

Action Statement

Flora and Fauna Guarantee Act 1988

No. 126

Twelve threatened Swainson-peas and Darling-peas (*Swainsona* species)

Description and distribution

The genus *Swainsona* is represented in Victoria by 18 species, of which all but four are considered to be threatened in the wild. This Action Statement addresses 12 threatened (vulnerable or endangered) taxa of *Swainsona* listed below. Detailed survey and monitoring of all known populations was undertaken between September 1997 and September 1999. The information presented in this Action Statement is based on results of these surveys which are stored on the Department of Sustainability and Environment threatened plant population monitoring database, VROTPop. Of the two remaining threatened *Swainsona* species, *Swainsona galegifolia* already has a published Action Statement, while *Swainsona recta* is presumed extinct in Victoria.

Swainsona species are small to medium annuals or renascent perennials, with hairy to glabrous, pinnate foliage with 3 - 7 linear leaflets, and flowers arranged in racemes (on lateral stalks) varying from yellow to red, pink, purple or violet in colour. Individual species' descriptions may be found in the *Flora of Victoria*, Volume 3 (Walsh and Entwisle 1996).

The *Swainsona* species addressed in this Action Statement are widely distributed across western and northern Victoria, and many also occur throughout South Australia, New South Wales, Australian Capital Territory and Queensland. Historical records suggest that many *Swainsona* species have become significantly reduced in Victoria and elsewhere, both in number and geographic extent, with many occurrences dating back to the 19th century now believed to be extinct.

Distribution maps of each species can be found at the end of this Action Statement.

Habitat

Swainsona species are confined to specific grassland and woodland habitats found in south-west Victoria, the Mallee, native grasslands of the northern plains, and riverine habitats along the Murray River.

Life history and ecology

Swainsona species are largely renascent perennials, resprouting in suitable conditions from a persistent rootstock. This gives individual plants the capacity to persist between years given suitable conditions. Walsh *et al.* (1996) also comment that *Swainsona purpurea* can behave as an annual.

Growth and flowering among most species of *Swainsona* species appears to be stimulated by available moisture, thus plants are most frequently observable following adequate Spring rainfall.

Exceptions include *Swainsona adenophylla*, which has not been reliably observed in Victoria since 1980 (Chesterfield *et al.*), *Swainsona luteola* which also has not been reliably observed for many years, and *Swainsona pyrophila*, a short-lived perennial which, as its name suggests (pyros = fire & philos = loving), displays a clear association with fire, and appears to grow for only 1 to 2 years after fire (Scarlett and Parsons 1993). Plants are usually seen in the first Spring following a fire. Soil disturbance will also often stimulate germination.

All species observed during this study (Spring 1999) produced copious flowers and similarly abundant quantities of seed, though significant variation in flowering and seed production occurs according to seasonal conditions. Flowering and seed production is apparently only curtailed when plants begin to dry off from insufficient moisture.

Vegetative reproduction appears to be the most common method of reproduction in *Swainsona greyana*, *Swainsona purpurea* and *Swainsona sericea* (in Mallee populations). The latter species, where it occurs on the Northern Plains, exhibits none of the rhizomatous habit observed in Mallee populations.

Swainsona species, like other members of the Pea family (Fabaceae), produce hard-coated seeds which frequently require some treatment to break dormancy. It is surmised that heat treatments, including fire or extreme soil temperatures, and physical disturbances such as soil scraping which can rupture the seed coat, are required in conjunction with moisture to stimulate germination.

The foliage and flowers of *Swainsona* species are highly palatable to grazing animals. Although *Swainsona* species are adversely affected by intense and continuous grazing by stock, rabbits or native herbivores, particularly in Spring flowering and seeding periods, it appears that light grazing at other times in their lifecycle can benefit the plants.

Growth of *Swainsona* species appears to be more vigorous in sites with an open understorey, consistent with many native species in grassy

ecosystems. Plants perform better in an environment where there are gaps in the herb layer, high light intensity and low competition from other plants.

Despite the abundance of seed produced by *Swainsona* species, the incidence of recruitment by this means is believed to be irregular and not great. Scientific data specifically about persistence of viable seed-banks, and germination of *Swainsona* seed is limited.

A recent study by Capuano (1993) investigating seed ecology of *Swainsona plagiotropis* found that only a small proportion of seed recovered from the soil was in fact viable (1 seed from a sample of 9). Significant increases in germination of seeds treated by scarification, and in those exposed to temperatures up to 70°C, were recorded in this study, giving some support to the idea that seed treatment or disturbance is a necessary precursor to seedling recruitment in *Swainsona* species.

Scarlett and Parsons (1993) speculate that a gradual depletion of the soil-stored seedbank of *Swainsona pyrophila* may be occurring in the absence of regular fires in its preferred habitat.

Conservation status

Each species has been listed in Table 1 by its status under the Environment Protection & Biodiversity Conservation Act 1999 (EPBC), its status within Victoria (DSE), and its status under the **Flora and Fauna Guarantee Act 1988** (FFG).

