

***Prasophyllum suttonii* R.S. Rogers & B. Rees Buffalo Leek-orchid**

Description

The Buffalo Leek-orchid *Prasophyllum suttonii* has a single, hollow, terete leaf to 25 cm long. The erect flower stem emerges through a slit in the leaf and grows to 30 cm tall, with up to 25 small, non-resupinate flowers, the sepals brownish with reddish stripes, the petals white with reddish stripes, the labellum white with a green callus. The dorsal sepal is about 6 mm long, downward-pointing and angled forward, the lateral sepals are about 7 mm long, erect, partially joined at the base and parallel, the petals spreading and curved forward. Flowering occurs from December to February (description from Backhouse & Jeanes 1995).

Distribution

Prasophyllum suttonii is endemic to Victoria, known it was known only from the type location on Mt. Buffalo in the Australian Alps IBRA bioregion (Figure 15). Maps showing the distribution of *P. suttonii* are available from DSE.



Figure 14. Distribution of *Prasophyllum suttonii*

Population Information

Prasophyllum suttonii has not been seen since the original collection in 1902, and is probably extinct.

Habitat

The natural habitat of *P. suttonii* is unknown.

Decline and Threats

Nothing is known of the original distribution or abundance of *P. suttonii*. Current and potential threats for *P. suttonii* are unknown. Searches by orchid researchers and enthusiasts over many years have failed to locate any populations in the area, and there is strong evidence to indicate that *P. suttonii* is extinct. Should the species be rediscovered, the protective measures described for other threatened orchids in this recovery plan will be applied as appropriate.

Prasophyllum uvidulum D.L. Jones & D.T. Rouse Summer Leek-orchid

Description

The Summer Leek-orchid *Prasophyllum uvidulum* has a single, hollow, terete leaf to 30 cm long. The erect flower stem emerges through a slit in the leaf and grows to 35 cm tall, with up to 25 small, fragrant, non-resupinate, greenish to reddish flowers, the labellum white or pinkish with a pale green, channelled callus. The dorsal sepal is about 9 mm long and more or less horizontal, the lateral sepals are about 10 mm long and curved upward, free, parallel or divergent, while the petals strongly incurved. Flowering occurs from October to December (description from Jeanes & Backhouse 2006; Jones & Rouse 2009).

Note: this species was only described in 2009; prior to this it was known as *Prasophyllum* species 'Shelley'.



Prasophyllum species 'Shelley' Shelley, Vic © Gary Backhouse

Distribution

Prasophyllum uvidulum is endemic to north eastern Victoria, near Shelley, in the South Eastern Highlands IBRA bioregion (Figure 12). Maps showing the distribution of *P. uvidulum* are available from DSE.

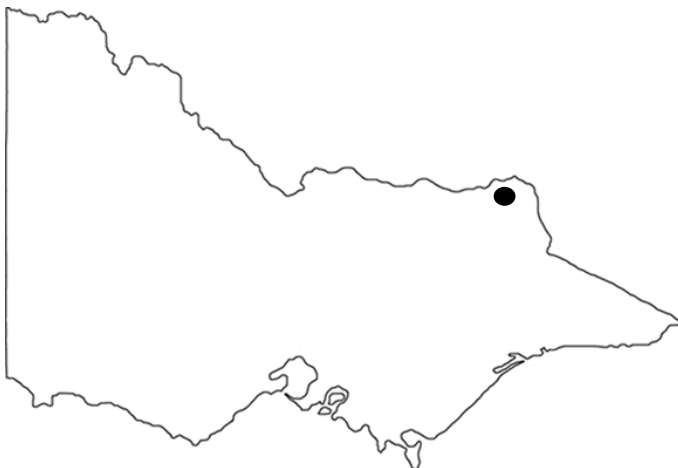


Figure 15. Distribution of *Prasophyllum uvidulum*

Population Information

Prasophyllum uvidulum is known from a single population of about 50 plants, in the Pheasant Creek Flora and Fauna Reserve, managed by Parks Victoria.

Habitat

Prasophyllum uvidulum occurs in winter-wet riparian grassland within shrubby *Eucalyptus dives* and *Eucalyptus viminalis* forest growing at about 750 m altitude. Associated understorey species include *Acacia melanoxylon*, *Daviesia latifolia*, *Derwentia derwentiana*, *Platylobium formosum*, *Pimelea linifolia* subsp. *linifolia*. The ground layer typically includes *Gonocarpus serpyllifolius*, *Glycine microphylla*, *Stellaria pungens*, *Poa* species, *Centaurea erythraea* and *Hypochaeris radicata*. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Decline and Threats

Nothing is known of the historical distribution of *P. uvidulum*, although it appears to be naturally restricted to a very limited area of north-eastern Victoria. The single population faces threats including grazing and trampling by feral Fallow Deer and Sambar, both of which are common in the area, and weed invasion by introduced grasses. Some plants occur close to a road and are potentially at risk from road maintenance activities. There is a high risk of extinction due to highly restricted distribution of this species.

Current Conservation Measures

Demographic monitoring has been established at the site, and some plants have been hand pollinated to increase the seed reservoir and chances of recruitment.

***Pterostylis despectans* Nicholls Lowly Greenhood**

Description

The Lowly Greenhood *Pterostylis despectans* is a small orchid growing to only about 50 mm in height. It has a basal rosette of 6–10 narrowly ovate leaves (withered by flowering time) and 1–6 sequentially-opening, translucent, grey-green to brownish flowers on relatively long, slender, curved pedicels. The sepals are about 15 mm long and end in long, slender free points; the dorsal sepal and petals are united to form a hood or galea that encloses the column, while the lateral sepals are deflexed. The labellum is sensitive and snaps shut into the galea when the insect pollinator alights on it (description from Backhouse & Jeanes (1995). Little is known of the ecology or biology of *P. despectans*. Flowering occurs from October to January.



Pterostylis despectans Caralalup, Vic © Gary Backhouse

Distribution

Pterostylis despectans is widely but sporadically distributed in mainland south-eastern Australia, where it occurs in South Australia, Victoria and New South Wales, in the Flinders Lofty Block, Victorian Midlands and Riverina IBRA bioregions (Figure 16). Maps showing the distribution of *P. despectans* are available from the nature conservation agency in each range State.

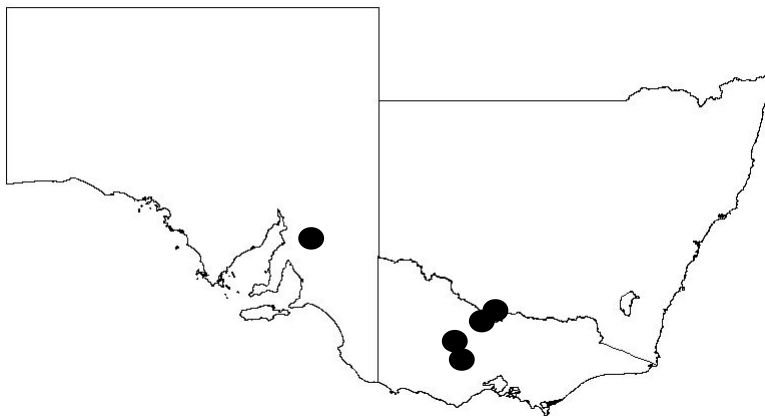


Figure 16. Distribution of *Pterostylis despectans*

Habitat

Pterostylis despectans occupies different habitats in different parts of its range. In South Australia, *P. despectans* occurs in *Eucalyptus odorata* grassy woodland, occasionally with *Eucalyptus leucoxylo*n or *Eucalyptus microcarpa*; on clay loam soil (Bickerton & Robertson 2000; Quarmby 2006). Populations in the Victorian Midlands primarily occur in open forest and woodlands dominated by *E. leucoxylo*n and *E. microcarpa* with an open shrubby understorey and sparse ground layer. The two populations growing in the Riverina bioregion (one each in Vic and NSW) grow in herb-rich native

grassland on heavy clay soil. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Population Information

Pterostylis despectans is currently known from 16 populations containing about 7,800 plants, with 12 populations occurring in Victoria, three in South Australia and one in New South Wales (Table 8).

