Velleia paradoxa

spur velleia

TASMANIAN THREATENED FLORA LISTING STATEMENT

Image by Richard Schahinger

Scientific name: ***Velleia paradoxa*** R.Br., *Prodr.* 580 (1810)
Common name: spur velleia (Wapstra et al. 2005)
Group: vascular plant, dicotyledon, family **Goodeniaceae**

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: **North, South**

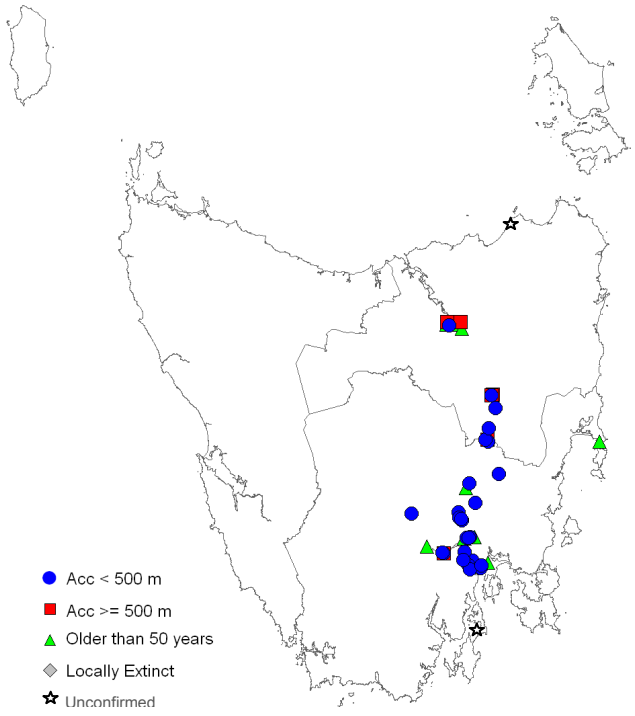

Figure 1. Distribution of *Velleia paradoxa* in Tasmania

Plate 1. *Velleia paradoxa*: flower detail (image by Richard Schahinger)

SUMMARY: *Velleia paradoxa* (spur velleia) is a short-lived perennial herb, known in Tasmania from the Midlands and Derwent Valley, where it grows in grassy woodlands and grasslands. While the species has been recorded at over 30 sites, the current status of most sites is uncertain. For the species to persist, fire or other disturbance that creates bare ground is needed for recruitment from soil-stored seed. The main threats to the species are grazing by stock and clearance of its habitat for agriculture or urban expansion, a threat exacerbated by the possible absence of plants or presence in low numbers between recruitment events. Past clearing has resulted in a fragmented distribution, further risking the species through increased edge effects.

IDENTIFICATION AND ECOLOGY

Velleia paradoxa regenerates from seed. The species is likely to be short-lived given that plants in cultivation rarely survive for longer than a year. It mostly flowers from November to January with flowers likely to be pollinated by a range of insects. Most dispersal of seed occurs in January and February (Pyrke 1993). Plants may die back to a rootstock by the end of summer, with new leaves resprouting in winter and plants may resprout following fire. The main requirement for recruitment from the soil-stored seedbank is the availability of bare ground which may be provided via fire or disturbance by native animals (Pyrke 1993), and freedom from stock grazing. The species appears to be capable of outcompeting grasses if grazing is excluded (Gilfedder 1991).

Survey techniques

As flowers are required to confirm the identify of the species, surveys for *Velleia paradoxa* are best undertaken during its peak flowering period in late November to early January. However, the species is easily detectable from old seed heads, even in thick tall grass, and early non-flowering rosettes are also detectable.

Description

Velleia paradoxa is a herb with a slender rootstock, leaves in a basal rosette and ascending to erect flowering stems to 60 cm high (Plates 1 & 2). Its light green leaves are 2 to 20 cm long, broadly oblanceolate, coarsely-toothed or almost entire, with a blunt apex and a base narrowed into a petiole that may be as long as the blade. The leaves may be pubescent or almost glabrous. The flowering stems are usually 2 to 4 times as long as the leaves, pubescent, and branched at about the middle, the branches subtended by small toothed or lobed bracteoles. The calyx consists of 5 free sepals 8 to 12 mm long. The corolla is 15 to 30 mm long, pale yellow and winged with a conspicuous spur at the base of the tube (Plate 1). The fruit is a compressed capsule, containing several flat seeds 3 to 5 mm in diameter, with winged margins (Plate 3).