Table 1: Conservation Status

Scientific name	EPBC	DSE	FFG
<i>Swainsona adenophylla</i>		e	L
<i>Swainsona brachycarpa</i>		v	L
<i>Swainsona greyana</i>		e	L
<i>Swainsona luteola</i>		e	L
<i>Swainsona murrayana</i>	V	e	L
<i>Swainsona phacoides</i>		e	L
<i>Swainsona plagiotropis</i>	V	e	L
<i>Swainsona purpurea</i>		e	L
<i>Swainsona pyrophila</i>	V	v	L
<i>Swainsona reticulata</i>		v	L
<i>Swainsona sericea</i>		v	R
<i>Swainsona wainsonioides</i>		e	L

Abbreviations:

EPBC: Status under the Commonwealth **Environment Protection and Biodiversity Conservation Act 1999**: V = vulnerable in Australia;

DSE: Status according to Advisory List of Rare or Threatened Vascular Plants in Victoria - 2003: e = endangered in Victoria; v = vulnerable in Victoria;

FFG: Status under the Victorian **Flora and Fauna Guarantee Act 1988**: L = listed as threatened, R = Recommended for listing as threatened.

Decline and threats

The Grampians

Recreational damage from vehicles is a minor problem at specific sites. In the Grampians, *Swainsona brachycarpa* is known from only five populations within a restricted area. There is no evidence that populations are declining, rather it appears that *Swainsona brachycarpa* is just extremely rare in Victoria. Apart from the small number and size of populations, *Swainsona brachycarpa* faces no major threats. Competition for light and nutrients with other grasses and herbs is a potential threat. Recreational damage from vehicles is a minor problem at some sites.

Wimmera and Northern Plains

In the Wimmera and Northern Plains the widespread decline in *Swainsona* species mirrors the fate of temperate grasslands in south eastern Australia.

The decline in population and plant numbers is a recent (post-European) phenomenon, attributable largely to loss of habitat in developing agricultural landscapes, compounded by subsequent management regimes, including intensive stock grazing, cropping, irrigation, pugging in wet weather, pasture improvement, road improvement, weed management. On roadsides, rail reserves, and some public land reserves, plants are threatened by a lack of disturbance, which prevents gap formation and increases competition for light and other resources from weeds. Grazing by rabbits or hares is also a threat at some sites.

The decline has been so severe that many populations are now very small, and subsequently increasingly vulnerable to local extinction. Species affected by this particular suite of threats include *Swainsona murrayana*, *Swainsona plagiotropis*, *Swainsona reticulata*, *Swainsona sericea*, and *Swainsona swainsonioides*.

In some cases, very large populations of *Swainsona murrayana*, *Swainsona plagiotropis* and *Swainsona sericea* persist on freehold land. In recent years however, many paddocks have been turned over to cropping, a completely new and different management regime, and one to which the plants are not resilient over time. With the current trend towards an increase in sustained cropping across the Wimmera and Northern Plains, continuing attrition of populations on freehold land is likely.

Over 90% of *Swainsona sericea* plants are found on freehold properties on the Northern Plains. Although numerically abundant at times, populations are subject to large seasonal fluctuations. Large declines in *Swainsona sericea*

numbers are expected as farming practices change (S. Diez *pers. comm.*).

Swainsona plagiotropis plants are confined almost exclusively to freehold land (88.6%), roadsides, rail reserves and cemeteries (8.5%), or Commonwealth land (Echuca airport) (2.8%). Although the total population number for *Swainsona plagiotropis* is estimated to be ca 170 000, there is a continuing decline in population numbers. Of 50 recorded populations, only 36 are still believed to be extant. The majority of populations occur in areas of <5ha, and are highly susceptible to a range of potentially devastating threats. Over 50% of plants grow in an area of <30ha, on a freehold property at Patho. The absence of significant populations of *Swainsona plagiotropis* in conservation reserves is a major limitation for its future survival.

Principal threats to *Swainsona plagiotropis* include inappropriate grazing regimes, intensive cropping and pasture improvement. At some sites the decline in *Swainsona plagiotropis* is attributed to a lack of disturbance, resulting in increased competition from weeds and grasses. Insect predation has also been noted to have a serious impact on populations where grass cover is dense, and adjacent to cropped areas (O'Brien and Diez 1997).

The recent declaration of Terrick Terrick National Park has secured *Swainsona murrayana* in Victoria. Over 45% of known plants, (>42 000 individuals), are included within the Park boundary, and management is, of course, primarily concerned with biodiversity conservation. A number of other populations comprising >1 000 plants occur on freehold land or roadside land on the Northern Plains. These populations continue to be faced with the range of threats mentioned above, and a continuing decline in population and plant numbers is expected on these tenures.

The situation with *Swainsona swainsonioides* is quite different. Only 18 extant populations of *Swainsona swainsonioides* are known. Although 95% (>3 000 plants) grow within conservation reserves, the vast majority of those are found in a single population. One population on freehold land comprises ca 64 plants. The remaining 5% of extant plants occur on roadsides, where populations are estimated to vary between two and 19 plants, ie. they are very small in size. There is a continuing decline in roadside plants, and it is likely that *Swainsona swainsonioides* will eventually disappear from roadsides, unless urgent remedial action is implemented.

