

TARENGO LEEK ORCHID

PRASOPHYLLUM PETILUM
ACTION PLAN



PREAMBLE

The Tarengo Leek Orchid (*Prasophyllum petilum*, D.L.Jones & R.J.Bates 1991) was declared an endangered species on 15 April 1996 (Instrument No. DI1996-29, *Nature Conservation Act 1980*). Under section 101 of the Nature Conservation Act 2014, the Conservator of Flora and Fauna is responsible for preparing a draft Action Plan for listed species. The first Action Plan for this species was prepared in 1997 (ACT Government 1997). This revised edition supersedes the earlier edition.

Measures proposed in this Action Plan complement those proposed in the Action Plans for Yellow Box Blakely's Red Gum Grassy Woodland, Natural Temperate Grassland and component threatened species such as the Small Purple Pea. This draft action plan includes any relevant parts of the Draft ACT Native Woodland Conservation Strategy.

CONSERVATION STATUS

The Tarengo Leek Orchid (*Prasophyllum petilum*) is recognised as a threatened species in the following sources:

- **National:** Endangered - *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).
- **Australian Capital Territory:** Endangered - *Nature Conservation Act 2014* and Special Protection Status Species - *Nature Conservation Act 2014*
- **New South Wales:** Endangered – *Biodiversity Conservation Act 2016*.

CONSERVATION OBJECTIVES

The overall objective of this plan is to preserve the Tarengo Leek Orchid in perpetuity in the wild across its natural geographic range in the ACT. This includes the need to maintain natural evolutionary processes.

Specific objectives of the action plan are to:

- Protect sites where the species is known to occur in the ACT from unintended impacts; including the implementation of suitable buffers around habitat to safeguard against any negative impacts from potential future re-zoning or development.
- Manage the species and its habitat to maintain the potential for evolutionary development in the wild.
- Improve the long-term viability of populations through management of adjacent woodland to increase habitat area and connect sub-populations.

- Expand the range of the Tarengo Leek Orchid in the ACT by providing suitable habitat and establishing new populations by translocation (upon advice from feasibility studies).
- Improve the understanding of the species' ecology, habitat and threats.
- Strengthen stakeholder and community collaboration in the conservation of the species.

SPECIES DESCRIPTION AND ECOLOGY

DESCRIPTION

The Tarengo Leek Orchid is a slender terrestrial orchid that grows to 30 cm, with its single cylindrical leaf reaching 25 cm (DECCW 2010). The flower spike emerges from October through to November and produces 5 to 18 flowers. After flowering, small obovoid seed capsules form. The leaves and flowers are both dull green with pink tinges on the flowers, making this a very inconspicuous plant when growing among tall grasses or in small numbers.

DISTRIBUTION

Known populations of the Tarengo Leek Orchid occur in grassy woodlands and grasslands of the southern tablelands and western slopes of NSW and the ACT. The largest known population is at the Tarengo Travelling Stock Reserve near Boorowa (NSW), where there is estimated to be up 100,000 plants some years. Other populations have been found as far north as Ilford

Cemetery (Bathurst, NSW), to the south at Steve's Travelling Stock Reserve (Delegate, NSW) and to the east at Captains Flat Cemetery (NSW) (DECCW 2010). These populations have relatively few individuals, but provide an insight into the extent of the population. Given the level of fragmentation and degradation across this region, it may be assumed that the Tarengo Leek Orchid was once more common and widespread than it is today.

Within the ACT, the Tarengo Leek Orchid is only known to occur at the Hall Cemetery, where the species was first properly identified in 1991. The number of flowering plants at the Hall Cemetery has fluctuated from year to year, within the range of 0 to 96. However, between 20 and 60 flowering plants are usually counted each year. Statistical analysis of the population indicates that it increased until the early 2000s, from which point it has remained relatively stable (Wilson et al. 2016).

The most up to date distribution data for this species is publicly available on the ACT Government's mapping portal, [ACTmapi](#).