[description based on Curtis 1963, Walsh & Entwisle 1999]

Plate 2. Habit of *Velleia paradoxa* (image by Richard Schahinger)

Plate 3. Capsule and seeds *Velleia paradoxa* (image by Robert Wiltshire)

Confusing species

Velleia paradoxa is unlikely to be confused with the only other *Velleia* species in Tasmania, *Velleia montana,* which has a flat basal rosette of leaves, an inflorescence shorter than its leaves, flowers with 3 rather than 5 sepals, and grows in montane habitats. Some *Goodenia* species are superficially similar to *Velleia paradoxa*, though they have inferior rather than superior ovaries, lack a conspicuous spur, and differ in bracteole shape and calyx vestiture (Curtis 1963).

DISTRIBUTION AND HABITAT

Velleia paradoxa is found throughout temperate Australia (Walsh & Entwisle 1999). It is known in Tasmania from the Hobart and Launceston areas, the Northern and Southern Midlands and the Derwent Valley (Figure 1). Considering reliable sites only, the species has a linear range of about 160 km and extent of occurrence 6,000 km^2 (Figure 1). The area of occupancy for sites with recent quantitative data (fewer than 13 subpopulations) is 2 to 3 ha (Table 1).

The Tasmanian Herbarium holds a collection of *Velleia paradoxa* from the central east coast at Coles Bay dating to 1932 (Table 1). The area appears unsuitable for the species and has been subject to a high level of botanical scrutiny in the interim, so the cited location may well be the result of a transcription error. There are also unconfirmed records from Fancy Point on Bruny Island (August 1996) and Waterhouse (December 1998). In the absence of supporting material these outliers have been treated as suspect and are not displayed in Figure 1.

Velleia paradoxa grows within forest, grassy woodlands or grasslands on dry sites on a variety of geologies, including Triassic sandstone, Jurassic dolerite and Tertiary basalt. The elevation range of recorded sites in Tasmania is 10 to 550 m above sea level, with an annual rainfall range of 450 to 750 mm. The species occurs in grassy woodlands dominated by *Eucalyptus amygdalina* (black peppermint), *Eucalyptus pauciflora* (cabbage gum), *Eucalyptus viminalis* (white gum) or *Allocasuarina verticillata* (drooping sheoak). Some co-occurring threatened flora species include the State and nationally listed *Caladenia caudata, Glycine latrobeana* (clover glycine), *Prasophyllum tunbridgense* (tunbridge leek-orchid) and *Pterostylis commutata* (midlands greenhood), and the State listed *Stackhousia subterranea* (grassland candles).

POPULATION ESTIMATE

Velleia paradoxa has been recorded from more than 30 locations in Tasmania. Taking into account fluctuations as a result of the likely short-lived nature of plants and time from disturbance, the total number of plants in any given year is likely to be in the several thousands (Table 1). The species is known to have persisted in good numbers since at least the 1980s at some sites including the cemetery at Hamilton and Waverley Park on Hobart's eastern shore, though its persistence at other sites is uncertain (Table 1).

There is a reasonable likelihood of additional subpopulations occurring in Tasmania, especially on private property in the Midlands. However, the localised nature of known sites and the species' collection history suggest that opportunistic rather than targeted surveys may be the most likely source of new information.

RESERVATION STATUS

Velleia paradoxa is not known to be extant in any formal reserve. It has been recorded in Township Lagoon Nature Reserve (Zacharek et al. 1997), Trevallyn Nature Recreation Area (North Barker & Associates 2001) and Kate Reed Nature Recreation Area (Ratkowsky & Ratkowsky 1994), but has not been seen in any of these areas in recent times (Table 1). The species is extant in 3 Council Reserves, at Amy Street (Glenorchy City), Knocklofty (Hobart City) and Waverley Park (Clarence City).

