National Recovery Plan for the Sturdy Leek-orchid Prasophyllum validum

Mike Duncan







Government of South Australia Department for Environment and Heritage



Department of Sustainability **Orla** and Environment Prepared by Mike Duncan, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg, Victoria

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Summary

The Sturdy Leek-orchid *Prasophyllum validum* is a tall, slender, deciduous terrestrial orchid endemic to south-eastern Australia, where it occurs in Victoria and South Australia. Little is known of the ecology or biology of the species, although it seems to prefer relatively dry woodland habitats. Currently 18 populations containing about 3,200 plants are known. There is no information on previous distribution or abundance, although substantial areas of woodland habitats have been cleared. Current threats include grazing by introduced and native herbivores and habitat disturbance and destruction. The Sturdy Leek-orchid is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, as Threatened under the Victorian *Flora and Fauna Guarantee Act* 1988, and Vulnerable under the South Australian *National Parks and Wildlife Act* 1972. This national Recovery Plan for the Sturdy Leek-orchid 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 Sturdy Leek-orchid is a deciduous, perennial, terrestrial orchid emerging annually from an underground tuber. It has a single, erect, slender green leaf to 45 cm long, which is often withered at flowering. A stout greenish stem to 60 cm tall bears 15–35 fragrant green and white flowers to 15 mm across, in a robust, fairly crowded spike. The dorsal sepal is lanceolate and incurved, while the lateral sepals are long, erect, partially to entirely connate, and the margins are often strongly incurved. The labellum is greenish white with crisped margins, sharply recurved near the middle, and the tip is sharply pointed. The callus is long, light green, raised, warty, channelled towards the base, and extends nearly to the apex of the labellum (description from Jones 2006; Bates & Weber 1990). The Sturdy Leek-orchid is illustrated in Bates and Weber (1990, plates 141 & 142), Bishop (1996, plate 106), Jeanes and Backhouse (2006, p. 279) and Jones (2006, p. 215).

Biology and Ecology

Very little is known of the biology and ecology of the Sturdy Leek-orchid. The single leaf emerges in late autumn, following the onset of seasonal rains. In South Australia, flowering commences in mid October and is usually completed by late November, while in Victoria, flowering commences in early November and concludes in mid December. About four weeks after flowering finishes, the leaf has shrivelled, and if pollination has occurred, the seed capsule is ripening. The species survives the dry summer and early autumn as a dormant tuber that is replaced annually.

The pollinator of *P. validum* flowers is unknown, but many *Prasophyllum* species are visited by a range of insects such as bees, wasps, beetles and ants, attracted to the flowers by strong perfumes and/or rewards of nectar (Backhouse & Jeanes 1995), so the species may not have a specific insect pollinator. A few *Prasophyllum* species appear to be primarily self-pollinating (Backhouse & Jeanes 1995). The Sturdy Leek-orchid usually flowers well in the absence of fire, with its preferred habitat having a low fire frequency. Flowering is probably more dependent upon good autumn and winter rainfall.

Taxonomy

Prasophyllum validum was described from plants collected at Melrose in the southern Flinders Ranges in South Australia. Populations of similar plants have since been found at a variety of locations throughout the box-ironbark forests of central Victoria, mostly between Stawell and Chiltern. It is unclear as to whether these populations are *P. validum* or a related but undescribed species (e.g. Jeanes & Backhouse 2006). Plants fitting this description have been sometimes included under *Prasophyllum fuscum* in South Australia and *Prasophyllum constrictum* and *Prasophyllum pyriforme* in Victoria. However, until their taxonomy is determined, all populations will be treated as *P. validum* and are included in this Recovery Plan. Plants recorded from several other locations in inland Victoria (e.g. Inglewood, St. Arnaud) ascribed to *P.* sp. aff. *pyriforme* (Rouse 2002) may also prove to be *P. validum*. A proposed action in this Plan is to determine the taxonomy of all populations currently included within *Prasophyllum validum*.

Distribution

Prasophyllum validum occurs across inland Victoria and in South Australia in the Flinders Ranges, in the Victorian Midlands and Flinders Lofty Block IBRA bioregions (*sensu* DEH 2000) (Figure 1). There is apparently a major disjunction in distribution between Victorian and South Australian populations. Maps showing the distribution of *P. validum* are available from the Department of Sustainability and Environment (for Victoria), and the Department for Environment and Heritage (for South Australia).