Table 8. Population and threat information for *Pterostylis despectans*

Population	Size	Extent	Manager	Threats (High Medium Low)
<i>South Australia</i>				
Peppermint Gully (private property and roadside)	~2,000 plants	~ 50 ha	private, Goyder Regional Council	<ul style="list-style-type: none"> • lack of pollination (H) • disturbance/ destruction (M) • weed invasion (H) • grazing/predation (H)
Yacka (Heritage Agreement private property)	~1,000 plants	~ 5 ha	private	<ul style="list-style-type: none"> • lack of pollination (H) • grazing/predation (M) • weed invasion (H)
Mt. Bryan (private property)	~150 plants	~5 ha	private	<ul style="list-style-type: none"> • Lack of pollination (H) • weed invasion (H) • grazing/predation (M)
<i>New South Wales</i>				
Moama Travelling Stock Route	~20 plants	<1 ha	LHPA	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (H) • grazing/predation (H)
<i>Victoria</i>				
Caralalup Nature Conservation Reserve	~1,600 plants	150 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
St. Arnaud Range National Park	~1,500 plants	100 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Daisy Hill State Forest	~720 plants	100 ha	DSE	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Glenmona State Forest	~250 plants	300 ha	DSE	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Maryborough 1 (private property)	~150 plants	<5 ha	private	<ul style="list-style-type: none"> • disturbance/ destruction (M) • grazing/predation (H)
Wareek	~140 plants	<5 ha	?	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Bung Bong (private property)	~120 plants	<5 ha	private	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Lillicur Nature Conservation Reserve	~70 plants	<2 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Terrick Terrick National Park	~40 plants	<2 ha	Parks Victoria	<ul style="list-style-type: none"> • grazing/predation (H) • weed invasion (L)
Paddys Range State Park	~40 plants	<1 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Lillicur State Forest	~10 plants	<1 ha	DSE	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)
Maryborough 2 (private property)	~10 plants	<1 ha	private	<ul style="list-style-type: none"> • disturbance/destruction (H) • grazing/predation (H)

Decline and Threats

Pterostylis despectans remains widely distributed across south-eastern Australia, but populations are generally small and usually well separated from one another. Given the extensive loss of and disturbance to its habitats, populations have undoubtedly been lost from within this range. Over 75% of the box-ironbark forests and woodlands across central and northern Victoria have been cleared, and almost all of the remainder has been subject to timber harvesting, grazing and mining (VNPA 1994). Remaining habitat is reduced to generally small, isolated patches, many suffering ongoing disturbance. The grassland and grassy woodland habitats of the southern Flinders Ranges and the

Riverina grasslands of northern Victoria and southern NSW have been greatly depleted, with only small remnants remaining (Lunt *et. al.* 1998; Bickerton & Robertson 2000).

However, the diminutive size and late flowering of *P. despectans* may mean it is overlooked, and the species possibly occurs elsewhere, especially in central Victoria where some suitable habitat still occurs. Several new populations were discovered in central Victoria in the late 1990s and early 2000s, the population in northern Victoria was discovered in 2003, while the only known NSW population was discovered in 2005. Remaining populations of *P. despectans* face several current and potential threats, including:

Grazing/predation

Predation of tubers by White-winged Choughs is a serious problem at many central Victorian populations. Grazing of leaves/stems by kangaroos/wallabies, rabbits/hares and/or invertebrates is a threat at all sites. The Moama TSR site is periodically intensely grazed by stock, and the Peppermint Gully site in SA is partially grazed by sheep, although the core areas have been fenced to exclude stock.

Disturbance/destruction

Disturbance to or destruction of plants and habitat is a major threat for most sites. The Peppermint Gully, St. Arnaud Range NP, Caralulup NCR, Lillicur NCR and Lillicur SF sites are located close to tracks/roads and at risk of accidental trampling caused by vehicles or walkers, or accidental destruction caused by maintenance activities. Most of the central Victorian populations occur in areas where there is ongoing amateur gold prospecting activity which has the potential to accidentally destroy plants and populations. One population on private property was partially damaged after a prospector illegally trespassed on the property and dug holes. The Moama TSR site was burnt in January 2007 and the site was scraped by bulldozers.

Weed invasion

Weed invasion is a major threat at the three South Australian sites, a minor threat at the Terrick Terrick NP site, and is currently minimal or not a concern for most other sites.

Current Conservation Measures

A number of measures for the conservation of *P. despectans* have been undertaken, including:

- Demographic monitoring at some sites and current status monitoring at all other sites.
- Searches for new populations in SA, resulting in the discovery of the Peppermint Gully population.
- Fencing of the Lillicur NCR population and caging of some plants.
- Fencing to exclude stock exclusion at the Mt. Bryan and Peppermint Gully private property sites.
- Hand pollination of some plants at sites with low natural pollination rates.
- Collection of seed and placement in long-term storage.
- Box Thorn control at Peppermint Gully and Mt Bryan.
- Ongoing consultation and liaison with landholders, land managers, and stakeholders at all sites.

***Pterostylis* sp. aff. *boormanii* 'Beechworth' Granite Rustyhood**

Description

The Granite Rustyhood *Pterostylis* sp. aff. *boormanii* 'Beechworth' grows to 20 cm tall. It has a basal rosette of 5–10 elliptical leaves (withered by flowering time) and 1–6 sequentially opening, reddish brown flowers. The sepals are about 20 mm long and end in long, slender free points; the dorsal sepal and petals are united to form a hood or galea that encloses the column, while the lateral sepals are deflexed and distinctly concave, the free points curving forward. The outer surface of the lateral sepals is covered by relatively long dense white hairs. The labellum has several pairs of long bristles along the margin, and is sensitive, snapping up into the galea when the insect pollinator alights on it (description from Backhouse & Jeanes (1995). Little is known of the ecology or biology of *P.* sp. aff. *boormanii*. Flowering occurs in October and November.



Pterostylis sp. aff. *boormanii* Beechworth, Vic
© Mike Duncan

Distribution

Pterostylis sp. aff. *boormanii* 'Beechworth' is endemic to a very limited area near the town of Beechworth in north-eastern Victoria (Figure 17), in the South Eastern Highlands IBRA bioregion. Maps showing the distribution of *P.* sp. aff. *boormanii* 'Beechworth' are available from DSE.



Figure 17. Distribution of *Pterostylis* sp. aff. *boormanii* 'Beechworth'

Habitat

Pterostylis sp. aff. *boormanii* 'Beechworth' occurs in *Eucalyptus goniocalyx*, *Eucalyptus macrorhyncha* and *Callitris endlicheri* open forest or woodland with a sparse shrubby understorey and grassy ground layer, on well drained dark brown granitic loam, usually in amongst granite boulders on ridges and slopes. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Important populations

Pterostylis sp. aff. *boormanii* 'Beechworth' is currently known from only two populations containing about 65 plants, one population in Beechworth Historic Park containing about 45 plants, and a second in Chiltern-Mt. Pilot National Park containing about 20 plants. Both areas are managed by Parks Victoria.

Decline and Threats

Virtually nothing is known of the historical distribution and abundance of *P. sp. aff. boormanii* 'Beechworth', but the species appears to be confined to a relatively limited area on the granite hills near Beechworth. Some of this habitat has been cleared for agriculture and residential development. Other areas of potentially suitable habitat exist, so the species may occur elsewhere in the region. However, there has been some disturbance of these areas from mining, timber production and recreational use, and repeated searches in recent years have located few new plants, so the species does appear to be quite rare. Ongoing drought in south-eastern Australia has also contributed to a reduction in flowering rates. It is likely that the conditions for the maintenance of the pollinator and/or fungal activity have been adversely affected at some sites. There is a high risk of extinction due to the tiny population sizes at the two sites. Major threats include grazing by kangaroos/wallabies and/or rabbits/hares, and disturbance to or destruction of plants and habitat. The Beechworth Historic Park site is located close to a track and therefore is at risk of accidental destruction by track maintenance activities, and recreational use damaged this site in 2009. The species is highly vulnerable to accidental damage especially from orchid enthusiasts and photographers, so site confidentiality is vital.

Current Conservation Measures

Plants at the Beechworth Historic Park site have been monitored since 2001.

***Thelymitra epipactoides* Muell. Metallic Sun-orchid**

Description

The Metallic Sun-orchid *Thelymitra epipactoides* Muell. is a large showy sun-orchid with a single leathery, channelled and ribbed dark green to purplish basal leaf to 25 cm in length, and a stout, fleshy flower stem to 50 cm tall, with up to 20 large flowers, to 40 mm across, colour varying from bronze, pink, reddish, green to bluish, often with a metallic lustre, the column yellowish with a narrow, incurved post anther lobe and two smaller incurved auxiliary lobes, the lateral lobes with a dense tuft of long, shaggy hairs. Flowering occurs from August to November (description from Backhouse and Jeanes 1995).