Mallee

In the Mallee dune landscapes at Hattah-Kulkyne National Park, populations of *Swainsona* ssp. have declined over many decades, against a scenario of

overgrazing by stock, rabbits and kangaroos and unpredictable rainfall.

Swainsona species in the Mallee underwent a renaissance in 1999. The current abatement of all grazing threats combined with favourable rainfall allowed the re-emergence of long-dormant plants. However, a new threat looms, with annual weeds also flourishing under the favourable conditions, particularly in the dune communities at Hattah-Kulkyne National Park. Weeds such as *Brassica tournefortii* and *Bromus ssp.* will smother *Swainsona* species if they are allowed to grow unchecked. Rabbit numbers have declined dramatically with the introduction of Rabbit Calicivirus Disease (RCD), but vigilance is required to ensure that numbers do not build up again. Species affected by these particular threats include *Swainsona phacoides*, *Swainsona purpurea* and *Swainsona sericea*.

It should be noted that these three *Swainsona* species are almost certainly more extensive and abundant than the monitoring data in Table 2 suggest. *Swainsona purpurea* was monitored at 10 randomly chosen sites (copi rises) along roads traversing the Raak Plain. It is likely that the numbers of populations and/or plants could be 100 times greater (indicated by figures in brackets in Table 2).

Similarly, *Swainsona phacoides* is known from an additional three populations in Hattah-Kulkyne National Park, and *Swainsona sericea* from an additional 6 sites, which have not been monitored (Sluiter *et al.* 1997). The overall population of *Swainsona sericea* in Hattah-Kulkyne National Park could be as high as 10 000 plants, with ca 30-40 plants growing on any large dune in the Mourmpall Block (I. Sluiter *pers. comm.*)

Of greatest concern is *Swainsona reticulata*. Only six extant populations of this species are known in

Victoria. The largest of these, are at Karadoc Swamp (ca 150 plants) near Mildura, on private property, and at Lake Powell Wildlife Reserve (ca 300 plants), although the latter population has not been verified since 1990. At Karadoc Swamp plants are growing just inside the boundary fence, barely 2m from a commercial vineyard. The habitat is very weedy, probably subjected to herbicide drift from the adjacent land, and also a favoured site for the dumping of rubbish.

Special mention must be made of *Swainsona pyrophila*. As a species that depends closely on fire to stimulate flowering and seed production, there is concern that the infrequency of wildfires in the Murray-Sunset National Park is contributing to a decline in numbers of viable soil-stored seed, thus preventing maintenance of potential populations (Scarlett and Parsons 1993). *Swainsona pyrophila* was not found in the 1999 survey, despite searches in recently burnt areas of Murray-Sunset National Park. A numerical summary of *Swainsona* Populations in Victoria is provided in Table 2.

Riverine Species

Of the three riverine *Swainsona* species only *Swainsona greyana* was located in 1999. Plants do not appear to be currently threatened, although grazing by rabbits remains a potential threat. Populations appear to be extremely stable, suggesting that incremental recruitment from seed is not occurring on a regular basis. Damage from recreational traffic is also a potential threat as *Swainsona greyana* grows on river and creek banks in areas quite accessible to vehicular traffic.

The habitat where *Swainsona adenophylla* has previously been recorded is on higher River Red Gum terraces, well away from the main river channel. Flooding of these areas is now a very infrequent event, occurring perhaps once in 10

Table 2: Numerical Summary of Swainsona Populations in Victoria

Scientific name	No. of extant populations	No. of plants (approx.)	Range (km)	Area occupied (ha)	Tenure - % of plants (no. of populations)			
					R	P	F	O
<i>Swainsona adenophylla</i>	?2	?12	?13	?25	-	100(?2)	-	-
<i>Swainsona brachycarpa</i>	5	800	5	0.15	100(5)	-	-	-
<i>Swainsona greyana</i>	7	1 800	28	0.5	57(3)	43(4)	-	-
<i>Swainsona luteola</i>	?	?	?	?	-	?100	-	-
<i>Swainsona murrayana</i>	28	94 000	493	164.3	45.6(6)	-	51.7(9)	2.7(13)
<i>Swainsona phacoides</i>	7+	350++	303	0.58	59.8(5)	37.4(1)	-	2.7(1)
<i>Swainsona plagiotropis</i>	38	170 000	231	121.3	0.01(2)	-	88.6(19)	11.4(16)
<i>Swainsona purpurea</i>	3++	52 000+ +	30	0.2	100(3)	-	-	-
<i>Swainsona pyrophila</i>	?	?	?	?	?100	-	-	-
<i>Swainsona reticulata</i>	6	490	250	0.001	64(3)	4(1)	32(1)	4(1)
<i>Swainsona sericea</i>	29+	18 000+	400	200	6.1(7)	-	92.5(12)	1.4(3)
<i>Swainsona swainsonioides</i>	18	3150	468	43	95(4)	-	2(1)	3(13)

Abbreviations: R - conservation reserve; P - other public land; F - freehold land; O - other (road and rail reserves, cemeteries, airports).

years and potentially compromising the survival of *Swainsona adenophylla*. The continued presence of rabbits at Barmah is also cause for concern to this species.

