

# NATIONAL RECOVERY PLAN FOR SMALL PURPLE-PEA



*(Swainsona recta)*

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## **DISCLAIMER**

The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved, and may also be constrained by the need to address other conservation priorities. Approved recovery actions may be subject to modifications due to changes in knowledge and changes in conservation status.

## SUMMARY

This document constitutes the formal National Recovery Plan for Small Purple-pea (*Swainsona recta*). The Plan considers the conservation requirements of the species across its known range, identifies the actions to be taken to ensure its long-term viability in nature and the parties who will undertake these actions.

Small Purple-pea is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, Endangered (Schedule 1, Part 1) on the NSW *Threatened Species Conservation Act 1995*, Endangered (Section 21) on the ACT *Nature Conservation Act 1980*, Threatened (Schedule 2) on the Victorian *Flora and Fauna Guarantee Act 1988* and classified as Endangered by the Victorian Department of Sustainability and Environment (2005).

Small Purple-pea is a slender, rigidly erect sparsely hairy perennial forb in the family Fabaceae. It was relatively widespread in south-eastern Australia with a range extending from north-eastern Victoria northwards along the western slopes of New South Wales to near Gulgargambone. Currently there are about 9,500 plants remaining across a total of 26 sites in NSW, the ACT and Victoria.

The first recovery plan for this species was produced in 1995 although it was not formally adopted as a national plan or in any of the range jurisdictions. At that time a total of about 1600 plants were known from nine sites. Over the 15 years that plan has been implemented the total population known in 1995 has increased to approximately 3,490 naturally occurring plants. This increase has occurred in both NSW and the ACT. However, most of the increase is attributable to a post burn flowering response in the Tralee-Williamsdale railway easement population which enabled the detection of many plants that were previously existing in a suppressed state. Many of the smaller populations have actually decreased in size and two have become extinct since 1995. Eighteen additional sites totalling 6,015 plants have been discovered since 1995, taking the total current population to about 9,500 plants. This current edition of the Recovery Plan includes an updated set of Recovery Actions that have been identified through a review of the current priority needs for the species.

The overall objectives of this Plan is to ensure that all populations of Small Purple-pea are stable or increasing in size, the genetic diversity of the species is maintained and formal protection for currently unprotected populations is achieved.

The future Recovery Actions detailed in this Recovery plan include:

- Undertake additional survey in vicinity of recently recorded sites.
- Monitor all known sites.
- Weed control.
- Undertake ecological burns.
- Negotiate improved management and/or formal protection of sites.
- Continue research into the biological / ecological effects of fire (burning frequency and season of burning) on Small Purple-pea and its habitat.
- Investigate potential sites suitable for enrichment planting or re-establishment of Small Purple-pea populations and undertake translocation projects.
- Investigate genetic variation within and between surviving populations to identify source and target populations for translocation and restoration. Measure the effects of habitat fragmentation and reduced population size on the long-term viability of Small Purple-pea.
- Increase community awareness and involvement in the Small Purple-pea recovery effort

## Abbreviations used in this Plan

ARHS - Australian Railway Historic Society

ARTC – Australian Rail Track Corporation

OEH –Office of Environment and Heritage (NSW)

DSE – Department of Sustainability and Environment (Vic)

LPMA - Land and Property Management Authority

NPWS – National Parks and Wildlife Service (NSW)

RIC - Rail Infrastructure Corporation

TAMS –Department of Territory and Municipal Services (ACT)

## SPECIES INFORMATION AND GENERAL REQUIREMENTS

### Description

Small Purple-pea (*Swainsona recta*) is a slender, erect, sparsely hairy perennial forb producing few to many flowering stems 20-30 cm long. Plants develop a long thickened taproot that has been recorded to extend to at least 60 cm below the soil surface. The leaves are almost hairless, pinnate, 3-9 cm long with 5-13 leaflets. The leaflets are narrow to very narrow elliptical. The terminal leaflet is distinctly larger (1.5-2.5 cm long) than the lateral leaflets (1.0-1.5 cm long). Mostly 10-21 bright purple flowers are produced on the upper half of the flower stalks. Individual flowers are borne on individual short downward then outward curving (recurved) stalks 0.1-0.3 cm long. The standard petal is 0.74-0.95 mm long and wide and the two wing petals are 0.7-0.8 cm long, whilst the keel petal is 0.5-0.75 cm long. The standard petal has two distinctive white spots or short stripes at its base and these are located either side of the vertical centre-line fold of the standard petal. The fruit is a more or less oblong hairless pod 0.7-0.11 cm long and 0.4-0.6 cm in diameter. Each pod contains several small, hard-coated and flattened kidney shaped seeds that are fawn in colour and about 2 mm long. (Briggs & Leigh 1990, 1992)

### Distribution

Most collections of Small Purple-pea were made prior to 1939. Historic collections suggest that the species was relatively widespread in south-eastern Australia, with a range extending from north-eastern Victoria, northwards along the western slopes of New South Wales to near Gulargambone. Past New South Wales collection sites where the species is presumed extinct include Gulargambone, Trangie, Wagga Wagga, Carcoar, Queanbeyan and Culcairn (Briggs and Leigh, 1990). Past Victorian collection sites where the species is presumed extinct include Echuca, Murchison, Wangaratta, Wodonga and Tallangatta (Leigh and Briggs, 1992). A single plant discovered at Glenrowan in 1995 is also known to have been lost (Johnson, pers. comm.). Some previously recorded small populations in the ACT are also known to have become extinct (Briggs and Leigh, 1985, Briggs, pers. comm.).

