

THREATENED SPECIES SCIENTIFIC COMMITTEE

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

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

Conservation Advice

Diuris ochroma

pale golden moths orchid

Conservation Status

Diuris ochroma (pale golden moths) 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 Vulnerable category are its restricted distribution, limited population size and projected decline due to the threats of grazing, weed invasion and habitat degradation.

Description

The pale golden moths orchid is an herbaceous perennial geophyte that dies back annually to one or two oblong underground tubers (Leigh et al., 1984). A tuft of three to five slender, grass-like leaves grow from the base of the plant to 18 cm long (Backhouse & Jeanes 1995; Jones 2006). The slender flower stem grows to 25 – 37 cm high and supports one to three pale yellow-cream flowers with variable maroon stripes on the dorsal sepal and labellum (central petal) (Entwisle 1994; Backhouse & Jeanes 1995). The dorsal sepal is up to 12 mm long and obliquely erect and the lateral sepals are up to 15 mm long and are brownish to greenish, slender and rolled inwards. The petals are up to 18 mm long with a narrow base and broadly ovate lamina and are spreading to drooping. The labellum is up to 15 mm long, broadly wedge-shaped and flat (Entwisle 1994; Backhouse & Jeanes 1995).

Distribution

The pale golden moths orchid is endemic to south-eastern Australia and displays a disjunct distribution between Victoria and New South Wales (NSW). In Victoria it is confined to the Wonnangatta Valley. In 2010 there were two known populations containing an estimated 8050 plants (Duncan & Coates 2010). The larger population, containing an estimated 8000 plants is reserved within the Alpine National Park (NP) (Coates et al., 2002), while the other is found on a roadside near Abbeyard (Duncan & Coates 2010). The former abundance in Victoria is unknown but the species was probably naturally rare with a fluctuating population size (DSE 2003).

In NSW the pale golden moths orchid occurs in the Kybeyan area, Monaro Tableland, with historical records in the Kosciuszko NP (Duncan & Coates 2010). In 2008 the species was restricted to a single population containing an estimated 130 plants in small colonies scattered over an area of less than 4 km² (NSW Scientific Committee 2008). This population occurs near Kybeyan on private property and roadside land managed by the Cooma-Monaro Shire. There are reliable historical records from two sites within the Kosciuszko NP, however in 2008 plants had not been observed at these sites for over 30 years (NSW Scientific Committee 2008). Searches of these former locations, as well as suitable habitat elsewhere within the district have failed to locate additional populations of the species (NSW Scientific Committee 2005, 2008). The former abundance in NSW is unknown (DSE 2003).

Relevant Biology/Ecology

In Victoria, the pale golden moths orchid grows at 400–500 m altitude in sub-alpine grassland and sparse woodland with an herbaceous understorey. Commonly associated species include *Themeda triandra* (kangaroo grass), *Poa annua* (annual meadow grass), *Ajuga australis* (austral bugle), *Asperula* spp. (woodruff), *Acaena novae-zelandiae* (bidgee-widgee), *Ranunculus* spp. (buttercups), *Wurmbea* spp. (early nancys), *Trifolium dubium* (suckling clover), *Lomandra* spp. (mat-rushes) and *Bromus hordeaceus* subsp. *hordeaceus* (soft brome) (Duncan & Coates 2010).

In NSW the pale golden moths orchid is found in grassland and sub-alpine open woodland above 900 m in altitude, on brown loam over shale, with scattered trees of *Eucalyptus pauciflora* (snow gum) and *E. viminalis* (mannum gum) (NSW Scientific Committee 2005; Duncan & Coates 2010). Associated species include kangaroo grass, *Poa* spp. (tussock grasses), *Rytidosperma* spp. (wallaby-grass), *Epacris microphylla* (coral heath) and *Leptorhynchus squamatus* (scaly buttons) (NSW Scientific Committee 2005; Duncan & Coates 2010). Little is known of the habitat of the historical populations within the Kosciuszko NP except that one occurred in dry grassland and both occurred at around 1400 m altitude (NSW Scientific Committee 2005).

