Image by Geoff Park

Tetratheca ciliata

northern pinkbells

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Scientific name: ***Tetratheca ciliata*** Lindl., *Three Exped. Australia* [Mitchell] 2: 205 (1838)
Common Name: northern pinkbells (Wapstra et al. 2005)
Group: vascular plant, dicotyledon, family **Tremandraceae**

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

Distribution: Endemic: **not endemic to Tasmania**
Tasmanian NRM regions: **Cradle Coast, North**

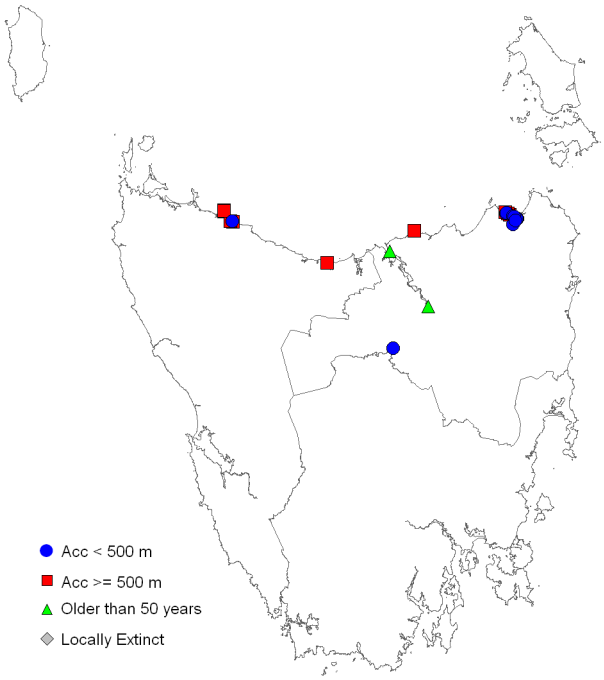

Figure 1. Distribution of *Tetratheca ciliata* in Tasmania, showing Natural Resource Management regions

Plate 1. Flowers and foliage of *Tetratheca ciliata* (image by Tim Leaman)

SUMMARY: *Tetratheca ciliata* (northern pinkbells) is a slender shrub that in Tasmania has been recorded from mostly near-coastal sites from Rocky Cape to the Tomahawk/Boobyalla area, where it grows in heathland or heathy woodland. The data suggest that the species occurs in small localised patches, placing them at risk from chance events. Small occurrences may not attract pollinator movement from plant to plant to effect the cross-pollination likely to be necessary for seed production leading to local extinctions. The risk of inadvertent losses is exacerbated as the species may only occur in small numbers or become restricted to the soil seed store in between fire events. Threats to the species include clearance and fragmentation of its habitat, infection by the exotic plant pathogen *Phytophthora cinnamomi*, and inappropriate fire regimes. Fire and disease management would benefit known occurrences.

ECOLOGY AND IDENTIFICATION

The main flowering period for *Tetratheca ciliata* in Tasmania is October to December, though flowers have been recorded as early as August. While the reproductive biology of *Tetratheca ciliata* has not been investigated, pollination of *Tetratheca* species is generally mediated by native bees (Hingston 1999). Some species are known to require cross-pollination for successful fruit and seed set (Potts & Barker 1999). However, the flowers are nectarless, offering their pollinators a pollen reward only. Seed set can be problematical if subpopulations are too small to attract the movement of pollinators from one plant to another, or if sufficient nectar producing plants are not present to sustain pollinators.

The presence of *Tetratheca ciliata* in heath and heathy woodland indicates some fire response adaptations. Fire in heathy habitats generally promotes the emergence of a diverse range of species that would sustain pollinators of non-nectar producing species such as *Tetratheca*. Observations in Victoria suggest the species may be an obligate seeder, with recruitment post-fire from a relatively long-lived soil seed bank (McMahon et al. 1996). The same study suggests that adult plants may senesce in long unburnt vegetation, the species persisting only in the soil seed bank. Insects may also assist in seed dispersal, as the species' seed have an appendage that may act as a food reward.

Tetratheca ciliata has a relatively high phylogenetic distinctiveness score, being one of only eight species and infra-species in the *Tetratheca* genus, with no other genera in the family Tremandraceae in Tasmania (Baker & de Salas 2013).

Survey techniques

Surveys for *Tetratheca ciliata* may be undertaken at any time of year, though detectability in its heathy habitat is much easier during its peak flowering period (October to December). Surveys should focus on recently burnt areas when plant numbers are likely to be at their highest.