HABITAT AND ECOLOGY

The Tarengo leek Orchid tends to grow among native – and to a lesser extent exotic – grasses on fertile soils of low relief. Species of the genus *Prasophyllum* are known to prefer moister soils in depressions and swamps (Jones 1988), a trend that appears to apply to the Tarengo Leek Orchid. The population at the Hall Cemetery occurs in a partially cleared area within a Yellow Box Blakely's Red Gum grassy woodland. The site is typical of the Tarengo Leek Orchid habitat and is dominated by Kangaroo Grass (*Themeda triandra*) and Wallaby grasses (*Rytidosperma* spp.) with a high diversity of forbs. There are localised dominant patches of the exotic grasses Yorkshire Fog (*Holcus lanatus*) and Sweet Vernal-grass (*Anthoxanthum odoratum*), which fluctuate annually.

Given the small population size and relatively recent identification, the biology and ecology of the Tarengo Leek Orchid is poorly understood. For much of the warmer months, the plant persists as a tuber, before shooting in late autumn. The inflorescence develops folded in half inside the leaf before flowering in late spring. An individual flowering in consecutive years is uncommon, and may contribute to the fluctuations in the population (Wilson et al. 2016). When flowering has been observed more than once in an individual, the minimum interval between flowering is generally less than 5 years. However, periods of up to 16 years between flowering

have been recorded at the Hall Cemetery. Comparable fluctuations between the Hall Cemetery and Tarengo Travelling Stock Reserve populations indicate that landscape scale factors – such as climate – may influence flowering. Minimum winter temperatures, particularly the number of nights at or below -4°C, are associated with lower numbers of recorded flowering plants at the Hall Cemetery (Wilson et al. 2016). This finding indicates that cold air and frost may damage the leaf and thus prevent flowering.

The flowers of *Prasophyllum* species are pollinated by insects, particularly bees and wasps, that are attracted by the nectar and scents produced by the flower (Jones 1988). A generalist thynnine wasp has been observed as an important pollinator for the Tarengo Leek Orchid (DECCW 2010). Like most orchids, *Prasophyllum* species are generally outcrossers and although reproduction is mostly by seed, daughter tubers are also produced (Jones 1988). The conditions associated with viable seed production are not known and attempts to disperse seed at sites known to have once been occupied by the Tarengo Leek Orchid have been unsuccessful. *Prasophyllum* species require a fungal symbiont, however the species associated with the Tarengo Leek Orchid remains unknown (DECCW 2010).

PREVIOUS AND CURRENT MANAGEMENT

The only known population of the Tarengo Leek Orchid in the ACT occurs at the Hall Cemetery. The site was set aside in 1883, but was left untouched until 1907 when a small portion of the land was cleared, fenced off and the first burials took place (DECCW 2010). The site was managed by trustees until the mid- 1970s. During this time the grass was burnt on an almost annual basis, but grazing by livestock was rare, if not completely absent. After a change in management in 1976, the site was mown at least three times a year. In 1988, the cemetery became a public cemetery managed by the Canberra Public Cemeteries Trust with regular mowing occurring until 1994.

Since the population at the Hall Cemetery was identified in 1991, there have been several instances where individuals have been dug up, or damaged by establishment of graves. In 1994 a mowing plan was established to avoid mowing plants while they are above ground. However, there have been further instances of plants being mown or damaged during or before flowering until around 2013. The Hall Cemetery Management Plan (Wildlife Research and Monitoring and Canberra Cemeteries 2005) provided recommendations on how to undertake common activities, while minimising damage to the Tarengo Leek Orchid population. This Plan was later updated in 2013 (Conservation Research and Canberra Cemeteries 2013).

The Hall Cemetery remains an active site with several burials every year. There is a current proposal for additional burial portions within the existing cemetery block to accommodate burials for the next 20 – 25 years. The scope of the proposal includes the protection of the existing orchid population and habitat as well as ongoing restoration of the grassy Yellow Box Blakely's Red Gum woodland. Neighbouring blocks (310 and 312) have been identified for future expansion of the cemetery. These blocks have a history of grazing and the Tarengo Leek Orchid is not known to occur there. The 'Pf' Public Land overlay of the cemetery block, which allows burials to occur, was expanded on 24/11/05 in the Territory Plan to include Blocks 310 and 312 (ACT Government 2005).

