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

Conservation Advice

Caladenia versicolor

candy spider-orchid

Conservation Status

Caladenia versicolor (candy spider-orchid) is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The species was eligible for listing under the EPBC Act at that time as, immediately prior to the commencement of the EPBC Act, it was listed as Vulnerable 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 Vulnerable category are its small population size, limited distribution and continuing decline due to threats from habitat loss and degradation and grazing.

Description

The candy spider-orchid (Orchidaceae) is an herbaceous perennial geophyte which is 25 cm high, with a single leaf 25 cm long and one or two flowers. It is a deciduous terrestrial orchid that dies back annually to a small, spherical, underground tuber (Backhouse & Jeanes 1995). It produces a single green leaf that grows from the base of the stem. The leaf of the candy spider-orchid is green with reddish spots, sparsely hairy and grows to 10 cm in length (Backhouse & Jeanes 1995). The flower stem grows has one or two white, pale pink or purplish flowers (Backhouse & Jeanes 1995). The sepals and petals are up to 45 mm long with the tips covered in reddish, purple or black glandular hairs (Jeanes & Backhouse 2006). The central petal (labellum) is narrowly triangular with the tip rolled under (Backhouse & Jeanes 1995). The expanded part of the labellum has four rows of short, curved, bluntly pointed reddish glands, the sides of which have short pinkish to reddish teeth decreasing in size and extending almost to the tip (Backhouse & Jeanes 1995).

Distribution

In 2010, the candy spider-orchid was known from a single population located south-west of Stawell in Victoria (Duncan et al., 2010). This population comprised an estimated 800 plants, spread over an area of approximately 50 hectares, in State Forest (Duncan et al., 2010).

A population of candy spider-orchid was found in the Black Range State Park east of Balmoral in September 2009. A volunteer survey in 2012 identified 175 flowering plants occupying an area of approximately 75ha at this location (DELWP pers. comm., 2016).

The historical distribution of candy spider-orchid is unknown. Records indicate that this species may have occurred on a roadside near St Arnaud in Victoria however individuals had not been seen at this site for over 20 years in 2010 (Duncan et al., 2010). Additionally, three historical records indicate that this species may have been present in the Penola-Naracoorte region of South Australia however are now likely to be extinct in this region (Duncan et al., 2010). The presence of this species, beyond the Penola-Naracoorte region, in South Australia is unknown.

Relevant Biology/Ecology

The candy spider-orchid is found on plains, sedgy woodland and shallow sands woodland, on silty clay loams derived from Quaternary alluvial and swamp deposits, in the Murray-Darling Depression Interim Biogeographic Regionalisation for Australia Bioregion (Duncan et al., 2010). These woodlands are dominated by *Eucalyptus leucoxylon* (yellow gum) (Duncan et al., 2010).

The candy spider-orchid is a winter active geophyte with emergence occurring in concert with cooler conditions and onset of winter rainfall. Flowering of this species occurs from September to November and is followed by summer dormancy (Backhouse & Jeanes 1995). 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 2000). 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 2000). 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 managing the long-term reproductive capability of the orchid.

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 criticl 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 candy 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 candy 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		
Timber harvesting	known past	The State Forest in which this species occurred was noted as being used for timber harvesting in past. Timber harvesting operations can destroy individual plants (Todd 2000).
Trampling	known current	In 2010, trampling including the accidental damage to individual plants and/or seedlings by visiting orchid enthusiasts was a known threat for this species (Duncan et al. 2010).
Grazing		
Rabbit grazing	known current	Grazing by rabbits (*Oryctolagus cuniculus*) was a known threat for this species (Duncan et al., 2010).
Fire		
Timing and frequency	potential	The role of fire for the candy 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 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

Habitat loss, disturbance and modification

- Ensure public and private land managers are aware of the presence and location of the candy spider-orchid on their land and provide protection measures against known and potential threats to the species.
- Manage access to known locations of the candy spider-orchid to prevent the accidental trampling of plants.
- Manage timber harvesting to ensure the protection of the candy spider-orchid.

Grazing

- Manage total grazing pressure by herbivores such as kangaroos and rabbits 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 (for example, poisoning and warren destruction).

Fire

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

Seed collection, propagation and other ex-situ recovery action

- Establish plants in cultivation in appropriate institutions such as the Botanic Gardens of South Australia and 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 South Australian Seed Conservation Centre, Victorian Conservation Seedbank, Botanic Gardens of South Australia and Royal Botanic Gardens Victoria, and curate the collection to ensure sustained 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 candy spider-orchid.
- Promote opportunities for partners to participate in recovery efforts for the candy spider-orchid, as appropriate.

Survey and Monitoring priorities

- Undertake survey work, when plants are flowering from September to November, in suitable habitat and potential habitat to locate any additional occurrences including previously identified known and potential 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 candy 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 candy 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 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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