Most of the surviving populations are in New South Wales and the Australian Capital Territory. The largest known population in 1996 and which consisted of about 3000 plants was scattered along a 30 km section of railway easement between Tralee and Williamsdale south of Queanbeyan in NSW (Briggs, 1994, Briggs and Mueller, 1999). The discovery in 2010 of a large population of 1000+ plants on private land near Williamsdale and an additional 4,200 plants on Mount Arthur near Wellington (total population there now 4,576) in 2011 and 2011 has significantly increased the total known population in NSW to approximately 9,270 plants. Other sites in NSW where the species survives are Burrendong (160 plants), Mudgee (270 plants), Burra (100 plants), Mandurama (10 plants), Guises Creek (50 plants), Burra (1 plant) and Stuart Town (1+ plants) (Briggs and Leigh, 1990, Briggs, pers. com.). In the ACT the largest population of 216 plants and another small population of about 10 plants occur near the southern Canberra suburb of Kambah. Other ACT occurrences are in the suburbs of Aranda (3 plants) and Farrer (1 plants) and near Williamsdale (a colony of two plants and another single individual) (Baines and Cook, pers. com). In Victoria, Small Purple-pea is now only known from a single colony of four naturally occurring plants near Chiltern (Johnson, pers. com.).

Figure 1 shows the location of historical and extant populations of Small Purple-pea. Table 1 provides a summary of population size, population trends, area of occupancy and land tenure at all known sites.

### Habitat

Small Purple-pea occurs predominantly in grassy woodlands, but sometimes extends into grassy open-forest. The tree cover usually includes one or more of the following species:- *Eucalyptus blakelyi* (Blakely's Red Gum), *E. melliodora* (Yellow Box), *E. goniocalyx* (Long-leaved Box) and *E. albens* (White Box). In the Wellington area *Callitris endlicheri* (Black Cypress Pine) is often also present and in Victoria Small Purple-pea also occurred at some sites where *E. microcarpa* (Grey Box) is a co-dominant tree of the grassy

woodland. The native understorey at most sites is dominated by *Themeda triandra* (Kangaroo Grass), *Poa sieberiana* (Snow Grass) and *Stipa* spp. (Spear Grass). The grassy groundcover includes a wide range of native forbs, with the most commonly present species including *Bulbine bulbosa* (Bulbine Lily), *Chrysocephalum apiculatum* (Common Everlasting), *Leptorhynchus squamatus* (Billy Buttons), *Stackhousia monogyna* (Creamy Candles), *Podolepis jaceoides* (Showy Copperwire Daisy), *Arthropodium fimbriatum* (Nodding Chocolate Lily) and *Arthropodium milleflorum* (Vanilla Lily). Occasionally the understorey may have a low shrub component including *Pimelea curviflora* (Curved Rice-flower), *Cryptandra amara* (Bitter Cryptandra), *Brachyloma daphnoides* (Daphne Heath) and *Daviesia mimosoides* (Leafy Bitter-pea).

The species occurs on both red-brown loams (Wellington - Mudgee – Mandurama locations) and grey gritty or stony loams (Canberra – Williamsdale locations), generally on undulating terrain. It occurs on all aspects and has an altitudinal range from 180m (some sites in Victoria) to 960m (near Williamsdale in NSW).



Figure 1. Map showing historic collections and current known locations of Small Purple-pea.

