

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister's delegate approved this Conservation Advice on 16/12/2016.

Conservation Advice

Caladenia fulva

tawny spider-orchid

Conservation Status

Caladenia fulva (tawny spider-orchid) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from the 16 July 2000. The species was eligible for listing under the EPBC Act as on 16 July 2000 it was listed as Endangered under Schedule 1 of the preceding Act, the *Endangered Species Protection Act 1992* (Cwlth).

Species can also be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

The main factors that are the cause of the species being eligible for listing in the Endangered category are the species' restricted geographic range, small number of locations, its fragmentation and the projected decline due to the threats it is facing.

Description

The tawny spider-orchid (Orchidaceae) is an herbaceous perennial geophyte which is 25 cm high, with a single leaf 12–25 cm long and one to two flowers. It is a deciduous orchid that dies back annually to a small, spherical, underground tuber (Backhouse & Jeanes 1995). The single leaf is narrow, green with reddish spots at the base and sparsely hairy (Entwisle 1994; Backhouse & Jeanes 1995). The erect hairy flower stem grows to 25 cm high and has one or two creamy white to pale yellowish flowers with variable red streaking to 8 cm wide (Backhouse & Jeanes 1995; Jeanes & Backhouse 2006). The sepals and petals are up to 8 cm long with tawny to black tips; the uppermost sepal is erect, the petals and lateral sepals spreading and drooping (Backhouse & Jeanes 1995). The central petal (labellum) is deep red or tawny, narrowly triangular with the tip rolled under and paler towards the base. The expanded part of the labellum has four to six rows of short, curved, bluntly pointed reddish fleshy teeth and its sides are fringed with short thickened teeth decreasing in size and extending almost to the labellum tip (Backhouse & Jeanes 1995).

Distribution

The tawny spider-orchid is endemic to Victoria and only occurs in a small area near Stawell in the western goldfields region (Entwisle 1994; Backhouse & Jeanes 1995). No records exist to indicate a formerly more widespread range and it is likely to be a naturally rare, narrow range endemic (DSE 2003). Although this species has been reported from South Australia, these plants are most likely *Caladenia colorata* (coloured spider-orchid) (Backhouse et al., 2016).

In 2002 the tawny spider-orchid was known from four populations containing an estimated 300 – 500 individual plants (Coates et al., 2002). The species is likely to have been more abundant with numbers in the thousands in the Stawell area, prior to landscape scale disturbance (DSE 2003). In 2010 only two populations were known containing an estimated total of 650 individual plants. One population, containing 550 plants, is found in the Deep Lead Nature Conservation Reserve (NCR) and adjoining Three Jacks Flora and Fauna Reserve with the other population, containing an estimated 100 plants, found in the Germania Mine NCR (Duncan & Coates 2010). Both reserves are managed by Parks Victoria.

Relevant Biology/Ecology

The tawny spider-orchid is found in generally flat or gently sloping terrain on well drained gravelly soils (Bishop 2006; Coates et al., 2002). The species is found in woodlands and open forest dominated by *Eucalyptus leucoxylon* (yellow gum) (Backhouse & Jeanes 1995) and occasionally *E. tricarpa* (red ironbark), with a sparse, heathy understorey dominated by *Acacia pycnantha* (golden wattle), *A. genistifolia* (spreading wattle), *Astroloma conostephioides* (flame heath), *Astroloma humifusum* (cranberry heath), *Brachyloma daphnoides* (Daphne heath), *Calytrix tetragona* (common fringe-myrtle) and *Hibbertia riparia* (erect guinea-flower) (Duncan & Coates 2010). Additionally, this species grows with *Caladenia audasii* (McIvor spider-orchid) and *C. reticulata* (veined spider-orchid) as well as many intermediate variants, colour variations and hybrids (Jeanes & Backhouse 2006).

The tawny spider-orchid is a winter active geophyte with emergence occurring in concert with cooler conditions and onset of winter rainfall. Flowering in the McIvor spider-orchid occurs in September and October and is followed by summer dormancy (Entwisle 1994; Jeanes & Backhouse 2006). The pollinator of the orchid is unknown.