Little is known of the biology or ecology of *T. epipactoides*. Some populations, especially in heathy habitats, appear to require periodic fire to initiate flowering. The pollinator of *T. epipactoides* flowers is a small native bee *Nomia* sp. that is attracted to the flowers by strong perfumes and/or rewards of nectar (Cropper 1993). The pollination rate is unknown, but it appears that *T. epipactoides* has optimised the chance of pollination by evolving a range of colour morphs (Cropper 1993).



Thelymitra epipactoides Port Campbell, Vic
© Gary Backhouse

Distribution

Thelymitra epipactoides is endemic to south-eastern Australia, where it is widely but sporadically distributed from the Eyre Peninsula in South Australia to central Gippsland in Victoria (Figure 18), in the Eyre-York Block, Murray-Darling Depression, Naracoorte Coastal Plain, and South East Coastal Plain IBRA bioregions. Maps showing the distribution of *T. epipactoides* are available from DEH (for SA) and DSE (for Vic).

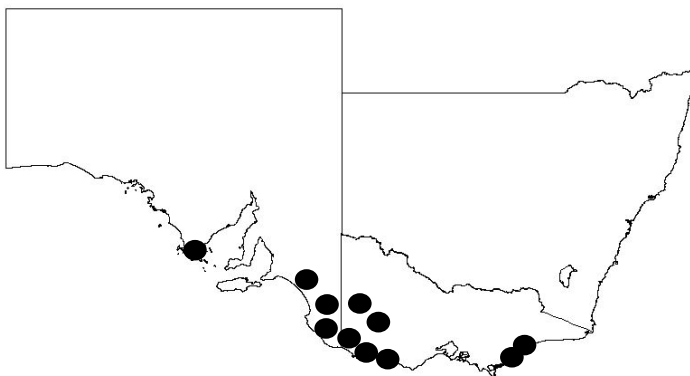


Figure 18. Distribution of *Thelymitra epipactoides*

Habitat

Thelymitra epipactoides occurs in a variety of habitats including grasslands, heathlands, heathy and shrubby woodlands and open forest. Substrates include moist to dry sandy loams, light sand over clay and heavier terra rossa soils over limestone. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Population Information

Thelymitra epipactoides is currently known from 50 populations containing only about 2,300 plants (Table 9). Most populations are very small, with only four containing 50 or more plants. About 30 populations contain 20 or fewer plants, while it is not known if plants persist in another 13 populations.

Table 9. Population and threat information for *Thelymitra epipactoides*

Location	Size	Extent	Manager	Threats (High Medium Low)
<i>South Australia</i>				
roadside, Duck Lake Road, Wangary	~80 plants	<2ha	DCLEP	<ul style="list-style-type: none"> • disturbance/ destruction (M) • Ph ytophthora (L) • grazi ng/predation (H) • lack of pollination/recruitment (H)
Meningie	~75 plants	~10 ha	CDC/DEH	<ul style="list-style-type: none"> • weed invasion (M) • grazi ng/predation (H)
Coorong National Park	32 plants	<1 ha	DEH	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (L) • grazi ng/predation (H)
Eastern Eyre Peninsula island ~30	plants	<1ha	DEH	<ul style="list-style-type: none"> • disturbance/ destruction (M)
Private property, Culburra	19 plants	<2 ha	private	<ul style="list-style-type: none"> • weed invasion (M) • grazing/pr edation (M)
Tilley Swamp Conservation Park	18 plants	<5 ha	DEH	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (L) • grazi ng/predation (H)
private property, Coonalpyn (1)	17 plants	<5 ha	private	<ul style="list-style-type: none"> • disturb ance/destruction (L) • weed invasion (M) • grazi ng/predation (H)
private property, Taillem Bend (1)	16 plants	<1 ha	private	<ul style="list-style-type: none"> • disturb ance/destruction (L) • weed invasion (M) • grazi ng/predation (H)
private property, Coonalpyn (2)	12 plants	<1 ha	private	<ul style="list-style-type: none"> • disturb ance/destruction (L) • weed invasion (M) • grazi ng/predation (H)
roadside, Flinders Hwy Wangary	10 plants	<1ha	DTEI	<ul style="list-style-type: none"> • lack of pollination/recruitment (H) • disturb ance/destruction (L)
roadside, Mena Road, Coulta	10 plants	<2ha	private	<ul style="list-style-type: none"> • lack of pollination/recruitment (H) • lack of fire regime (H)
Mocambar Forest Reserve	10 plants	<10 ha	Forestry SA	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (H) • grazi ng/predation (H)
Sawers Heritage Agreement (private property)	7 plants	<1 ha	private	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (M) • grazi ng/predation (H)
roadside, Sleaford Bay Road, Port Lincoln	7 plants	<1ha	DCLEP	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (L)
Reedy Well Water Reserve, Culburra	6 plants	<1 ha	CDC	<ul style="list-style-type: none"> • weed invasion (M) • grazi ng/predation (H)
roadside, Fishery Bay Rd	5 plants	<1ha	DCLEP	<ul style="list-style-type: none"> • grazing/pr edation (M) • lack of fire regime (H) • lack of pollination/recruitment (H) • disturbance/ destruction (M)
Messent Conservation Park	4 plants	<1 ha	DEH	<ul style="list-style-type: none"> • disturbance/ destruction (M) • grazi ng/predation (H)

Location	Size	Extent	Manager	Threats (High Medium Low)
private property, Meningie	4 plants	<1 ha	private	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (H) • grazing/predation (H)
Desert Camp Conservation Park	3 plants	<1 ha	DEH	<ul style="list-style-type: none"> • grazing/predation (H)
Padthaway Conservation Park	3 plants	<1 ha	DEH	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (M) • grazing/predation (H)
Tintinara Scrub	3 plants	<1 ha	DEH	<ul style="list-style-type: none"> • weed invasion (L) • grazing/predation (H)
Zellerfield Heritage Agreement (private property)	3 plants	<5 ha	private	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (L) • grazing/predation (H)
roadside, Mikkira Sanctuary, Port Lincoln	3 plants	<1ha	DCLEP	<ul style="list-style-type: none"> • lack of pollination/recruitment (H) • lack of fire regime (H) • weed invasion (L)
Coonalpyn Heritage Agreement (private property)	2 plants	<1 ha	private	<ul style="list-style-type: none"> • disturbance/destruction (L) • weed invasion (M) • grazing/predation (H)
Wanilla Conservation Park	2 plants	<1ha	DEH	<ul style="list-style-type: none"> • lack of pollination/recruitment (H) • weed invasion (M)
roadside, Forest Road, Fountain	2 plants	<1ha	DCLEP	<ul style="list-style-type: none"> • disturbance/destruction (H) • lack of pollination/recruitment (H) • weed invasion (M) • grazing/predation (L)
Parnkalla trail	2 plants	<1ha	PLCC	<ul style="list-style-type: none"> • weed invasion (M) • disturbance/ destruction (M)
Murray Bridge	1 plant	<1 ha	DEH	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (H) • grazing/predation (H)
private property, Taillem Bend (2)	1 plant	<1 ha	private	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (H) • grazing/predation (H)
Barwell Conservation Park	?	?	DEH	<ul style="list-style-type: none"> • ?
roadside, Wanilla Settlement	?	<1ha	DCLEP	<ul style="list-style-type: none"> • lack of pollination/recruitment (H) • weed invasion (M) • grazing/predation (L)
roadside, Wattle Drive, Wanilla	?	<1ha	DCLEP	<ul style="list-style-type: none"> • weed invasion (H) • disturbance/destruction (H)
Wanilla Forest Reserve	?	?	PLACC	?
Wanilla Railway corridor	?		Genesee & Wyoming Aust	<ul style="list-style-type: none"> • weed invasion (H) • grazing/predation (H) • lack of pollination/recruitment (H) • disturbance/ destruction (M)
roadside, Flinders Hwy, Fountain	?	?	?	<ul style="list-style-type: none"> • ?
roadside, Borlase Road, Fountain	?	<1ha	DCLEP	<ul style="list-style-type: none"> • disturbance/destruction (H) • lack of pollination/recruitment (H) • weed invasion (M) • grazing/predation (L)
Marble Range North	?	<1ha	private	<ul style="list-style-type: none"> • grazing/pr edation (M) • disturbance/ destruction (M)
Marble Range South	?	?	private	<ul style="list-style-type: none"> • ?
Shannon Heritage Agreement (private property)	?	?	private	<ul style="list-style-type: none"> • ?
Sect 212 Hundred of Koppio	?	?	private	<ul style="list-style-type: none"> • ?
Tod Reservoir	?	?	SA Water	<ul style="list-style-type: none"> • ?
Murrnatta Conservation Park	?	?	DEH	<ul style="list-style-type: none"> • weed invasion (M)

