Image by Greg Jordan

Boronia hemichiton

mt arthur boronia

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Scientific name: ***Boronia hemichiton*** Duretto, *Muelleria* 17: 87 (2003)
Common Name: mt arthur boronia (Wapstra et al. 2005)
Group: vascular plant, dicotyledon, family **Rutaceae**

Status: *Threatened Species Protection Act 1995*: **endangered**
Environment Protection and Biodiversity Conservation Act 1999: **Vulnerable**

Distribution: Endemic status: **endemic to Tasmania**
Tasmanian NRM Region: **North**

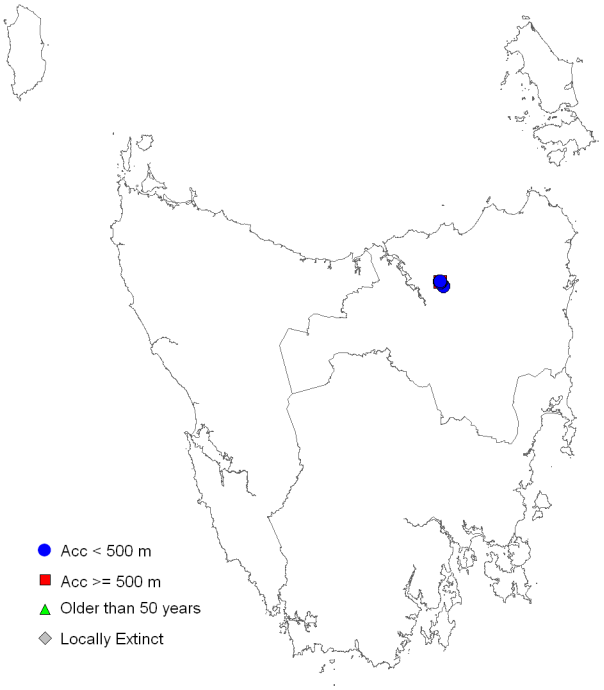

Figure 1. Distribution of *Boronia hemichiton*, showing NRM regions

Plate 1. *Boronia hemichiton* at Mt Arthur (image by Anne Chuter)

SUMMARY: *Boronia hemichiton* (mt arthur boronia) is an aromatic woody shrub that occurs in wet heath/scrub and is only known from the western flanks of Mount Arthur in northeast Tasmania. The species has a linear range of 3.9 km, and the total number of mature individuals is estimated to be fewer than 2,500, its highly restricted distribution making it susceptible to extinction from chance events. The species is at risk from inappropriate fire regimes and impacts of climate change that may reduce the potential for recruitment from the soil seed store. Predation of seed by insects is likely an issue for the species (as it is with the closely related *Boronia hippopala*), and may increase with outbreaks associated with changed environmental conditions. Planning considerations will alleviate potential indirect impacts from adjacent forestry activities and the species will also benefit from proposed forest reserves.

IDENTIFICATION AND ECOLOGY

Boronia hemichiton has been observed in flower from October to January, with fruit ripening by mid summer. The species is believed to be an obligate out-crosser, with pollination effected by range of insects (Hingston & McQuillan 2000). Field observations indicate that *Boronia hemichiton* is an obligate seeder, with evidence of mass germination from a soil-stored seed-bank following fire (Chuter 2006) and limited germination in the absence of fire even where bare ground is available in its preferred wet heath habitat (Schahinger 2004). Individual plants may live in excess of 20 years (Chuter 2010), with plants reaching reproductive maturity in perhaps 5 to 6 years. Seed predation by insects is often a feature of closely related species in the Rutaceae family, including *Boronia hippopala,* its closest relative (James Wood, pers. comm.). There is no information as to the longevity of the soil-stored seed-bank. The species has a strong aromatic citrus odour with peppermint gum overtones.

Survey techniques

Surveys for *Boronia hemichiton* can be conducted at any time of the year, though is more practical and efficient when the species is in flower (October to January) and plants are easier to detect.