The following information applies to the general biology and ecology of spider-orchids.

Spider-orchids use either food deception or sexual deception for pollination (Jones 1988; Bishop 2006). The usual pollinator for spider-orchids is male wasps from the family Thynnidae. A scent that mimics female thynnid wasp pheromone is produced by the glandular tips of the sepals and acts as a sexual attractant for the pollinators (Backhouse & Jeanes 1995; Bishop 2006). Once the pollinator reaches the flower, it attempts to copulate with the labellum of the flower, mistaking it for the female wasp, and effects pollination (Todd 2000). The life cycle and ecological requirements of pollinators involved in sexual deception and food deception is generally unknown and represents a major risk in managing the long-term reproductive capability of orchids with this dependency.

Spider orchids generally reproduce from seed (Backhouse & Jeanes 1995). Fruits of spider-orchids take five to eight weeks to reach maturity following pollination and each mature capsule may contain tens of thousands of microscopic seeds that are dispersed by the wind when the capsule dries out (Todd 2000). Most spider-orchids grow in a complex relationship with mycorrhizal fungi (Warcup 1981). The fungus assimilates some nutrients for the orchid, but the degree of nutritional dependence upon the fungus by spider-orchids is not clearly understood (Todd 2000). The long term persistence of a suitable mycorrhiza is however critical for growth and development of the orchid yet little is known of the ecological requirements for long-term maintenance of the mycorrhizal fungus in soil.

Longevity of most spider-orchids is not known but there are examples of individuals of one species having survived for at least 17 years in the wild (Carr 1999).

Most terrestrial orchids have evolved under conditions of hot summer fires, generally when the plants have been dormant (Backhouse & Jeanes 1995). Some *Caladenia* species flower vigorously following hot summer fires (Backhouse & Jeanes 1995; Todd 2000). However, this may be as much the result of the removal of surrounding vegetation and reduced competition as any chemical effect of the fire (Backhouse & Jeanes 1995). The timing of fire for orchids is important, with the best time during late summer or early autumn, after seed dispersal but prior to new plant emergence. The variation in seasonal climatic conditions, most notably rainfall and temperature also influences flowering. Flowering is often aborted when periods of sustained hot, dry weather follow flower opening (Todd 2000).

Threats

The tawny spider-orchid is at risk from a combination of threats across its range, including habitat disturbance, invasive species and grazing. Risk posed by each of these threats may vary depending on geographical, environmental, biological and sociological factors.

Table 1 – Threats impacting the tawny spider-orchid in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Habitat loss, disturbance and modification		
Illegal collection	potential	The tawny spider-orchid is likely to be sought by collectors (Coates et al., 2002).
Land clearance for agriculture	known past	Much of the woodland and forest in the region where the tawny spider-orchid was found has been cleared for agriculture (Duncan & Coates 2010). It is likely that populations of the tawny spider-orchid have been lost from the region as a result of this clearing.
Historical habitat disturbance	known past	The remaining, uncleared patches of woodland and forest in the region where the tawny spider-orchid was found have a long history of disturbance from grazing, gold mining and exploration (Backhouse & Jeanes 1995), and timber production (Duncan & Coates 2010).
Accidental trampling	known current	The two reserves where the tawny spider-orchids are found are well known and attract large numbers of wildflower and orchid enthusiasts during spring (DSE 2003; Duncan & Coates 2010). Activities such as gold prospecting and firewood collection also occur in the area (DSE 2003; Duncan & Coates 2010). As a result, accidental trampling of plants and seedlings is a serious threat at both sites.
Invasive species		
Weed invasion	known current	Weed invasion is a risk to orchids because weeds directly out-compete orchids for resources and change the vegetation type and structure of the habitat. They can also alter microhabitats, which may indirectly cause a negative impact on orchid species (Duncan et al., 2005). In 2010 weeds including bridal creeper (<i>Asparagus asparagoides</i>), hair-grass (<i>Aira</i> spp.), fescue (<i>Vulpia</i> spp.) and large quaking grass (<i>Briza maxima</i>) occurred in the vicinity of the tawny spider-orchid (Duncan & Coates 2010).
Grazing		
Grazing by rabbits	potential	Grazing by feral herbivores, including rabbits (<i>Oryctolagus cuniculus</i>), on orchids can be devastating (Duncan et al., 2005). Rabbits were common at both sites in 2010 and grazing by these herbivores is a potential threat (Duncan & Coates 2010).