Location	Size	Extent	Manager	Threats (High Medium Low)
<i>Victoria</i>				
Port Campbell National Park (1)	~1,000 plants	<20 ha	PV	<ul style="list-style-type: none"> • disturbance/destruction (L) • grazing/predation (H) • altered fire regimes (M)
Bay of Islands Coastal Park	~400 plants	~20 ha	PV	<ul style="list-style-type: none"> • grazing/predation (H) • altered fire regimes (M)
Gippsland Lakes Coastal Park	~250 plants	<1 ha	PV	<ul style="list-style-type: none"> • grazing/predation (H) • altered fire regimes (M)
Blond Bay Wildlife Reserve	~200 plants	~20 ha	PV	<ul style="list-style-type: none"> • weed invasion (L) • grazing/predation (H) • altered fire regimes (M)
Lake Mundi Wildlife Reserve	~60 plants	<2 ha	PV	<ul style="list-style-type: none"> • weed invasion (L) • grazing/predation (H) • altered fire regimes (L)
roadside, Golden Beach	~30 plants	<1 ha	WS	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (H) • grazing/predation (H)
Kiata Flora and Fauna Reserve	10 plants	<1 ha	PV	<ul style="list-style-type: none"> • disturbance/ destruction (M) • weed invasion (H) • grazing/predation (H)
Port Campbell National Park (2)	10 plants	<1 ha	PV	<ul style="list-style-type: none"> • disturbance/ destruction (M) • grazing/predation (H) • altered fire regimes (M)
roadside, Strathdownie	1 plant	<1 ha	GS	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (H) • grazing/predation (H)
Grampians National Park	1 plant	<1 ha	PV	<ul style="list-style-type: none"> • grazing/predation (H)
Lower Glenelg National Park	?	<1 ha	PV	?

Abbreviations: CDC=Coroong District Council; DCLEP=District Council Lower Eyre Peninsula; DTEI=Dept. Transport, Energy & Infrastructure; GS=Glenelg Shire; PLACC=PLACC Port Lincoln Aboriginal Community Council; PLCC=Port Lincoln City Council; PV=Parks Victoria; WS=Wellington Shire

Decline and Threats

Although *Thelymitra epipactoides* remains widely distributed, it has suffered a substantial decline and range and abundance. Much of its habitat, especially in South Australia and western Victoria, has been cleared for agriculture, while heathy habitat in coastal areas has been cleared for residential development. There are historical records of *T. epipactoides* close to Melbourne (Epping and Beaumaris), but these populations were lost decades ago. In the south-east of South Australia, thousands of plants were observed flowering after the native vegetation was rolled and burned during land clearing operations there in the 1960s (NOSSA 2009), but these populations were subsequently lost when pasture or crops were sown. Plants have not been seen at the Lower Glenelg NP site for about 15 years, while the population in Mocambar Forest Reserve declined from about 60 plants to just 10 plants. At 13 locations on the Eyre Peninsula, plants have not been seen for several years, and it is not known if populations still persist there. Remaining populations are mostly small (<20 plants) and highly fragmented. About 30 populations contain 20 or fewer plants. Many populations on the Eyre Peninsula occur on roadsides, where they are at great risk. Low genetic diversity and inbreeding is a risk for many South Australian populations, especially on the Eyre Peninsula (K. Pobke, pers. comm.). There is a high risk of extinction of many populations due to the tiny population sizes and the highly fragmented distribution. It is likely that the conditions for maintenance of the pollinator and/or mycorrhizal fungi have been adversely affected at some sites, especially as pollination in very small populations is almost non-existent (NOSSA 2009). Remaining populations of *T. epipactoides* face a variety of current and potential threats, including:

Grazing

Grazing by kangaroos and rabbits/hares is a serious threat at the Lake Mundi WR, Port Campbell NP (1), Blond Bay WR, Kiata FFR (now fenced), Gippsland Lakes CP (now fenced), Coorong NP, Tilley Swamp CP, Coonalpyn HA, Murray Bridge, Taillem Bend private property 1 and Bay of Islands NP sites. Eyre Peninsula populations are grazed by kangaroos, sheep, snails and caterpillars (K. Pobke pers. comm.).

Weed invasion

A large variety of weed species are an existing or potential problem at most sites, with Bridal Creeper *Asparagus asparagoides* and/or Perennial Veldt Grass *Erharta calycina* at the Wanilla and Wangary populations on the Eyre Peninsula, Tilley Swamp CP, Coonalpyn HA, Meningie, Murray Bridge, Culburra private property, Reedy Well Water Reserve and Tailern Bend private property 1 sites, Wild Turnip *Brassica rapa* var. *silvestris* at the Coorong NP site, Capeweed *Arctotheca calendula* at the Murray Bridge site, Monterey Pine *Pinus radiata*, Gazania *Gazania* sp., African Boxthorn *Lycium ferocissimum* and Flame Caper *Euphorbia terracina* at the Meningie site, Monterey Pine at the Mocambar FR site, Ragwort *Senecio jacobaea* and pasture grasses at the Bay of Islands NP site, Dogwood *Cassinia* sp. and Onion Grass *Romulea rosea* var. *australis* have appeared in large numbers since the last fire at the Port Campbell NP (1) site.

Disturbance/destruction

There is potential for accidental disturbance to or destruction of plants and/or habitat at many sites. There is the risk of accidental trampling or destruction of plants by road/track maintenance activities at the Port Campbell NP (1) and Roadside (Golden Beach & Strathdownie) sites and most populations on the Eyre Peninsula. Rubbish dumping has occurred in the vicinity of the Golden Beach roadside site. There is a risk of grazing or accidental trampling resulting from illegal stock grazing or escapees from surrounding farmland at the Bay of Islands NP site. There is a risk of accidental trampling or removal of flower spikes if a proposed walking track passes through the Port Campbell NP (1) site. Alterations to current hydrology have the potential to adversely affect populations at the Lake Mundi WR, Golden Beach roadside, Blond Bay WR, and Gippsland Lakes CP sites. Plants from some populations have been illegally picked.

Altered fire regimes

Populations growing in dense heathy habitats probably rely on periodic summer wildfire to initiate flowering by temporarily reducing competition. Too frequent fire or fire at the wrong time, especially in spring, could damage plants and/or habitat. Absence of fire may mean reduced opportunities for flowering, seed production and establishment of new plants.

Climate variation

The flowering period of *T. epipactoides* has been cut short by severe hot north winds on Eyre Peninsula in recent years (first recorded Oct & Nov 2006) (K. Pobke pers. comm.). Flowers have been observed opening once or twice and then wilting and shrivelling, instead of the traditional multiple reopening and closing of flowers throughout the flowering season. This renders the flowers unavailable for pollination and effectively finished for the year. Such interference in plant life cycle has been recorded in below average and above average rainfall years now, but seems more pronounced in below average drought years and in populations that persist in fragmented habitat.

Current Conservation Measures

A number of measures for the conservation of *T. epipactoides* have been undertaken, including:

- Demographic monitoring of the Gippsland Lakes CP, Blond Bay WR, Bay of Islands NP and Tilley Swamp CP sites, and current status monitoring at all other sites.
- Fencing and/or caging of plants at the Gippsland Lakes CP, Kiata FFR, Blond Bay WR, Coorong NP, Meningie Parklands and Tilley Swamp CP sites to protect them from grazing/disturbance.
- Weed control in the vicinity of the Tilley Swamp CP site.
- Hand pollination of flowers at some Eyre Peninsula sites in 2009 (DEH permit # 25744-1).
- Genetic testing of Eyre Peninsula and South East South Australia populations (unpublished results, Ottewell 2009).
- Collection of seed for long-term storage.
- Ecological burning at the Port Campbell NP (1) and Mocambar FR sites in autumn 2003 and 2007 respectively, to stimulate *T. epipactoides* flowering.
- Periodic slashing of the Gippsland Lakes CP site to stimulate flowering.
- Research into the ecology and pollination biology of *T. epipactoides* (Calder *et al.* 1989; Cropper & Calder 1990).
- Monitoring of population numbers and reassessment of threats undertaken for the Upper South East (SA) populations (Davies 2009).
- Prior to the implementation of a proposed change in the hydrological regime for Messent Conservation Park, a survey for *T. epipactoides* was conducted in areas that may be inundated (Cutten & Squires 2002). Since no *T. epipactoides* were recorded in the area surveyed, potential

flooding regimes were suggested for the area. Following a wildfire in the Park in 2002, another survey for *T. epipactoides* was undertaken (Cutten & Squires 2003).

