

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 sp. Kilsyth South (G.S.Lorimer 1253)

Kilsyth South spider-orchid

Conservation Status

Caladenia sp. Kilsyth South (G.S.Lorimer 1253) (Kilsyth South spider-orchid) is listed as Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from the 5 October 2001.

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 Critically Endangered category are its very restricted geographic range, extremely low population size and projected decline due to the threats it is facing.

Description

The Kilsyth South spider-orchid (Orchidaceae) is an herbaceous perennial geophyte which is 35 cm high, with a single leaf 15 cm long and one to two flowers. It is a deciduous orchid that dies back annually to a small, spherical, underground tuber. The single leaf is long and narrow. The erect, hairy flower stem grows to 35 cm high and has one or two large, creamy white flowers which grow up to 8 cm across. The sepals and petals are up to 7 cm long and slender, with long filamentous tips covered in brownish glands. The uppermost sepal is erect, the petals and lateral sepals spread and droop. The central petal (labellum) is narrowly triangular with the tip rolled under. The expanded part of the labellum has four to six rows of short, curved, reddish teeth and the sides of the labellum are fringed with short, thickened, reddish teeth decreasing in size and extending almost to the labellum tip (Jeanes & Backhouse 2006).

Distribution

The Kilsyth South spider-orchid is endemic to Victoria where it is only known from one location in the Kilsyth South area of the eastern outskirts of Melbourne (Jeanes & Backhouse 2006). This site was originally on private land but was purchased by the City of Maroondah in 2009 to protect the orchid and add to an existing reserve system (Duncan & Coates 2010). Nothing is known of the original distribution and abundance of the Kilsyth South spider-orchid (Duncan & Coates 2010). It is likely it once occurred in the local area before widespread clearing of habitat for agriculture and residential development. The lack of records indicating a formerly more widespread distribution suggests this is a short-range endemic species (Coates et al., 2002).

The only known population of the Kilsyth South spider-orchid contained 23 plants in 2002 (Coates et al., 2002) and 23 plants when surveyed in 2010 (Duncan & Coates 2010). The extent of occurrence and area of occupancy of the Kilsyth South spider-orchid are both less than 2 km² (TSSC 2001).

Relevant Biology/Ecology

The Kilsyth South spider-orchid is found in heathy, open forest on well-drained clay loam (VicFlora 2015). It occurs in *Eucalyptus radiata* (narrow-leaved peppermint) and *E. cephalocarpa* (mealy stringybark) open forest with scattered *Exocarpos cupressiformis* (native cherry) and a shrubby understorey of *Banksia marginata* (silver banksia) and *Leptospermum continentale* (prickly tea-tree). The ground layer is species rich, but mainly consists of *Rytidosperma pallidum* (silvertop wallaby-grass), *Patersonia fragilis* (swamp iris), *P. occidentalis*, *Thelionema caespitosum* (tufted blue-lily) and *Sphaerolobium minus* (globe-pea) (Coates et al., 2002). The Kilsyth South spider-orchid flowers in September and October (Jeanes & Backhouse 2006).

The Kilsyth South spider-orchid is a winter active geophyte with emergence occurring in concert with cooler conditions and onset of winter rainfall. Flowering is followed by summer dormancy. 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). 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). 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.

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 Kilsyth South spider-orchid is highly restricted and has only ever been known from one small population. This population is known to be threatened by weed invasion and may be at risk from fire.

Table 1 – Threats impacting the Kilsyth South 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	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). Weed species including sweet pittosporum (<i>Pittosporum undulatum</i>) and Spanish heath (<i>Erica quadrangularis</i>) were present at the one known site of the Kilsyth South spider-orchid in 2010 but were confined to one small area of the site (Duncan & Coates 2010).
Habitat loss, disturbance and modification		
Land clearance for agriculture and residential development	known past	It was likely the Kilsyth South spider-orchid occurred elsewhere in the district before widespread clearing of habitat for agriculture and residential development occurred (Duncan & Coates 2010).
Fire		
Timing and frequency	potential	The specific role of fire for the Kilsyth South 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.

Conservation Actions

Conservation and Management priorities

Invasive species

- Collaborate with land manager to control and reduce the spread of invasive species, particularly sweet pittosporum and Spanish heath. Consult with local experts in determining the most appropriate physical and chemical control methods for these weeds that will not have a detrimental effect on the Kilsyth South spider-orchid.

Fire

- Fires must be managed to ensure prevailing fire regimes do not disrupt the life cycle of the Kilsyth South spider-orchid, they support rather than degrade the habitat necessary to the Kilsyth South 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 Kilsyth South spider-orchid's life cycle (summer to late autumn).

- Physical damage to the habitat and individuals of the Kilsyth South 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 Kilsyth South 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, community-based organisations and conservation management organisations that may be associated with recovery of the Kilsyth South spider-orchid.
- Promote opportunities for partners to participate in recovery efforts for the Kilsyth South 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 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 the Kilsyth South spider-orchid 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 Kilsyth South spider-orchid.

Information and research priorities

- Investigate options for enhancing the population or establishing additional populations.
- 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/biodiversity/threatened/conservation-advice/caladenia-sp-aff-venusta>

VicFlora (2015). Flora of Victoria – *Caladenia* sp. aff. *venusta* (Kilsyth South).

Available on the Internet at:

<http://data.rbg.vic.gov.au/vicflora>