Grazing by native herbivores	potential	Grazing by native herbivores such as <i>Macropus giganteus</i> (eastern grey kangaroo) can be threat to orchids in highly fragmented habitats, where herbivores exert a significantly increased grazing pressure on the remnant vegetation, including any orchids present (Duncan et al., 2005). Macropods, including the eastern grey kangaroo were common at both sites in 2010 and grazing by these herbivores is a potential threat (Duncan & Coates 2010).
Fire		
Timing and frequency	potential	The specific role of fire for the tawny spider-orchid is unknown. However, fires that occur in autumn, winter and spring, after the species shoots but before seed is set, may pose a threat. Too frequent fire may pose a threat by altering the habitat, removing organic surface materials and negatively impacting pollinators and mycorrhizal agents. In 2002 both sites were long unburnt and the fire risk was low (Coates et al., 2002).

Conservation Actions

Conservation and Management priorities

Habitat loss disturbance and modifications

- Ensure public and private land managers are aware of the presence and location of the tawny spider-orchid on their land and provide protection measures against known and potential threats to the species.
- Manage access to known locations of the tawny spider-orchid to prevent the accidental trampling of plants.
- Ensure confidentiality of the known locations of the tawny spider-orchid is maintained to reduce the potential threat from illegal collection.

Invasive species

- Collaborate with public and private land managers to control and reduce the spread of invasive species, particularly bridal creeper, hair-grass, fescue and large quaking grass. Consult with local experts in determining the most appropriate physical or chemical control methods for these weeds that will not have a detrimental effect on the tawny spider-orchid.

Grazing

- Manage total grazing pressure by herbivores such as rabbits and kangaroos through exclusion fencing and other barriers.
- Control rabbits using appropriate methods in accordance with the 'Threat abatement plan for competition and land degradation by rabbits' (refer to DEWHA 2008), which may include undertaking a range of control techniques (e.g. poisoning and warren destruction).

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the tawny spider-orchid, that they support rather than degrade the habitat necessary to the tawny spider-orchid, they do not promote invasion of exotic species, and they do not increase impacts of grazing.

- Ensure that prescribed fires occur only within the habitat during the dormant phase of the tawny spider-orchid's life cycle (summer to late autumn).
- Physical damage to the habitat and individuals of the tawny spider-orchid must be avoided during and after fire operations. Ensure retention of surface soil organic material and leaf litter on soil as it is important for many terrestrial orchids that rely on these materials for regeneration from seed.
- Fire management authorities and land management agencies should use suitable maps and install field markers to avoid damage to the tawny spider-orchid.

Seed collection, propagation and other ex-situ recovery action

- Seed should be appropriately sourced and stored in a seed bank facility using best practice seed storage guidelines and procedures to maximise seed viability and germinability.
- To manage the risk of losing genetic diversity, undertake appropriate seed and mycorrhizal fungi collection and storage in appropriate institutions, such as the Victorian Conservation Seedbank, Royal Botanic Gardens Victoria, and determine viability of stored seed. Seeds from all natural populations to be collected and stored.
- Establish plants in cultivation in appropriate institutions such as the Royal Botanic Gardens Victoria.

Stakeholder Engagement

- Identify partners including traditional owners, landholders, community-based organisations and conservation management organisations that may be associated with recovery of the tawny spider-orchid.
- Promote opportunities for partners to participate in recovery efforts for the tawny spider-orchid, as appropriate.