- A Regional Recovery Plan was written for nine nationally threatened plant taxa in the SA Murray Darling Basin NRM Region, including *Thelymitra epipactoides* (Obst 2005).
- Preparation of a fact sheet for the SAMDB Region, hosted on the Department for Environment and Heritage website, http://www.environment.sa.gov.au/biodiversity/pdfs/metallic_sunorchid.pdf
- The recently formed Friends of Meningie Parklands Group has commissioned a management plan for the parklands and undertaken control of Gazanias, African Boxthorn and Monterey Pines

***Thelymitra gregaria* D.L. Jones & M.A. Clem. Basalt Sun-orchid**

Description

The Basalt Sun-orchid *Thelymitra gregaria* has a single dark green, linear-lanceolate, channelled basal leaf to 15 cm in length, and a slender dark green stem to 20 cm tall, with 1–6 flowers to 30 mm across, colour varying from dark blue to purplish, with darker veins, the column bluish with a curved, hooded black or brownish post-anther lobe, yellow apex and white hair tufts. The species has a distinctive, clump-forming habit. Flowering occurs in October and November (description from Backhouse & Jeanes 1995, as *Thelymitra* sp. aff. *nuda*).

Little is known of the biology or ecology of *T. gregaria*. Pollination occurs through simple food deception and, like many other sun-orchids, the species is probably capable of self-pollination as well (Jones 2006).



Thelymitra gregaria Caramut, Vic © Gary Backhouse

Distribution

Thelymitra gregaria is endemic to a limited area in south-western Victoria, in the Victorian Volcanic Plain IBRA bioregion (Figure 19). Maps showing the distribution of *T. gregaria* are available from DSE.



Figure 19. Distribution of *Thelymitra gregaria*

Habitat

Thelymitra gregaria occurs in open species-rich native grassland dominated by *Themeda triandra* with perennial herbs and lilies on poorly drained red-brown basalt soils, often at sites with embedded basalt boulders. The sites form part of the 'Natural Temperate Grassland of the Victorian Volcanic Plain', which is a critically endangered ecological community under the EPBC Act, and the 'Western (Basalt) Plains Grasslands Community' which is listed as a threatened ecological community under the FFG Act. Recovery actions include the identification of habitat critical to the survival of the species.

Population Information

Thelymitra gregaria is known from eight populations containing about 3,000 plants (Table 10).

Table 10. Population and threat information for *Thelymitra gregaria*

Location	Size	Extent	Manager
roadside, Caramut	>2,000 plants	~20 plants	Moyne Shire
roadside, Woorndoo	~300 plants	<5 plants	Moyne Shire
roadside, Nerrin Nerrin	~300 plants	<5 plants	Ararat Shire
Whitcliffe	~100 plants	<5 ha	Ararat Shire
roadside, Derrinallum	~100 plants	<5 plants	Corangamite Shire
roadside, Eucumbene	~100 plants	<20 plants	Moyne Shire
roadside, Vite Vite	~100 plants	<5 plants	Corangamite Shire
Yalla-Y-Poora Grassland Reserve	~50 plants	<1 ha	Parks Victoria

Decline and Threats

The original distribution and abundance of *T. gregaria* is not known, but it is highly likely to have been restricted to the native grasslands and grassy woodlands of the western basalt plains. This habitat has been reduced to less than 1% of its original occurrence (CNR 1994, mostly for agriculture, and many populations of *T. gregaria* have undoubtedly been lost. There has been extensive loss of grasslands and grassy woodlands in south-eastern Australia, such that these are now some of Australia's most threatened ecosystems (Kirkpatrick *et al.* 1995). Remaining populations are mostly small and all are restricted to tiny remnant patches of habitat, often in highly tenuous locations such as roadsides. There is a high risk of extinction due to the small population size at most sites and the highly disjunct distribution of the species. It is possible that some ecological functions such as conditions for the maintenance of pollinator and fungal activity have been adversely affected at these remnant sites. Remaining populations of *T. gregaria* are at risk from a variety of current and potential threats, including:

Disturbance/destruction

Accidental disturbance to or destruction of plants and habitat from vehicle and stock movement and road/utilities installation and maintenance activities is a serious ever present risk at all sites, despite some populations being sign-posted. Soil disturbance facilitates weed invasion and establishment, with weeds readily colonizing disturbed sites.

Weed invasion

Weed invasion, especially by pasture grasses and other weeds such as *Phalaris aquatica*, *Romulea rosea* and *Cuscuta dubia* is a major recurring problem at all sites, especially sites suffering soil disturbance or with the prolonged absence of fire.

Altered fire regimes

Thelymitra gregaria probably requires periodic fire to reduce accumulation of grasses, especially Kangaroo Grass, which otherwise may suppress growth if grass swards become too dense.

Grazing

Grazing by introduced herbivores (rabbits/hares) is a minor threat at several locations, while invertebrate predation on seed capsules also occurs. Grazing and trampling by stock is a potential threat if stock are moved along roadsides containing the species.

Current Conservation Measures

A number of measures for the conservation of *T. gregaria* have been undertaken, including monitoring annually at all sites and collection and long-term storage of seed from several populations.

***Thelymitra hiemalis* D.L. Jones & M.A. Clem. Winter Sun-orchid**

Description

The Winter Sun-orchid *Thelymitra hiemalis* has a single dark green, linear-lanceolate, channelled basal leaf to 15 cm in length, and a slender dark green stem growing to 35 cm tall, with 1–4 flowers to 30 mm across that have greenish sepals, spotted pale blue petals and labellum, and a white column with a reddish collar, yellow apex and white hair tufts. Flowering can occur from March to October, although most records have been between June and August (description from Backhouse & Jeanes 1995, as *Thelymitra ixioides* var. *subdifformis*).

Little is known of the biology or ecology of *T. hiemalis*. It has only ever been recorded from very few sites and plants, and on the rare occasions it has been seen in the field, it is often just a single plant. In South Australia, the species is detected about every three years, and is considered possibly a freak development of the common *Thelymitra ixioides* or a related species (NOSSA 2009). *Thelymitra hiemalis* was once known as *T. ixioides* var. *subdifformis*.

Distribution

Thelymitra hiemalis has a wide but apparently sporadic distribution in south-western Victoria and south-eastern South Australia (Figure 20). In Victoria it has recently been recorded near Anglesea (South East Coastal Plain IBRA bioregion) and Portland (Naracoorte Coastal Plain IBRA bioregion) while in South Australia there are records from near Port MacDonnell (Naracoorte Coastal Plain IBRA bioregion) and Mount Crawford and Meadows in the Adelaide Hills (Flinders Lofty Block IBRA bioregion). Maps showing the distribution of *T. hiemalis* are available from DSE (for Victoria) and DEH (for South Australia).