Until the presence of *Swainsona luteola* in Victoria is confirmed, discussion of threats is purely speculative. However, the presumed habitat in Black Box Woodland on Wallpolla Island is subject to grazing under licence, which may be adversely impacting on any surviving plants.

Salinity is a potential threat which may have widespread impacts on native vegetation including *Swainsona* species. It is not possible to predict in this Action Statement how salinity may affect the *Swainsona* species considered, though it is an issue that requires addressing.

Nine of the 12 species considered in this Action Statement now occur predominantly in Conservation reserves or other Public Land (not including roadsides or rail reserves, airports or cemeteries) where biodiversity conservation is a high priority. The exceptions are *Swainsona murrayana*, *Swainsona plagiotropis* and *Swainsona sericea*, which occur substantially on private land.

Existing conservation measures

Reservation

- A number of populations are protected in conservation reserves (see Table 3).

Monitoring

- In 1997 and 1999 systematic monitoring of recorded *Swainsona* populations was carried out. All data has been entered into the VROTPop database (DSE)

Management research

- Capuano (1993), BSc thesis investigating seed ecology of *Swainsona plagiotropis*.
- Foreman (1996), MSc thesis investigating the ecology of native grasslands of Victoria's northern Riverine Plain.
- Sluiter et al. (1997), investigated vegetation responses to kangaroo grazing in Hattah-Kulkyne National Park between 1992 and 1996, commissioned by DSE and Parks Victoria.
- Conway (2000), BSc thesis analysing vegetation data collected from Terrick Terrick National Park between 1992 and 1999.
- Westbrooke et al. (1999) review of grazing in Terrick Terrick National Park commissioned by Parks Victoria.
- Rodda, L. (2001) BSc Honours project examining *Swainsona sericea*.

Management guidelines

- Crawford (1993), commissioned by Jerilderie Shire Council to prepare guidelines for propagation and management of *Swainsona plagiotropis*
- Lunt et al. (1999), Parks Victoria commissioned a preliminary assessment of vegetation in Terrick Terrick National Park including reference to *Swainsona murrayana*, *Swainsona plagiotropis* and *Swainsona swainsonioides*.

Grazing management

- Control of rabbit and kangaroo grazing at Hattah-Kulkyne National Park ongoing since 1982.
- Introduction of RCD has caused massive reduction in rabbit numbers, particularly in drier areas of north west Victoria, allowing

Table 3 - Reservation

A number of populations are protected in conservation reserves:

Reserve	Species protected
Terrick Terrick National Park	<i>Swainsona murrayana</i> , <i>Swainsona plagiotropis</i> , <i>Swainsona swainsonioides</i>
Hattah-Kulkyne National Park	<i>Swainsona phacoides</i> , <i>Swainsona pyrophila</i> , <i>Swainsona sericea</i>
Murray-Sunset National Park	<i>Swainsona greyana</i> , <i>Swainsona phacoides</i> , <i>Swainsona purpurea</i> , <i>Swainsona pyrophila</i>
Hunter Grassland Reserve	<i>Swainsona plagiotropis</i>
Grampians National Park	<i>Swainsona brachycarpa</i>
Naringaningalook Grassland Reserve (Trust for Nature)	<i>Swainsona sericea</i>
James Barrett Flora and Fauna Reserve	<i>Swainsona murrayana</i> , <i>Swainsona swainsonioides</i>
Barrabool Flora and Fauna Reserve	<i>Swainsona swainsonioides</i>

recovery of threatened plants including *Swainsona* species.

- Stock/grazing management on Northern Plains reserves.

Conservation objectives

Long term objective

By the year 2010 all Victorian *Swainsona* species encompassing the range of geographic and genetic variation currently present in the state, will be securely conserved in public reserves, or on private land with formal management agreements, and management practices specifically tailored towards their conservation. Through a combination of research and well documented history of management practices, specific management guidelines will be available that will ensure *Swainsona* populations can grow and flourish, recruiting readily from seed germinants.

Objectives of this Action Statement

- Within 3 years, locate and accurately document populations of all Victorian species of *Swainsona* addressed in this document. Specific attention should be given to the three species not seen in the past five years.
- Ensure all 12 species of *Swainsona* remain extant in Victoria representing the geographic and genetic diversity within the state.
- Identify up to 10 key populations of each *Swainsona* species and implement measures to ensure their long-term survival.

Intended management actions

(see following pages for a species by species summary)

Survey and Monitoring

15. Undertake spring surveys for *Swainsona luteola*.
16. Undertake surveys after autumn break and/or significant spring/summer rain events for *Swainsona adenophylla*.
17. Undertake survey in spring after any fire in Murray-Sunset National Park for *Swainsona pyrophila*.
18. Undertake survey and monitor all known populations of *Swainsona reticulata*.
19. Document urgent conservation requirements and record information on VROTPop database.

