***Swainsona murrayana* Wawra (Fabaceae-Faboideae)**

Review of Current Information in NSW

June 2008

Current status:

Swainsona murrayana (Slender Darling-pea) is currently listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act), Threatened in Victoria under the *Flora & Fauna Guarantee Act* 1988 (FFG Act) Vulnerable in South Australia under the *National Parks and Wildlife Act* 1972 (NPW Act) and Vulnerable in Queensland under the *Nature Conservation Act* 1992 (NC Act). The NSW Scientific Committee recently determined that *Swainsona murrayana* meets criteria for listing as Vulnerable in NSW under the *Threatened Species Conservation Act* 1995 (TSC Act), based on information contained in this report and other information available for the species.

Species description:

Thompson and James (2002, p. 606) describe *Swainsona murrayana* as follows: "Prostrate, ascending to erect perennial to 25 cm high; stems densely pubescent with appressed medifixed hairs. Leaves mostly 5-10 cm long; leaflets 3-11, linear-lanceolate to elliptic, lateral leaflets 5-30 mm long, 1-2 mm wide, terminal leaflet distinctly longer than laterals, apex narrow-acute, both surfaces sparsely pubescent to ± glabrous; stipules mostly 1-5 mm long, sometimes with broad, lateral teeth. Racemes 3-9-flowered; flowers about 10 mm long. Calyx pubescent, base spirally twisted, teeth ± shorter than the tube. Corolla pink or purple; keel apex obtuse, twisted. Style tip incurved. Pod narrow-elliptic, mostly 20-65 mm long, pubescent; style twisted, about 4 mm long; stipe about 0.5 mm long."

Taxonomy:

Following the original species description (Wawra von Fernsee 1881), *Swainsona murrayana* was split by Lee (1948) into two subspecies in NSW. Subspecies *eciliata* was said to differ from the type subspecies *murrayana* in the broader and shorter standard petal and the absence of hairs on the lobes of the wing petals. These subspecific rankings are not used in the Thompson (1993) *Swainsona* revision, in which the species is characterised by the strongly twisted hypanthium and keel with retracted tip. The specific epithet refers to the locality of the type collection from the Murray River.

Distribution and number of populations:

Swainsona murrayana is distributed throughout all western Botanical Subdivisions of NSW, as well as South Australia, Victoria and Queensland. Its national distribution is represented by over 200 herbarium and atlas records, with at least 60 geographically distinct populations occurring in NSW (NSW Herbarium Records, PlantNET NSW, Atlas of NSW Wildlife, Australia's Virtual Herbarium). Two clusters of collections occur, the largest in the southern Riverina and a smaller group in an area located between Dubbo and Moree. The species has been recorded commonly in the Jerilderie and Deniliquin areas and in the Hay Plain region extending north to Willandra National Park (Porteners 1993; Benson *et al.* 1997). Populations also occur in northern and

western Victoria, southern Queensland, and in an outlying area in South Australia west of Broken Hill (Thompson 1993; Walsh & Entwisle 1996).

Ecology:

Key habitat requirements

Swainsona murrayana often grows with *Maireana* species on heavy soils, especially in depressions, while also found on grey and brown clay and clay-loam soils in *Atriplex vesicaria* (Bladder Saltbush), *Eucalyptus largiflorens* (Black Box) and grassland communities. In Victoria, the species is found in seasonally inundated flats and around lakes. Associated species in NSW include *Atriplex vesicaria, Acacia pendula, Maireana aphylla, Chloris truncata, Austrodanthonia caespitosa, A. duttoniana, A. eriantha, A. linkii, Homopholis proluta, Eragrostis australasica, Austrostipa nodosa, A. aristiglumis, A. variabilis, A. setacea, A. scabra* subsp. *falcata, Enteropogon acicularis, Hordeum leporinum, Lolium rigidum, Bromus madritensis, Eleocharis acuta, Rhodanthe corymbiflora, Pycnosorus globosus, Calotis scabiosifolia, Microseris lanceolata, Chrysocephalum apiculatum, Brachyscome chrysoglossa, Cotula bipinnata, Podolepis muelleri, Ixiolaena tomentosa, Maireana excavata, Sclerolaena tricuspis, S. napiformis, Allocasuarina luehmannii, Swainsona plagiotropis* and *S. procumbens*.

