasterly aspects, and tend to grow where there are barriers to animal browsing, such as deep rocky crevices or spiny shrubs and fallen trees (Plate 3).

The extant population of *Hardenbergia violacea* in Tasmania has a linear range of 0.8 km, extent of occurrence 0.15 km^2, and area of occupancy of less than 1 ha

POPULATION ESTIMATE

Hardenbergia violacea is known in Tasmania from a single extant subpopulation consisting of 60 to 70 mature plants (Table 1). A second subpopulation, some 1.3 km south of the first, is known to have supported at least 8 plants in the past, but the species has not been observed there since November 2006.

As noted earlier, the first collection of *Hardenbergia violacea* in Tasmania was from 1857, with an earlier note of its presence dating to 1834 (Buchanan 1994). The species was not recorded again in Tasmania until 1981 when it was located by Tony Moscal in the same area as 'Frogmore'. Moscal recorded 30 and 8 plants at 'northern' and 'southern' sites, respectively

(cf. Table 1). The sites were described as having been 'frequently fired', with no juveniles or seedlings seen. Lynch (1993) revisited these sites in the early 1990s and recorded fewer than 20 and 10 plants at the respective sites, though it is not clear if her surveys spanned the same area as Moscal's.

Hardenbergia violacea is a very distinctive plant and is unlikely to have been overlooked by botanists during the course of extensive surveys of dry sclerophyll vegetation undertaken in Tasmania (eg, Duncan & Brown 1985). The likelihood of additional subpopulations being found in Tasmania is thus considered to be very low. However, anecdotal reports suggest the species was present on the western flanks of Pontos Hills until about twenty years ago (R. Walker, pers. comm..), while the characteristics of the known sites are mirrored by conditions on Butchers Hills, a range running south from Richmond; the former area was surveyed without success by DPIPWE personnel in 2010 but it is unclear if the latter area has been surveyed and, if so, to what extent.

RESERVATION STATUS

The extant subpopulation of *Hardenbergia violacea* occurs on private land covered by a conservation covenant under the Tasmanian *Nature Conservation Act 2002*.

CONSERVATION ASSESSMENT

Hardenbergia violacea was listed as endangered on the Tasmanian *Threatened Species Protection Act 1995* when the Act came into being, satisfying criterion D, viz., total population estimated to support fewer than 250 mature individuals.

THREATS. LIMITING FACTORS & MANAGEMENT ISSUES

Hardenbergia violacea is at risk in Tasmania because of its extremely restricted distribution and low number of plants. The species may now be confined to a single subpopulation, increasing its susceptibility to chance events. Tasmanian plants may also be limited by low genetic diversity. Threats are detailed below.

Browsing and grazing: The leaves and stems of *Hardenbergia violacea* appear to be highly palatable to a range of herbivores (sheep, rabbits, native animals). Continual browsing may limit recruitment through the loss of seedlings and by reducing seed production. It may also weaken established plants, making them more susceptible to drought or insect attack.

It is likely that clearing of native vegetation on the hills surrounding the known *Hardenbergia* sites for grazing purposes has led to the decline of the species in Tasmania. The Pontos Hills have had a long and, until very recently, continuous history of sheep grazing. Persistence of plants at the northern subpopulation may be attributed in part to fencing in the late 1990s that has reduced sheep and native herbivore browsing, while caging of plants in the mid 2000s has further enhanced conditions, plants now being relatively healthy and increasing in size, with evidence of active recruitment (in 2009).

Live plants have not been recorded at the southern subpopulation since November 2006, though seed may still be present in the soil seed-bank. Stock have had limited access to the site in recent years (M. Briant, pers. comm.), though browsing by native animals (& rabbits?) would need to be addressed to increase the feasibility of recovering this subpopulation.

Drought: Drought is considered a serious threat to the species. Drought stress reduces plant health, seed set, recruitment and the ability to produce leaf-defensive chemicals (making the plants more susceptible to browsing), as well as reducing the species' ability to resprout after fire and to compete with drought-tolerant weeds. Observations over the course of the 2005–2008 drought revealed the death of several large plants, a dramatic decline in plant size and health, extreme browsing of uncaged plants (total leaf removal in some cases), critically low seed-set (with only 1% of flowers producing fruit), and no recruitment (Larcombe 2006). In times of extreme prolonged drought, supplementary watering may be required to prevent the extinction of *Hardenbergia violacea* in Tasmania.