CONSERVATION ASSESSMENT

Velleia paradoxa was listed as vulnerable on Schedules of the Tasmanian *Threatened Species Protection Act 1995* when the Act came into being. It meets criterion B for vulnerable as the area of occupancy is less than 50 ha, and

1. it is severely fragmented;

2c. a continuing decline is inferred in area, extent and/or quality of habitat.

Table 1. Population summary for *Velleia paradoxa* in Tasmania

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) observed	Area of occupancy (ha)	Number of plants
1	Waverley Park	Clarence City Council	South	Hobart	2010 (1988)	0.15	400–500
2	Flagstaff Gully	private land	South	Hobart	1990	unknown	100s [0 in 2010/2011]
3	Porter Point	Crown land	South	Hobart	1990	unknown	few [0 in 2010/2011]
4	Cambridge	unknown	South	Hobart	1938	unknown	possibly extinct
5	Knocklofty	Hobart City Council	South	Hobart	2010 (1996)	0.01	20 (abundant)
6	Amy Street	Glenorchy City Council	South	Hobart	2010 (1996?)	1.0	1000–1500
7	Rosetta	private land	South	Collinsvale	1993	unknown	100 [0 in 2010/2011]
8	Austins Ferry	private land	South	Richmond	2010 (1892?)	0.01	30
9	Brighton	unknown	South	Tea Tree	1876	unknown	unknown
10	Pontville	crown or private land	South	Tea Tree	1999	unknown	unknown [0 in 2010/2011]
11.1	Tea Tree Road	DIER	South	Tea Tree	1999 (1994)	0.0001	30 [0 in 2010/2011]
11.2	Tea Tree Road	TASRAIL	South	Tea Tree	1999 (1993)	0.02	50 [0 in 2010/2011]
12	Tea Tree	unknown	South	Tea Tree	1942	unknown	unknown
13	East Bagdad Road	Southern Midlands Council	South	Elderslie	2010 (1991)	0.01	50
14	Harbachs Road	Southern Midlands Council	South	Elderslie	2010 1999 (1992)	0.03	550–600 200
15	Kempton	Crown land	South	Elderslie	2011 (1999)	unknown	13 (30)
16	New Norfolk (2 km east)	private land?	South	New Norfolk	1985	unknown	unknown
17	New Norfolk (Tynwald)	private land	South	New Norfolk	2009 (1994)	0.14	530–850
18	Glen Leith	private land?	South	Uxbridge	1839	unknown	unknown
19	Hamilton cemetery	private land	South	Hamilton	2010 (1980s?)	0.2	1200–1500
20	Mud Walls Road	Southern Midlands Council	South	Colebrook	2011 (1984)	0.0001	1
21	Jericho cemetery	private land	South	Stonor	2010 (2002)	0.005	35
22	Spring Hill	private land?	South	Stonor	1952	unknown	unknown
23	Tin Dish Rivulet (Mt Seymour)	private land	South	Stonor	2009	0.002	40

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) observed	Area of occupancy (ha)	Number of plants
24	Mount Cartwright (Murderers Tier)	private land	South	Lemont	1997	unknown	unknown
25.1	Tunbridge	Township Lagoon Nature Reserve	South	Tunbridge	1997	unknown	unknown [0 in 2010/2011]
25.2	Tunbridge	Road Reserve	South	Tunbridge	2000	0.6	100 [0 in 2010/2011]
25.3	Tunbridge	private land	North	Tunbridge	2001 (1984)	unknown	<5
25.4	Tunbridge	DIER	North	Tunbridge	1992	unknown	unknown [0 in 2010/2011]
26	Brown Hills, S of Ross	private land	North	Ellinthorp	2006	unknown	10s
27	Campbell Town Golf Course	private land *	North	Campbell Town	2010 (2008)	0.2	200
28	E of Wanstead Hill, SE of Conara	DIER	North	Conara	2009 (1992)	unknown	7 (5)
29	Prospect (1)	Kate Reed Nature Recreation Area	North	Prospect	1993	unknown	unknown
30	Prospect (2)	Launceston City Council, private land?	North	Prospect	1992	unknown	unknown [0 in 2010/2011]
31	Duck Reach & Cataract Gorge	Trevallyn Nature Recreation Area	North	Prospect & Launceston	1992 (1938)	unknown	unknown [0 in 2010/2011]
32	St Leonards	unknown	North	Prospect or Launceston	1880	unknown	unknown
33	Corra Linn	unknown	North	Prospect	1863	unknown	unknown
34	Scottsdale Road	unknown	North	Launceston ?	1965	unknown	unknown
35	Coles Bay	unknown	South	Coles Bay?	1932	unknown	unknown

NRM = Natural Resource Management Region; DIER = Tasmanian Department of Infrastructure, Energy and Resources; * = covered by a conservation covenant under the Tasmanian *Nature Conservation Act 2002*.