Since 2008, Friends of Grasslands (FoG) – a volunteer organisation – in cooperation with Canberra Cemeteries and Conservation Research, has conducted removal of woody weeds, thistles and exotic grasses as well as the re-planting of under-storey species in the woodland area surrounding the cemetery. Up until 2013, this included the removal of eucalypt regeneration from within and around the Tarengo leek Orchid population as a means of preserving the open grassy habitat occupied by the species. As an adaptive management measure to ensure the ongoing persistence and health of the remnant woodland in the cemetery, this practice has been scaled back and individual saplings have been identified for protection from mowing with the implementation of the updated Hall Cemetery Management Plan in 2013 (Conservation Research and Canberra Cemeteries 2013). The recent findings by Wilson et al. (2016) of a negative relationship between flowering of the Tarengo Leek Orchid at the Hall Cemetery and the number of nights equal to or colder than -4°C also highlights the need to ensure the persistence of elevated vegetation as both a grassy sward and intact woodland in and around the Hall

Cemetery. Maintaining vegetation structural complexity will help in avoiding frequent and severe frosts across the orchid habitat.

THREATS

The major threat to the Tarengo Leek Orchid in the ACT is its restricted range and population size. There is the potential for the ACT population to go extinct in a single event. Further, the isolation from other populations limits localised genetic diversity, leaving it vulnerable to environmental change and disease. Within the current management paradigm, fine-scale habitat loss is likely as new graves are established. However, some consideration is given to avoiding known Tarengo Leek Orchid habitat when planning the establishment of new graves.

For many years a flock of Sulphur-Crested Cockatoos (*Cacatua galerita*) have repeatedly visited the Cemetery to feed during spring, primarily on the bulb of the weed species Onion Grass (*Romulea rosea*). They often cause damage to Tarengo Leek Orchid flowering stems and those of other native forb species (eg. Bulbine Lily) by biting through the stems. Areas of orchid habitat are also disturbed by the birds digging in their search for Onion Grass bulbs. The extent of disturbance varies annually. Such damage has the potential to reduce the production of viable seed, and could affect the recruitment of new individuals as well as reduce habitat condition.

Competition from both native and exotic species is also considered to be a risk. Patches of the Hall Cemetery are dominated by exotic grasses that are feared to be overcrowding individual plants. Given that exotic grasses have been present throughout the monitoring period, they do not appear to present an imminent threat, but require close monitoring. There are also concerns that Kangaroo Grass may be encroaching and present a threat at the Tarengo TSR site (NSW OEH 2012). However, Kangaroo Grass is the dominant native grass species at the Hall Cemetery and is unlikely to be a threat.

CHANGING CLIMATE

Climate is considered to influence flowering in the Tarengo Leek Orchid, with recent analysis indicating flowering is associated with minimum winter temperatures (Wilson et al. 2016). Consequently climate change may present a threat to the population of the Tarengo Leek Orchid if it were to result in an increased number of frost nights. To what extent climate change may influence the species remains unknown.

CONSERVATION ISSUES AND INTENDED MANAGEMENT ACTIONS

PROTECTION

A critical element in the conservation of the Tarengo Leek Orchid is the conservation of Yellow Box

Blakely's Red Gum Grassy Woodland and Natural Temperate Grassland. Both of these communities have been listed as endangered in the ACT, and have their own Action Plans and Strategies. The Hall Cemetery population occurs in partially modified Yellow Box Blakely's Red Gum Grassy Woodland that has remained in relatively stable state for over a century. This land is primarily managed by the Canberra Public Cemeteries Trust, who has worked with ACT Government to maintain this population of the Tarengo Leek Orchid.

ENVIRONMENTAL OFFSET REQUIREMENTS

Environmental offset requirements for species and ecological communities in the ACT are outlined in the ACT Environmental Offsets Policy and associated documents such as the ACT Environmental Offsets

Assessment Methodology and the Significant Species Database. In the Assessment Methodology and Database, some of the threatened species have special offset requirements to ensure appropriate protection. It has

been determined that the Tarengo Leek Orchid is not able to withstand further loss in the ACT so offsets for this species are not appropriate.

