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

# Conservation Advice

# *Caladenia rosella*

Rosella Spider-orchid

## Conservation Status

*Caladenia rosella* (Rosella 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 at that time as, immediately prior to the commencement of the EPBC Act, 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 restricted extent of occurrence that is continuing to decline due to habitat disturbance, invasive weeds and small population size.

## Description

The rosella spider-orchid belongs to the family Orchidaceae. Flowering plant 10 - 17 cm tall. Leaf 4 - 9 cm long, 5 - 8 mm wide, blotched with red at base. Flower solitary, with musk-like fragrance; perianth segments 3 - 5 cm long, pale to bright rose-pink with dark glandular tail; sepals flattened at base, 2 - 5 mm wide, tapered to a long tail densely covered in crowded, glandular hairs; petals shorter than sepals but otherwise similar. Labellum curved forward with apex recurved and lateral lobes erect, lamina ovate-cordate, very obscurely 3-lobed, 9 - 15 mm long and 7 - 10 mm wide (when flattened), pale pink at base with deep pink mid-lobe, margins and calli, sometimes with a paler tip; margins of lateral lobes fringed with linear calli to 2 mm long; margins of mid-lobe with shorter calli becoming tooth-like and broader towards tip; lamina calli in 4 - 6 rows, extending slightly onto mid-lobe, narrow, finger-like, to 1.5 mm long at base of lamina, decreasing in size towards apex (RBGV 2016).

## Distribution

The rosella spider-orchid occurs in disjunct populations north east of Melbourne at Cottlesbridge, Research and Christmas Hills and there is an unconfirmed record from near Stawell (Todd 2000). In 2000 it was estimated that there were 120 plants in four populations (Todd 2000). The former distribution is uncertain but may have been scattered through the Box Ironbark woodlands and forests of the Victorian Midlands bioregion (Todd 2000).

## Relevant Biology/Ecology

The rosella spider-orchid is typically found in heath woodlands and woodlands on well-drained sandy soils derived from sandstone and mudstone, that are moist in winter and dry in summer (Backhouse & Jeanes 1995; Todd 2000).

The rosella spider-orchid has a summer dormancy period, which commences when temperatures increase and soils dry out in late spring. The orchid shoot in response to soaking rains in late autumn, initially producing only a single green leaf. Growth of the rosella spider-orchid occurs during late autumn, winter and spring and flowering occurs in August and September (Entwisle 1994; Backhouse & Jeanes 1995).

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

Spider-orchids are generally pollinated by sexual deception through a process called pseudocopulation (Jones 1988; Bishop 2000). 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). While thynnid wasps are the most likely pollinators, a small native calictid bee (*Neoproctus* species) has been reported as a pollinator of the rosella spider-orchid (C. Beardsell *pers. comm*. in Todd 2000).

For most spider-orchids reproduction is only possible 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 dependence upon the fungus by spider-orchids is not known (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).

Hybrids in the *Caladenia* genera may only persist for the life of an individual plant, the hybrid being sterile and eventually dying (Backhouse & Jeanes 1995). Hybridisation in the *Caladenia* genus may occur at an increased rate at disturbed sites, where factors that would normally limit cross-pollination are altered or removed (Backhouse & Jeanes 1995).

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, including *C. australis* (southern spider orchid), *C. fragrantissima* (scented spider orchid) and *C. insularis* (French Island spider orchid) (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 shoot growth. 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 rosella spider-orchid is threatened by habitat loss and fragmentation, invasive species and land tenure that places the orchid at risk. These threats are described in the table below.

Table 1 – Threats impacting the Rosella 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 overtime change the species composition of invaded areas (Duncan et al., 2005). Over time this may result in the elimination of native species as they are out competed. Duncan et al. in 2005 and 2010 listed the following weed species as a significant threat to Victorian orchids include bridal creeper (*Asparagus asparagoides*), golden wattle (*Acacia longifolia*), common olive (*Olea europaea*), perennial veldt grass (*Erharta calycina*) and African weed orchid (*Disa bracteata*). |
| Habitat Disturbance | | |
| Trampling by recreational activities | known current | The distribution of the rosella spider-orchid is in proximity to urban areas (Todd 2000). Proximity to populated areas and visitation of these areas during flowering pose a risk of trampling to the rosella spider orchid (Todd 2000). |
| Habitat loss and fragmentation | | |
| Land clearing | known past | Habitat of the rosella Spider-orchid, Caldenia *audasii* (McIvor spider-orchid) and *C. amoena* (charming spider-orchid) has been severely reduced and altered by historic mining activities and more recent urban development (Todd 2000). |
| Grazing | | |
| Gazing by rabbits | known current | Grazing by rabbits (*Oryctolagus cuniculus*) causes damage to the rosella Spider-orchid. |
| Foraging by white-winged choughs | known suspected | Foraging by white-winged choughs (*Corcorax melanorhamphos*) for insects and seeds by racking the ground litter in groups of up to 10 (Birdlife 2016), in the remaining fragmented and remnant bushland may cause damage to the rosella spider-orchid. Todd (2000) notes that white winged choughs have been observed to dig up tubers. |
| Fire | | |
| Timing and frequency | potential | The role of fire for the rosella spider-orchid is unknown (Todd 2000). The rosella spider-orchid occur in urban environment (Todd 2000). 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 killing any growth stimulated by initial summer fires. |

## 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 bridal creeper, golden wattle, common olive, perennial veldt grass and African weed orchid. Consult with local experts in determining the most appropriate physical, chemical or other control methods for these weeds that will not have a detrimental effect on the rosella spider-orchid.

Habitat Disturbance and Habitat loss and fragmentation

- Ensure public and private land managers are aware of the presence and location of the rosella spider-orchid on their land and provide information based of best available scientific evidence on the habitat requirements of the rosella spider-orchid.
- Ensure that local recreational groups are aware of the presence of the rosella spider-orchid and the impacts that trampling and disturbance of habitat have on the species.
- Manage access to known locations of the rosella spider-orchid to prevent the accidental trampling of plants through protective fencing or signage.

Grazing

- Manage total grazing pressure by herbivores such as rabbits and white-winged choughs 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 (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 rosella spider-orchid, that they support rather than degrade the habitat necessary to the rosella 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 rosella spider-orchid's life cycle (summer to late autumn).
- Physical damage to the habitat and individuals of the rosella 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 rosella 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 determine

viability of stored seed. Best practice seed storage guidelines and procedures should be ahered 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 rosella spider-orchid.
- Promote opportunities for partners to participate in recovery of the rosella 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 September, in suitable habitat and potential habitat to locate any additional occurrences.
- Undertake survey work, when plants are flowering in August and September, 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.
- Monitor the size, structure and reproductive status of populations of rosella 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 rosella 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.

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