Responsibility: DSE (Biodiversity and Natural Resources Division; Regions; Forests Service); Parks Victoria

Ex-situ conservation

20. Commence *ex-situ* conservation program for *Swainsona reticulata*. Collect seed from all known populations for propagation at RBG.
21. Commence a program to propagate seed and augment populations of *Swainsona swainsonoides*.

Responsibility: DSE (Biodiversity and Natural Resources Division; Regions), Royal Botanic Gardens

Reservation

22. Determine whether options exist for land purchase to protect large population(s) of *Swainsona plagiotropis*.
23. Identify secure sites in north west Victoria for potential introduction of *Swainsona reticulata*.

Responsibility: DSE (Biodiversity and Natural Resources Division; Regions), Parks Victoria

Conservation outside Reserves

24. Identify 4 or more key, off-reserve populations of *Swainsona plagiotropis*, *Swainsona sericea* (Wimmera), and *Swainsona swainsonioides*.
25. Pursue the establishment of formal management agreements with responsible land managers to protect *Swainsona* species (Public Authority Management Agreements on public land, covenants on freehold land).

Responsibility: DSE (Biodiversity and Natural Resources Division; Regions), Trust for Nature

Management Advice for Landholders

26. Provide specific advice for landholders on managing *Swainsona* species (and other threatened plants) on private land (Northern Plains and Wimmera).

Responsibility: DSE (Biodiversity and Natural Resources Division; Regions), Trust for Nature, Catchment Management Authorities

Conservation in National Parks and Reserves

27. Prepare and implement specific management plans for all *Swainsona* species in National Parks and Reserves, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).

Responsibility: Parks Victoria

Information Management

28. Coordinate the monitoring of *Swainsona* species and store data in the VROTPop monitoring database.

15. Incorporate data into Biosites database and make available to relevant land managers.
16. Review conservation status of *Swainsona* species following IUCN Red Book criteria.

Responsibility: DSE (Biodiversity and Natural Resources Division)

Other desirable actions

Research

17. Encourage research into the biology and conservation of *Swainsona* species, including:
 - Determine importance of seedling recruitment under current regimes, to the maintenance and augmentation of populations, and determine practical techniques to optimise recruitment from seed.
 - Determine if taxonomic separation of Mallee and Northern Plains populations of *Swainsona sericea* is warranted.

Responsibility: DSE (Biodiversity and Natural Resources Division)

Compiled by Gillian Earl, Murrayana Botanical Services P/L, Timothy Barlow, La Trobe University and Adrian Moorrees, Biodiversity and Natural Resources Division, DSE.

Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: <http://www.dse.vic.gov.au>

This Action Statement has been prepared under section 19 of the Flora and Fauna Guarantee Act 1988 under delegation from Professor Lyndsay Neilson, Secretary, Department of Sustainability and Environment, September 2003.

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Violet Swainson-pea (*Swainsona adenophylla*)

Habitat

Reliably recorded from Barmah Forest, though it has not been seen since its discovery there in 1979, despite regular searching by local naturalists (M. Moor *pers. comm.*). Plants were growing in an open, treeless, grassy plain dominated by *Austrostipa* and *Austrodanthonia* spp. The site is flooded only occasionally, lying on higher ground adjacent to Grey Box-Black Box ridges at the southern boundary of the forest. Significant regeneration of River Red Gum has taken place over recent years, and the suitability of habitat there for *Swainsona adenophylla* is uncertain.

Distribution



EPBC Act - DSE endangered # populations ?2 # individuals ?12

Intended Management Actions

- Undertake surveys for *Swainsona adenophylla* in Barmah State Park and Barmah State Forest after the autumn break or significant spring/summer flooding.
DSE (Biodiversity & Natural Resources Division, Regions, Forests Service), Parks Victoria
- If relocated, monitor populations, assess threats and identify urgent management actions (if any). Record information in VROTPop or compatible database.
DSE (Biodiversity & Natural Resources Division, Regions, Forests Service), Parks Victoria
- If relocated, implement specific management plans for *Swainsona adenophylla* in Barmah State Park and Barmah State Forest, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
DSE (Regions, Forests Service), Parks Victoria

Slender Swainson-pea (*Swainsona brachycarpa*)

Habitat

Confined to gentle gullies with Herb-rich Foothill Forest or Valley Grassy Forest on the western side of Lake Bellfield, in the Grampians National Park.

Distribution



EPBC Act - DSE vulnerable # populations 5 # individuals 800

Intended Management Actions

1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in VROTPop or compatible database.

Parks Victoria

2. Prepare and implement specific management actions for *Swainsona brachycarpa* in Grampians National Park, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).

Parks Victoria

Hairy Darling-pea (*Swainsona greyana*)

Habitat

Restricted to far north west Victoria on raised banks with fine clay loam soils, along the Murray River and associated creeks and billabongs on Lindsay and Mulcra Islands. Associated species include River Red Gum *Eucalyptus camaldulensis* and Black Box *E. largiflorens* in the overstorey, together with Small Cooba *Acacia stenophylla*, Tangled Lignum *Muehlenbeckia florulenta*, and a variety of grasses and herbs.