**Table 1. Population size, population trends, area of occupancy and land tenure at all known sites.**

*Site Number, Name, Tenure and Land manager	Area of Occupancy (ha)	Population Size at time of first survey (Year of survey)	Population Size at second most recent survey (Year of survey)	Population Size at most recent survey (Year of survey)	Population Trend (Assessment based on changes between population counts)
<b>NSW</b>					
1. Tralee-Williamsdale Rail Easement (Crown under VCA – Rail Infrastructure Corporation)	4.5	800 (1986)	1150 (1994)	3,090 (1996)	Stable (based on monitoring of research plots – increase between 1994 & 1996 due to suppressed plants resprouting following management burns in 1995)
2. Mount Arthur Reserve –Brennans Way Fire trail (Crown Reserve – Department of Primary Industries (Catchment and Lands) (DPI))	0.05	36 (1986)	24 (2005)	12 (2010)	Declining loss partly due to fire trail maintenance
3. Burrendong Arboretum (Crown – LPMA)	0.05	135 (1986)	150 (1997)	46 (2005) (partial count only)	Uncertain
3. Lake Burrendong (private)	3.0	173 (1986)	126 (1994)	30 (2005)	Declining
3. Burrendong State Recreation Area (Crown LPMA)	1.0	28 (1986)	82 (1997)	86 (2005)	Uncertain – no recent count & continuing stock grazing likely to have lead to decline
4. Mumbil-Stuart Town Railway Easement (RIC)	ca. 0.05	57 (1986)	114 (1997)	0 (2005) 0 (2009)	Declining
5. Mudgee-Lue Road (road easement – Mudgee Shire Council)	0.01	70 (1987) 40 (1988)	17 (2005)	2 (2010)	Declining
6. Mandurama (railway easement – RIC)	0.01	20 (1996) 15 (1997)	6 (2009)	10 (2010)	Declining
7. Royalla (Council reserve – Palerang Shire Council)	0.01	10 (2000)	N/A	10 (2001)	Stable
8. Guises Creek (Crown lease – LPMA)	0.01	Approx 50 (2001)	N/A	Approx 50 (2001)	Stable
9. Smiths Gap (private)	0.001	1 (2000)	N/A	1 (2000)	Unknown
10. Mount Arthur Reserve – Bundari Trail (Crown Reserve – DPI)	0.1	52 (2005)	Approx. 52 (2008)	23 (2011)	Declining
11. Mount Arthur Reserve – Brennans Way (Crown Reserve – DPI)	0.05	Approx 50 (2006)	Approx 50 (2009)	71 (2011)	Stable
12. Mount Arthur south-west (Crown – (under licence) - DPI)	20	Approx 200 (2007)	Approx 200 (2009)	1,425 (2011)	Unknown – population increase due to discovery of additional



					populations
13. Mount Arthur west – Longs Road (Crown Reserve – DPI)	0.05	Approx 50 (2008)	Approx 50 (2009)	1878 (2011)	Unknown – population increase due to discovery of additional populations
14. Mount Arthur west – Bushrangers Ck Road (Crown Reserve –DPI)	0.01	20 (2007)	20 (2009)	435 (2010)	Unknown – population increase due to discovery of additional populations
15. Stuart Town Common (Crown – DPI)	0.001	1+ (2008)	N/A	1+ (2008)	Unknown
16. Burra Creek (Water catchment - Commonwealth land)	0.001	1 (2008)	N/A	1 (2008)	Unknown
17. Mudjee Lookout (Crown – Mudjee Shire Council)	0.1	70 (2009)	N/A	270 (2010)	Increasing
17. Williamsdale (Private)	5	1000 (2010)	N/A	1000 (2010)	Probably stable
18. Burra (Crown Reserve – DPI))	0.1	100 (2010)	N/A	100 (2010)	Probably stable
19. Mount Arthur – near Fire Trail 2(Crown Reserve – DPI)	0.05	434 (part count only) (2010)	434 (part count only) (2010)	732 (2011)	Unknown
<b>ACT</b>					
19. Kambah (Open Space - Territory and Municipal Services)	0.02	14 (1986) 10 (1997)	11 (2005)	4 (2009) + 3 planted	Slow decline
20. Mt Taylor (Nature Park – TAMS)	0.1	74 (1994) 90 (1997)	194 (2005)	216 (2009)	Increasing
21. Caswell Drive (leasehold)	0.001	3 (2003)	3 (2005)	0 (2009)	Uncertain
22. Farrer Ridge (Open space)	0.001	1 (2004)	1 (2006)	1 (2008)	Uncertain
23. Williamsdale (Leasehold)	0.001	2 (2009)	N/A	2 (2009)	Unknown
24. Williamsdale (Proposed development offset – ACTEW)	0.001	1 (2009)	N/A	1 (2009)	Unknown
25. Long Gully Road	0.001	1 (1983)	1 (1995)	0 (2000)	Extinct
26. Mawson	0.005	7 (1983)	N/A	0 (1984)	Extinct
<b>Victoria</b>					
27. Chiltern (Chiltern-Pilot National Park - DSE)	0.001	4 (2000)	4 (2008)	4 (2009) + 8 planted	Stable
28. Glenrowan (railway easement - VicRail)	0.001	1 (1995)	1 (1998)	0 (1999)	Extinct

\*Separate Site Numbers have been assigned to each population that is more than 0.5 km from the next nearest population. Contiguous populations extending across more than one land tenure have been assigned the same Site Number, but have been identified separately in the Table 1 according to differing land tenures.

## **Biology and ecology**

Small Purple-pea is a perennial forb. In autumn and winter (usually from April to August), plants resprout from their underground rootstocks. The species flowers in spring, peaking in a 2-3 week period during October. Plants in the Wellington – Mudgee area usually commence flowering about two weeks earlier than those at the higher altitudes near Canberra and Queanbeyan. The seed ripens between early and late December. The plants then die back to the perennial rootstock until they resprout again in the following autumn / winter.

Pollination appears to be primarily by insects, although plants also appear to have some capacity to self. Good seed set is observed in favourable seasons in larger populations, and seedlings raised from seed produced in larger populations have been healthy. Whilst seed is also set in smaller populations, progeny raised from small populations at Kambah and at Chiltern have lacked vigour and have often died after being planted into the wild (Briggs, pers. comm.; Johnson, pers. comm.). This suggested there may be an inbreeding effect in small populations where most remaining individuals may be closely related.

