

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 robinsonii

Frankston spider-orchid

Conservation Status

Caladenia robinsonii (Frankston 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 its small population size, limited distribution and continuing decline due to threats including habitat loss and degradation, weed invasion and grazing.

Description

The Frankston spider-orchid (Orchidaceae) is an herbaceous perennial geophyte which is 30 cm high, with a single leaf 10 cm long and a single flower. It is a deciduous orchid that dies back annually to a small, spherical, underground tuber. The single leaf is long and narrow, reddish-green and hairy. The erect hairy flower stem grows to 30 cm tall and has a single (rarely two) yellow and red flower which grows up to 40 mm across. The sepals are up to 35 mm long and are yellowish with variable reddish stripes and suffusions. The central petal (labellum) is triangular with a red-striped yellow base and red tip. The side lobe margins are fringed with short thickened reddish teeth decreasing in size and extending almost to the petal tip (Duncan et al., 2010).

Distribution

The Frankston spider-orchid is endemic to Victoria. In 2010, this species was known from only one population of approximately 40 plants at Rosebud on the Mornington Peninsula (Duncan et al., 2010). The tenure of this population is unknown.

In 2010, the historical distribution of this species was not known, however, given its distribution it was likely to have been distributed along the eastern shore of Port Phillip Bay. A collection of this species was also recorded from 'Frankston' (precise location not known) in 1941 however only two populations have been seen in recent decades: the population at Rosebud (outlined above) and a population at Frankston North (which was destroyed for housing development in the 1990s) (Duncan et al., 2010).

Relevant Biology/Ecology

The Frankston spider-orchid occurs in heathy grassy *Eucalyptus pryoriana* (coast manna gum) woodland, on deep sandy loamy soils, in the South East Coastal Plain IBRA bioregion (Duncan et al., 2010).

The Frankston spider-orchid is a winter active geophyte with emergence occurring in concert with cooler conditions and onset of winter rainfall. Flowering in the Frankston spider-orchid

occurs in September and October with flowers remaining open for up to four weeks, and is followed by summer dormancy (Backhouse et al., 1999). The pollinator of the orchid is unknown.

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

Spider-orchids use either food deception or sexual deception for pollination (Jones 1988; Bishop 2006). The usual pollinators for spider-orchids are 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 is generally unknown and represents a major risk in management the long-term reproductive capability of the orchid.

Spider orchids generally reproduce from seed (Backhouse & Jeanes 1995). Fruits of spider-orchids normally 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 Frankston spider-orchid is at risk from a combination of threats across its range. Risk posed by each of these threats may vary depending on geographical, environmental, biological and sociological factors.

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

Threat factor	Threat type and status	Evidence base
Invasive species		
Weed invasion	known current	In 1999, weed invasion was a known threat at the remaining population of this species. Weed invasion was a threat to this population because weeds out-compete orchids for resources and change the vegetation type and structure of habitat. Weeds can also alter microhabitats, which can indirectly cause a negative impact on orchid species (Duncan et al., 2005). Problem weeds included boneseed (<i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i>), coast wattle (<i>Acacia sophorae</i>) and coast tea-tree (<i>Leptospermum laevigatum</i>) (Backhouse et al., 1999).
Fungus invasion	potential	In 1999, cinnamon fungus (<i>Phytophthora cinnamomi</i>) occurred near the one remaining population of this species. Some patches of vegetation near the population displayed symptoms of dieback. However the cause of this dieback, including whether the dieback resulted from cinnamon fungus, was not known (Backhouse et al., 1999).
Habitat loss, disturbance and modification		
Illegal collection	potential	In 1999, the rarity of this species made it particularly susceptible to collection. <i>Xanthorrhoea australis</i> (austral grass-tree) and their flowering stems were illegally removed from areas surrounding the Frankston spider-orchid which increased the risk of illegal collection due to its close proximity (Backhouse et al., 1999).
Land clearance for residential development	known current	In 1999, land clearance for residential development was a threat for this species. Residential development stretched in a largely unbroken band along the entire eastern shoreline of Port Phillip Bay (Backhouse et al., 1999).
Trampling	known current	In 1999, trampling including the accidental damage to individual plants and/or seedlings by recreational users was a known threat to the one remaining population of this species (Backhouse et al., 1999).
Fire		
Timing and frequency	potential	In 1999, too frequent fires, or fires at the wrong time of the year (late autumn, winter, spring) were a threat to this species (Backhouse et al., 1999). Too frequent fire or aseasonal fires may pose a threat by altering the habitat, removing organic surface materials and negatively impacting pollinators and mycorrhizal agents.

Conservation Actions

Conservation and Management priorities

Invasive species

- Collaborate with public and private land managers to control and reduce the spread of invasive species particularly boneseed, coast wattle and coast tea-tree. 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 Frankston spider-orchid.
- Monitor habitat for the presence of *Phytophthora cinnamomi* and other *Phytophthora* species. If detected, minimise the spread by implementing appropriate vehicle and footwear hygiene protocols where possible, and mitigate impacts with phosphite treatments, fumigants, specific vegetation destruction, and containment barriers (Department of the Environment 2014).

Habitat loss, disturbance and modification

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

Fire

- Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the Frankston spider-orchid, that they support rather than degrade the habitat necessary to the Frankston spider-orchid, that they do not promote invasion of exotic species, and that they do not increase impacts of grazing.
- Ensure that prescribed fires occur only within the habitat during the dormant phase of the Frankston spider-orchid's life cycle (summer to late autumn).
- Physical damage to the habitat and individuals of the Frankston 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 Frankston spider-orchid.

Seed collection, propagation and other ex-situ recovery action

- Establish plants in cultivation in appropriate institutions such as the Royal Botanic Gardens Victoria.
- 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 curate the collection to ensure viability of stored seed. Seeds from all representative populations to be collected and stored.

Stakeholder Engagement

- Identify partners including traditional owners, landholders, community-based organisations and conservation management organisations that may be associated with recovery of the Frankston spider-orchid.
- Promote opportunities for partners to participate in recovery efforts for the Frankston 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 including previously identified known populations to establish baselines where required and 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 Frankston 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 Frankston spider-orchid.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional populations.
- Undertake genetic analysis of all populations of Frankston spider-orchid in order to confirm the presence, extent and severity of hybridisation.
- Investigate reproductive status, longevity, fecundity and recruitment levels for this species in order to form a view on the resilience of this species to known and potential threats 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.

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Available on the Internet at:

<http://www.environment.gov.au/system/files/resources/bad95d05-3741-4db3-8946-975155559efb/files/threat-abatement-plan-disease-natural-ecosystems-caused-phytophthora-cinnamomi.pdf>