Life history

Flowering period of *Swainsona murrayana* is cited as August to November. *Swainsona* species are largely renascent perennials, resprouting in suitable conditions from a persistent rootstock (Earl *et al.* 2003). Plants produce winter-spring growth and die back after flowering, re-shooting readily after cool-season rains and often carpeting the landscape. Copious flowers and abundant quantities of seed can be produced under favourable conditions. Fire is unlikely to play an essential role in seedling regeneration, given the open and low-lying habitats in which the species is found. Population growth may be favoured by some forms disturbance under certain circumstances. Light grazing may reduce grass cover and maintain an open sward, allowing sufficient inter-tussock space for germination and establishment (Appleby *et al.* 1991; Earl *et al.* 2003). S*wainsona* species are well known as a cause of stock-poisoning, due to the presence of the poisoning principle swainsonine which affects the nervous system (Thompson 1993).

Number of mature individuals:

Recorded data on population size for the 60 estimated populations of *Swainsona murrayana* are highly variable. Plant abundance is generally described as locally common to abundant, with counts ranging from single plants to at least 1 000 plants made at various sites in NSW (Table 1). Information suggests populations are relatively abundant in optimal seasons. Small numbers appear to represent incidental records, with potential population sizes likely to be much larger.

Population sizes can be particularly significant in the Riverina and Hay Plain areas, numbering in the hundreds or potentially thousands of plants per population (3 000 plants were recorded at one southern Riverina site). Total number of mature individuals is likely to be in the range of 12 000 to 30 000 plants, assuming a conservative estimate of 200 to 500 individuals per population. In Victoria, 28 populations comprising an estimated 94 000 individuals are scattered throughout grassy ecosystems of the Northern and Wimmera Plains (Earl *et al.* 2003), giving an average of 3

357 plants per population. Up to 200 000 individuals of *Swainsona murrayana* could occur within the 60 estimated populations in NSW if these Victorian averages are considered.

Table 1. Location of *Swainsona murrayana* sites in NSW with data or comments recorded on population size and plant abundance (43 records ordered chronologically by most recent collection date) (NSW & CANB Herbarium Records, Atlas of NSW Wildlife).

Location	**Date of Record**	**Population Size Description**	**No. Plants**
Old Urana Rd corner (SWP)	November 2005	Occasional but easily overlooked this time of year	-
Barnes Crossing TSR (SWP)	September 2005	Abundant	-
Mathoura (SWP)	September 2004	Three plants	3
Lang's Crossing, SE of Hay (SWP)	August 2003	75-100 plants estimated in 50 x 80 m area	75-100
Lang's Crossing (SWP)	August 2003	80 plants	80
Lang's Crossing (SWP)	September 2002	Counts of 1, 9, 15 and 18 plants made in area	43
Gurley area, S of Moree (NWP)	December 2001	One plant	1
Gurley area, S of Moree (NWP)	October 2001	One plant	1
Willandra NP (SWP)	December 2000	One plant	1
Peery Stn Rd, E of White Cliffs (NFWP)	November 2000	Locally occasional	-
English Bridge, Quandialla Rd (CWS)	October 2000	67 plants, population area 0.4 ha	67
Coonong, NW of Urana (SWP)	October 2000	Fairly common	-
William's Crossing, Quandialla Rd (CWS)	October 2000	61 plants	61
Morundah-Urana Rd (SWP)	October 2000	3000 plants	3000
South Coree Rd, Jerilderie (SWP)	October 2000	Counts of 13 and 35 plants made at location	48
Merriola Station, E of Hay (SWP)	August 2000	Five to 10 plants estimated in 1 ha survey area	5-10
Willandra NP, in Senna exclosure (SWP)	July 2000	50+ plants	50+
Wahgunyah State Forest (SWP)	September 1999	One plant seen	1