The life span of the species is not known with certainty, but given the size of the rootstock and monitoring observations to date, could be as long as 50 years. Several tagged plants in the ACT have been monitored for the past 24 years (Briggs, pers. comm.).

Research indicates that plants are not usually killed by fire, and indeed are generally favoured by periodic burning, particularly on sites where the tree cover has been removed or thinned and there is a high competition from the groundcover. In such cases fire serves to reduce the build up of dead plant matter, especially from Kangaroo Grass, and reduces the competition between Small Purple-pea and other native grassland species. Fire is an important factor in seedling regeneration, as dormancy of the hard-coated seed is broken by fire. On sites retaining a more natural density of tree cover, e.g. at some sites in Burrendong Arboretum and on Mount Arthur, leaf litter and shading often help to maintain inter-tussock spaces in which the Small Purple-pea can persist and in such cases fire appears to have a less important role in the survival of the species (Briggs, pers. comm.).

New vegetative growth has been observed sprouting from the tops of rootstocks that have been cut off during grading of firebreaks along railway easements and also from roots exposed through erosion of a road cutting. Despite this capacity to resprout from damaged rootstock, the species will not persist when the shoot growth is periodically removed by domestic stock grazing.

## **Threats**

Small Purple-pea is believed to have once been relatively widespread in south-eastern Australia, extending from north-central and north-east Victoria along the western slopes and parts of the Southern Tablelands of New South Wales to near Gulargambone in NSW.

In New South Wales population sizes are believed to have been greatly reduced and populations only persist in patches of remnant habitat which have had, by chance, a favourable management and land use history.

Small Purple-pea was presumed extinct in Victoria until the re-discovery of a single plant at Glenrowan and the more recent discovery of four plants near Chiltern.

The range reduction and decline in population sizes is believed to be due to both adult mortality and low recruitment which occurs in response to several major threat factors (Briggs and Leigh, 1990; Leigh and Briggs, 1992). These are:

- \* habitat loss due to pasture improvement and other agricultural developments;
- \* domestic stock grazing;
- \* competition from herbaceous weeds;
- \* reduced fire frequency and the resulting competition with native groundcover species;
- \* railway maintenance, roadworks and urban development.

Current threats to remaining populations include:

- \* weed invasion;
- \* domestic stock grazing;
- \* browsing by feral and native herbivores;
- \* site erosion;
- \* loss of individuals and habitat during weed spraying;
- \* recreational pressures;
- \* railway maintenance;
- \* soil dumping;
- \* absence of fire;
- \* infrastructure development; and
- \* low numbers at several sites.

In Victoria flowering and seed set has also been significantly reduced due to invertebrates eating the plants.

### **Legal Status**

Small Purple-pea (*Swainsona recta*) is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Endangered (Schedule 1, Part 1) on the NSW *Threatened Species Conservation Act 1995* (TSC Act), Endangered (Section 21) on the ACT *Nature Conservation Act 1980* (NC Act) and Threatened on the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).

### **International obligations**

The species is not listed under International agreements. This Plan is consistent with the aims and recommendations of the Convention on Biological Diversity, which has been ratified by Australia, and will assist in meeting Australia's responsibilities under that convention.

### **Role and interests of indigenous people**

Consultation with Aboriginal communities regarding any traditional knowledge/use of this species and any comment they may have on the content and implementation of this recovery plan commenced during the public exhibition of the draft recovery plan. Consultation will continue during the implementation stage of this Plan and efforts will be made to accommodate any suggestions received regarding the action details and any interest in being involved in undertaking the actions.

### **Habitat critical to the survival of the species**

Given the small number of extant populations, small area of occupancy and the reliance on in-situ protection for the conservation of the species, all populations and the habitat they occupy are critical to the survival of the Small Purple-pea.

### **Biodiversity Benefits**

The preparation and long term implementation of Recovery Plans for threatened species, populations and ecological communities contributes to conserving biodiversity in general. The conservation of biodiversity has a number of wider community benefits. These include the provision and maintenance of a range of ecosystem functions and landscape health.

The appropriate protection and management of the habitat of Small Purple-pea will contribute to the conservation of one Endangered Ecological Community listed under the EPBC Act. This community is *White*

*Box-Yellow Box-Blakely's Red Gum Grassy Woodlands* which constitutes the vegetation community at most sites that support Small Purple-pea. Conservation of the Small Purple-pea will provide a small benefit to one nationally listed threatened species, Hoary Sunray (*Leucochrysum albicans* var. *tricolor*) and to the rare Wingless Grasshopper (*Keyacris scurra*) both of which have small occurrences along sections of the Tralee-Williamsdale railway easement in NSW.