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Land clearance for agriculture and urban expansion poses the greatest threat to the species and has resulted in fragmentation, further risking the species through increased edge effects from residential or agricultural activities. The threat is exacerbated by the absence of plants or presence in low numbers between recruitment events. Additional threats include over-grazing by stock, weed invasion and a lack of disturbance.

Land clearance: Extensive tracts of the species' grassy woodland habitat in the Northern and Southern Midlands have been cleared since European settlement, with the loss of an unknown number of subpopulations and plants. Suburban subdivisions around Hobart and Launceston are thought to have impacted subpopulations at Amy Street, Pontville, Rosetta, Waverley Park and Prospect, and pose a threat to the Tynwald site at New Newfolk. The species survives for the most part in small council reserves, roadside remnants and cemeteries, representing a highly fragmented population, with many subpopulations having little room for expansion.

Stock grazing: Kirkpatrick et al. (1988) note that *Velleia paradoxa* is very sensitive to grazing by introduced stock, and is rarely seen in grazed paddocks, an issue applicable to most of the sites on private property in the Midlands.

Weeds: Woody weed invasion is also a threat, with *Chrysanthemoides monilifera* (boneseed) being a particular problem at several of the southern sites (Amy Street, Knocklofty, Flagstaff Gully, East Risdon, Rosetta, Waverley Park), while *Ulex europaeus* (gorse), *Rosa rubinigosa* (briar rose), *Rubus fruticosus* complex (blackberry) and *Acacia paradoxa* (thorn wattle) each threaten one or more of the sites.

Lack of disturbance: *Velleia paradoxa* requires open ground to germinate and recruit, so some form of disturbance is required to maintain such conditions, either through fire, slashing or physical disturbance. The long-term persistence of the small dense subpopulation at Harbachs Road is likely due to the abundance of bare ground on a regularly slashed roadside cutting, coupled with a lack of browsing pressure. The obverse is true at the Knocklofty and Flagstaff Gully sites, with plant numbers dwindling in recent years as the species' grassy woodland habitat has become increasingly rank in the absence of fire.

Road and rail-side maintenance: Part of the East Bagdad Road subpopulation was lost to road works in the late 1990s (North & Associates 2000). Several other roadside sites have not been seen in recent times despite targeted surveys (Table 1), including Tea Tree Road and Tunbridge, though the precise reasons for these declines are not known.

Stochastic events: The small size of some of the subpopulations exposes them to a high risk of extinction due to chance events.

MANAGEMENT STRATEGY

What has been done?

Management planning: Management plans for the conservation of native grasslands at the species' two cemetery sites, Hamilton and Jericho, were prepared in 2002. Two sites, Tunbridge and the site east of Wanstead Hill, are included in DIER's roadside management program (Corbett 2010). Fire management plans for two council reserves, Knocklofty and Waverley Park, include provisions for the species (AVK 2005 & 2010).

Survey: Surveys to assess the status of known sites within the Jordan River Catchment were undertaken in 1999 (North 1999), and for the majority of recorded sites south of Tunbridge and a number of sites around Launceston in 2010/2011 (Table 1).

Seed banking: Seed from the Hamilton subpopulation has been collected and lodged for long-term conservation storage at the Tasmanian Seed Conservation Centre at Royal Tasmanian Botanical Gardens.

Management objectives

The main objectives for the recovery of *Velleia paradoxa* are to prevent the loss or degradation of known subpopulations, identify new subpopulations within the range of the species and gain a better understanding of the ecological requirements of the species.

What is needed?