Figure 1. Distribution of Prasophyllum validum

Habitat

The Sturdy Leek-orchid tends to grow in drier woodland habitats, generally with a low sparse understorey. In Victoria, it occurs in box and box-ironbark woodland with overstorey trees including *Eucalyptus polyanthemos, Eucalyptus albens, Eucalyptus macrorhyncha, Eucalyptus viminalis* and *Callitris glaucophylla*, and an open grassy to sparsely shrubby understorey including *Themeda triandra, Joycea pallida, Arthropodium strictum, Acacia verniciflua, Bursaria spinosa, Grevillea alpina* and *Grevillea dryophylla*. Soils vary from heavy clays to sandy loams. In South Australia, *P. validum* occurs in *Eucalyptus cladocalyx* woodland with porcupine grass *Triodia* species understorey, on loamy soils (Bates & Weber 1990). Little is known of specific habitat requirements, and some sites have been disturbed by periodic fire, stock grazing and timber removal. A proposed action in this Recovery Plan is to more precisely determine habitat that is critical to survival of the Sturdy Leek-orchid.

Population Information

The Sturdy Leek-orchid is currently known from 18 populations containing about 3,200 plants (Table 1), with one population containing almost 50% of the total number of plants. All populations are considered important to survival of the species.

Location	Pop. size	Extent Land Mgr		Comments		
South Australia						
Mt. Remarkable National Park (1)	~1,500 plants (2006)	<10 ha	DEH	largest known population, containing almost half the known individuals		
Melrose (private property 1)	~420 plants (2007)	<10 ha	private			
Mt. Remarkable National Park (2) and Melrose (private property 2)	~100 plants (2006)	<10 ha	DEH & private	population occurs in park and on adjoining private land		
Mt. Remarkable National Park (3)	~40 plants (2008)	<5 ha	DEH			
Mt. Brown Conservation Park	1 plant	<1 ha	DEH	not seen since 1994		
Telowie Gorge Conservation Park	unknown	unknown	DEH	not seen since 1985		
Cormacks Road, west of Hammond	unknown	unknown	private	not seen since 1983		
Orroroo Road, east of Wilmington (private property)	nington unknown		private	not seen since 1977 (vouchered)		
6 km nth-west of Bangor (private unknown property)		unknown	private	not seen since 1974 (vouchered)		
Victoria		-				
Chiltern-Mount Pilot National Park	~500 plants (2004)	<5 ha PV		only Victorian population reserved in a national park		
Deep Lead Flora and Fauna Reserve	200 plants (2006)	c. 25 ha	PV			
McKenzie Flora Reserve, ~100 plants (2009) Alexandra		<5 ha	PV			
Inverleigh Flora Reserve ~100 plants (2004)		<5 ha	PV			
Axedale Flora Reserve ~75 plants (2004)		<20 ha	PV	few plants in adjoining roadside reserve		
Mt. Beckworth State Forest 30 plants (2006)		<1 ha	DSE			
Germania Bushland Reserve <30 plants (200		<10 ha	PV			
Kooyoora State Park 10 plants (200		c. 50 ha	PV			
Wattle Flat State Forest	<10 plants (2006)	<1 ha	DSE			

Table 1. Population information for *Prasophyllum validum*

Abbreviations: DEH – Department for Environment and Heritage (SA); DSE – Department of Sustainability and Environment (Victoria); PV – Parks Victoria

Decline and Threats

Little is known of the former distribution or abundance of the Sturdy Leek-orchid. However, it is likely to have been more widespread in suitable habitat throughout much of central Victoria, especially between Chiltern and Stawell. This region formerly held much of the box and box/ironbark forest habitats in Victoria. However, over 75% of these forest and woodlands have been cleared, principally for agriculture, and almost all of the remainder has been subject to a long history of disturbance from grazing, timber harvesting and mining (VNPA 1994). There has also been extensive clearance of suitable habitat in the Melrose region of South Australia, and populations may well have been lost there.

Even though most remaining populations occur in reserves and have a relatively high level of protection, they are small and isolated. Populations occurring in State Forest and on private property need to be protected. The impact of the extensive disturbance of the forests on vital ecological associations such as pollinator presence and abundance, and mycorrhizal fungal activity, is unknown.