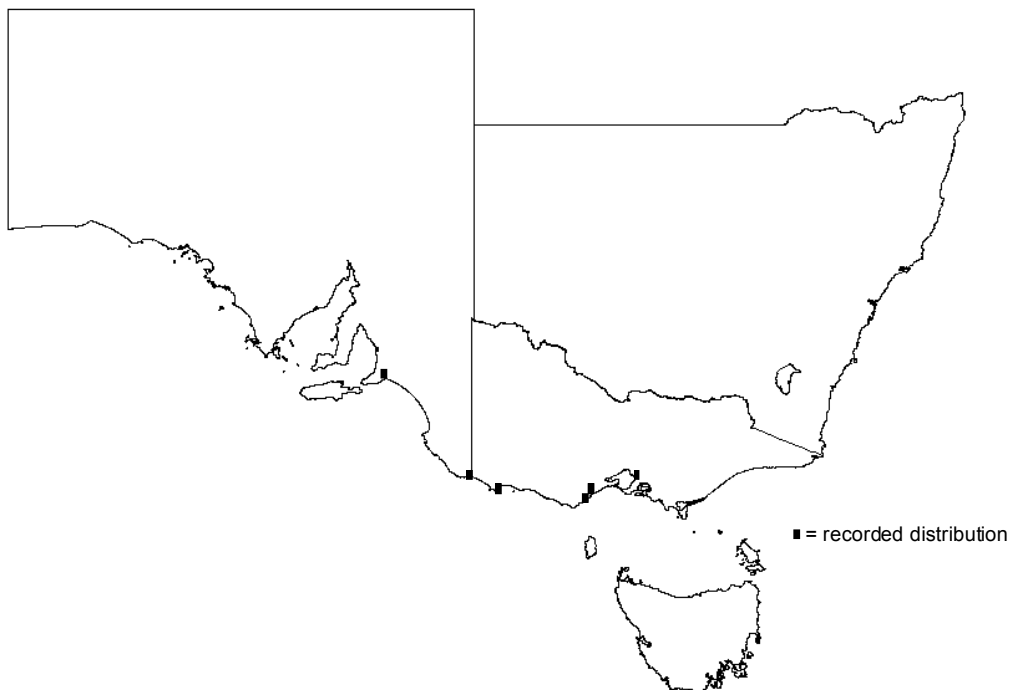


Figure 20. Distribution of *Thelymitra hiemalis*

Habitat

Thelymitra hiemalis occurs in *Eucalyptus baxteri* or *Eucalyptus willisii* woodland with an understorey typically dominated by heath species such as *Xanthorrhoea australis*, *Leptospermum myrsinoides*, *Leptospermum continentale*, *Acacia oxycedrus*, *Banksia marginata* or *Pteridium esculentum* on well

drained dark grey loamy sand. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Population Information

Thelymitra hiemalis is currently known from about 10 plants occurring at six locations (Table 11).

Table 11. Population and threat information for *Thelymitra hiemalis*

Location	Size	Extent	Manager	Threats (High Medium Low)
<i>Victoria</i>				
Mount Richmond National Park	3 plants	<1 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (L)
Angahook-Lorne State Park	2 plants	<1 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H)
Portland (private property)	2 plants	<1 ha	private	<ul style="list-style-type: none"> • weed invasion (M)
Lower Glenelg National Park	1 plant	<1 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (L)
Bats Ridge Flora and Fauna Reserve	1 plant	<1 ha	Parks Victoria	<ul style="list-style-type: none"> • disturbance/destruction (H) • weed invasion (L)
Aireys Inlet (private property)	1 plant	<1 ha	private	<ul style="list-style-type: none"> • disturbance/destruction (L)
<i>South Australia</i>				
Port MacDonnell	?	?	?	
Mount Crawford	?	?	?	
Meadows	?	?	?	

Decline and Threats

Little is known of the historical range or abundance of *T. hiemalis*, but it seems to always have been a naturally rare plant. There are historical records from the south-east of Melbourne and from Port Campbell, which may indicate a decline in distribution and abundance of the species. There are no recent records from South Australia (NOSSA 2009). There is a high risk of extinction due to the tiny population sizes and the highly fragmented distribution. It is likely that the conditions for maintenance of the pollinator and/or mycorrhizal fungi have been adversely affected at some sites. Remaining populations of *T. hiemalis* face a variety of threats including:

Weed invasion

The Lower Glenelg NP, Mt. Richmond NP, Bats Ridge FFR, and Portland private property sites are at risk of Monterey Pine *Pinus radiata* or Coast Wattle *Acacia longifolia* invasion.

Disturbance/destruction

The Mt. Richmond NP, Bats Ridge FFR and Angahook-Lorne SP sites are at risk of accidental destruction caused by track maintenance activities. All populations are highly vulnerable to damage from trampling, and maintaining site confidentiality is important to protecting existing plants.

Current Conservation Measures

A number of measures for the conservation of *T. gregaria* have been undertaken, including monitoring annually at several sites and collection and long-term storage of seed from several populations. There is continuing liaison with the landholders of the Aireys Inlet and Portland private property sites, who have been very supportive of conservation efforts.

***Thelymitra mackibbinii* Muell. Brilliant Sun-orchid**

Description

The Brilliant Sun-orchid *Thelymitra mackibbinii* Muell. has a single slender, basal, channelled, dark green leaf growing to 10 cm long. The erect flower stem grows to 20 cm tall and bears 1–3 purple to pinkish flowers with faint darker stripes, the sepals and petals to 17 mm long, the column has a yellow apex and distinct glandular, incurved lateral lobes lacking hair tufts. Flowering occurs in September and October (description from Backhouse & Jeanes 1995).

Little is known of the biology or ecology of *T. mackibbinii*. Pollination occurs through simple food deception and, like many other sun-orchids, the species is probably capable of self-pollination as well (Jones 2006).

Distribution

Thelymitra mackibbinii is sporadically distributed across central and western Victoria, where it is currently known from only two sites between Stawell and St Arnaud, in the Victorian Midlands IBRA bioregion (figure 21). There is an unconfirmed (and doubtful) record from near Bordertown in South Australia. Maps showing the distribution of *T. mackibbinii* are available from DSE.



Thelymitra mackibbinii Deep Lead, Vic © Mike Duncan



Figure 21. Distribution of *Thelymitra mackibbinii*

Habitat

Thelymitra mackibbinii grows in open forest dominated by *Eucalyptus leucoxyton* and sometimes with *Allocasuarina verticillata*, with a heathy understorey typically consisting of *Acacia paradoxa*, *Acacia*

montana and *Pultenaea largiflorens* on well drained light brown silt with quartz and lateritic lag deposits. Recovery actions include survey and mapping of habitat that will lead to the identification of habitat critical to the survival of the species.

Population Information

Thelymitra mackibbinii is currently known from just two populations: one in Deep Lead Nature Conservation Reserve near Stawell containing 10 plants, and a second at Mt. Bolangum Nature Conservation Reserve near Marnoo containing 12 plants. Both sites are managed by Parks Victoria.

Decline and Threats

The historical range of *T. mackibbinii* is unknown, but it is likely to have been more common in central and western Victoria prior to land clearing. Plants have not been seen at the type location near Maryborough in central Victoria for over 100 years. Other reported occurrences have been near Bendigo, Ballarat and near Bordertown in South Australia (NOSSA 2009), but no plants have been seen in the last decade or so at any of these locations. Much of the woodland habitat of *T. mackibbinii* has been cleared for agriculture, with remaining patches having a long history of disturbance from gold mining and timber harvesting.

Both remaining populations occur in a relatively weed-free habitats, although face a variety of current and potential threats. There is a high risk of extinction due to the tiny population sizes and the highly fragmented distribution. It is likely that the conditions for maintenance of the pollinator and/or mycorrhizal fungi have been adversely affected at some sites. Grazing by native and introduced herbivores is a threat at both sites, with grazing of leaves and seed capsules observed at the Mt. Bolangum site. There is a high potential for disturbance/destruction by off-road vehicles and accidental trampling by people.

Current Conservation Measures

A number of measures for the conservation of *T. mackibbinii* have been undertaken, including monitoring at the Deep Lead and Mt Bolangum sites, and collection and storage of seed.

Recovery Objectives and Actions

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of each of the 21 threatened orchid species in the wild and to increase the probability of populations becoming self-sustaining in the long term. Within the duration of this Recovery Plan, the specific objectives for the recovery of the 21 threatened orchid species are to:

1. Determine distribution, abundance and population structure
2. Determine habitat requirements
3. Ensure that all populations and their habitat are protected and managed
4. Manage threats to populations
5. Identify key biological functions
6. Determine growth rates and viability of populations
7. Establish a population in cultivation
8. Establish new populations in the wild
9. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for the 21 threatened orchid species and will be implemented and managed by the Department of Sustainability and Environment (for Victoria), the Department for Environment and Heritage (for South Australia) and the Department of Environment, Climate Change and Water (for NSW), supported by other agencies, educational institutions, regional natural resource management authorities and community groups as appropriate. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist groups on research, *in situ* management, community education and cultivation as required. Contact will be maintained between the State agencies on recovery issues concerning the threatened orchid species. The Recovery Plan will run for a maximum of five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption.