If threatened species numbers are observed to change dramatically (either increase or decrease), a review of the threshold for that particular species in the Assessment Methodology and Database would be undertaken.

SURVEY, MONITORING AND RESEARCH

Since the population at the Hall Cemetery was first identified, it has been monitored on an almost annual basis, resulting in a quality long term population dataset. Projects have also been conducted to determine the pattern and timing of the annual life stages of the species and to model the stability of the population and the influences of climatic variables on flowering within the Hall population.

Conservation Research have partnered with the Australian National Botanic Gardens (ANBG) on numerous occasions to collect and bank the seed from various threatened plant species in the ACT. The Tarengo Leek Orchid has been part of a number of these projects. There is currently 0.3976 grams (equating to ~ 198, 203 seeds) of Tarengo Leek Orchid seed banked from the Tarengo TSR and Hall Cemetery populations. Owing to the small size of the Hall population and the difficulties faced in collecting seed from *Prasophyllum* species, there is an ongoing need to add to the seed collection from the Hall Cemetery population.

Searches for potential undiscovered populations have been undertaken in the past, however these searches should continue in to the future. Continued development in spatial modelling and remote sensing will assist in guiding better informed searches for new populations.

Future data collection will be complemented by recording additional observations about localised site conditions. Specifically, this should include measurement of surrounding vegetation structure and dominance, soil moisture and temperatures, as well as evidence of disturbance such as cockatoo diggings or mowing. Such additional information will assist in linking population fluctuations with potential causes.

The conservation of the Tarengo Leek Orchid will also benefit from further research in to its biology, specifically its reproductive processes and fungal symbiotic

relationships. These biological traits are likely to be limiting factors in expanding the population size and range of the Tarengo Leek Orchid. Research in these areas will also help to inform population viability analyses.

Priority research areas include:

- Improving knowledge of life history and ecology, such as plant longevity, seed longevity and identification of the environmental germination niche of the Tarengo leek Orchid.
- Investigations of soil chemistry, moisture and mycorrhizal fungi associations.
- Quantification of habitat vegetation dominance and structure.
- Investigation of genetic variation within and between surviving Tarengo Leek Orchid populations, including research into the genetic viability of the current seed bank.
- Investigation of pollinator limitations, effects of habitat fragmentation and reduced population size on genetic variability.
- Improving knowledge of how microsite variations, minimum winter temperatures and soil moisture affect the Tarengo Leek Orchid.
- Investigations into the effect of potential future climate regimes on the frequency and severity of frost nights and subsequent effects on flowering success.
- Identification of potential refugia sites for the Tarengo Leek Orchid under a changing climate.
- Continuing refinement of suitable seed collection methods and identification of methods for establishing additional populations via translocation of greenhouse germinated plants in conjunction with ANBG, Greening Australia and other parties.

MANAGEMENT

The confined distribution and small population of the Tarengo Leek Orchid in the ACT places the species at high risk of local extinction. Thus, the management focus for the Tarengo Leek Orchid should be to maintain adequate site condition and reduce the risk of disturbance to the current population (Jones 1992). Canberra Public Cemeteries Trust are the primary managers of the species in the ACT, owing to their management of the Hall Cemetery. Conservation Research are also actively involved in overseeing the management of the species. Management of the Hall Cemetery is guided by the Hall Cemetery Management Plan (Conservation Research and Canberra Cemeteries 2013). The plan outlines the best course of action associated with the following issues:

- Mowing
- Weeds
- Eucalyptus regeneration
- Vehicle access
- Grave digging
- Fertiliser use
- Cockatoo disturbance
- Fire
- Grazing

Priority management actions include:

- Manage biomass to maintain a heterogeneous habitat structure and diverse floristic composition while allowing for cemetery operations.
- Control weeds if they pose a threat to the population or the site.
- Manage eucalypt regeneration to ensure ongoing persistence of the existing open woodland community.
- Avoid incompatible activities such as grave digging or vehicle movement in habitat areas.
- Maintain a low public profile of the site.
- Limit visitor impacts by curbing access to orchid populations during flowering and seed set, and restricting the species approved for graveside plantings.
- Continue annual monitoring program.
- Maintain an ex-situ 'insurance' population (plants and/or seed bank) while there is a high risk of extant populations becoming extinct.

