

# THREATENED SPECIES SCIENTIFIC COMMITTEE

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

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

## Conservation Advice

### *Caladenia concolor*

crimson spider orchid

#### Conservation Status

*Caladenia concolor* (crimson spider orchid) is listed as Vulnerable 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 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 current 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 restricted area or occupancy and fragmentation and continuing decline in habitat.

#### Description

The crimson spider orchid grows up to 15 – 25 cm tall is sparsely hairy, leaf is 8 – 15 cm long and 8 – 10 mm wide. The flower stem is to 25 cm tall and dark purplish red in colour bearing 1 or 2 large flowers. The flowers are also purple/red with sepals and petals 4.5 cm long, and a purple labellum with curving marginal teeth to 3 mm long.

#### Distribution

The crimson spider orchid is known to occur in Victorian Volcanic Plain, Victorian Riverina, Goldfields, Central Victoria Uplands, Northern Inland Slopes, Southern and Northern Highlands and Victorian alps Bioregions in Victoria and in southern New South Wales (AVH 2014, Coates et al., 2002; NSW NPWS 2003). The species can be found on grassy or heathy open woodlands, on well drained, gravelly sand and clay loams (Backhouse & Jeans 1995). In New South Wales the crimson spider orchid is known from three populations near Cootamundra, Lake Burrinjuck and Albury (NSW TSSC 2011). In Victoria the species is known from the Central Uplands (Coates et al., 2002). In 2002 it was estimated that the Victorian population had 150 individuals across 10 sub-populations (NSW TSSC 2011; NSW NPWS 2003).

#### Relevant Biology/Ecology

The crimson spider orchid flowers in August to late October and grows in sclerophyll forest on clay loams or gravelly soils (NSW TSSC 2011). It occurs within dry eucalypt forest, heathland, closed scrub and grassland (Coates et al., 2002; NSW NPWS 2003). There is very little known about the ecology of the crimson spider orchid (NSW NPWS 2003). A single leaf appears during autumn and winter, flowering occurs from August to late October (NSW NPWS 2003).

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 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 are generally unknown and represent 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 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). The influence of fire on the life history of the crimson spider orchid is unknown.

### Threats

The crimson spider orchid is threatened by habitat loss and fragmentation, altered moisture regimes, invasive species and too frequent fire. These threats and their effects on the species are described in the table below. The threats outlined below have corresponding conservation managements.

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

Threat factor	Threat type and status	Evidence base
Invasive species		
Invasive weeds	known current	Invasive weeds compete with orchid species for resource and over time change the species composition of invaded areas (Duncan et al., 2005). This may result in the elimination of native species as they are out competed (Duncan et al., 2005). Species that represent this threat include St Johns Wort ( <i>Hypericum perforatum</i> ) and blackberry ( <i>Rubus fruticosus</i> agg.) (NSW NPWS 2003).
Grazing by stock	known current	Trampling and grazing by sheep ( <i>Ovis aries</i> ) cause physical damage to the crimson spider orchid. Areas that are grazed beyond their carrying capacity, or are not grazed appropriately, may cause damage to the crimson spider orchid.
Grazing by rabbits	known current	In 2002, grazing by rabbits ( <i>Oryctolagus cuniculus</i> ) was a known threat for most populations of the crimson spider-orchid (Coates et al., 2002).

Habitat loss, fragmentation and degradation		
Land clearing	known past	This species occupies habitats that have, in large parts, been cleared for agricultural production (NSW NPWS 2003). Landscape fragmentation as a result of this clearing may represent the greatest threat to the long term survival of this species (Todd 2000).
Damage from rubbish dumping	known suspected	Dumping of rubbish can cause the introduction of weed species to habitat of the crimson spider orchid and physical damage through rubbish build up and removal.
Fire		
Too frequent burning	known current	The specific role of fire for the crimson 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 the risk from fire was considered to be low (Coates et al., 2002).

## **Conservation Actions**

### **Conservation and Management priorities**

#### Invasive species

- Identify and remove new weeds and undertake control of weeds in the local area that could become a threat to the crimson spider-orchid, using appropriate methods which may include hand weeding. Consider the possible disturbance/overspray threats associated with the control method.
- Maintain practices that are consistent with the controlled weeds guidelines provided by NSW DPI (2016) for species such as St Johns wort and blackberry.

#### Impacts of domestic species

- If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species by trampling and manage total grazing pressure at important sites through exclusion fencing or other barriers to prevent damage to the crimson spider orchid.

#### Habitat loss disturbance and modifications

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

#### Fire

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

- Physical damage to the habitat and individuals of the crimson 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 crimson spider orchid.
- The NSW Rural Fire Service recommends no burning, slashing, tittering or tree removal in relation to fire management of the crimson spider orchid (NSW RFS 2013).

#### Seed collection, propagation and other ex situ recovery action

- Establish plants in cultivation in appropriate institutions such as the Royal Botanic Gardens Victoria and Royal Botanic Garden Sydney.
- 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. Best practice seed storage guidelines and procedures should be adhered to, to maximise seed viability and germinability. Seeds from all natural 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 crimson spider-orchid.
- Promote opportunities for partners to participate in recovery of the crimson spider-orchid, as appropriate.
- Determine objectives for any public engagement to improve management on private land to raise awareness of its presence on land that is not currently managed as native reserve land and ensure recent scientific knowledge is incorporated into this public land management. Separate engagement processes will likely be required where there are different objectives.
- Prepare a management strategy with the input and from local experts. Actions should be stated for each engagement process identified e.g. Indigenous consultation, a specific community consultation, or land manager consultation.

#### Survey and Monitoring priorities

- Undertake survey work when plants are flowering in August and late October in suitable habitat and potential habitat to locate any additional occurrences.
- Undertake survey work when plants are flowering in August and late October of 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.
- Precise fire history records must be kept for the habitat and extant populations (confirmed and suspected) of the crimson spider orchid.

- Monitor the size and structure and reproductive status of populations after planned and unplanned fires to improve understanding of the fire response of the crimson spider orchid.
- Precise fire history records must be kept for the habitat and extant populations (confirmed and suspected) of the crimson 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 understand the vulnerability 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 crimson spider orchid.

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