Recovery Objectives, Actions and Performance Criteria

Action	Description	Species Targeted	Performance Criteria
Specific Objective 1: Determine distribution, abundance and population structure			
1.1	Undertake surveys to determine the area and extent of populations, the number, size and structure of populations, and inference or estimation of population change. Responsibility: DSE, PV, DEH, Albury City	All 21 species	<ul style="list-style-type: none"> For each species, at least five current population sites searched during flowering season (for species with <5 pops; all current population sites searched). Sites mapped for population size, condition and habitat.
1.2	Determine taxonomy of all populations to confirm identity. Responsibility: DSE	<i>Caladenia concolor</i> <i>Caladenia</i> sp. aff. <i>venusta</i> <i>Prasophyllum suaveolens</i> <i>Prasophyllum subbisectum</i> <i>Pterostylis despectans</i> <i>Pterostylis</i> sp. aff. <i>boormanii</i>	<ul style="list-style-type: none"> Taxonomy of all uncertain populations/undescribed species clarified.
Specific Objective 2: Determine habitat requirements			
2.1	Survey known habitat and collect floristic and environmental information relevant to community ecology and condition. Responsibility: DSE, DEH, DECCW	<ul style="list-style-type: none"> All 21 species 	<ul style="list-style-type: none"> Species/habitat specific survey design prepared. Habitat critical to survival mapped for at least three populations for each species (for species with <3 pops; all current population sites mapped).
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference. Responsibility: DSE, DEH, DECCW	<ul style="list-style-type: none"> All 21 species 	<ul style="list-style-type: none"> Survey potential habitat at three sites for each species. Predictive model for potential habitat developed & tested at two sites for each species.
Specific Objective 3: Ensure that all populations and their habitat are protected and managed appropriately			
3.1	Protect populations on public land. Responsibility: DSE, DEH, DoL	<i>Caladenia concolor</i> <i>Caladenia pilotensis</i> <i>Diuris ochroma</i> <i>Prasophyllum fosteri</i> <i>Prasophyllum suaveolens</i> <i>Pterostylis despectans</i> <i>Thelymitra epipactoides</i> <i>Thelymitra gregaria</i>	<p>Public Authority Management Agreements (PAMA), Special Protection Zones (SPZ) or similar in place for the following species & sites:</p> <ul style="list-style-type: none"> PAMA for Harcourt and Tyaak sites; SPZ for Carboor and Castlemaine SF sites; preparation of Fire Management Plan for Nail Can Hill, Albury SPZ for Barambogie SF site. PAMA for Abbeyard roadside site. PAMA for Shelford roadside site. PAMA for Ballarat reserve and Caramut, Derrinallum, Vite Vite, Woorndoo & Wingeel roadside sites. SPZ for Daisy Hill, Glenmona, Lillicur and Wareek SF sites. PAMA for Golden Beach & Strathdownie roadside sites (Vic); protection agreement for Meningie, Murray Bridge and Tintinara Scrub sites (SA). PAMA for Whitcliffe & Caramut, Derrinallum, Eucumbene, Nerrin Nerrin, Vite Vite & Woorndoo roadside sites.
3.2	Protect populations on private land.		Conservation covenant (CC) or similar private land agreement in place for the

Responsibility: DSE, DEH

Caladenia concolor
Caladenia cruciformis
Prasophyllum hygrophilum
Prasophyllum suaveolens
Pterostylis despectans
Thelymitra epipactoides

Thelymitra hiemalis

following species & sites:

- Barfold, Christmas Hills & Mandurang South private property sites.
- Stuart Mill private property sites.
- Bendigo private property site.
- Darlington private property site.
- Bung Bong, Maryborough (Vic) and Mt. Bryan (SA) private property sites.
- Initiate private land management agreement at Coonalpyn 1 & 2, Meningie, & Tailern Bend 1 & 2 private land sites.
- Aireys Inlet and Portland private property sites.

Specific Objective 4: Manage threats to populations

4.1	Control threats from pest plants. Responsibility: DSE, PV, DEH, DECCW	All 21 species	<ul style="list-style-type: none"> • Measurable reduction in cover of weeds at and near all sites.
4.2	Control threats from pest animals. Responsibility: DSE, PV, DEH, DECCW	All 21 species	<ul style="list-style-type: none"> • Measurable reduction in damage by pest animals at and near all sites.
4.3	Control the threat of direct damage by human activities. Responsibility: DSE, PV, DEH, DECCW	All 21 species	<ul style="list-style-type: none"> • Impact of human activities at all sites monitored and reduced (e.g. by signage, fencing) if required.
4.4	Manage microhabitat for seedling recruitment, collect seed and restock populations with seed. Responsibility: DSE, DEH	All 21 species	<ul style="list-style-type: none"> • Measurable increase in recruitment at three treated sites for each species (for species with <3 pops; all current population sites treated).

Specific Objective 5: Identify key biological functions

5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels. Responsibility: DSE, DEH, DECCW	All 21 species	<ul style="list-style-type: none"> • Reproductive ecology and regenerative potential quantified for three representative sites for each species (for species with <3 pops; all current populations evaluated). • Seed bank potential quantified for four representative sites.
5.2	Identify key stimuli for seed germination requirements. Responsibility: DSE, DEH, DECCW, RBG	All 21 species	<ul style="list-style-type: none"> • Stimuli for recruitment identified. • Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival.
5.3	Identify optimal fire regimes to maintain habitat. Responsibility: DSE, PV	<i>Diuris ochroma</i> <i>Prasophyllum fosteri</i> <i>Prasophyllum suaveolens</i> <i>Thelymitra epipactoides</i> <i>Thelymitra gregaria</i>	<ul style="list-style-type: none"> • Preparation and implementation of management prescriptions for ecological burning at key population sites.

Specific Objective 6: Determine the growth rates and viability of populations			
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. Responsibility: DSE, DEH, DECCW	All 21 species	<ul style="list-style-type: none"> • Techniques for monitoring developed and implemented. • Population growth rates determined and Population Viability Analysis completed for two populations of each species (EXCEPT for <i>Caladenia</i> sp. aff. <i>venusta</i>, <i>Prasophyllum morganii</i>, <i>Prasophyllum suttonii</i>, <i>Thelymitra hiemalis</i> where remaining populations are too small (or the species is extinct) to achieve this).
Specific Objective 7: Establish a population in cultivation			
7.1	Establish a seed bank and determine seed viability. Responsibility: RBG, DECCW	All 21 species	<ul style="list-style-type: none"> • Seed from five populations in storage.
7.2	Establish plants in cultivation to safeguard against destruction of wild populations, provide a research population and potentially for reintroductions. Responsibility: DSE, RBG, NOGN, DECCW	All 21 species	<ul style="list-style-type: none"> • Development of effective propagation and cultivation techniques. • At least 50 healthy, genetically diverse, mature plants in cultivation. • At least 500 seedlings propagated in flasks for translocation to the wild.
Specific Objective 8: Establish new populations in the wild			
8.1	Select and evaluate potential reintroduction sites that are ecologically suitable, have secure land tenure and are managed appropriately. Responsibility: DSE	All 21 species	<ul style="list-style-type: none"> • Criteria for site suitability identified and site selected. • At least one translocation site identified and prepared for each species. • Translocation plan developed and approved.
8.2	Prepare site to achieve maximum survival of plants / germination of seed, using fungal baiting techniques. Responsibility: DSE	All 21 species	<ul style="list-style-type: none"> • Successful fungal baiting, direct seeding, and translocation techniques developed.
8.3	Introduce and monitor plants from cultivation, or seed stock (sow seed and fungus mix directly into the field). Responsibility: DSE	All 21 species	<ul style="list-style-type: none"> • Measurable increase in population size at the site.
Specific Objective 9: Build community support for conservation			
9.1	Identify opportunities for community involvement in the conservation of the 15 threatened orchid species. Responsibility: DSE, PV, DEH, DECCW	All 21 species	Community nature conservation and Landcare groups aware of the species and support its conservation.

Abbreviations: DECCW=Department of Environment, Climate Change and Water (NSW); DEH=Department for Environment and Heritage (SA); DoL = Department of Lands NSW; DSE=Department of Sustainability and Environment (Vic); NOGN=Native Orchid Growers Network; PV=Parks Victoria; RBG=Royal Botanic Gardens, Melbourne

Management Practices

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of each threatened orchid taxon necessary for specific population management. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are structured to acquire baseline data, assess habitat condition, including ecological and biological function, and maintain or improve population growth through protection and management.