Current and potential threats faced by remaining populations of the Sturdy Leek-orchid include:

Grazing/predation

Grazing by native herbivores such as kangaroos and/or introduced herbivores such as rabbits, hares feral goats and domestic stock is an existing or potential threat at most sites. Flowers and seed capsules are frequently removed, possibly by invertebrate grazers such as caterpillars or

grasshoppers. Predation of tubers by White-winged Choughs has been observed at the Inverleigh site.(Duncan pers. obs.).

Weed invasion

Weeds, particularly annual grasses such as Avena fatua, Avena barbata, Briza maxima, Briza minor, Vulpia bromoides and Poa annua are a problem at most sites. Other weeds such as Paterson's Curse Echium plantagineum and clovers Trifolium spp. are problems at several South Australian sites, English Broom Cytisus scoparius subsp. scoparius and St Johns Wort Hypericum perforatum are prevalent at the Alexandra site, while Boneseed Chrysanthemoides monilifera subsp. monilifera and Serrated Tussock Grass Nassella trichotoma are threats at the Inverleigh site.

Disturbance/destruction

Soil disturbance caused by vehicle and machinery movement is a threat at some sites where plants grow close to roads and tracks, where there is also the potential for accidental trampling by people. Illegal rubbish dumping has occurred at the Axedale and Alexandra sites.

Climate change

Climate change poses a substantial long-term threat to *P. validum*. The species lives in drier forest habitats, and observations suggest that flowering is substantially reduced in years of below average rainfall. With climate change predictions for south-eastern Australia including an increase in temperatures, decrease in rainfall, and increase in evaporation rates, a long-term reduction in flowering could result in reduced seed set and recruitment of new plants, and reduced viability of many populations.

Recovery Information

Existing Conservation Measures

A number of initiatives are already in place to conserve the Sturdy Leek-orchid, including:

- Weed control at the Inverleigh and Alexandra sites (in conjunction with reserve Friends groups).
- Grazing exclusion plots have been established throughout the Inverleigh FR to monitor grazing pressure by macropods in the reserve.
- Rubbish removal by the 'Friends of McKenzie FR' at the Alexandra site (Semmens 2002).
- Fencing and rabbit control at the Axedale FR site.
- Revegetation works (community planting days) have been organised by the City of Greater Bendigo, North Central Catchment Management Authority and Longlea Landcare Group to revegetate bare areas at the Axedale FR site.
- Crown land adjacent to the Axedale FR site has been transferred to the City of Greater Bendigo and added in the reserve.
- The City of Greater Bendigo has successfully liaised with the water authority for the proposed Bendigo-Axedale water pipe to be routed outside the Axedale FR site.
- Annual monitoring at the Chiltern-Mount Pilot NP and Axedale FR sites, and periodic monitoring at the Inverleigh, Mt. Remarkable NP and private property sites near Melrose.
- Firewood collection and timber harvesting are now prohibited at the Deep Lead FFR site.
- The Kooyoora SP site is part of a larger parcel of land that was recently added to the park.

Recovery Objectives

The Overall Objective of recovery is to minimise the probability of extinction of the Sturdy Leek-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 (five years), the Specific Objectives for the recovery of the Sturdy Leek-orchid are to:

- 1. Determine distribution, abundance and population structure
- 2. Determine habitat requirements
- 3. Ensure that all populations and their habitat are protected and managed
- 4. Manage threats to populations
- 5. Identify key biological characteristics
- 6. Determine life history and viability of populations
- 7. Establish an ex situ collection
- 8. Build community support for its conservation