Description

Tetratheca ciliata is a slender shrub up to 1 m high with erect or spreading branches (Plate 2). Its stems are terete, irregularly ridged, and vary in their degree of hairiness from almost glabrous to more typically densely hairy, with erect hairs to 1 mm long, and scattered glandular hairs particularly on younger growth. The leaves range from broadly-elliptical to broad obovate-orbicular or rhomboid, and are usually 5 to 10 mm long though sometimes up to 15 mm long. They have conspicuously ciliate margins, and usually occur in regular whorls of 3 though are occasionally alternate. The flowers occur singly in the leaf axils of the upper leaves on reflexed stalks that are glandular-hairy and as long as or longer than the leaves. The flowers have 4 parts and are regular and bisexual. The petals are purple to lilac, obovate and up to 10 mm long. The sepals are purplish, broadly ovate, 2 to 3 mm long and glandular hairy, with the upper part spreading or reflexed. The 8 stamens have short filaments and erect, dark-coloured anthers that are 2 to 3 mm long and open by a terminal pore. The ovary is velvety, sometimes with scattered, short glandular hairs. The fruit is a flattened 2-celled capsule 4 to 8 mm long. The seed is 2 to 3 mm long and hairy with a cream appendage.

[description based on Curtis & Morris 1975, Walsh & Entwisle 1999, Gray 2011]

Plate 2. Habit of *Tetratheca ciliata* (scanned image by Eve Lazarus)

Confusing species

There are three other species of *Tetratheca* in Tasmania that are hairy to varying degrees (Gray 2011) and could be confused with *Tetratheca ciliata*. *Tetratheca labillardierei* has a dense covering of glandular hairs, which occur only sparingly on the stems of *Tetratheca ciliata*, while *Tetratheca pilosa* is wholly devoid of glandular hairs. *Tetratheca labillardierei* and *Tetratheca pilosa* have leaves that are alternate or sometimes randomly clustered rather than in distinct whorls. *Tetratheca* sp. Flinders Is. (T.Rudman HO510551) Tas Herbarium lacks glandular hairs on the flower stalks and sepals, and though its leaves occur in whorls, they are much smaller than for *Tetratheca ciliata* and have narrowly recurved and crenate margins rather than being flat and entire.

DISTRIBUTION AND HABITAT

On mainland Australia *Tetratheca ciliata* occurs in Victoria, New South Wales and South Australia. In Tasmania the species is known from near-coastal areas in the State's north at altitudes below 70 m above sea level, ranging from Rocky Cape in the west to Tomahawk/Boobyalla in the east, and an outlying site near Liffey about 60 km inland at an altitude of 320 m (Figure 1).

In Tasmania *Tetratheca ciliata* has been recorded from heathlands and heathy woodlands on sandy well-drained soils, the woodland dominated by *Eucalyptus amygdalina* (black peppermint). Associated species include *Acacia suaveolens, Allocasuarina monilifera, Aotus ericoides, Dillwynia glaberrima, Hibbertia procumbens, Leptospermum scoparium, Lepidosperma concavum* and *Xanthorrhoea australis*. *Xanthorrhoea bracteata* (shiny grasstree), a nationally listed species, is found at some of the Tomahawk sites, while the rare *Banksia serrata* (saw banksia) is present at the Sisters Beach site.

The relatively restricted habitat range for *Tetratheca ciliata* in Tasmania is at odds with that in Victoria, where it is reported as being widespread in higher rainfall areas and can be locally common in a range of habitats (Walsh & Entwisle 1999).

POPULATION PARAMETERS

Tetratheca ciliata has been recorded in Tasmania from eight or nine locations (Table 1). Quantitative estimates of plant numbers are available for only a few of these sites, with a total of fewer than 500 mature plants. The linear range of the species in Tasmania is 198 km and the extent of occurrence about 6,400 km^2. While reliable estimates for the area of occupancy are not available it is likely that the species occupies less than 10 ha.

The species has only been seen in Tasmania at three locations in recent years: Sisters Beach in the northwest, Liffey in the central north, and the area between Tomahawk and Boobyalla in the northeast. The latter subpopulation is the largest known and consists of several discrete patches extending over almost 9 km. The Don Reserve record is unvouchered and requires confirmation.

Table 1. Population summary for *Tetratheca ciliata* in Tasmania

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen	Area occupied (ha)	Number of mature plants
1	Rocky Cape	Rocky Cape National Park	Cradle Coast	Rocky Cape	1995	unknown	unknown
2	Irby Flats, Sisters Beach	Rocky Cape National Park	Cradle Coast	Mawbanna	2008 (1834)	unknown	c. 15
3	Don Reserve	Crown land	Cradle Coast	Devonport	pre 2005	unknown	unknown
4	Liffey	private land	North	Liffey	2007	unknown	2
5	near Launceston	unknown	North	unknown	1900?	unknown	unknown
6	West Head	Narawntapu National Park?	North	Low Head?	1850 (1834)	unknown	unknown
7	Stony Head	Commonwealth	North	Tam O'Shanter	1970s	unknown	unknown
8a	Tomahawk - Boobyalla	Boobyalla Conservation Area	North	Tomahawk	2007 (1970s)	unknown	unknown
8b	Tomahawk - Boobyalla	private land	North	Tomahawk	2008	0.002	3
8c	Tomahawk - Boobyalla	private land	North	Tomahawk	2012	0.2 (5 patches over 2.5km)	c. 300
9	Tomahawk Road	private land	North	Monarch	1980	unknown	reasonably frequent