Hay Plain near Carrathool (SWP)	September 1998	Relatively common	-
Goolgumbla, NE of Conargo (SWP)	September 1998	Fairly common	-
Steam Plains (SWP)	August 1998	50 plants observed in 0.5 ha area	50
Barratta TSR, NW Deniliquin (SWP)	October 1997	Locally common	-
Barratta Station (SWP)	October 1997	Common over an area of about 10 ha	-
Epsom Downs map area (SWP)	October 1997	200 plants estimated over an area of 60 ha	200
Coree Rd, E of Conargo (SWP)	October 1995	Abundant	-
Coonong Siding Rd (SWP)	September 1995	Occasional	-
Jerilderie (SWP)	September 1995	Locally frequent	-
Hynes Lane, W of Jerilderie (SWP)	September 1995	Abundant	-
Willandra National Park (SWP)	October 1993	Two plants seen in 0.2 ha sample plot	2
Jerilderie Airfield (SWP)	September 1993	Frequent	-
Urana TSR, Innes Bridge (SWP)	September 1993	Common	-
Jerilderie (SWP)	September 1993	Occasional	-
NE of Jerilderie (SWP)	September 1993	Common	-
Conargo Rd TSR, W of Jerilderie (SWP)	September 1993	In large numbers over a large area	-
Urana-Jerilderie Rd (SWP)	September 1991	At least 1000 plants	1000+
Elliot Lane, Jerilderie (SWP)	September 1991	Scattered, count possibly higher, area 1.1 ha	-
Hay Plain SW of Hay (SWP)	September 1990	Locally occasional	-
Coree on Conargo-Jerilderie Rd (SWP)	September 1990	Locally occasional	-
Highway near Lockhart (SWP)	September 1985	30 plants estimated on either side of road	30
Myalla, NW of Hillston (SWP)	August 1985	Widespread but not common	-

Jerilderie-Urana Rd (SWP)	October 1984	Localised population of about 30 plants	30
CSIRO Field Stn, Deniliquin (SWP)	November 1973	Common	-
Hay (SWP)	October 1956	Only in one location	-

Threats:

Major threats to *Swainsona murrayana* populations include loss of grassland habitat to cultivation and pasture improvement, in particular rice farming, application of fertiliser and pesticides and the use of large quantities of water. Ploughing of paddocks also provides an environment suitable for the invasion of exotic species. Heavy grazing in the flowering and fruiting season may influence the soil seed bank and hence the future abundance of plants in populations. Increased salinisation, frequent fire, rabbit grazing and urban expansion are other possible threats. While information suggests that the species is not as uncommon as previously thought, a main concern is security of tenure for the many populations that are found on travelling stock routes and roadside reserves which could be subject to clearing or altered management. Climate change is also likely to have reduced populations in the Riverina with the recent drought conditions, as the species needs rain to flower and set seed (expert advice). 'Clearing of native vegetation', 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition', 'Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus*' and 'Anthropogenic Climate Change' are listed as Key Threatening Processes under the TSC Act in NSW.

Extreme fluctuations:

Cool-season perennials such as *Swainsona murrayana* produce winter-spring growth and die back after flowering, re-shooting readily after seasonal rains and often carpeting the landscape. As a result, population numbers and abundances may appear to be extremely unstable from year to year. Populations may also persist unseen during adverse conditions as soil-stored seed, requiring cool-season rains or a fire event to release dormancy. Any variation in counts within single populations over the years may simply reflect this seasonal variability, flowering frequency or other environmental cycles. Given that dormant and non-flowering plants are relatively difficult to detect, it is likely that populations are reasonably stable.

Population reduction and continuing declines:

There is currently no hard evidence of population decline in *Swainsona murrayana* across its range of distribution, with many new and some substantial populations documented in recent years (Table 1). It is likely that some populations have been reduced in areas that have been cleared or overgrazed, but there are no data available to substantiate this. Climate change may also have reduced populations within the past 10 years of drought, as the conditions necessary for flowering and germination have not been met in many parts of NSW particularly in the central west and Riverina. Given the number of potential threats to the species however, it is reasonable to infer a projected decline in the future unless vulnerable sites are protected, particularly those on stock routes, road reserves and other areas subject to clearing and disturbance.

Extent of Occurrence (EOO) & Area of Occupancy (AOO):

National EOO for *Swainsona murrayana* is calculated at almost 1 200 000 km^2, incorporating the disjunct records from South Australia and Queensland (Figures 1 and 3). EOO of the species in NSW covers an area of about 520 000 km^2 (based on a geographic range of 980 km from the Victorian border to northern-most NSW localities, and a longitudinal distribution of 530 km along the Victorian border (Figures 2 and 3). It is difficult to quantify the AOO of *Swainsona murrayana* given the seasonal nature of the species. Large fluctuations in population size and area of occupancy are natural responses of the species to variable seasonal conditions. It is reasonable to assume the potential AOO is relatively large, in the order of hundreds of km^2 given the extensive habitat areas. Using a minimum coverage of 4 km^2 or 400 ha per population (the spatial scale of assessment recommended by IUCN 2008) results in an AOO of 240 km^2 for the estimated 60 populations. This figure is likely to be conservative, considering the large areas of potential habitat and probability of more populations. An upper bound estimate may be as high as 500 km^2 if these factors are considered.