- 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;
- survey sites not seen in recent years, especially those on private property in the Midlands to determine status and to inform the development of an appropriate management strategy for each site;
- regenerate declining subpopulations by burning or slashing if the vegetation has become overgrown;
- support the Private Land Conservation Program (DPIPWE) with the establishment of conservation covenants for private land supporting *Velleia paradoxa*, and ensure that current priorities for the species are incorporated into the program's reservation strategies;

- monitor selected subpopulations for longevity, recruitment, condition and response to disturbance;
- undertake extension surveys of potential habitat within the species' recorded range.

BIBLIOGRAPHY

AVK (2005). *Knocklofty Reserve & McRobies Gully Fire Management Plan.* AVK Environmental Management, Sandford.

AVK (2010). *Bushfire Management Plan: Waverley Park, Mornington/Bellerive. Draft Fire Management Plan.* AVK Environmental Management, Sandford.

Corbett, C. (2010). *Conservation Sites Progress Report: High Priority Botanical Sites, Botanical Monitoring.* Report prepared for the Department of Infrastructure, Energy and Resources. Greening Australia, Tasmania.

Curtis, W. (1963). *The Student's Flora of Tasmania, Part 2.* Government Printer, Hobart.

Gilfedder, L. (1991) *Management Plan Case Study: Waverley Flora Park, Tasmania.* In: Kirkpatrick, J. (ed.) Tasmanian Native Bush: A Management Handbook. Tasmanian Environment Centre Inc., Hobart.

Kirkpatrick, J., Gilfedder, L. & Fensham, R. (1988). *City Parks and Cemeteries: Tasmania's Remnant Grasslands and Grassy Woodlands.* Tasmanian Conservation Trust Inc., Hobart.

Leonard, S. (2002a). *Management Plan for Conservation of Native Grassland: St Peter's Cemetery, Hamilton.* Greening Australia, Hobart.

Leonard, S. (2002b). *Management Plan for Conservation of Native Grassland: St James' Cemetery, Jericho.* Greening Australia, Hobart.

North, A. (1999). *Jordan River Catchment: Assessment of Biological Conservation Values and Identification of Management Priorities.* A report prepared for Brighton & Southern Midlands Councils (forming part of the Jordan River Catchment Management Plan).

North, A.J. & Associates (2000). *National Highway – Pontville to Dysart: Botanical Survey and Fauna Habitat Assessment.* Report forming part of the Bagdad Planning Study, Maunsell McIntyre Pty Ltd, Hobart.

North Barker & Associates (2001). *Trevallyn State Reserve: Vegetation Management Guidelines.* Report for Parks and Wildlife Service, Department of Primary Industries, Water and Environment, Tasmania.

Pyrke, A. (1993). *The Role of Soil Disturbance by Small Mammals in the Establishment of Rare Plant Species.* Department of Geography and Environmental Studies, University of Tasmania, Hobart.

Ratkowsky A.V. & Ratkowsky, D.A (1994). Plant Species of the Cataract Gorge, Punch Bowl and Kate Reed Reserves. *Tasforests* 6: 33–49.

Walsh, N.G. & Entwisle, T.J. (1999). *Flora of Victoria. Volume 4. Dicotyledons: Cornaceae to Asteraceae.* Inkata Press, Melbourne.

Wapstra, H., Wapstra, A., Wapstra, M. & Gilfedder, L. (2005). *The Little Book of Common Names for Tasmanian Plants.* Department of Primary Industries, Water and Environment, Hobart.

Zacharek, A., Gilfedder, L. & Harris, S. (1997). The flora of Township Lagoon Nature Reserve and its management, Tunbridge, Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* 131: 57–64.

Prepared in March 2011 under the provisions of the Tasmanian *Threatened Species Protection Act 1995*. Approved by the Secretary and published in September 2011.

Cite as: Threatened Species Section (2011) *Listing Statement for* Velleia paradoxa *(spur velleia)*, Department of Primary Industries, Parks, Water and Environment, Tasmania.

View:
www.dpipwe.tas.gov.au/threatenedspecieslists

Contact details: Threatened Species Section, Department of Primary Industries, Parks, Water and Environment, GPO Box 44, Hobart, Tasmania, Australia, 7001. Ph (03) 6233 6556; fax (03) 6233 3477.

Permit: It is an offence to collect, disturb, damage or destroy this species unless under permit.