

Action Statement

Flora and Fauna Guarantee Act 1988

No. 252

Winged Peppercross *Lepidium monoplocoides*

This revised Action Statement is based on the Recovery Plan prepared for this species by DSE under contract to the Commonwealth Department of the Environment, Water, Heritage and the Arts.

Description

The Winged Peppercross (*Lepidium monoplocoides*) is an annual herb with erect stems, to 20 cm tall. Leaves are narrowly linear, pinnately lobed or entire, 5 - 10 cm long and 1 - 2 mm wide and are arranged along and at the base of stems. Flowers and fruit are observed in the spring and summer. The inflorescence is an elongating raceme with tiny green-brown flowers; 2 mm wide, with sepals 1 mm long and petals inconspicuous to absent. Fruits are broadly ovate to circular, 5 mm long and 4 mm wide, and borne on flattened pedicels to 3 mm long. The apex of the fruit is pointed with a small notch and two smooth wings that are divided into halves that surround the entire fruiting body.

Distribution

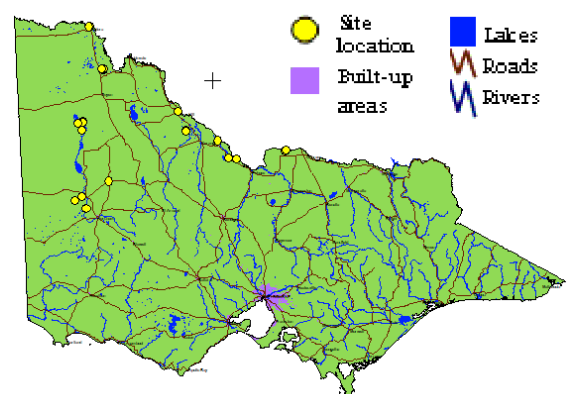
The Winged Peppercross is widely distributed on the inland plains of south-eastern Australia, occurring from northern New South Wales to western Victoria, with an old record from south-eastern South Australia. The species occurs in the Murray Darling Depression, Riverina, Darling Riverine Plains and Cobar Peneplain Bioregions (*sensu* DEH 2000).

The Winged Peppercross has apparently suffered a widespread decline in both range and abundance since European settlement. The species was once widely distributed and probably reasonably abundant on floodplains across the inland plains of the Murray-Darling Basin regions of Victoria, New South Wales and South Australia.

It once occurred from the Darling River in north central NSW around Bourke, through the NSW Riverina near Griffith, Balnarald and Deniliquin,



Winged Peppercross (*Lepidium monoplocoides*)
(Photo: Dale Tonkinson)



Distribution of Winged Peppercross in
Victoria (DSE 2004)

A Victorian
Government
Project



along the Murray River from Mildura to Gunbower State Forest on NSW/Victorian border and as far south as the Wimmera in western Victoria (Scarlet 2000).

Currently, the Winged Peppergrass is known from seven locations in Victoria: a small stand in the Hattah-Kulkyne National Park, between Lake Hattah and Lake Bulla; two stands on the Murray River floodplain in Barmah State Park and near Reedy Lagoon in the Gunbower Reserve; in the Stony Plain Bushland Reserve, 20 km east of Sealake; two populations in Wyperfeld National Park; and in the West Wail Flora and Fauna Reserve, north-west of Horsham.

The Winged Peppergrass was recorded at two sites near Mildura in 1923, at a site east of Robinvale in 1853 and at Swan Hill along the Murray River in 1890. None of these populations have been located since and it is highly likely the species no longer exists at these sites. The species was also recorded at a small number of sites in Little Desert National Park in the 1890's and again as recently as 1987, however it has not been recorded in the Little Desert National Park since. A thorough search of suitable habitat is required in order to ascertain if populations of the species are still present in Little Desert National Park. The species was recorded on a leased property in Mystic State Park in 1981, although a search in 1984 could not relocate the plants and no record of this species has since been made.

In New South Wales, the Winged Peppergrass is found over a wide geographic area encompassing the Darling Riverine Plains, the Riverina Bioregions and the Cobar Peneplain (Thackaway 1995), where it is currently known from 7 populations.

Abundance

It is estimated there are 50 000 – 60 000 plants remaining in approximately seven wild populations in Victoria.

Important populations

Populations important to the long term survival and recovery of the Winged Peppergrass occur in the following locations:

National Parks

Hattah-Kulkyne National Park

- The population is located between Lake Hattah and Lake Bulla.
- The site was monitored in 1985 (Browne), 1989 (Tonkinson), 1991 (Allen) and 1995/1996 (Smith & Allen and Allen) and recorded in the VROTPop (database for Victorian Rare and Threatened Species) monitoring in Victoria. In 1991, the population size was estimated at

approximately 1037 individuals over an area of approximately 920 m².

