National Recovery Plan for the **Small Golden Moths Orchid** Diuris basaltica

Gary Backhouse and Karen Lester





Australian Government



Department of State Government SustainaDinty Victoria and Environment Prepared by Gary Backhouse and Karen Lester, Department of Sustainability and Environment, East Melbourne, Victoria

Published by the Victorian Government Department of Sustainability and Environment (DSE) Melbourne, October 2010.

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ISBN 978-1-74242-226-8 (online)

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Citation: Backhouse, G. and Lester, K. (2010). National Recovery Plan for the Small Golden Moths Orchid *Diuris basaltica*. Department of Sustainability and Environment, Melbourne.

Cover photograph: Small Golden Moths Orchid Diuris basaltica Rockbank, Vic © Gary Backhouse

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Summary

The Small Golden Moths Orchid (*Diuris basaltica*) is a small, yellow deciduous terrestrial orchid endemic to Victoria. Previously locally common in a limited area of the basalt plains to the west of Melbourne, the species has suffered a catastrophic decline in range and abundance, and now survives in just three wild populations containing about 400 plants (almost all plants occur in just one population), with about 200 plants in cultivation. Major threats include disturbance to and destruction of plants and habitat, grazing, weed invasion and altered fire regimes. *Diuris basaltica* is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act). This national Recovery Plan is the first prepared for the species, and details its distribution, habitat, threats and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Small Golden Moths Orchid (*Diuris basaltica*) D.L. Jones (also known as the Early Golden Moths) (Family Orchidaceae) is a deciduous, perennial, terrestrial orchid emerging annually from an underground tuber. It has 3–7 linear green leaves in a basal tuft, and an erect green flower stem to 15 cm tall, bearing one or two small, nodding, poorly opening, bright golden yellow to orange-yellow flowers to 20 mm wide. The dorsal sepal is ovate and obliquely erect, sometimes with a slightly recurved apex, while the lateral sepals are linear and obliquely deflexed. The petals have an ovate to ovate-elliptic lamina, are incurved and partially overlapped by the labellum. The labellum is flat, broadly ovate to ovate-elliptic and has a deeply and irregularly lobed labellum callus. The species can grow in densely crowded tufts of up to 30 plants, and flowers in September and October (description from Jones 2006).

Very little is known of the biology and ecology of *D. basaltica*. The leaves emerge in late autumn, following the onset of seasonal rains. Flowering occurs in September. By late spring the leaves have shrivelled, and if pollination has occurred, the seed capsule is ripening. Seed dispersal occurs soon after. The species survives the dry summer and early autumn as a dormant tuber that is replaced annually. Reproduction is from seed and vegetative reproduction through tuber multiplication. The pollinators of *D. basaltica* are probably native halictid bees (Walker 1997), through simple food deception, where the orchid mimics nearby nectar or pollen-bearing flowers, but offers no food reward of its own. Halictid bees are opportunistic in their foraging activities and can gather pollen and nectar from a wide variety of plant species. Seed capsules have been observed on plants at the Rockbank site (Peter Kiernan ANOS pers. comm. 2010), indicating that the pollinator is present and natural pollination is occurring.

Taxonomy

There has been some uncertainty around the correct identity and distribution of *Diuris basaltica*. The species was only formally described in 2006 (Jones 2006) although it has been EPBC-listed under the manuscript name *Diuris basaltica* ms since 1999. It was previously thought to be more widely distributed across the basalt plains of south-western Victoria, and has been confused with other species of *Diuris* in this region. However, the published formal descriptions of *D. basaltica* and *Diuris gregaria* (another highly threatened species) from the basalt plains in south-western Victoria (Jones 2006) have enabled the correct identification of these species and a precise determination on distribution and abundance of *D. basaltica* to be made.

Distribution

Diuris basaltica is endemic to a small area on the Keilor and Werribee plains immediately to the west of Melbourne, stretching from Sydenham in the north to Lara in the south, a distance of about 50 km, in the Victorian Volcanic Plain IBRA bioregion (*sensu* DEH 2000) (Figure 1). Within this distribution, the species currently occurs at only three locations, at Laverton, Derrimut and Rockbank. Locations will be kept confidential to protect the orchid. Maps showing the general distribution of *D. basaltica* are available from the Department of Sustainability and Environment.