The species may require open herbaceous vegetation maintained by regular burning (DSE 2003). As with many other species of *Diuris*, the pale golden moths orchid may flower in greater numbers in the season following summer fire (NGH Environmental 2004). Winter fires have been used to control St. John's wort (*Hypericum perforatum*) in Victoria. While this has probably caused some damage to the species, maximum flowering has been noted to occur in the year following these fires (Coates et al., 2002). The pale golden moths orchid flowers from November to January (Duncan & Coates 2010); however within this period it is variable in terms of its flowering time and the proportion of the plants that flower in one season (NSW Scientific Committee 2008).

The following information applies to the general biology and ecology of *Diuris* spp.

Pollination of *Diuris* spp. is mainly by small native bees attracted by bright floral colours (Jones 2006). Most terrestrial orchids have evolved under conditions of hot summer fires, generally when the plants are dormant (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 restricted following periods of sustained hot, dry weather following flower opening (Todd 2000).

Threats

The pale golden moths orchid is at risk from a combination of threats across its locations in Victoria and NSW, including grazing, invasive species and habitat disturbance. Risk posed by each of these threats may vary depending on geographical, environmental, biological and sociological factors.

Table 1 – Threats impacting the pale golden moths orchid in approximate order of severity of risk, based on available evidence.

Threat factor	Threat type & status	Evidence base
Invasive species		
Weed invasion	known current	Weed invasion is a known threat to the pale golden moths orchid. 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, problem weeds for the pale golden moths orchid at the Alpine NP site included St. John's wort, blackberries (<i>Rubus fruticosus</i>), paspalum (<i>Paspalum dilatatum</i>), lesser quaking grass (<i>Briza minor</i>), sticky mouse-ear chickweed (<i>Cerastium glomeratum</i>), white clover (<i>Trifolium repens</i>) and prairie grass (<i>Bromus catharticus</i>) (Duncan & Coates 2010). At the NSW site, problem weeds included clover (<i>Trifolium</i> spp.), flatweed (<i>Hypochaeris radicata</i>), sheep sorrel (<i>Acetosella vulgaris</i>), fescue (<i>Vulpia</i> spp.) and Yorkshire fog (<i>Holcus lanatus</i>) (NGH Environmental 2004).
Grazing		
Rabbit grazing	known current	Grazing by feral herbivores, including rabbits (<i>Oryctolagus cuniculus</i>) is a known threat to the pale golden moths orchid. Grazing can have a devastating impact on orchids (Duncan et al., 2005). In 2010 grazing by rabbits was a serious threat to the pale golden moths orchid at the two Victorian populations (Duncan & Coates 2010).
Pig grazing	known past	Feral pigs (<i>Sus scrofa</i>) were a known threat for an historic population of the pale golden moths orchid. Pigs were known to dig for tubers and roots in the grassland community where records show the pale golden moths orchid occurred in Kosciuszko NP (Duncan & Coates 2010), causing physical damage to the plants in the area.
Impacts of domestic species		
Stock grazing	known current	Grazing by cattle (<i>Bos</i> spp.) is a known threat to the pale golden moths orchid. Grazing by introduced herbivores, including cattle, can have a devastating impact on orchids. The impact of cattle can be exacerbated by their trampling of plants that escape grazing and their introduction of weed seed in their faeces (Duncan et al., 2005). In 2010, grazing by cattle was a serious threat at the Abbeyard population in Victoria and the Kybeyan population in NSW (Duncan & Coates 2010). In 2003, there was evidence of heavy browsing by cattle on a small number of plants in the NSW population (NGH Environmental 2004).