### **Social and economic impacts**

The implementation of this Recovery Plan is not expected to cause significant adverse social or economic impacts. The cost of implementation will be offset by the social and environmental benefits of preventing further loss in biodiversity. Actions on the public land sites, e.g. Burrendong Arboretum, Burrendong State Recreation Area, Mount Arthur Reserve, Mount Taylor Nature Park, Black Mountain Nature Reserve, Tralee-Williamsdale railway easement VCA and Chiltern – Pilot National Park, are consistent with current land management objectives identified for such land.

### **Plan review and evaluation**

The NSW Office of Environment and Heritage in consultation with the ACT Department of Territory and Municipal Services and the Victorian Department of Sustainability and Environment will evaluate the performance of the Recovery Plan against the criteria identified below. The Plan will be formally reviewed within five years from the date of its adoption as a national Recovery Plan, and revised if necessary.

### **Guidance for Environmental Assessment**

All populations are important to the long-term survival of the species and the maintenance of existing genetic diversity. To avoid significant impacts on the species, any of the following management practices or on ground works in the vicinity of the species may require assessment:-

Clearing of native vegetation for agricultural purposes, application of fertilisers, intensification of domestic stock grazing, switching the type of domestic stock, application of herbicide, urban development, rural subdivision, road and railway maintenance works, soil disturbance, slashing and recreational activities.

Detailed field surveys in appropriate seasonal conditions should be undertaken prior to the assessment and approval of any proposed developments within potential habitat.

In circumstances where loss of individuals is permitted, the loss should be offset by achieving improved long term protection and management of a suitable, currently unreserved population or other compensatory arrangements are agreed to by the consent authority.

### **Management Practices**

Management practices required to avoid a significant impact include:

- Protect known populations from changes to land use.
- Do not undertake road works, pasture modification or other changes in land use that may affect populations.
- Do not increase grazing pressures on sites where populations persist - reduce grazing pressures where possible.
- Undertake weed control in and adjacent to populations, taking care to spray or dig out only target weeds.
- Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning road works, residential and infrastructure developments, remnant protection, rehabilitation).

- Maintain or install, where appropriate, on-site signs to alert maintenance staff to the presence threatened species habitat.
- Search for new populations in potential habitat.

## **RECOVERY OBJECTIVES AND CRITERIA**

### **Objectives**

1. All natural populations are stable or increasing.
2. Maintain current genetic diversity across the range of the species.
3. Achieve formal protection for currently unprotected populations.

### **Performance Criteria**

1. All natural populations have remained stable or have increased in size over a five year period following formal approval of this Plan.
2. All large natural populations have been maintained. At least four disjunct and geographically isolated populations, have been increased using seed sourced from other appropriate populations.
3. Formal protection of currently unprotected populations has been negotiated.

## **RECOVERY ACTIONS**

### **Previous Recovery Actions**

#### NSW

- In 1993 a Voluntary Conservation Agreement was established between the then NPWS and State Rail for the population along the Tralee-Williamsdale railway easement. This formal agreement has enabled NPWS to achieve a more appropriate management regime on this site than is likely to have occurred in the absence of such an agreement. Changes in the ownership of the railway easement and a shortage of funds has reduced the ability to fully implement some actions, particularly weed control.
- Several management burns undertaken for ecological purposes and as recommended in the previous draft recovery plan have been conducted along the Tralee-Williamsdale railway easement. These have been discontinued in the last few years due to resourcing and logistical problems.
- Research into the biological and ecological effects of fire on the Small Purple-pea has been undertaken within the Tralee-Williamsdale railway easement population, as advocated in the previous draft recovery plan. Fire has been shown to be important in reducing competition and stimulating flowering of the Small Purple-pea. The initial results of the burn trials are documented in Briggs & Mueller (1999).
- Some boundary fences were repaired in 1996 along the Tralee-Williamsdale railway easement to prevent domestic stock accessing the site.
- In 1998 a few of the remaining clumps of Small Purple-pea plants on the private land site at Lake Burrendong were protected using wire netting cages. The plants within these cages have persisted, but few outside the cages have re-appeared.
- The section of the railway easement at Mandurama supporting the Small Purple-pea was fenced by the Australian Rail Track Corporation (ARTC) in 2000 and signs were erected to notify the significance of the site.