Survey and Monitoring priorities

- Undertake survey work, when plants are flowering in September and October, in suitable habitat and potential habitat to locate any additional occurrences.
- Undertake survey work, when plants are flowering in September and October, of known populations to establish baselines where required to identify changes (if any) in population size, distribution, ecological requirements and relative impacts of threatening processes.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Monitor the size, structure and reproductive status of populations of tawny spider-orchids at different stages in the fire cycle. Opportunities to monitor after planned and unplanned fires should be undertaken where they occur in order to improve understanding of the fire response of this species.
- Precise fire history records must be kept for the habitat and extant populations (confirmed and suspected) of the tawny spider-orchid.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional populations.
- Investigate reproductive status, longevity, fecundity and recruitment levels for this species and adjust conservation actions as required.

- Continue to undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment, including disturbance and mycorrhizal fungi requirements.
- Improve understanding of the mechanisms of response to different fire regimes and identify appropriate fire regimes for conservation of this species by undertaking appropriately designed experiments in the field and/or laboratory.
- Where appropriate, use understanding and research on fire response among related (e.g. congeneric) or functionally similar species to develop fire management strategies for conservation.
- Identify optimal fire regimes for regeneration (vegetative regrowth and/or seed germination), and response to other prevailing fire regimes.
- Undertake research into pollinator activity and the ecological requirements to support pollinator communities of the orchid.

References cited in the advice

- Backhouse, G. & Jeanes, J. (1995). *The orchids of Victoria*. Melbourne University Press, Melbourne, Victoria.
- Bishop, T. (2006). *Field guide to the orchids of New South Wales and Victoria*. Second Edition. UNSW Press, Sydney, New South Wales.
- Carr, G.W. (1999). Mellblom's Spider-orchid. *Nature Australia* 26, 18–19.
- Coates, F., Jeanes, J. & Pritchard, A. (2002). *Recovery Plan for Twenty-five Threatened Orchids of Victoria, South Australia and New South Wales 2003 - 2007*. Department of Sustainability and Environment, Melbourne, Victoria.
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Threat abatement plan for competition and land degradation by rabbits*. Department of the Environment, Water, Heritage and the Arts, Canberra, Australia.
- Duncan, M. & Coates, F. (2010). *National Recovery Plan for Twenty-two Threatened Orchids in South-eastern Australia*. DRAFT for public comment. Department of Sustainability and Environment, Melbourne, Victoria.
- Duncan, M., Pritchard, A. & Coates, F. (2005). *Major Threats to Endangered Orchids of Victoria, Australia*. *Selbyana* 26, 189–195.
- Entwisle, T.J. (1994). *Orchidaceae*. In 'Flora of Victoria Vol. 2, Ferns and Allied Plants, Conifers and Monocotyledons' (eds N G Walsh & T J Entwisle). Inkata Press, Melbourne, Victoria.
- Jeanes, J. & Backhouse, G. (2006). *Wild orchids of Victoria, Australia*. Aquatic Photographics, Melbourne, Victoria.
- Jones, D.L. (1988). *Native Orchids of Australia*. Reed Natural History Australia, Melbourne, Victoria.
- Todd, J.A. (2000). *Recovery Plan for Twelve Threatened Spider-orchids Caladenia taxa of Victoria and South Australia 2000 - 2004*. Department of Natural Resources and Environment, Melbourne, Victoria.

Warcup, J.H. (1981). The mycorrhizal relationships of Australian orchids. *New Phytology* 87, 371–381.

Other sources cited in the advice

Department of Sustainability (DSE) (2003). Action Statement – Tawny Spider-orchid
Caladenia fulva.

Available on the Internet at:

http://www.depi.vic.gov.au/_data/assets/pdf_file/0017/250532/Tawny_Spider-orchid_Caladenia_fulva.pdf

Department of the Environment (2005). Species Profile and Threats Database. *Caladenia fulva*
– Tawny Spider-orchid.

Viewed: 20 June 2016.

Available on the Internet at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=24371