Mirbelia oxylobioides

sandstone bushpea

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Image by Natalie Tapson

Scientific name: ***Mirbelia oxylobioides*** F.Muell., *Fragm.* (Mueller) 2: 154 (1861)
Common Name: sandstone bushpea (Wapstra et al. 2005)
Group: vascular plant, dicotyledon, family **Fabaceae**

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 Region: **South**

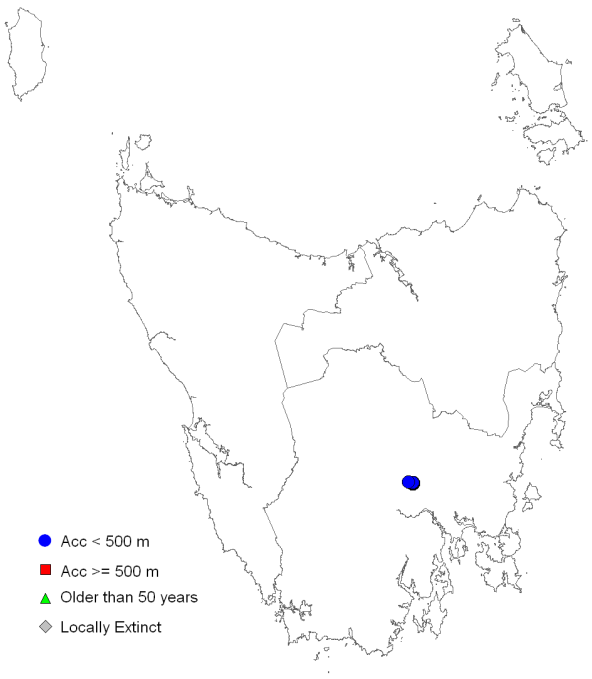

Figure 1. Distribution of *Mirbelia oxylobioides* in Tasmania, showing Natural Resource Management regions

Plate 1. *Mirbelia oxylobioides*: heavily browsed flowering plant (image by Richard Schahinger)

SUMMARY: *Mirbelia oxylobioides* (sandstone bushpea) is a shrub with a highly restricted distribution in Tasmania, occurring on Triassic sandstone outcrops in dry eucalypt woodland near Elderslie in the State's Southern Midlands. The species has only been confirmed from two sites within a single subpopulation, with a total number of mature individuals estimated at about 6,500 in an area of less than 10 ha, putting the species at risk from inadvertent or chance events. Other threats to the species include invasion by woody weeds (especially gorse), inappropriate fire regimes and drought.

IDENTIFICATION AND ECOLOGY

Mirbelia is a genus of prostrate to erect perennial woody shrubs in the Fabaceae family (tribe Mirbelieae), represented by about 20 to 25 species, all endemic to Australia (Walsh & Entwisle 1996). *Mirbelia oxylobioides* is the only member of the genus present in Tasmania (Baker & de Salas 2012).

Most genera in the Mirbelieae tribe exhibit a typical bee-pollinated papilionoid flower with yellow and red markings (Chandler et al. 2003). The flowers have nectar guides and rewards adapted to bees, which are strong enough to force the wings and keel of the flower apart to access nectar (Hingston & McQuillan 2000). *Mirbelia oxylobioides* flowers in October and November, with a peak in late October. The species is believed to be an obligate seeder, recruiting after fire from a soil-stored seed bank.

Survey techniques

Surveys for *Mirbelia oxylobioides* can be conducted at any time of the year due to its distinctive foliage, though the species is more easily detected when in flower. Care should be taken when conducting surveys to avoid spreading *Phytophthora cinnamomi* by. surveying in dry conditions and ensuring that field equipment, including footwear, is disinfected.

Description

Mirbelia oxylobioides is a wiry open shrub to 3 m tall. The terete stems have a covering of soft downy hairs that are pressed closely together. Leaves are narrow-ovate to elliptic, sometimes oblong, and generally arranged in opposite pairs, though sometimes whorled to scattered, along the stem. They are 2 to 10 mm long, 1 to 4 mm wide and taper into tiny points. The lower surfaces are covered with soft downy hairs, and the upper surfaces are hairless. The leaf margins are recurved. The flowering parts consist of sparse racemes (succession of flowers with the oldest at the base). The flower stalks are up to 4 mm long and silky. The orange-yellow flower tube has red markings and is 8 to 10 mm long. The outermost whorl of floral parts (calyx) is 5 to 6 mm long, and silky, with teeth that are about equal to the floral tube in length. The fruit is an 8 to 10 mm long, oval to oblong brown pod, and has an internal partition (septum). The pod is covered in soft downy hairs, and contains up to 10 seed.