Weeds: Small infestations of african boxthorn (*Lycium ferocissimum*) and boneseed

(*Chrysanthemoides monilifera*) occur near the northern and southern subpopulations, respectively, and if untreated pose a threat to the species and the integrity of its habitat.

Inappropriate fire regimes: *Hardenbergia violacea* has hard-coated seeds that may remain stored in the soil until germination after fire or mechanical disturbance. Seed is estimated to remain viable in the soil for 30 to 40 years or more. Research on the species in grassy woodland in New South Wales suggests that seedling emergence is higher following spring rather than autumn burns and in response to fires of moderate intensity (Knox & Clarke 2004), with seedling emergence reduced by frequent, low intensity burns. The Pontos Hills sites have had a history of frequent burning, at least until the 1980s, and this may have contributed to the low population size. It may be possible to use fire to promote germination from soil-stored seed to recover the southern subpopulation.

Limited genetic diversity: Lynch (1993) suggested that the genetic diversity of *Hardenbergia violacea* is likely to be restricted as the number of plants contributing to the soil-stored seed-bank is likely to have been very low. For example, the southern subpopulation had been observed to consist of less than 10 individuals for at least 20 years. Low genetic diversity may lead to inbreeding depression and lower adaptive potential. Molecular studies have confirmed low genetic diversity in the Tasmanian population compared to those on mainland Australia, and seed set and reproductive output in the Tasmanian population was also very low, perhaps indicating inbreeding depression (Larcombe 2006).

Stochastic risk: *Hardenbergia violacea* has a very restricted distribution and low number of plants in Tasmania, putting it at risk from stochastic events. Chance events, such as inappropriate fire and severe drought may lead to declines or local extinction. Predicted climatic trends in the region, including warmer temperatures and more extreme events (Grose et al 2010), may exacerbate these risks.

What has been done?

- Cuttings and seeds were collected from the southern Pontos Hills subpopulation in 1990 and propagated for sale by a commercial nursery (Schaffer 1997, Larcombe 2006). An *ex situ* holding of this material and that from the northern subpopulation has been maintained at the Royal Tasmanian Botanical Gardens (RTBG), and seed from these holdings held for long-term conservation storage at the Tasmanian Seed Conservation Centre.
- Stock-proof fencing was erected around the northern Pontos Hills subpopulation in the late 1990s as part of the North Facing Slopes Project initiated by the now Department of Primary Industries, Parks, Water and Environment. To encourage recruitment most plants in the northern subpopulation were caged in 2006–2007 by DPIPWE personnel to reduce browsing pressure from native animals and rabbits.
- A University of Tasmania research project was undertaken in 2005–2006 to investigate the status of the species (Larcombe 2006, Larcombe et al. 2010).
- A conservation covenant under the Tasmanian *Nature Conservation Act 2002* was established in 2009 on land that includes the 'northern' subpopulation. Management prescriptions included fencing to exclude stock entirely from the subpopulation (completed in 2010), and measures to control infestations of african boxthorn.
- An *ex situ* site of seventy-seven plants was established in three rabbit and possum-proof exclosures to the south of the 'northern' wild subpopulation in 2010 (during the course of which a further 25 to 30 wild plants were discovered: 1a in Table 1). The project was undertaken by RTBG personnel in conjunction with the Penna Landcare Group and volunteers with Threatened Plants Tasmania (a Wildcare-affiliated group). Survival rates by the spring of 2012 were about 60%.

Management objectives

The main objectives for the recovery of *Hardenbergia violacea* are to arrest the decline in the species, maintain genetic diversity and increase the overall number and diversity of individuals at the Pontos Hills sites.

What is needed?

The following actions are proposed for the recovery and management of *Hardenbergia violacea*:

- monitor the wild sites biannually to gauge the population's stability and level of recruitment, and the need for additional management actions;
- monitor compliance with the conservation covenant covering the northern site, ensuring that stock fencing is inspected and maintained, and woody weeds controlled;
- monitor the established *ex situ* plantings at the northern Pontos Hills site, maintain the existing exclosures, and supplement plant numbers as required;
- fence the southern site to exclude native herbivores and establish an *ex situ* planting using material sourced from the site held by RTBG;
- investigate the use of fire to encourage recruitment at the two known sites;
- supplement the RTBG's long-term conservation holdings of seed representing both subpopulations;
- survey the eastern flanks of Butchers Hills for new subpopulations;
- provide information and extension support to relevant Natural Resource Management committees, local councils, government agencies and the local community on the locality, significance and management of known sites.

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