Potential habitat for *Tetratheca ciliata* is extensive between Freycinet Peninsula and Rocky Cape. While targeted surveys for the species have not been undertaken, its coastal heath habitat has been subject to numerous surveys since the 1970s (e.g. Kirkpatrick 1977, Corbett & Balmer 2003), including surveys during the development of *Phytophthora* management areas in the early 2000s (Schahinger et al 2003) and surveys associated with development proposals. As *Tetratheca ciliata* is a conspicuous species when in flower, and has a relatively long flowering season, the lack of sightings indicates a genuinely rare species, in Tasmania at the edge of its range. The Liffey site does throw up the possibility that the species may have a wider habitat range in Tasmania than previously thought, though its collection history suggests that any such occurrences are likely to be highly localised and support few plants.

RESERVATION STATUS

Tetratheca ciliata has been recorded from Boobyalla Conservation Area and Rocky Cape National Park.

CONSERVATION ASSESSMENT

Tetratheca ciliata was listed as rare on the original schedules of the Tasmanian *Threatened Species Protection Act 1995* as at the time its distribution did not exceed a range defined by a 100 x 100 km square (Flora Advisory Committee 1994). There is currently insufficient data available on the number of mature individuals and area occupied to enable reassessment of the conservation status of the species in Tasmania.

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Land clearance & fragmentation: The species' coastal heath and heathy woodland habitat has been extensively cleared since European settlement (Kirkpatrick 1977), with the presumed loss of an unknown number of plants and subpopulations. The Tomahawk/Boobyalla area has been especially affected, with the loss of prime habitat to pasture for cattle grazing (and also residential development). The current patchy distribution of the species in this area is assumed to

represent the vestiges of what would have originally been a more-or-less continuous subpopulation. The easternmost occurrences were uncovered in 2012 during pre-logging surveys by the Forest Practices Authority and were ultimately safe-guarded from clearance. Fragmentation may result in poor seed set by reducing the ability of plants to attract pollinators and by increase the risk of spread and introduction of disease.

Small occurrences: The small size of occurrences exposes them to a high risk of extinction due to chance events and may result in insufficient seed being produced to replenish the soil seed store if the density of plants is insufficient to attract pollinators to effect cross-pollination for seed production. The species is also at risk from inadvertent losses and fragmentation as the true extent of subpopulations may not be apparent for many years, with the number of plants declining to low levels and small patches, or be absent being restricted to the soil seed store in between fire events.

***Phytophthora cinnamomi*:** *Tetratheca ciliata* is believed to be susceptible to the exotic soil-borne plant pathogen *Phytophthora cinnamomi* (Schahinger et al. 2003), as are the plant communities in which it occurs. There are disease infestations close to most of the known sites, though to date field symptoms have yet to be observed in Tasmania. The Irby Flats site at Sisters Beach is within a designated *Phytophthora cinnamomi* management area (Schahinger et al. 2003). Infected communities may not support the abundance and diversity of nectar-producing plants necessary to sustain pollinators for *Tetratheca ciliata*.

Inappropriate fire regimes: The species is likely to be susceptible to inappropriate fire frequencies. Too long an interval between fires may cause declines due to competition from other shrub species and too short an interval between fires may kill standing plants before they reach reproductive maturity and replenish the soil seed bank. Inappropriate fire regimes may also reduce the abundance and diversity of nectar producing species necessary to sustain pollinators for *Tetratheca ciliata*.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the recovery of *Tetratheca ciliata* are to prevent the inadvertent decline and fragmentation of subpopulations, maintain existing subpopulations, and promote conditions for successful recruitment.

What has been done?

No specific activities have been undertaken to conserve the species.

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 the known *Tetratheca ciliata* subpopulations and areas of potential habitat;
- survey sites not seen in recent years to determine their status and to inform the development of an appropriate management strategy for each site;
- survey sites following fire to determine and document their abundance and extent;
- update relevant management plans;
- investigate the pollination biology of the species to inform future management and recovery options;
- monitor selected subpopulations for longevity, recruitment, condition and response to disturbance;
- regenerate declining subpopulations by burning if the vegetation has become overgrown;
- collect seed for long-term storage at the Tasmanian Seed Conservation Centre based at the Royal Tasmanian Botanical Gardens in Hobart;

- undertake extension surveys of potential habitat within the species' recorded range, including the Liffey area.

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