[description based on Walsh & Entwisle 1996]

Confusing species

Mirbelia oxylobioides can be confused with *Oxylobium ellipticum,* the fruit of which do not have an internal partition, its leaves tend to be larger and have a distinct reticulate venation, and its flowers are yellowish whereas those of *Mirbelia oxylobioides* are a dull orange (Plate 1).

DISTRIBUTION AND HABITAT

Mirbelia oxylobioides occurs in Victoria, New South Wales, the Australian Capital Territory, and Tasmania (Walsh & Entwisle 1996). In Tasmania the species is known from Heathy Hills near Elderslie in the Southern Midlands (Figure 1), where it is associated with outcrops of Triassic quartz sandstone (Plate 2). It grows in *Eucalyptus amygdalina* low open woodland with a 1 to 2 m tall shrub layer dominated by species such as *Boronia anemonifolia* and *Leucopogon ericoides*, with *Baeckea ramosissima* prominent on the shallowest soils (where the eucalypts drop out and the shrub layer opens up). *Mirbelia oxylobioides* displays a preference for west, northwest to north aspects, and occurs in the altitude range of 110 to 300 m above sea level. The annual mean rainfall at the Heathy Hills site is about 550 to 600 mm.

Plate 2. *Mirbelia oxylobioides* habitat at Heathy Hills (image by Richard Schahinger, March 2013)

POPULATION PARAMETERS

Mirbelia oxylobioides has been recorded from effectively a single subpopulation, with most plants occurring in two distinct patches separated by a deeply incised gully. The species has a linear range of 1.6 km, extent of occurrence of about 1 km^2, and area of occupancy 6 to 7 ha. The total number of mature plants was estimated in 1999 to be 6,500 ± 500 (Johnson 1999; Table 1). The larger of the two patches, which is in the northwest of Heathy Hills Nature Reserve above the Jordan River, contains about three-quarters of the population. The smaller patch, in the reserve's northeast, extends onto private property.

There is an unconfirmed sighting of a single plant some 3 km to the west of Heathy Hills in January 2011. The site could not be relocated in early 2013 despite a GPS reading accurate to 5 m, and was on Permian rather than Triassic sediments. In the absence of a supporting herbarium specimen the sighting has been assumed to be a misidentification.

Mirbelia oxylobioides was first discovered in Tasmania in 1998, surprisingly late in botanical terms given the species' stature and its capacity for local dominance. Opportunities for further subpopulations are limited by the availability of potential habitat, that is, sandstone outcrops in lowland situations in southern Tasmania, especially those within the 'Elderslie Sandstone Landform' (Dixon & Duhig 1996). Botanical surveys of such habitat have been patchy in the past, access being limited for the most part to those areas within the public estate (Craven et al. 1999). However, it is possible that the species occurs south of the Heathy Hills site on private properties, some of which are now covered by conservation covenants.

RESERVATION STATUS

About 90% of known plants occur in Heathy Hills Nature Reserve.

CONSERVATION ASSESSMENT

Mirbelia oxylobioides was listed as rare on the Tasmanian *Threatened Species Protection Act 1995* in 1999 and uplisted to vulnerable in 2002, satisfying criteria B and C:

(B) area of occupancy estimated to be less than 50 hectares, known to exist at no more than ten locations, and a continuing decline inferred in the quality of habitat and number of mature individuals;

(C) total population estimated to number fewer than 10,000 mature individuals, and a continuing decline inferred in numbers of mature individuals and population structure, with all individuals in a single population.

Table 1. Population summary for *Mirbelia oxylobioides* in Tasmania

	Subpopulation	Tenure	NRM Region	1:25000 Mapsheet	Year last (first) seen	Area occupied (ha)	Number of mature plants
1.1	Heathy Hills (South)	Heathy Hills Nature Reserve	South	Elderslie	2013 (1998)	5	4,875 *
1.2	Heathy Hills (North)	Heathy Hills Nature Reserve and private land	South	Elderslie	2011 (1998)	1.5	1,625 *

NRM Region = Natural Resource Management Region;
* = mean estimates of Johnson (1999).

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Threats to *Mirbelia oxylobioides* include competition from woody weeds, inappropriate fire regimes, severe climatic conditions (drought) and stochastic events. Infection by the exotic soil-borne pathogen *Phytophthora cinnamomi* is a potential threat. Threats and some management issues are discussed below.