- Mudgee Shire Council erected “Significant Roadside” vegetation signs to assist in the protection of the Mudgee-Lue Road population. One of these signs has been damaged and needs replacing.
- Over the past 10 years several unsuccessful attempts have been made by OEH to negotiate the protection of the Small Purple-pea population on private land at Lake Burrendong.
- Major weed control, primarily of St Johns Wort, Sweet Briar, and Blackberry, has been undertaken within the Tralee-Williamsdale railway easement over the last few years. A total of \$37 000 has been contributed to this work by OEH, the Australian Railway Historic Society (ARHS) and the ARTC. This is in addition to other weed control undertaken by the ARHS within the easement, particularly within the ballast area. St Johns Wort remains a major problem along this railway easement and requires ongoing control.
- The Mount Arthur Trust has supported a Tiger Pear and Bridal Creeper control program within the Mount Arthur reserve over the past few years. A total of 280 feral goats have also been removed by from this reserve in the past three years.
- In recent years the Mount Arthur Trust with funding assistance from Central West CMA breached and drained five dams and fenced a further nine dams within the Mount Arthur reserve in an effort to reduce grazing pressure from native herbivores and feral goats.
- A sample of one of the denser colonies within Burrendong Arboretum was fenced in 1998 to exclude heavy browsing by kangaroos and all Small Purple-pea plants within the enclosure were tagged to enable monitoring of individual plants in a similar way to that being done within the research plots on the Tralee-Williamsdale railway easement.
- In 2000 Yarrowlumla Shire Council required the establishment of a 6 ha reserve for the protection Small Purple-pea at Royalla as a condition of consent for a rural subdivision. A project to enhance the Small Purple-pea population within this reserve was commenced by the Royalla Landcare Group and OEH in 2011.
- Surveys to locate previously unrecorded colonies of the Small Purple-pea on and adjoining Mount Arthur Reserve have been undertaken by a Ranger and other members of the Mount Arthur Reserve Trust since 2004. A total population of 4,240 plants has now been found in the vicinity of Mount Arthur.
- Monitoring to various levels of detail has been undertaken of most populations. Monitoring has varied in detail, ranging from periodic site inspections aimed at detecting any obvious threats, but with no comprehensive population count undertaken, to detailed counts of total numbers for sites and the monitoring of individuals within a selection of permanent research plots.
- In 2009 the ARTC replaced missing fencing and gate along a 2 km section of the NSW-ACT boundary fence of the Tralee-Williamsdale railway easement to prevent vehicle access and associated soil and rubbish dumping.
- Since 2009 the ACT National Parks Association has assisted OEH in hand weeding St Johns Wort from 32 research plots located along the Tralee – Williamsdale railway easement.
- A draft Plan of Management was completed in early 2010 for the Mount Arthur Reserve. This Plan, prepared by the Mount Arthur Reserve Trust, includes a specific management strategy for the Small Purple-pea which aims to ensure that the populations do not decline and threats are minimised.
- A draft Plan of Management was completed in early 2010 by the Royalla LandCare Group, Palerang Shire Council and OEH for the Royalla Small Purple-pea Reserve. This Plan documents what management is required to enhance the native vegetation of the site and to encourage an increase in the size of the Small Purple-pea population in the reserve. A brochure has also been produced in 2012 describing the biodiversity values of this reserve, including the presence of the small purple-pea.

## ACT

- In 1988 and 1989 twelve plants raised from seed collected from the Tralee-Williamsdale railway easement in NSW were planted to supplement the Kambah population and in an effort to increase the vigour of the progeny from the original plants at the site. Only three of these plantings were surviving in 2009. There has been no improvement in recruitment at the site.
- Detailed population size monitoring has been undertaken for all occurrences of Small Purple-pea in the ACT. All known plants in the ACT have been tagged to allow the history of individuals to be tracked. The coordinates of most individuals has also been recorded using GPS.
- Ecological burns were undertaken at the Mount Taylor and Kambah sites in 2000.
- Weed control has been undertaken at the Kambah site to remove Sweet Briar, naturalised *Grevillea juniperina* and overly dense eucalypt regeneration.
- Slug and snail bait has occasionally been laid at the Kambah site to control slug damage to Small Purple-pea plants.
- All sites have been periodically monitored in order to identify any threats that may have arisen.

## VIC

- The area immediately surrounding the plant that was located at Glenrowan was burnt in December 1998 in the hope of stimulating germination of possible soil-stored seed in an effort to recruit additional plants. This action did not result in any new plants and the original plant has now also died.
- A single plant was planted at the Glenrowan site in 2001, but subsequently died.
- Seed has been collected from the small Chiltern population for five seasons since 2002. Several plants were grown from this seed and planted into the site in 2005 in an effort to increase the population. All of these plantings died within a few months of planting out, probably largely due to drought conditions at the time.
- An inoculant derived from Smooth Darling Pea (*Swainsona galegifolia*) (and other native non woody legume species) root nodule bacteria has been successfully developed to aid germination and growth of Small Purple-pea seedlings.
- In July/August 2009 DSE in collaboration with the Melbourne Botanic Gardens planted nine new plants raised from locally collected seed into the Chiltern site. Slightly moister microhabitats were selected in the hope of improving the success rate for this planting. Plants were caged to protect from macropod grazing. Eight of nine plants have survived with three flowering and producing seed in the first season.

## **Proposed Recovery Actions**

The total estimated cost of the implementation of recovery actions is \$210 000.

### **1. Undertake additional survey in vicinity of recently recorded sites**

Further survey in the vicinity of some known sites, particularly those recorded relatively recently, is warranted in an effort to locate additional colonies or individuals. Some of the newly recorded sites were found in the midst of below average rainfall conditions and additional plants may become evident when surveys are undertaken in better seasonal conditions. Sites that should be targeted include Mount Arthur, Stuart Town Common, Mudgee lookout, Guises Creek, Burra Creek, Smiths Gap, Williamsdale and Chiltern.