Distribution



EPBC Act	-	DSE	endangered	# populations	7	# individuals	1800
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Intended Management Actions

1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria; DSE (Forests Service)
2. Establish formal management agreements with responsible land managers to protect *Swainsona* species (Public Authority Management Agreements, PAMAs on public land, covenants on freehold land).
DSE (Biodiversity & Natural Resources Division, Regions)
3. Provide specific advice for landholders on managing *Swainsona greyana* (and other threatened plants) on private land (Northern Plains and Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities
4. Prepare and implement specific management actions for *Swainsona greyana* in Murray-Sunset National Park, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Parks Victoria

Dwarf Darling-pea (*Swainsona luteola*)

Habitat

Not reliably located in Victoria, the available information suggests *Swainsona luteola* may have occurred in River Red Gum - Black Box woodlands in the vicinity of Wallpolla Island on land now reserved as State Forest.

Distribution



EPBC Act - DSE endangered # populations ? # individuals ?

Intended Management Actions

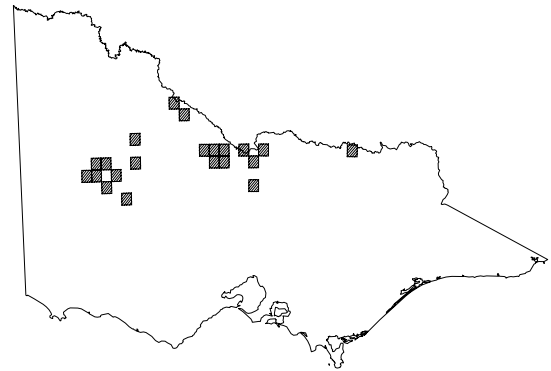
1. Undertake surveys for *Swainsona luteola* in suitable habitat at Wallpolla Island during Spring
DSE (Biodiversity & Natural Resources Division, Regions, Forests Service)
2. If relocated, monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions, Forests Service)

Slender Darling-pea (*Swainsona murrayana*)

Habitat

Scattered widely through grassy ecosystems of the Northern (Northern Plains Grassland) and Wimmera Plains, between Warracknabeal (west) and Picola (north). It grows on heavy, cracking clays of gilgai and seasonally inundated sites. Associated species include low chenopod shrubs *Maireana* spp., Wallaby-grasses *Austrodanthonia* spp. and Spear-grasses *Austrostipa* spp., and rich array of herbs. The distribution and abundance of *Swainsona murrayana* has been much depleted by loss of habitat to incompatible agricultural practices.

Distribution



EPBC Act Vulnerable DSE vulnerable # populations 28 # individuals 94,000

Intended Management Actions

1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.

DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria

2. Establish formal management agreements with responsible land managers to protect *Swainsona murrayana* (PAMAs on public land, covenants on freehold land).

DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature

3. Provide specific advice for landholders on managing *Swainsona murrayana* (and other threatened plants) on private land (Northern Plains and Wimmera).

DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities

4. Prepare and implement specific management actions for *Swainsona murrayana* in Terrick Terrick National Park and James Barrett Flora and Fauna Reserve, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).

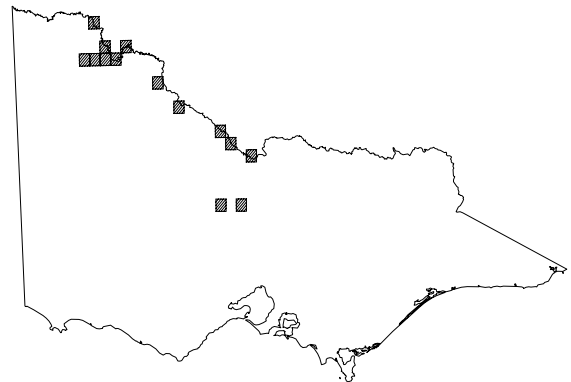
Parks Victoria

Dwarf Swainson-pea (*Swainsona phacoides*)

Habitat

Largely confined to Semi-arid Herbaceous Cypress-Pine Woodlands with sandy, calcareous soils. Structural dominants include Slender Cypress-pine *C. gracilis*, with scattered Buloke *Allocasuarina luehmannii* and Narrow-leaf Hop-bush *Dodonaea viscosa* ssp. *angustissima* (Sluiter *et al.* 1997). The majority of known populations are known from Hattah-Kulkyne National Park, with isolated plants recorded near Robinvale and on Lindsay Island. Plants occur on stable dune ridges and slopes which have until recently suffered from serious overgrazing by kangaroos and rabbits.