Habitat loss, disturbance and modification		
Physical disturbance by vehicles	known current	In 2010 accidental destruction of the pale golden moths orchid by off-road vehicles was a known threat for the Victorian populations (Duncan & Coates et al. 2010). In 2008 the NSW population was at risk from bulldozer and other traffic along road edges and fence lines (NSW Scientific Committee 2005, 2008).
Road / track maintenance activities	potential	In 2010 there was potential for accidental damage of the pale golden moths orchid by activities associated with road/track maintenance at known sites (Duncan & Coates et al. 2010).
Habitat loss	known past	Habitat loss is a known past threat for the pale golden moths orchid. The NSW population is found in a fragmented landscape that has undergone considerable disturbance and clearing. It is likely that the population of the pale golden moths orchid has been impacted by this clearing and its habitat has been lost (NSW Scientific Committee 2008).
Fire		
Timing and frequency	potential	The role of fire for the pale golden moths orchid is not well understood. Fires that occur in autumn, winter and spring, after the species shoots but before seed is set, may pose a threat, although Coates et al., (2002) note that flowering is often maximum in the year following winter fires. Too frequent fire may pose a threat by altering the habitat, removing organic surface materials and negatively impacting pollinators and mycorrhizal agents. However, the species may require regular burning to maintain the open herbaceous vegetation that it prefers (DSE 2003) and too infrequent fire may also be a threat. Pile burning was identified as a potential threat at the NSW site in 2004 (NGH Environmental 2004).

Conservation Actions

Conservation and Management priorities

Invasive species

- Collaborate with public and private land managers to control and reduce the spread of invasive species, including those identified in the table of threats in this document. Consult with local experts in determining the most appropriate physical or chemical control methods for these weeds that will not have a detrimental effect on the pale golden moths 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 (e.g. poisoning and warren destruction).

Impacts of domestic species

- If livestock grazing occurs in the area, ensure land managers use an appropriate grazing regime that does not detrimentally affect the pale golden moths orchid.

Habitat loss, disturbance and modifications

- Ensure public and private land managers are aware of the presence and location of the pale golden moths orchid on their land and provide protection measures against known and potential threats to the species.
- Manage road maintenance activities to ensure the protection of the pale golden moths orchid (for example, ensure that stockpiles and machinery parking are located away from known locations of the species).
- Manage access to known locations of the pale golden moths orchid to prevent the accidental trampling or destruction of plants by people or off-road vehicles.

Fire

- Fires must be managed to ensure prevailing fire regimes do not disrupt the life cycle of the pale golden moths orchid, they support rather than degrade the habitat necessary to the pale golden moths orchid, they do not promote invasion of exotic species, and they do not increase impacts of grazing.
- Physical damage to the habitat and individuals of the pale golden moths 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.
- Physical damage to the habitat and individuals of the pale golden moths orchid must be avoided during and after fire operations.
- Fire management authorities and land management agencies should use suitable maps and install field markers to avoid damage to the pale golden moths 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, Royal Botanic Gardens Victoria and the Australian PlantBank, Australian Botanic Garden, Mount Annan, and determine viability of stored seed. Seeds from all natural populations to be collected and stored.
- Establish plants in cultivation in appropriate institutions such as the Royal Botanic Gardens Victoria and Australian Botanic Garden, Mount Annan.

Stakeholder Engagement

- Identify partners including traditional owners, landholders, community-based organisations and conservation management organisations that may be associated with recovery of the pale golden moths orchid.
- Promote opportunities for partners to participate in recovery for the pale golden moths orchid, as appropriate.

Survey and Monitoring priorities

- Undertake survey work, when plants are flowering from November to January, in suitable habitat and potential habitat to locate additional occurrences. Given the species' variability in flowering time and the proportion that flower in any season, ensure survey work involves multiple trips across the flowering period.
- Undertake survey work, when plants are flowering from November to January at known populations to establish baselines where required to identify changes (if any) in population size, distribution, ecological requirements and relative impacts of threatening processes. Given the species' variability in flowering time and the proportion that flower in any season, ensure survey work involves multiple trips across the flowering period.
- 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 the pale golden moths orchid 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 pale golden moths 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 and adjust conservation actions as required.
- 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 pale golden moths orchid.

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