Description

Boronia hemichiton is an erect to somewhat straggly shrub to 1.5 m tall. The branchlets are slightly glandular tuberculate and hispidulous (covered with stiff short hairs) and have faint leaf decurrencies. The pinnate leaves are arranged opposite each other, with 3 to 7 leaflet pairs, and are 9 to 12 mm long by 12 to 16 mm wide. The leaflets are linear to narrowly elliptic to narrowly obovate, and 2 to 9 mm long and 0.5 to 1 mm wide. They are hispidulous on the portion close to the stem. The flowers occur in clusters of 1 to 5 in the upper leaf axils. They occur in four parts, with the sepals and petals free, and eight stamens. The sepals are narrowly triangular and 0.75 to 1.25 mm long. The petals are white to pink, narrowly ovate, pointed and 4.5 to 5.5 mm long. The fruit is a glabrous capsule. The seeds are dark brown to black and about 2 mm long and 1 mm wide.

[description based on Duretto 2003 & 2009, and field observations]

Confusing species

Boronia hemichiton can be distinguished from the closely-allied *Boronia hippopala* by its leaflets being hispidulous (covered with stiff short hairs) on the proximal portion only (rather than all over), and its fruit which is glabrous (rather than hispidulous) (Duretto 2003). It can be distinguished from *Boronia citriodora* subsp. *orientalis* by its relatively narrow leaflets and small sepals. These characters, combined with the hispidulous branches, also distinguish it from *Boronia pilosa* (Duretto 2003).

DISTRIBUTION AND HABITAT

Boronia hemichiton is endemic to Tasmania and is found only on the western flanks of Mt Arthur in northern Tasmania in the upper catchment of the Pipers River (Figure 1).

The species grows in wet heath or scrub in association with *Melaleuca virens*, *Melaleuca squamea, Leptospermum lanigerum, Westringia rubiaefolia* and *Gahnia grandis*, usually with

scattered emergent eucalypts (*Eucalyptus gunnii* or *Eucalyptus ovata*), with the occasional plant at the scrub margins within *Eucalyptus delegatensis*/ *Eucalyptus amygdalina* forest (Schahinger 2004) (Plate 3). The underlying substrate is alluvium over Jurassic dolerite, and the elevation range 480 to 660 m above sea level.

Plate 3. Forest margin habitat of *Boronia hemichiton* (image by Anne Chuter)

POPULATION PARAMETERS

Boronia hemichiton is known from two subpopulations (Table 1). The larger subpopulation occurs to the south of Whites Mill Road and comprises two patches, while the smaller subpopulation is about 3 km further south in a marsh between Eaglehawk Tier and Skyline Tor. The total number of mature individuals is believed to be in the order of 1000 to 2000 (Schahinger 2004), though further surveys are required to better define numbers. *Boronia hemichiton* has a linear range of 3.9 km, an extent of occurrence of about 1 km^2 and an estimated area of occupancy of 35 to 50 ha (Schahinger 2004). This estimate of the area of occupancy represents the extent of suitable habitat at the two known sites, with the actual area of occupancy expected to be a fraction of this range.

The likelihood of new subpopulations being detected is quite low, based on the extent of botanical surveys within the current predicted range of the species (Schahinger 2004, Chuter 2006 & 2010). Minor range infillings and extensions within the same wet heath/scrub and adjacent forest fringe are possible.

RESERVATION STATUS

Boronia hemichiton is not currently known from any formal reserve though the whole distribution of the species is proposed for reservation under the *Tasmanian Forests Agreement 2013*.

CONSERVATION ASSESSMENT

Boronia hemichiton was listed as endangered on the Tasmanian *Threatened Species Protection Act 1995* in 2005, meeting criterion B:

- extent of occurrence estimated to be less than 500 km^2, known to exist at no more than five locations, and a continuing decline, inferred, observed or projected in area, extent and/or quality of habitat.

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Boronia hemichiton is most at risk from factors that influence its potential for recruitment following fire, particularly those that influence input into and viability of the soil-stored seed bank. As such, an inappropriate fire regime is the most important threat, and the species is susceptible to the potential impacts of climate change on recruitment. Consideration of the species when planning forestry activities in areas adjacent to stands will alleviate indirect impacts. The species may also be slightly susceptible to the root rot pathogen, *Phytophthora cinnamomi* (Rudman et al. 2008).