Weeds: *Ulex europaeus* (gorse) is common along the Jordan River downslope of the Heathy Hills site, though steep sandstone cliffs along the river have acted as a barrier to its spread upslope into areas occupied by *Mirbelia oxylobioides* (Craven et al. 1999). The situation changed in the late 1990s, with an illegal incursion into the Nature Reserve using heavy machinery, the clearance of native vegetation and its deliberate burning. This was followed inevitably by the establishment of gorse in the disturbed areas and its spread into areas occupied by *Mirbelia oxylobioides*. Gorse is capable of resprouting vigorously after fire, as well as recruiting from seed, giving it a competitive advantage over an obligate seeder such as *Mirbelia oxylobioides*. The condition of the Heathy Hills site is likely to continue to decline without active measures to control gorse.

Inappropriate fire regimes: The dry woodland habitat of *Mirbelia oxylobioides* is particularly fire-prone, and high intensity summer fires have probably been the norm in the past. The subpopulation at Heathy Hills is more or less even-aged due to a high intensity fire in 1982, the only burn in the interim being a spot fire of very limited extent in the population's southwest in September 1999 (associated with the deliberate burn noted above). Plants burnt in the latter fire failed to resprout, though new recruits did appear in the following spring from what is presumed to be a long-lived soil-stored seed bank. The population may be at risk by depletion of the seed bank if two fires were to occur within close succession before new plants have time to set seed and replenish the seed bank, probably 8 to 10 years, though this is considered an unlikely scenario. The more likely Scenario is a prolonged absence of fire and, eventually, senescence of plants and loss of viability of soil stored seed.

Drought/climate change: It is likely that even minor shifts in average seasonal conditions will have an adverse impact on highly restricted species such as *Mirbelia oxylobioides*. The prolonged drought in the mid 2000s caused the death of numerous plants, with those on the shallower soils being affected especially badly, suggesting that a warmer climate and longer periods of drought would impact deleteriously on the species.

Stochastic risk: The relatively low number of plants confined to effectively one subpopulation, exposes the species to the risk of local extinctions due to unforeseen human activities or chance events.

Phytophthora cinnamomi: The susceptibility of *Mirbelia oxylobioides* to *Phytophthora* is unknown and no field symptoms have been observed to date. Conditions for the pathogen's expression are suboptimal in the Heathy Hills area due to the relatively dry conditions, but it would be prudent to adopt a precautionary approach to hygiene given the species' localised distribution.

Land clearance: The species' preferred habitat, *Eucalyptus amygdalina* woodland and forest on sandstone (Harris & Kitchener 2005), is listed as a threatened vegetation community under the Tasmanian *Nature Conservation Act 2002*, affording those occurrences on private land in the northern part of the Heathy Hills population some degree of protection from clearing.

Stock: At the time of the species' discovery, part of the Heathy Hills site was unallocated Crown land subject to a grazing lease. The lease was revoked following the proclamation of the area as a Nature Reserve in December 2000. There is no direct evidence of stock impacting on the species, though it is known that native animals browse the species (Plate 1). Areas that support the species on private land have been fenced to exclude stock, so provided fencing is adequately maintained stock no longer constitute a threat to the species.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the recovery of *Mirbelia oxylobioides* are to prevent the inadvertent destruction of subpopulations, maintain the viability of existing subpopulations, and promote conditions for the species' successful recruitment.

What has been done?

Survey: Extension surveys were undertaken following the discovery of the species in October 1998. These effectively mapped the distribution and size of the population (Craven et al. 1999, Johnson 1999). Follow-up surveys were undertaken in 2000 and 2001, further clarifying the extent and characteristics of the population, as well as the species' likely response to fire, with targeted surveys of areas under covenant to the south of Heathy Hills undertaken in 2013.

***Ex situ* conservation:** An *ex situ* living plant collection has been established at the Royal Tasmanian Botanical Gardens. Seed was collected from the Heathy Hills population in January 2008 for long-term storage at the Tasmanian Seed Conservation Centre based at the Royal Tasmanian Botanical Gardens.

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.

- implement weed control within the Heathy Hills subpopulation;
- liaise with the Tasmanian Parks & Wildlife Service to ensure that fire management of Heathy Hills is consistent with the species' long-term health;
- monitor to better understand the species' response to disturbance regimes (fire) and management actions (weed control activities) and ultimately to guide future recovery work;
- undertake extension surveys, radiating out from the known sites into areas of sandstone cliff habitat;
- 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.

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