On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to mitigate these threats including weed control, caging / fencing, control of pest animals, and fire management. Broad-scale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers including private landholders. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The recovery plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of seed bank dynamics and recruitment. Successful *in situ* population management will be founded on understanding the obligate relationships between each threatened orchid taxon and associated flora, as well as its response to environmental processes. These are directly linked to seed production, recruitment and regeneration and are thus vital to recovery. A demographic census will be necessary to gather life history information and to monitor the success of particular management actions. In addition to the above, *ex situ* conservation measures will be required and will include seed storage and plant cultivation. Cultivating *ex situ* populations will also aim to increase the amount of seed available for reintroduction to sites. Translocation of cultivated plants will be considered only where there is a high chance of success, and where secure sites exist.

Biodiversity Benefits

The recovery plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria, South Australia and New South Wales. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with each threatened orchids, particularly those species with similar life forms and/or flowering responses. Protecting sites of threatened orchids on the western basalt plains of Victoria will also lead to the protection of high value remnants of the threatened ecological community 'Natural Temperate Grassland of the Victorian Volcanic Plain', which supports a variety of nationally threatened animals and more than 20 threatened plants (DEWHA 2008).

The recovery plan will also provide an important public education role as orchids have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation. Germination and cultivation techniques developed during the recovery phase will be of use for other threatened orchids elsewhere in southeast Australia while the requirement to recover taxa across state boundaries will better develop working relationships between state departments on a broader range of biodiversity conservation issues.

Several sites support more than one nationally threatened orchid (and some sites have other nationally threatened flora present) covered by this or other recovery plans, and implementing recovery actions on-site will benefit several species. Locations with more than one threatened orchid include:

- *Caladenia cruciformis* grows with *Caladenia creatcea* at two sites near Stuart Mill.
- *Prasophyllum subbisectum* grows with *Caladenia fulva* at Deep Lead.
- *Prasophyllum fosteri* and *Thelymitra gregaria* occur together at Mt. Mercer.
- *Prasophyllum suaveolens* and *Thelymitra gregaria* occur together at Caramut, Derrinallum, Vite Vite, Woorndoo and Yalla-Y-Poora. *Pimelea spinescens* subsp. *spinescens* is also present at the Wingeel site, while *Leucochrysum albicans* subsp. *albicans* var. *tricolor* is also present at the Woorndoo site.

- *Thelymitra epipactoides* grows with *Prasophyllum frenchii* at Golden Beach, with *Caladenia lowanensis* and *Caladenia tensa* at Kiata and with *Pterostylis cucullata* at the Bay of Islands site.

Affected Interests

The 21 threatened orchids occur across a variety of land tenures, including parks and reserves, public land not specifically reserved for conservation, and private property. Consequently, their management is the responsibility of a range of organisations and individuals, including the Department of Sustainability and Environment (Vic), Parks Victoria, the Department for Environment and Heritage (SA), the Department of Environment, Climate Change and Water (NSW), local councils, local authorities, community groups and landholders (Table 12). The recovery plan has the support of government agencies, statutory authorities and community groups involved in orchid conservation in Victoria, South Australia and New South Wales, who will assist in the management and monitoring of each species. Important community groups include the Australasian Native Orchid Society (Victorian and Geelong groups) and the Native Orchid Society of South Australia.

Table 12. Organisations with a direct interest in the conservation of the 21 threatened orchid species

Species	Management Interest
<i>Caladenia concolor</i>	DSE, PV, DECCW, Albury City, Department of Lands, NSW Nature Conservation Trust; Wangaratta & Murrindindi Shires, landowner
<i>Caladenia cruciformis</i>	DSE, PV, landowner
<i>Caladenia fulva</i>	DSE, PV
<i>Caladenia maritima</i>	DSE, PV
<i>Caladenia pilotensis</i>	DSE, PV, Wangaratta Shire
<i>Caladenia</i> sp. aff. <i>venusta</i>	DSE, PV, Maroondah City
<i>Diuris ochroma</i>	DSE, PV, DECCW, Alpine & Cooma-Monaro Shires, landowner
<i>Prasophyllum fosteri</i>	DSE, Golden Plains Shire
<i>Prasophyllum hygrophilum</i>	DSE, PV, landowner
<i>Prasophyllum morganii</i>	DSE, PV
<i>Prasophyllum niphopedium</i>	DSE, PV
<i>Prasophyllum suaveolens</i>	DSE, PV, Ballarat City, Corangamite, Golden Plains & Moyne Shires, landowner
<i>Prasophyllum subbisectum</i>	DSE, PV
<i>Prasophyllum suttonii</i>	DSE, PV
<i>Prasophyllum uvidulum</i>	DSE, PV
<i>Pterostylis despectans</i>	DSE, PV, DEH, DECCW, LHPA, landowner
<i>Pterostylis</i> sp. aff. <i>boormanii</i>	DSE, PV
<i>Thelymitra epipactoides</i>	DSE, PV, DEH, FSA, Wellington Shire, landowner
<i>Thelymitra gregaria</i>	DSE, PV, Moyne, Ararat & Corangamite Shires
<i>Thelymitra hiemalis</i>	DSE, PV, DEH, landowner
<i>Thelymitra mackibbinii</i>	DSE, PV

Abbreviations: DECCW=Department of Environment, Climate Change and Water (NSW); DEH=Department for Environment & Heritage (SA); DSE=Department of Sustainability & Environment (Vic); LHPA=Livestock Health and Pest Authority (NSW); PV=Parks Victoria

Role and interests of indigenous people

Indigenous communities on whose traditional lands the 21 threatened orchids occur have been advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and invited to provide comments and be involved in the implementation of the plan.

Social and Economic Impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Most populations occur on public land, either crown land reserved for various public purposes, or on road reserves, managed by a variety of local and State government agencies. Any protection measures required at these sites (e.g. fencing, signage, track closures) will have minimal impact on current recreational and commercial activities. Protection of these populations has been negotiated with the relevant land manager. Protection of populations on private land or land managed by other authorities will be achieved through voluntary agreements with landowners and managers.

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Priority, Feasibility and Estimated Costs of Recovery Actions

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					Total
					Year 1	Year 2	Year 3	Year 4	Year 5	
1	Distribution, abundance									
1.1	Surveys	1	100%	DSE, DECC	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$300,000
1.2	Taxonomy	2	100%	DSE, DECC, CPBR	\$20,000	\$20,000	\$20,000	\$0	\$0	\$60,000
2	Habitat requirements									
2.1	Known habitat	1	100%	DSE, DECC	\$100,000	\$100,000	\$0	\$0	\$0	\$200,000
2.2	Potential habitat	2	75%	DSE, DECC	\$0	\$0	\$60,000	\$60,000	\$0	\$120,000
3	Habitat protection									
3.1	Public land	1	100%	DSE	\$0	\$0	\$25,000	\$25,000	\$25,000	\$75,000
3.2	Private land	1	100%	DECC	\$30,000	\$30,000	\$30,000	\$0	\$0	\$90,000
4	Threat management									
4.1	Pest plants	1	90%	DSE, PV, DECC	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
4.2	Pest animals	1	90%	DSE, PV, DECC	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000
4.3	Human damage	1	90%	DSE, PV, DECC	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$200,000
4.4	Seedling recruitment	1	75%	DSE, DECC	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$300,000
5	Biological functions									
5.1	Reproductive status	2	75%	DSE, PV, DECC	\$50,000	\$50,000	\$50,000	\$50,000	\$0	\$150,000
5.2	Seed germination	2	100%	DSE, DECC, RBG	\$0	\$0	\$50,000	\$50,000	\$50,000	\$150,000
5.3	Fire regimes	1	75%	DSE, PV, DECC	\$60,000	\$60,000	\$80,000	\$80,000	\$80,000	\$300,000
6	Population viability									
6.1	Censusing	1	100%	DSE, DECC	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000
7	Cultivation									
7.1	Seed bank	2	75%	DSE, RBG, NOGN	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
7.2	Cultivated plants	2	100%	RBG	\$0	\$0	\$300,000	\$30,000	\$50,000	\$110,000
8	New populations									
8.1	Site selection	2	75%	DSE, RBG, NOGN	\$0	\$50,000	\$50,000	\$0	\$0	\$100,000
8.2	Site preparation	2	100%	DSE, DECC, RBG	\$0	\$0	\$50,000	\$50,000	\$0	\$100,000
8.3	Reintroduction	2	100%	RBG	\$0	\$0	\$0	\$50,000	\$50,000	\$100,000
9	Community support									
9.1	Community extension	3	100%	DSE, PV, DECC	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
TOTALS					\$590,000	\$750,000	\$1,155,000	\$835,000	\$695,000	\$3,755,000