Inappropriate fire regime: *Boronia hemichiton* is killed by fire, with subsequent regeneration from soil-stored seed, and flowering after about five year's growth. Fires at a shorter interval would prevent seed production, while a prolonged period between fires, say greater than 25 years, runs the risk of plants senescing and soil-stored seed losing its viability. Active fire management of the species' wet heath habitat is required, with a preferred mosaic

Table 1. Population summary for *Boronia hemichiton*

	Subpopulation	Tenure	NRM Region	1:25000 Mapsheet	Year last (first) seen	Area occupied (ha)	Number of individuals
1	Whites Mill Road	State forest*	North	Patersonia	2013 (2003)	c. 40	c. 1500 to 2000
2	Eaglehawk Tier – Skyline Tor	State forest*	North	Patersonia	2005 (2003)	c. 10	c. 250 to 500

NRM Region = Natural Resource Management Region
* proposed for reservation under the *Tasmanian Forests Agreement 2013*

burn approach at intervals of 12 to 20 years (Schahinger 2004, Chuter 2010). Part of the Eaglehawk Tier subpopulation was burnt by wildfire in 2003 (Chuter 2010), and a small part of the White Mills Road subpopulation in 2004.

Forest management: *Boronia hemichiton* occurs exclusively on State forest in areas managed for wood production. The preferred habitat is unlikely to be directly impacted as it is essentially non-commercial in terms of timber production. However, the species can occur in the marsh-forest ecotone (Chuter 2006), extending into the fringes of the marshes which are sometimes used as fire breaks, or into a forest habitat that may be impacted by timber harvesting operations. While direct impacts are tightly regulated, Chuter (2006 & 2010) considers that it is essential for *Boronia hemichiton* to be taken into account when planning forestry operations immediately adjacent to stands to avoid indirect impacts by associated roading, culverted crossings of marsh drain points and fuel reduction activities in marshes. These impacts may operate through the introduction and spread of weeds and disease, and modification to hydrology. Proposed reservation under the *Tasmanian Forests Agreement 2013* will alleviate this risk, improving the reservation status of the species by 100% (Independent Verification Group 2012).

Climate change: A warmer climate, longer periods of drought and a change in rainfall patterns may impact deleteriously on *Boronia hemichiton* and its habitat, through a detrimental increase in fire frequency, a reduction in recruitment following fire, and an increase in insect outbreaks leading to decreased input to the soil seed bank due to increased predation of seed. The risk to the species is exacerbated by its highly restricted distribution.

***Phytophthora cinnamomi*:** As laboratory trials determined that *Boronia hemichiton* may be slightly susceptible to *Phytophthora cinnamomi* (Rudman et al. 2008) and given the localised distribution of the species, it is considered appropriate that the precautionary principle should be applied, with hygiene measures to be prescribed for any activities in and around the known population (Schahinger et al. 2003, Chuter 2010).

Stochastic risk: The highly restricted distribution, low number of subpopulations and relatively low numbers of individuals exposes the species to a high risk of local extinctions due to unforeseen human activities or stochastic events.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the recovery of *Boronia hemichiton* 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: The extent of the extant subpopulations has been determined, in the main, by targeted surveys (Schahinger 2004, Chuter 2006).

Susceptibility to *Phytophthora cinnamomi*: As several members of the Rutaceae family in Tasmania are known to be susceptible to the introduced soil-borne plant pathogen *Phytophthora cinnamomi* (Podger et al. 1990), laboratory trials were conducted in 2007 to 2008 to determine the susceptibility of *Boronia*

hemichiton. The trials determined that *Boronia hemichiton* may be slightly susceptible to *Phytophthora cinnamomi* (Rudman et al. 2008).

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.

- update the status of the Eaglehawk Tier - Skyline Tor subpopulation;
- ensure that the areas supporting the species are subject to an appropriate fire regime;
- collect seed for long-term conservation storage at the Tasmanian Seed Conservation Centre based at the Royal Tasmanian Botanical Gardens in Hobart;
- monitor the species' response to disturbance such as fire and monitor levels of seed predation and disease to guide future recovery work including the need to supplement or establish ex situ occurrences using conserved seed to prevent extinctions in the wild;
- 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 *Boronia hemichiton*.

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