Distribution



EPBC Act	-	DSE	endangered	# populations	7	# individuals	350+
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Intended Management Actions

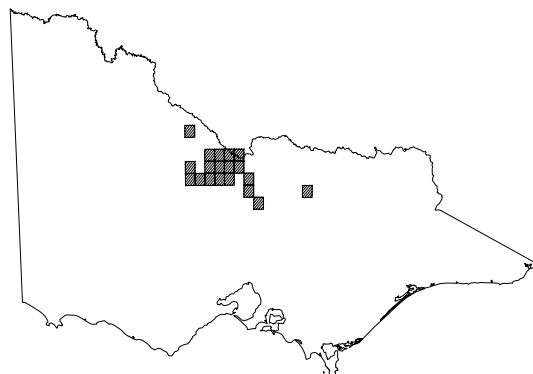
1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria;
2. Pursue the establishment of formal management agreements with responsible land managers to protect *Swainsona phacoides* (PAMAs on public land, covenants on freehold land).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature
3. Provide specific advice for landholders on managing *Swainsona phacoides* (and other threatened plants) on private land (Northern Plains and Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities
4. Prepare and implement specific management actions for *Swainsona phacoides* in Hattah Kulkyne National Park, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Parks Victoria

Red Swainson-pea (*Swainsona plagiotropis*)

Habitat

Found on heavy red soils of the Northern Plains Grassland, between the Loddon and Campaspe Rivers. Associated species are Wallaby-grasses *Austrodanthonia* spp. and Spear-grasses *Austrostipa* spp.), and rich array of herbs including Scaly Buttons *Leptorhynchus squamatus* and Common Everlasting *Chrysocephalum apiculatum* (O'Brien and Diez 1997). The largest populations occur privately-owned paddocks, while others are largely confined to roadsides.

Distribution



EPBC Act Vulnerable DSE endangered # populations 38 # individuals 170,000

Intended Management Actions

1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria;
2. Identify 4 or more key, off-reserve populations of *Swainsona plagiotropis*.
DSE (Biodiversity & Natural Resources Division, Regions)
3. Determine whether options for land purchase to protect large population(s) of *Swainsona plagiotropis* exist.
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature
4. Pursue the establishment of formal management agreements with responsible land managers to protect *Swainsona plagiotropis* (PAMAs on public land, covenants on freehold land).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature
5. Provide specific advice for landholders on managing *Swainsona plagiotropis* (and other threatened plants) on private land (Northern Plains and Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities
6. Prepare and implement specific management plans for *Swainsona plagiotropis* in Terrick Terrick National Park and Hunter Grassland Reserve, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Parks Victoria

Purple Swainsona-pea (*Swainsona purpurea*)

Habitat

Restricted to low chenopod shrublands on dunes and low-lying copris of saline gypseous loams in far north west Victoria. Principal populations occur on the northern Raak Plain within the Murray-Sunset National Park which also includes a designated Mineral and Stone Production area within the Park boundary (LCC 1989). Associated species are low chenopod shrubs such as Glassworts *Halosarcia* spp., Rounded Noon-flower *Disphyma clavellatum*, Small-leaf Sea-heath *Frankenia sessilis*, and a variety of herbs including Shiny Elachanth *Elachanthus glaber*, Woolly Yellow-heads *Tricanthodium skirrophorus* and Dense Crassula *Crassula colorata*.

Distribution



EPBC Act - DSE endangered # populations 3+ # individuals 52,000+

Intended Management Actions

1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria;
2. Prepare and implement specific management plans for *Swainsona purpurea* in Murray Sunset National Park, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).

Parks Victoria

Yellow Swainson-pea (*Swainsona pyrophila*)

Habitat

Grows in mallee shrublands of far north west Victoria, on calcareous sands or loams (Walsh and Entwisle 1996), most often on heavy red sands and clay loams between sand rises. Associated species include Red Mallee *Eucalyptus calycogona*, Dumosa Mallee *E. dumosa*, Yorrell *E. gracilis*, Oil Mallee *E. oleosa* and Grey Mallee *E. socialis*. Not located during 1999 survey, despite searches in recently burnt areas.

Distribution



EPBC Act	Vulnerable	DSE	vulnerable	# populations	?	# individuals	?
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Intended Management Actions

1. Undertake surveys for *Swainsona pyrophila* in Spring after any fire or substantial soil disturbance in Murray-Sunset and Hattah Kulkyne National Parks.

Parks Victoria

2. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.

DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria

3. Prepare and implement specific management actions for *Swainsona pyrophila* in Murray-Sunset and Hattah Kulkyne National Parks, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).

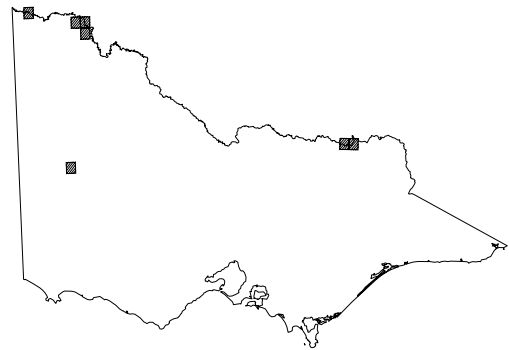
Parks Victoria

Kneed Swainson-pea (*Swainsona reticulata*)

Habitat

Known with certainty from Black Box woodland on sandy lunettes, beside lakes and swamps in north west Victoria, and in Grey Box - Buloke woodland in western Victoria. Another doubtful (now extinct) record is from near Wodonga on grassy plains near the shores of Lake Hume.