Habitat

Diuris basaltica grows in herb-rich native grasslands dominated by Kangaroo Grass (*Themeda triandra*) on heavy basalt soils, often with embedded basalt boulders. This vegetation is dominated by

a ground layer of tussock-forming perennial grasses, with a wide variety of wildflowers and herbs growing among the tussocks. Other species present include wallaby-grasses *Austrodanthonia* species, spear-grasses *Austrostipa* species, tussock-grasses *Poa* species, *Dianella longifolia*, *D. revoluta*, *Tricoryne elatior*, *Pimelea humilis* and *Dichanthium sericeum* subsp. *sericeum*. All sites form part of the 'Natural Temperate Grassland of the Victorian Volcanic Plain', which is a critically endangered ecological community under the EPBC Act, and the 'Western (Basalt) Plains Grasslands Community' which is listed as a threatened ecological community under the FFG Act.



Figure 1. Current distribution of Diuris basaltica

Population Information

Diuris basaltica is currently known from just three populations. The largest population occurs on private land at Rockbank and contains about 400 plants. Another population containing only five plants occurs in a small reserve at Derrimut managed by Parks Victoria, and the third population occurs on private land at Laverton and contains just two plants.

Decline and Threats

By the early 1990s, *D. basaltica* had disappeared from all of these sites, and just one population was known, occurring in private land at Altona. This population became extinct in the late 1990s when the site was developed for industry, and it was feared that the species was in fact extinct in the wild, with only a few plants surviving in cultivation. Subsequent surveys discovered small populations of *D. basaltica* growing on the site of the former RAAF base at Laverton, at Derrimut and the largest population on private land at Rockbank, all in Melbourne's outer west. The Laverton site has not been resurveyed since the early 2000s, and it is not known if the species still survives there.

Habitat loss, initially for agriculture and subsequently for expanding urban and industrial development in Melbourne's west, has undoubtedly been the major cause for the catastrophic decline in range and abundance of *D. basaltica*. There has been extensive loss of grasslands and grassy woodlands in south-eastern Australia, such that these are now some of Australia's most threatened ecosystems (Kirkpatrick *et al.* 1995). There is a high risk of extinction of remaining populations due to the small population size at the two remaining sites, and the highly disjunct distribution of the species. It is possible that some ecological functions such as conditions for the maintenance of pollinator and fungal activity have been adversely affected at these remnant sites. Remaining populations of *D. basaltica* are at risk from a variety of current and potential threats, including:

Disturbance/destruction

Disturbance to or destruction of plants and/or habitat is a major threat to *D. basaltica*. The Laverton site is on private land destined for urban development. The Rockbank site, also on private land, is under increasing threat due to uncontrolled off-road vehicle access to the property, which is a consequence of expanding residential development and greatly increased vehicle traffic in the area.

Grazing/predation

Grazing of plants by European Rabbit, Brown Hare and invertebrates is a threat at all sites.

Weed invasion

All populations are at risk of weed invasion, especially by introduced grasses such as Nasella species.

Altered fire regimes

Diuris basaltica probably requires periodic fire to reduce accumulation of grasses, especially Kangaroo Grass, which otherwise may suppress growth and/or flowering if grass swards become too dense. Although current sites remain relatively open, the total exclusion of fire risks the sites being eventually becoming crowded out by Kangaroo Grass. However, burning during severe or prolonged drought conditions risks poor post-fire regeneration.

Recovery Information

Existing Conservation Measures

A number of measures have been undertaken for the conservation of *D. basaltica* including:

- Salvage of 25 plants from the Altona site prior to its destruction, for cultivation and propagation. Currently about 200 plants are in cultivation by Zoos Victoria and the Native Orchid Growers Network of the Australasian Native Orchid Society (Victorian group), which provides a source of plants for introduction into secure sites in the wild.
- Fencing of two small areas at the Laverton site for protection as part of development conditions, including where *D. basaltica* grows. However, the sites have no legal status, and are at risk from expanding urban development.
- Commitment by the Victorian Government to protect the Rockbank site as part of the offsets for the expanded urban growth boundaries project to accommodate Melbourne's increasing population. Protection will be achieved by either land purchase or binding management agreement with the land owners.

Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of the Small Golden Moths Orchid in the wild and to increase the probability of populations becoming self-sustaining in the long term. Within the duration of this Recovery Plan, the specific objectives for the recovery of the Small Golden Moths Orchid are to:

- 1. Determine distribution, abundance, growth rates and viability of populations
- 2. Determine habitat requirements
- 3. Ensure that populations and their habitat are protected and managed
- 4. Manage threats to populations
- 5. Maintain plants in cultivation
- 6. Increase numbers of plants and populations in the wild
- 7. Build community support for conservation

Program Implementation and Evaluation

This Recovery Plan guides recovery actions for the Small Golden Moths Orchid and will be implemented and managed by the Department of Sustainability and Environment, supported by other agencies, educational institutions, regional natural resource management authorities and community groups as appropriate. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist groups on research, *in situ* management, community education and cultivation as required. The Recovery Plan will run for a maximum of five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption.