Severe fragmentation:

Given that large areas of the grassland habitats occupied by *Swainsona murrayana* in the southern Riverina and on the western slopes have been cleared for agriculture or degraded with continuing grazing pressures, it is reasonable to assume that populations have been fragmented to some degree. However as a seasonally opportunistic species, populations can be widespread and common under favourable conditions, even in disturbed areas or small remnant habitats surrounded by cleared areas. The numerous records in its core area of distribution are relatively continuous, suggesting some level of habitat stability. There is currently insufficient evidence to infer that populations of *Swainsona murrayana* have undergone severe fragmentation and genetic isolation. Phylogenetic studies would be useful to get a better understanding of the genetic integrity and diversity of existing populations and the extent of genetic interaction.

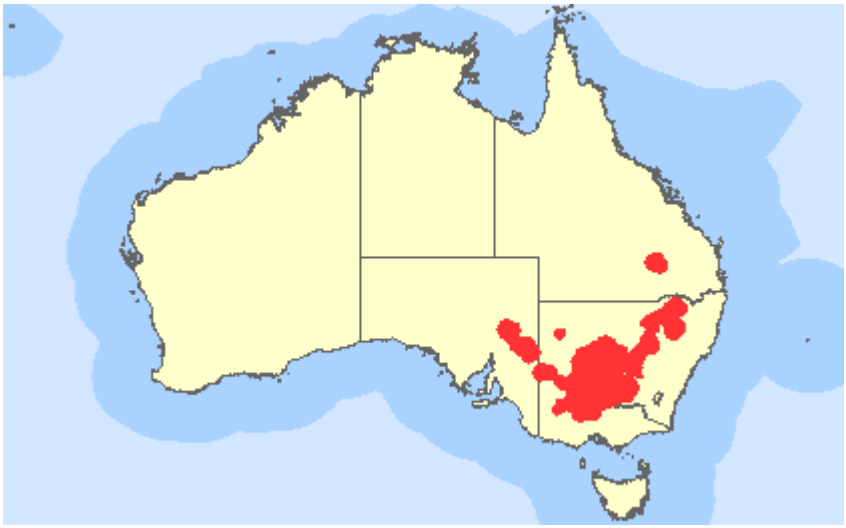

Figure 1. National distribution of *Swainsona murrayana* showing site clusters and extent of occurrence (Department of the Environment, Water, Heritage and the Arts 2008).

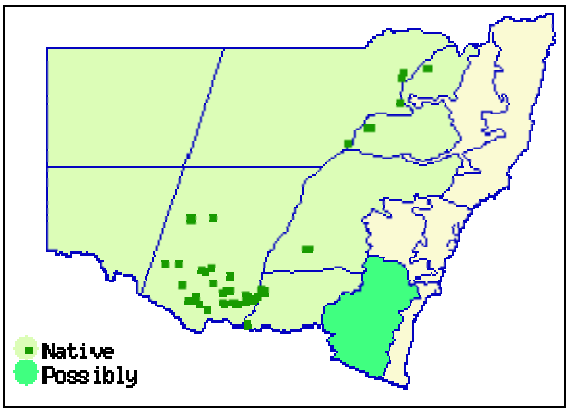

Figure 2. Distribution of *Swainsona murrayana* in New South Wales, showing locations of known records (PlantNET NSW 2008).