Distribution



EPBC Act - DSE vulnerable # populations 6 # individuals 490

Intended Management Actions & Responsibility

1. Survey all known populations of *Swainsona reticulata* in Spring.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria;
2. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria;
3. Commence ex-situ conservation program for *Swainsona reticulata*. Collect seed from all known populations for propagation at Royal Botanic Gardens.
DSE (Biodiversity & Natural Resources Division, Regions); Royal Botanic Gardens
4. Identify secure sites in north west Victoria for potential introduction of *Swainsona reticulata*
DSE (Biodiversity & Natural Resources Division, Regions)
5. Pursue the establishment of formal management agreements with responsible land managers to protect *Swainsona reticulata* (PAMAs on public land, covenants on freehold land).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature
6. Provide specific advice for landholders on managing *Swainsona reticulata* (and other threatened plants) on private land (Northern Plains and Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities
7. Prepare and implement specific management actions for *Swainsona reticulata* in relevant parks and reserves, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Parks Victoria

Silky Swainson-pea (*Swainsona sericea*)

Habitat

Occurs in two distinctly different habitats. Mallee populations are found in Semi-arid Sand Dune Hummock Pine Woodland, commonly in the dune blow-outs found in Hattah-Kulkyne National Park (Sluiter *et al.* 1997). Slender Cypress-pine *C. gracilis* is the dominant tree, but vegetation is largely herbaceous, and dominated by pioneer species able to recolonise the unstable dunes which until recently have suffered from serious over-grazing by kangaroos and rabbits. Populations of *Swainsona sericea* also occur within grassy ecosystems of the Northern (Northern Plains Grassland) and Wimmera Plains, where they occur on heavy, cracking clays on gilgai puffs. Populations in this habitat are seriously threatened, owing to ongoing loss of suitable habitat to agriculture.

Distribution



EPBC Act	-	DSE	vulnerable	# populations	29+	# individuals	18,000+
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Intended Management Actions & Responsibility

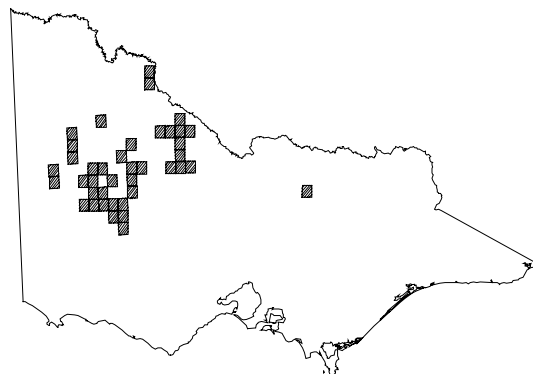
- Identify 4 or more key, off-reserve populations of *Swainsona sericea* (Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions)
- Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria
- Pursue the establishment of formal management agreements with responsible land managers to protect *Swainsona sericea* (PAMAs on public land, covenants on freehold land).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature
- Provide specific advice for landholders on managing *Swainsona sericea* (and other threatened plants) on private land (Northern Plains and Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities
- Prepare and implement specific management actions for *Swainsona sericea* in Hattah Kulkyne National Park, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Parks Victoria
- Prepare and implement specific management actions for *Swainsona sericea* in Naringaningalook Grassland Reserve, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Trust for Nature

Downy Swainson-pea (*Swainsona swainsonioides*)

Habitat

Grows on heavy, cracking clays, on gilgai puffs in seasonally inundated depressions surrounded by Black Box woodland, and also in open Grey Box – Buloke grassy woodland, including relatively disturbed sites such as roadside table drains. Associated species include Wallaby-grasses *Austrodanthonia* spp., Spear-grasses *Austrostipa* spp., Rigid panic *Homopholis proluta*, Spider Grass *Enteropogon acicularis*, Bluebushes *Maireana* spp. in sites that are often very weedy.

Distribution



EPBC Act	-	DSE	endangered	# populations	18	# individuals	3150
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Intended Management Actions

1. Monitor populations, assess threats and identify urgent management actions (if any). Record information in appropriate DSE (or compatible) databases and circulate to relevant land managers.
DSE (Biodiversity & Natural Resources Division, Regions); Parks Victoria
2. Commence program to propagate seed and augment populations of *Swainsona swainsonioides*.
DSE (Biodiversity & Natural Resources Division, Regions); Royal Botanic Gardens
3. Identify 4 or more key, off-reserve populations of *Swainsona swainsonioides*.
DSE (Biodiversity & Natural Resources Division, Regions)
4. Pursue the establishment of formal management agreements with responsible land managers to protect *Swainsona swainsonioides* (PAMAs on public land, covenants on freehold land).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature
5. Provide specific advice for landholders on managing *Swainsona swainsonioides* (and other threatened plants) on private land (Northern Plains and Wimmera).
DSE (Biodiversity & Natural Resources Division, Regions); Trust for Nature, Catchment Management Authorities
6. Prepare and implement specific management actions for *Swainsona swainsonioides* in Terrick Terrick National Park, James Barrett Flora and Fauna Reserve and Barrabool Flora and Fauna Reserve, addressing key threats, and employing integrated management techniques (grazing management, weed control, fire management).
Parks Victoria