Implementation and Evaluation

This Recovery Plan guides recovery actions for the Sturdy Leek-orchid and will be implemented and managed by the Department of Sustainability and Environment (for Victoria) and the Department for Environment and Heritage (for South Australia), 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. Contact will be maintained between the State agencies on recovery issues concerning the Sturdy Leek-orchid. The Recovery Plan will run for 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	Performance Criteria						
Specific	cific Objective 1: Determine distribution, abundance and population structure							
1.1	Undertake surveys to determine the area and extent of known and historical populations, the number, size and structure of populations, and inference or estimation of	 All current population sites searched during flowering season. All sites mapped for population size, condition and 						
	population change.	habitat.						
	Responsibility: DSE, PV, DEH							
1.2	Clarify faxonomy of South Australian and Victorian populations, including genetic research to determine genetic diversity of species and populations.	Taxonomic status of all populations determined.						
	Responsibility: DEH, DSE, RBG, CPBR							
Specific	Objective 2: Determine habitat requirements							
2.1	Survey known habitat and collect floristic and	Species/habitat specific survey design prepared.						
	and condition.	 Habitat critical to survival mapped for any extant populations. 						
	Responsibility: DSE, PV, DEH							
2.2	Identify and survey potential habitat, using ecological and	 Potential habitat surveyed at five sites. 						
	preference.	 Predictive model for potential habitat developed & tested at five sites 						
	Responsibility: DSE, DEH							
Specific	Specific Objective 3: Ensure that all populations and their habitat are protected and managed							
3.1	Protect unreserved populations on public land.	A Special Protection Zone for the Wattle Flat SF site initiated						
	Responsibility: DSE	 Actions to protect species incorporated in relevant management plans. 						
3.2	Protect populations on private land.	Initiate Heritage Agreement discussions for the two						
	Responsibility: DSE, DEH	private property sites at Melrose initiated.						
Specific	Objective 4: Manage threats to populations							
4.1	Control threats from pest plants. Sites with particular problems include Axedale FR, McKenzie FR, Wattle Flat SF, Mt. Remarkable NP (1), and the Melrose private property sites.	 Significant reduction in cover of weeds at and near all sites. 						
	Responsibility: DSE, PV, DEH, CGB							
4.2	Control grazing threats from domestic stock and pest animals and investigate grazing impacts by fencing sites and/or caging plants at affected sites; investigate installation of a cattle grid at the Mt Beckworth SR site.	 Significant reduction in damage by grazing at and near all sites. 						
	Responsibility: DSE, PV, DEH, CGB							
4.3	Control the threat of direct damage by human activities.	 Impact of vehicle movement, visitor activity and other disturbance monitored 						
	Responsibility: DSE, PV, DEH, CGB	 Protection/restoration works implemented to prevent and repair damage. 						
4.4	Manage microhabitat for seedling recruitment, collect seed and restock populations with seed.	Measurable increase in recruitment at three treated sites.						
	Responsibility: DSE, PV, DEH							

Specific Objective 5: Identify key biological characteristics							
5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels.	 Reproductive ecology and regenerative potential quantified for four representative sites. 					
	Responsibility: DSE, DEH	 Seed bank potential quantified for five representative sites. 					
5.2	Identify key stimuli for seed germination requirements.	Stimuli for recruitment identified.					
	Responsibility: DSE, DEH						
Specific Objective 6: Determine life history, demography and viability of populations							
6.1	Measure population trends and responses against recovery actions by collecting demographic information	 Techniques for monitoring developed and implemented. 					
	stages and morphological data.	Population growth rates determined and Population					
	Responsibility: DSE, PV, DEH	viability Analysis completed for all populations.					
Specific	Objective 7: Establish an <i>ex situ</i> collection						
7.1	Develop techniques for <i>ex situ</i> cultivation and maintenance of <i>Prasophyllum</i> species and establish	Effective propagation and cultivation techniques developed.					
	plants in cultivation to provide a research population and to quard against loss of plants from the wild	 Mycorrhizal fungus isolated and in culture. 					
	Responsibility: RBG, NOGN, DSE	 At least 50 healthy, genetically diverse, mature plants in cultivation. 					
7.2	Establish a seed bank and determine seed viability.	 Seed from all extant populations in storage. 					
	Responsibility: RBG						
Specific	Objective 8: Build community support for its conservat	ion					
8.1	Identify opportunities for community involvement in the conservation of the Sturdy Leek-orchid and implement them.	Community nature conservation and Landcare groups aware of the species and support its conservation.					
	Responsibility: DSE, PV, DEH						

Abbreviations: CGB – City of Greater Bendigo; DEH – Department for Environment and Heritage (SA); DSE – Department of Sustainability and Environment (Victoria); NOGN – Native Orchid Growers Network; PV – Parks Victoria; RBG – Royal Botanic Gardens, Melbourne

Management Practices

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of *P. validum* necessary for specific population management. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are structured to acquire baseline data, assess habitat condition, including ecological and biological information, and maintain or improve populations through protection and management.