IMPLEMENTATION

Implementation of this action plan and the ACT Woodland Conservation Strategy will require:

- Land planning and land management areas of the ACT Government to take into account the conservation of threatened species.
- Allocation of adequate resources to undertake the actions specified in the strategy and action plans.
- Liaison with other jurisdictions (particularly NSW) and other land managers (Canberra Public Cemeteries Trust) with responsibility for the conservation of a threatened species or community.
- Collaboration with universities, CSIRO, Australian National Botanic Gardens and other research institutions to facilitate and undertake required research.
- Collaboration with non-government organisations such as Friends of Grasslands and Greening Australia to undertake on-ground actions.
- Engagement with the community, where relevant, to assist with monitoring and other on-ground actions, and to help raise community awareness of conservation issues.

OBJECTIVES, ACTIONS AND INDICATORS

Table 1: Objectives, Actions and Indicators

OBJECTIVE	ACTION	INDICATOR
PROTECT		
1. Protect all populations from unintended impacts (unintended impacts are those not already considered through an environmental assessment or other statutory process).	1a. Apply formal measures to ensure all populations are protected from impacts of recreation, infrastructure works and other potentially damaging activities.	All populations are protected from unintended impacts by appropriate formal measures.
	1b. Encourage other jurisdictions to protect sites where the species occurs on their lands from unintended impacts.	
	1c. Ensure sites are protected from unintended impacts.	All sites are protected by appropriate measures from unintended impacts.
	1d. Implement ample buffers around habitat to ensure no unintended impacts result from adjacent re-zoning or development actions.	All sites protected from unintended impacts from re-zoning or development by sufficient buffer areas.
	1e. Ensure protection measures require site management to conserve the species.	Protection measures include requirement for conservation management.
	1f. Identify other sites where the species occurs by maintaining alertness to the possible presence of the species while conducting vegetation surveys in suitable habitat.	Vegetation surveys in suitable habitat also aim to detect the species.
MAINTAIN		
2. Manage the species and its habitat to maintain the potential for evolutionary development in the wild.	2a. Monitor populations and the effects of management actions.	Trends in abundance are known. Management actions are recorded and considered in analysis of monitoring data.
	2b. Manage to conserve the species and its habitat, including implementing advice under the Hall Cemetery Management Plan (Conservation Research and Canberra Cemeteries 2013).	Populations are stable or increasing. Habitat is managed appropriately (indicated by maintenance of an appropriate sward structure and herbage mass). Potential threats (e.g. weeds) are avoided or managed.

OBJECTIVE	ACTION	INDICATOR
	2c. Maintain a database of sightings of the species, and if available, record habitat information.	Records of sightings are maintained and used to determine the distribution of the species in the ACT.
IMPROVE		
3. Enhance the long-term viability of populations through management of adjacent grassland/woodland to increase habitat area and connect sub-populations.	3a. Manage grassland/woodland adjacent to the species' habitat to increase habitat area or habitat connectivity.	Grassland/woodland adjacent to or linking habitat is managed to improve suitability for the species (indicated by an appropriate sward structure and plant species composition).
	3b. Undertake or facilitate research and trials into techniques for increasing the population size.	Research trials have been undertaken to increase the size of the population. The population is stable or increasing.
4. Expand the range of the species in the ACT by providing suitable habitat and establishing new populations by translocation (upon advice from feasibility studies).	4a. Undertake or facilitate research and trials into establishing new populations.	Research and trials have been undertaken to establish new populations. New population(s) established.
5. Improved understanding of the species' ecology, habitat and threats.	5a. Undertake or facilitate research on habitat requirements, techniques to manage habitat, and aspects of ecology directly relevant to conservation of the species.	Research undertaken and reported, and where appropriate, applied to the conservation management of the species and Hall Cemetery Management Plan.
COLLABORATE		
6. Promote a greater awareness of, and strengthen stakeholder and community engagement in, the conservation of the species.	6a. Undertake or facilitate stakeholder and community engagement and awareness activities.	Engagement and awareness activities undertaken and reported.

ACKNOWLEDGMENTS

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