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

Conservation Advice

Caladenia tensa

rigid spider-orchid

Conservation Status

Caladenia tensa (rigid spider-orchid) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from 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 *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 small population size, limited distribution and continuing decline due to threats from habitat loss and degradation, weed invasion and grazing.

Description

The rigid spider-orchid (Orchidaceae) is a herbaceous perennial geophyte which is 35 cm high, with a leaf to 12 cm long and a single (occasionally two) flower (Duncan et al., 2010). It is a herbaceous perennial orchid that dies back annually to a small underground tuber. The single leaf is long and narrow (Todd 2000). The flower stem is erect and hairy, with a flower that is pale green, white and maroon (Jones 2006). The sepals and petals are pale green with variable thin maroon stripes and up to 40 mm long (Duncan et al., 2010). The central petal (labellum) is broadly triangular and delicately hinged with a prominent white median band and maroon tip (Duncan et al., 2010). The labellum margins are deeply fringed with very long slender teeth (Jones 2006).

Distribution

The historical distribution of the rigid spider-orchid included aeolian sand deposits within and surrounding the Little Desert in western Victoria and southeast South Australia (Todd 2000; Duncan et al., 2010).

The species is also recorded (4 specimens, collected 1987-1988) from the central west of New South Wales at locations near Lake Cargelligo, Trundle and Carrathool (ALA 2016).

In 2000, the species was considered to be widespread at locations in Victoria and eastern South Australia (Todd 2000). In South Australia, the species occured at Cape Gantheaume Conservation Park, Billiat Conservation Park and the Mount Boothby Conservation Park (Todd 2000). Five populations of the rigid spider-orchid are known from Victoria; between Horsham and Ouyen and west to the border with South Australia. Duncan et al. (2010) noted that three of these populations (estimated to be 200, 100 and 40 plants) occurred on land managed by Parks Victoria and two of these populations (both estimated to be 50 plants) occurred on land managed by the Hindmarsh Shire Council.

Relevant Biology/Ecology

The rigid spider-orchid occurs in *Callitris spp.* (cypress pine)*, Eucalyptus leucoxylon* (yellow gum) woodland and *Melaleuca uncinata* (broombush) mallee on Tertiary and Quaternary aeolian sandy loams in the Murray-Darling Depression bioregion (Todd 2000).

The rigid spider-orchid is a winter active geophyte with emergence occurring in concert with cooler conditions and onset of winter rainfall. Flowering in the rigid spider-orchid occurs in September and October and is followed by summer dormancy (Todd 2000).

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 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 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 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 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 most ecologically appropriate 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 rigid spider-orchid is unknown.

Threats

The rigid 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 rigid 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		
Habitat fragmentation	known past and current	Extant populations tend to occupy fragmented forests and woodlands in agricultural landscapes. This fragmentation and associated habitat degradation may represent the greatest threat to the species (Todd 2000).
Trampling	known current	In 2010, trampling by recreational users was identified as a threat to the three populations managed by Parks Victoria (Duncan et al., 2010).
Road maintenance	potential	In 2010, disturbance from road maintenance was identified as a threat to the two populations managed by the Hindmarsh Shire Council (Duncan et al., 2010).
Vegetation clearance	known past	This species occupies habitats that have, in large parts, been cleared for agricultural production (Todd 2000).
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). In 2010, weed invasion was known to be a threat to all known populations. Problem weeds include veld grass (*Ehrharta longiflora*), large quaking grass (*Briza maxima*), bridal creeper (*Asparagus asparagoides*), boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*) and fescue (*Vulpia* sp.) (Duncan et al., 2010).
Grazing		
Rabbit grazing	known current	Grazing can have a major impact on orchids (Duncan et al., 2005). In 2010, opportunistic grazing by rabbits (*Oryctolagus cuniculus*) was identified as a known threat to all known populations (Duncan et al., 2010).
Fire		
Timing and frequency	potential	The influence of fire on the life history of the rigid spider-orchid is poorly known (Todd 2000). Based on related species, fires that occur in autumn, winter and spring, after shoots emerge above ground 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 rigid spider-orchid on their land and provide protection measures against known and potential threats to the species and promote private land covenanting for protection of the orchid.
- Manage access to known locations of the rigid spider-orchid, including roadsides, to prevent accidental damage and trampling of plants.

Invasive species

- Collaborate with public and private land managers to control and reduce the spread of invasive species particularly veld grass, large quaking grass, bridal creeper, boneseed and fescue. 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 rigid spider-orchid.

Grazing

- Manage total grazing pressure by herbivores such as 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 prevailing fire regimes do not disrupt the life cycle of the rigid spider-orchid, they support rather than degrade the habitat necessary to the rigid spider-orchid 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 rigid spider-orchid's life cycle (summer to late autumn).
- Physical damage to the habitat and individuals of the rigid 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 rigid spider-orchid 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 and Royal Botanic Gardens Victoria, and curate the

collection to ensure sustained viability of stored seed. Seeds from representative 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, landholders, community-based organisations and conservation management organisations that may be associated with recovery of the rigid spider-orchid.
- Promote opportunities for partners to participate in recovery of the rigid 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 known and potential populations to identify any changes 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 rigid 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 rigid 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 and possible translocation, 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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