On-ground site management will aim to mitigate threatening processes and thereby ensure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, inappropriate fire regimes / biomass accumulation 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 biomass management. Broadscale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers. 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. These include an understanding of seed bank dynamics and recruitment. Successful *in situ* population management will be founded on understanding the obligate relationships between *P. validum* 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 storage and plant cultivation. Cultivating *ex situ* populations will also serve to increase the amount of seed available for reintroduction to sites. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

Affected Interests

The 18 extant populations of *P. validum* occur in national parks, a state park, flora reserves, a scenic reserve, a bushland reserve, and State Forest and on private property. Consequently, their management is variously the responsibility of Department of Sustainability and Environment (Vic), Parks Victoria and the Department for Environment and Heritage (SA). The recovery plan has the support of government agencies, statutory authorities and community groups involved in orchid conservation in Victoria and South Australia, who will assist in the management and monitoring of this species.

Role and Interests of Indigenous People

Indigenous communities on whose traditional lands the Sturdy Leek-orchid occurs are being advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and will be 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 in South Australia and Victoria. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data could also benefit a number of other plant species growing in association with P. validum, particularly those species with similar life forms and/or flowering responses. Prasophyllum validum grows near to other threatened orchids including Caladenia gladiolata and Caladenia woolcockiorum in Mt Remarkable NP (Quarmby 2006), and Caladenia concolor and Caladenia xanthochila at Koovoora SP, and Caladenia fulva at Deep Lead FFR and Germania BR, all of which are the subject of current national Recovery Plans (Coates et al. 2002; Todd 2000) and will benefit from implementation of this Recovery Plan. 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 invasion and habitat degradation. Germination and cultivation techniques developed during the recovery phase will be of use for other threatened orchids elsewhere in southeast Australia while the requirement to recover species across state boundaries will better develop working relationships between state departments on a broader range of biodiversity conservation issues.

Social and Economic Impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Most populations of *P. validum* occur on public land, either crown land reserved for various public purposes, or on road reserves, managed by a variety of local and State government agencies. Any protection measures required at these sites (e.g. fencing, signage, track closures) will have minimal impact on current recreational and commercial activities. Protection of these populations has been negotiated with the relevant land manager. Protection of the few populations on private land or on land managed by other authorities will be achieved through voluntary agreements with landowners and managers.

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Action	Description	Priority	Feasibility	Responsibility	Cost estimate					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Distribution, abundance									
1.1	Surveys	1	100%	DSE, PV, DEH	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
1.2	Taxonomy	1	100%		\$10,000	\$10,000	\$0	\$0	\$0	\$20,000
2	Habitat requirements									
2.1	Known habitat	1	100%	DSE, PV, DEH	\$15,000	\$15,000	\$10,000	\$0	\$0	\$40,000
2.2	Potential habitat	2	75%	DSE, PV, DEH	\$0	\$0	\$15,000	\$15,000	\$0	\$30,000
3	Habitat protection									
3.1	Public land	1	100%	DSE, PV, DEH	\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
3.2	Private land	1	75%	DSE, PV, DEH	\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
4	Threat management									
4.1	Pest plants	1	75%	DSE, PV, DEH	\$15,000	\$15,000	\$10,000	\$10,000	\$10,000	\$60,000
4.2	Pest animals	1	75%	DSE, PV, DEH	\$10,000	\$10,000	\$8,000	\$5,000	\$5,000	\$38,000
4.3	Human damage	1	75%	DSE, PV, DEH	\$15,000	\$10,000	\$10,000	\$5,000	\$5,000	\$45,000
4.4	Seedling recruitment	2	75%	DSE, PV, DEH	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$100,000
5	Biological characteristics									
5.1	Reproductive status	2	100%	DSE, PV, DEH	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
5.2	Seed germination	2	75%	DSE, PV, DEH	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
6	Population viability									
6.1	Censusing	1	90%	DSE, PV, DEH	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
7	Ex situ Cultivation									
7.1	Cultivated plants	2	50%	DSE, PV, DEH	\$10,000	\$10,000	\$5,000	\$5,000	\$5,000	\$35,000
7.2	Seed bank	2	90%	DSE, PV, DEH	\$5,000	\$5,000	\$5,000	\$2,000	\$2,000	\$19,000
8	Community support									
8.1	Community extension	3		DSE, PV, DEH	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
				TOTALS	\$155,000	\$150,000	\$128,000	\$107,000	\$92,000	\$632,000

Priority, Feasibility and Estimated Costs of Recovery Actions