Recovery Actions and Performance Criteria

Action	Description									
Specific	Objective 1: Determine distribution, abundance, growth rates and viability of populations									
Performa	ance Criterion: Population sizes and trends are determined from annual monitoring									
1.1	Undertake survey and monitoring to determine the area, extent, number, size and structure of populations, and inference or estimation of population change. Responsibility: DSE									
1.2	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. Responsibility: DSE									
Specific Objective 2: Determine habitat requirements										
Performance Criterion: Habitat critical to survival mapped for both populations										
2.1	Survey known habitat and collect floristic and environmental information. Responsibility: DSE									
2.2	Identify and survey potential habitat, using ecological and bioclimatic information to indicate habitat preference. Responsibility: DSE									
Specific Objective 3: Determine identity, presence and habitat requirements of pollinator										
Performa	ance Criterion: Identity of pollinator and ecological requirements determined and used in management.									
3.1	Determine the identity, presence and habitat requirements of the pollinator(s). Responsibility: DSE									
3.2	Use ecological information to manage habitat to encourage pollinator presence. Responsibility: DSE									
Specific	Objective 4: Ensure that populations and their habitat are protected and managed									
Performa	ance Criterion: Designation of the Laverton and Rockbank sites as protected reserves									
4.1	Investigate permanent reservation status of a grassland reserve at the Laverton site. Responsibility: DSE									
4.2	Negotiate either land purchase or binding management agreement for the Rockbank site under the expanded urban growth boundary offset program.									
Specific	Objective 5: Manage threats to populations									
Performa	ance Criterion: Measurable reduction in weed cover, predation rates and site disturbance									
5.1	Control threats from pest plants. Responsibility: DSE, PV									
5.2	Control threats from grazing/pest animals. Responsibility: DSE, PV									
5.3	Prevent vehicle access to Rockbank site. Responsibility: DSE, PV									
Specific	Objective 6: Maintain plants in cultivation									
Performa	ance Criterion: At least 50 genetically diverse, mature plants in cultivation and 400 plants produced in flasks									
6.1	Maintain plants in cultivation to provide seed for mass propagation for reintroductions. Responsibility: ZV, NOGN									
6.2	Establish a seed bank and determine seed viability. Responsibility: RBG									
6.3	Isolate and cultivate the mycorrhizal fungus for <i>ex situ</i> seed germination Responsibility: RBG									
6.4	Propagate plants in flasks for reintroductions. Responsibility: DSE									
Specific Objective 7: Increase numbers of plants and populations in the wild										
Performa	ance Criterion: 1,000 plants maintained in four wild populations									
7.1	Identify and manage fire regimes to maintain habitat for optimal growth and flowering. Responsibility: DSE									
7.2	Introduce plants from cultivation to the Laverton and Derrimut sites to increase population size. Responsibility: DSE									
7.3	Manage microhabitat at all sites for seedling recruitment, collect seed and restock populations with seed. Responsibility: DSE									

- 7.4 Find a secure site for the establishment of a new wild population and prepare reintroduction plan, following the guidelines in Vallee et al. (2004). Responsibility: DSE, PV
- 7.5 Establish and monitor plants at the site (including plant survival, flowering and seed set). Responsibility: DSE, NOGN, PV

Specific Objective 8: Build community support for conservation

Performance Criterion: Community group participation in recovery of the species

8.1 Identify and develop opportunities for community involvement in the conservation of *D. basaltica*. Responsibility: DSE, PV

Abbreviations: DSE=Department of Sustainability and Environment; NOGN=Native Orchid Growers Network; PV=Parks Victoria; RBG=Royal Botanic Gardens, Melbourne; ZV=Zoos Victoria

Management Practices

Disturbance to or destruction of the Altona and Rockbank sites for development remains the greatest threat that requires management. On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to mitigate these threats including weed control, caging/fencing, control of pest animals and fire management. Broadscale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers including private landholders. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The recovery plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of seed bank dynamics and recruitment. Successful *in situ* population management will be founded on understanding the obligate relationships between each threatened orchid taxon and associated flora, as well as its response to environmental processes. These are directly linked to seed production, recruitment and regeneration and are thus vital to recovery. A demographic census will be necessary to gather life history information and to monitor the success of particular management actions. In addition to the above, *ex situ* conservation measures will be required and will include seed and mycorrhizal fungi storage and plant cultivation. Cultivating *ex situ* populations will also aim to increase the amount of seed available for introduction to sites, and translocation of cultivated plants will be required to bolster existing populations and establish new populations. Community participation in recovery actions will be sought.