*Responsibility: OEHL, Mount Arthur Reserve Trust, TAMS, DSE*

*Cost: NSW – \$5000 total. ACT - \$1000 total. Vic - \$500 total.*

## **2. Monitor all known sites**

The past monitoring programs should be maintained and for some sites the frequency of monitoring increased. It is recommended that the following frequency of monitoring be adopted:

- a. At least every two years for sites with populations of less than 100 plants
- b. At least every four years for sites with populations of more than 100 plants

Monitoring should consist of counts of all flowering plants for most sites. Estimates based on appropriate sampling of the larger sites (Tralee-Williamsdale railway easement and Mount Arthur) should be adequate for determining population trend. Monitoring should also aim to record the effectiveness of recent recovery actions, such as fencing, burning and weed control.

In addition to the population counts, annual surveillance monitoring of all sites should be undertaken in order to enable the early detection and control of any threats that may have arisen and thus minimise any damage to sites.

*Responsibility: OEHL, Mount Arthur Reserve Trust, TAMS, DSE*

*Cost: NSW – \$3000 per year. ACT - \$1000 per year. Vic \$1000 per year.*

## **3. Weed control**

Habitat invasion by various weed species poses a major threat at many sites. Weed control must undertaken extremely carefully, generally using hand application methods and using appropriate herbicides in order to avoid collateral damage to Small Purple-pea plants and associated habitat. In order to minimize damage to Small Purple-pea plants it is recommended that where possible herbicide applications are undertaken during the summer and early autumn dormancy period for the Small Purple-pea. For most of the controllable major problem weed species (St Johns Wort, Sweet Briar, Tiger Pear) such timing of herbicide application is feasible.

The most substantial weed control program required is for the Tralee-Williamsdale population in NSW.

Effective control of exotic grasses that affect some sites will be extremely difficult and those sites which are heavily infested with such species are possibly doomed. Investigation into the most effective means of controlling heavy infestations of exotic grasses which affect some sites is needed. Spring burns, use of desiccant herbicides such as Diquat and Paraquat, or applications of sugar to lower available nitrogen to the weedy grasses are options that could be considered.

*Responsibility: OEHL, Mount Arthur Reserve Trust, TAMS, DSE*

*Cost: NSW – \$10 000 per year. ACT - \$1000 per year. Vic \$500 per year.*

## **4. Undertake ecological burns**

Some sites have not been burnt for many years and there is considerable build-up of groundcover biomass (sometimes comprised of both native and exotic species) and obvious suppression of Small Purple-pea plants. Occasional autumn burning of such sites is likely to be beneficial in removing competition and encouraging seed germination and recruitment. Dense competition (particularly from exotic grasses) may be partly



responsible for the current absence of plants at the Mumbil-Stuart town railway easement. Until the last few years sections of the Tralee-Williamsdale railway easement were being burnt every three to four years in an effort to replicate historic management of this site and benefit the Small Purple-pea. Efforts should be made to resume this burning regime for this site. An ecological burn was last applied to the Kambah site in the ACT in 2000 and this site now has an overly dense cover of Kangaroo Grass (Cook, pers. comm.). The ACT Mount Taylor site was last burnt in a wildfire in 2003.

Until the research into the optimal fire frequency and the effects of season of burning is completed sites should not be burnt more than every 4-5 years in autumn. There are indications that repetitive frequent burning of sites may be detrimental to the Small Purple-pea.

The need for regular ecological burning of sites which retain trees at or near benchmark densities appears to be lessened, as on such sites sufficient inter-tussock spaces usually maintained and in which the Small Purple-pea can persist.

In Victoria biomass build up is currently not an issue due to macropod grazing (Johnson, pers. com.). However, small ecological burns may be applicable at some stage in the future.

*Responsibility: OEH, Mount Arthur Reserve Trust, TAMS, DSE*

*Cost: NSW – \$3000 per year. ACT - \$2000 total.*

## **5. Negotiate improved management and/or formal protection of sites**

Many of the NSW sites are on private land or on Crown land with designated purposes other than conservation. Efforts should be made to negotiate with the various landowners and land managers to modify current management of sites supporting Small Purple-pea and where possible establish more permanent protection agreements such as Voluntary Conservation Agreements or Conservation Property Vegetation Plans over the sites. Sites which would particularly benefit from this action include the Guises Creek Crown lease, Lake Burrendong private land, Mudgee lookout, Stuart Town Common and the Caswell Drive site in the ACT.

*Responsibility: OEH, TAMS.*

*Cost: NSW – \$5000 total. ACT - \$1000 total.*

## **6. Continue research into the biological / ecological effects of fire (burning frequency and season of burning) on Small Purple-pea and its habitat.**

Research commenced by CSIRO in 1994 and continued by OEH is investigating the effects of a range of burning frequencies and comparing the effects of burning in autumn and spring on population demographics and community integrity. This research is being conducted along the Tralee-Williamsdale railway easement.

The research results will form the basis of determining a fire management regime that will optimise the maintenance and expansion of Small Purple-pea populations. The research will also have relevance to the fire management of other temperate grassland communities.