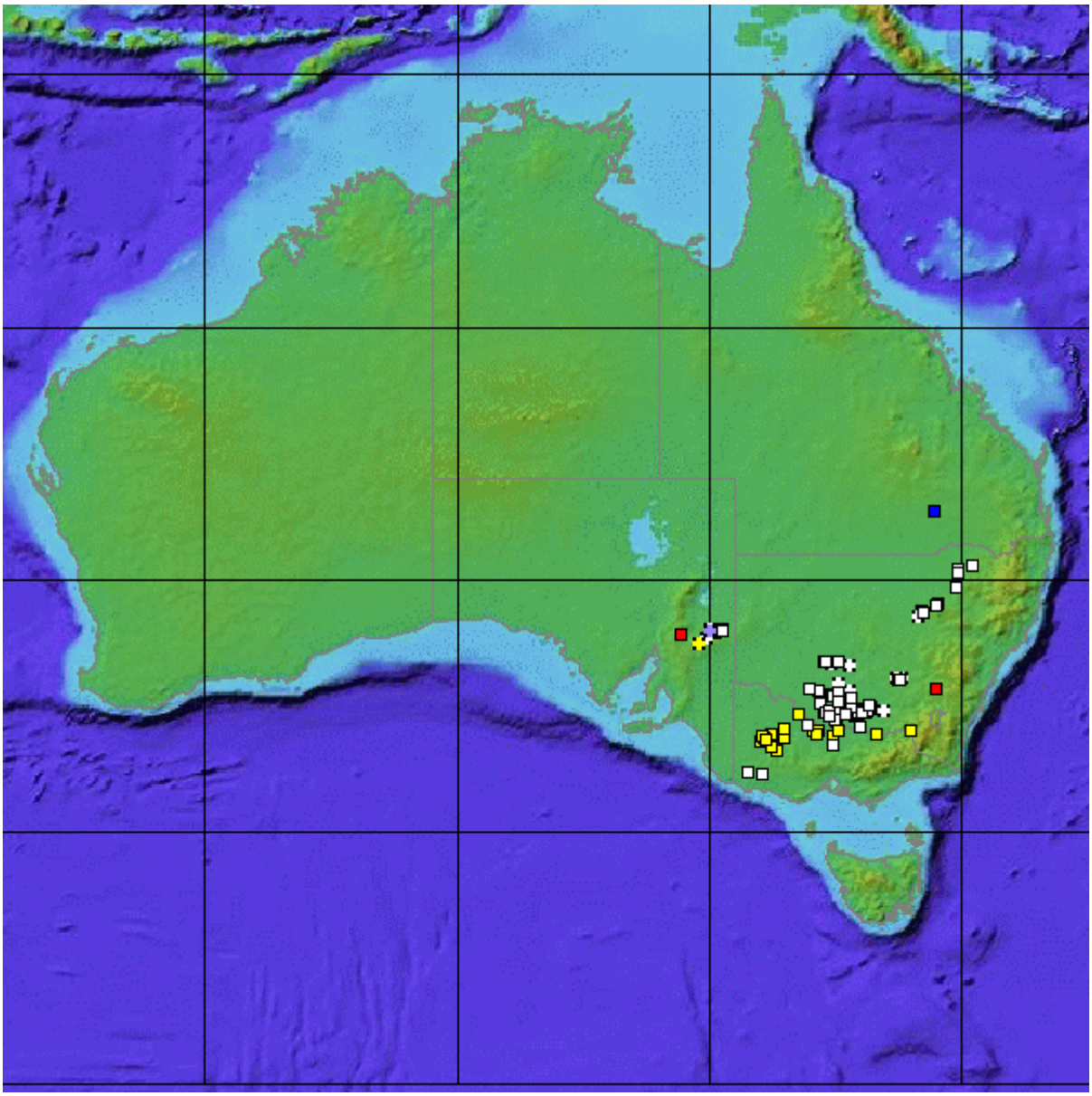

Figure 3. National distribution of *Swainsona murrayana* based on 131 mapped records from various herbaria (Australia's Virtual Herbarium 2008).

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Explanatory note

Between 2007 and 2009 the NSW Scientific Committee undertook a systematic review of the conservation status of a selection of plant and animal species listed under the Threatened Species Conservation Act. This species summary report provides a review of the information gathered on this species at the time the Review was undertaken.

The Scientific Committee's report on the Review of Schedules project and final determinations relating to species that were either delisted or had a change in conservation status can be found on the following website: www.environment.nsw.gov.au .

The Committee gratefully acknowledges the past and present Committee members and project officers who ably assisted the Committee in undertaking the Review of Schedules Project. Information on the people involved in the project can be found in the Acknowledgement section of the project report entitled "Review of the Schedules of the Threatened Species Conservation Act 1995. A summary report on the review of selected species" which is available on the abovementioned website.

This species summary report may be cited as:

NSW Scientific Committee (2008) *Swainsona murrayana* Review of current information in NSW. June 2008. Unpublished report arising from the Review of the Schedules of the Threatened Species Conservation Act 1995. NSW Scientific Committee, Hurstville.