Affected Interests

Two populations of *D. basaltica* occur on private land, and the Department of Sustainability and Environment will negotiate with the land owners over protection of the sites. This will include the possibility of purchase of the Rockbank site under the expanded urban growth boundaries policy announced by the Victorian Government (DSE 2009). One small population occurs in a reserve managed by Parks Victoria. Zoos Victoria and the Australian Native Orchid Society (Victorian group) will continue to be involved in threatened orchid conservation activities including propagation of *D. basaltica* and the establishment of new populations.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands *D. basaltica* occurs have been advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and invited to provide comments and be involved in the implementation of the plan.

Biodiversity Benefits

The recovery plan includes a number of potential biodiversity benefits for other species and vegetation communities. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with the threatened orchid, particularly those species with similar life forms and/or flowering responses (e.g. *Diuris fragrantissima*). Protecting the sites at Rockbank and Laverton will also lead to the protection of high value remnants of the threatened ecological community 'Natural Temperate Grassland of the Victorian Volcanic Plain', which supports a variety of nationally threatened animals and more than 20 threatened plants (DEWHA 2008). The recovery plan will also provide an important public education role as orchids have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation. Germination and cultivation techniques

developed during the recovery phase will be of use for other threatened orchids elsewhere in southeastern Australia.

Social and Economic Impacts

The implementation of this recovery plan is unlikely to cause significant adverse social impact. However, it may cause some economic impact, as protection of the orchid could impact on development opportunities of the sites. Outcomes will be negotiated with land owners, with a view to government purchase of the Rockbank site.

Acknowledgments

The authors would like to thank the following people who provided information, critical comment or assisted with field work during the preparation of this recovery plan: Adam Muir (Department of Sustainability and Environment, Vic); Dick Thomson, Neil Anderton and Peter Kiernan (Australasian Native Orchid Society Victorian group).

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Action	Description	Priority	Feasibility	Responsi	bility	Cost estimate					
						Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Distribution, abundance										
1.1	Survey, monitoring	1	100%	DSE		\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
1.2	Population trends	2	100%	DSE		\$5,000	\$5,000	\$5,000	\$0	\$0	\$15,000
2	Habitat requirements										
2.1	Known habitat	1	100%	DSE		\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
2.2	Potential habitat	2	50%	DSE		\$0	\$0	\$10,000	\$10,000	\$0	\$20,000
3	Pollinator ecology										
3.1	Identity, habitat	2	75%	DSE		\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
3.2	Habitat management	2	50%	DSE		\$0	\$0	\$10,000	\$10,000	\$10,000	\$30,000
4	Protection										
4.1	Laverton site	1	50%	DSE		\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
4.2	Rockbank site*	1	75%	DSE		\$10,000	\$10,000	\$0	\$0	\$0	\$20,000
5	Threat management										
5.1	Pest plants	1	75%	DSE		\$10,000	\$10,000	\$5,000	\$5,000	\$10,000	\$40,000
5.2	Pest animals	1	75%	DSE		\$10,000	\$5,000	\$10,000	\$5,000	\$10,000	\$40,000
5.3	Vehicle control	1	100%	DSE		\$15,000	\$5,000	\$2,000	\$2,000	\$2,000	\$26,000
6	Cultivation										
6.1	Cultivated plants	1	100%	DSE		\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
6.2	Seed bank	1	100%	RBG		\$0	\$0	\$2,000	\$2,000	\$2,000	\$6,000
6.2	Mycorrhizal fungus	1	100%	RBG		\$5,000	\$0	\$0	\$0	\$0	\$5,000
6.3	Propagation	1	100%	DSE		\$0	\$0	\$5,000	\$5,000	\$5,000	\$15,000
7	Population increase										
7.1	Fire regimes	2	75%	DSE		\$0	\$10,000	\$0	\$0	\$10,000	\$20,000
7.2	Site supplementation	1	75%	DSE		\$0	\$7,000	\$7,000	\$7,000	\$0	\$21,000
7.3	Microhabitat management	2	50%	DSE		\$0	\$0	\$5,000	\$5,000	\$5,000	\$15,000
7.4	Introduction site/plan	2	75%	DSE		\$0	\$0	\$5,000	\$10,000	\$5,000	\$20,000
7.6	Plant establishment	2	75%	DSE		\$0	\$0	\$0	\$10,000	\$10,000	\$20,000
8	Community support										
8.1	Community extension	3	100%	DSE		\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$15,000
					TOTALS	\$83,000	\$80,000	\$79,000	\$84,000	\$82,000	\$408,000

Priority, Feasibility and Estimated Costs of Recovery Actions

* note: these figures do not include the cost of land purchase