*Responsibility: OEH*

*Cost: NSW – \$1000 per year to apply burn treatments, \$5000 every two years to undertake major data collection from all plots.*

## **7. Investigate potential sites suitable for enrichment planting or re-establishment of Small Purple-pea populations and undertake translocation projects.**

Most of the occurrences of Small purple-pea occur in very small or narrow remnants with large perimeter to area ratios and which experience major “edge effects” with surrounding farmland and urban areas, including issues of nutrient run-on, associated weed invasion and physical disturbances from various activities. These sites will continue to be problematic to manage and long term maintenance of the Small Purple-pea populations on such sites is likely to be difficult. Enhancement of those populations located on less disturbed larger sites and the re-introduction of the species into larger areas of suitable habitat should therefore be investigated as a strategy to maintain the Small Purple-pea in the long term.

Factors which are important to consider in determining whether sites could be suitable for re-introduction include: whether the site is within the known range of the species; whether the habitat free of major weeds or can it be satisfactory weeded; whether the landowner is agreeable to allow the species to be established there and is likely to be afforded long term protection; whether the site can be satisfactorily protected from stock browsing and other threats.

Enrichment plantings or re-introduction will require collection of seed (in the case of re-introductions, from appropriate nearby populations), propagation and planting, or establishment through direct seeding programs. Post planting maintenance is also likely to be required. Guidance on appropriate source populations for seed to be used in any introductions will be obtained from Action 8.

If fully successful, self-sustaining populations will result from the translocation plantings.

*Responsibility: OEH, DSE, TAMS*

*Cost: NSW – \$12 000 total. ACT - \$6000 total. Vic \$3000 total.*

## **8. Investigate genetic variation within and between surviving populations to identify source and target populations for translocation and restoration. Measure the effects of habitat fragmentation and reduced population size on the long-term viability of Small Purple-pea.**

Field studies of population demography, use of molecular genetic markers and controlled pollination and growth studies will need to be integrated to address various questions regarding genetic variability, pollinator limitation, inbreeding effects in small populations, and effects of population size on probability of survival. Data on the size of populations necessary to maintain sufficient genetic variation to ensure population viability will provide direct input into the development of management objectives and strategies for the conservation of Small Purple-pea. Determination of distances and environments across the geographical range over which ecologically significant genetic differentiation occurs between populations is needed to guide seed sourcing for translocation and population restoration activities.

*Responsibility: Research institution*

*Cost: - \$50 000 total.*

## **9. Increase community awareness and involvement in the Small Purple-pea recovery effort**

Keep landholders, interest groups and the public informed of the precarious conservation status of the species, the threats operating and progress and achievements of actions being taken under this plan. This could be achieved through agency websites, newsletters, field days, the media and direct contact with agency

staff. Interest groups include LandCare, National Parks Associations, Friends of Grasslands, Kosciuszko to Coast, CMAs and the Box Gum Woodland Conservation Management Network.

Support ongoing community/volunteer survey and monitoring program for the Mount Arthur populations and the proposed translocation project for the Royalla Reserve site in NSW. Encourage the continued assistance of the ACT National Parks Association in hand weeding of the research plots located along the Tralee – Williamsdale railway line. Seek community involvement in undertaking further surveys for this species and in identifying potential re-establishment sites. Identify and encourage community groups to assist with seed collection, propagation, site preparation and planting projects where suitable translocation/enrichment planting sites are identified and approved by the relevant State or Territory agency.

*Responsibility: OEH, DSE*

*Cost: NSW – \$1,800 per year, Vic \$600 per year.*

Summary of costs and actions identified in the Recovery Plan

Action No.	Action Priority	Action Title	Cost Estimate (\$1000s/year)					Total Cost (\$)	Responsible Party
			Year 1	Year 2	Year 3	Year 4	Year 5		
1	High	Undertake additional survey in vicinity of recently recorded sites	1	3	2.5			6.5	OEH, TAMS, DSE
2	High	Monitor all known sites	5	5	5	5	5	25	OEH, TAMS, DSE
3	High	Weed control	11.5	11.5	11.5	11.5	11.5	57.5	OEH, TAMS, DSE
4	Medium	Undertake ecological burns	4	3	4	3	3	17	OEH, TAMS, DSE
5	Medium	Negotiate improved management and/or formal protection of sites	1	1	2	1	1	6	OEH, TAMS
6	Medium	Continue research into the biological / ecological effects of fire (burning frequency and season of burning) on Small Purple-pea and its habitat	6	1	6	1	6	20	OEH
7	Medium	Investigate potential sites suitable for enrichment planting or re-establishment of Small Purple-pea populations and undertake translocation projects	4	4	4	6	3	21	OEH, TAMS, DSE
8	Medium	Investigate genetic variation within and between surviving populations to identify source and target populations for translocation and restoration. Measure the effects of habitat fragmentation and reduced population size on the long-term viability of Small Purple-pea.		25	25			50	Research Institution
9	Medium	Increase community awareness and support	2.4	2.4	2.4	2.4	2.4	12	OEH, DSE
<b>Total</b>			34.9	55.9	62.4	29.9	31.9	215	

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