- The site was monitored in 2003 and the number of individual plants was estimated at approximately 100 - 150. This indicates an obvious decline in population size.

Wyperfeld National Park

- Two stands were monitored in 1983 (Cheal) recorded in the VROTPop monitoring database in Victoria. 50 plants were estimated at one site (near Meridian Gate) and 175 individual plants were estimated approximately 1 km NNW of the first site. A third site, recorded in 1981, could not be relocated in 1983.
- In 2003, Parks Victoria and several Field Naturalists searched the area where the two stands were known to occur, however neither stands was relocated. In 1996, the block containing the two stands was fenced from domestic stock, however anecdotal evidence suggested the population may be under continued threat from rabbit and kangaroo grazing due to the supposed high palatability of the species. As a result, it is uncertain if the population still persists.
- The two sites should be monitored in the future, as evidence suggests that populations may fluctuate depending on seasonal conditions.

Other Reserves

Gunbower Island Reserve (State forest)

- Monitoring of the site in 1984 found an estimated 750 individuals. The stand covered an area approximately 115 X 115 m.
- J. Mavromihalis and M. Thorson surveyed the site in February 2004 and 750 - 1800 individuals were estimated. The stand covered an area approximately 600 m².
- Monitoring of the population in 2005/06 estimated the population at approximately 50 000 individuals.
- Monitoring of the population in January 2007 failed to locate any evidence of plants across the whole site. This may be attributed to the very dry conditions observed at the time of survey.

Barmah State Park

- The site was discovered in 2001 (Parsons) and approximately 45 individuals were counted. The stand covered an area 9 X 9 m.

Snape Reserve (Trust for Nature)

- The Winged Peppergrass is known at several sites within Snape Reserve. In 2008/09,

massive germination was observed after good rainfall. Over 10 000 seedlings were estimated on one lake bed and over 50 recorded on another. Monitoring will determine the ongoing status of this population.

Stony Plain Bushland Reserve.

- Approximately 15 plants were located in an 8 m X 10 m area in October 2003 (Tonkinson).

West Wail Flora and Fauna Reserve.

- The site was monitored in 1984 (Scarlett) and recorded in the VROTPOP monitoring data in Victoria. Approximately 35 individual plants were estimated at the site. The site was again monitored in 1993 (McGuckin) and 500+ plants were estimated at the site.
- No plants were observed during site surveys in December 2003. The site was thoroughly searched a week later by the Parks Victoria Ranger and several summer crew employees; again no plants were located. The Winged Peppergrass has not been observed at this site since 2005; but due to the reasonably high number of plants observed in the previous decade and the fact the reserve is protected from threats such as stock grazing, there is a high probability that the species may still exist at the site. The species may have died down to its rootstock or could be present in the form of a seed bank (viable seeds in the soil) following several years of recent drought.

Habitat

The temporal and spatial components circumscribing the habitat of The Winged Peppergrass are poorly understood; therefore all habitat currently occupied by the species is considered important. To address this issue, recovery actions include surveys for critical, common and potential habitat, which will lead to the identification of habitat essential to the survival of the species.

A current lack of information regarding critical habitat characteristics is likely a result of several factors, including the completion of few botanical surveys of inland south-eastern Australia and the under-collection of the species due to its inconspicuous nature (except when seeding) and apparent ephemeral habit. The species also appears to be somewhat of an opportunistic species occupying temporally suitable habitat.

Critical habitat for the Winged Peppergrass is likely to be determined by a combination of edaphic (soil), climatic and disturbance elements. The species' habitat profile has been compiled from anecdotal and incidental sources and may not necessarily reflect the entire ecological amplitude of the species. Winged Peppergrass

populations are generally found in areas with an average rainfall range of 200 - 450 mm per year. It is often found on heavy clay and clay loam soils, with some sites prone to water-logging. In the past, the species is likely to have occupied extensive areas across the inland plains draining the Murray-Darling Basin in SA, NSW and Victoria.

The Winged Peppergrass is found in a number of vegetation formations supported by fine textured soils across arid and semi-arid areas of south-eastern Australia. Communities in which the species occurs include grasslands, wetlands, floodplain woodlands dominated by *Eucalyptus coolabah* and *E. largiflorens* and chenopod shrublands dominated by *Atriplex*, *Maireana* and/or *Nitraria* species. It has also been recorded from samphire communities dominated by *Halosarcia* spp. and temperate woodlands with *E. microcarpa* and *Allocasuarinia luehmannii* on the southern margins of its range. The Winged Peppergrass occurs in association with a wide range of herbs and grasses, including *Austrodanthonia* and *Austrostipa* species, *Rumex brownii*, *Spergularia rubra s.l.*, and occasionally species that are dependent upon open water, such as *Marsilea* sp. The Winged Peppergrass is often found in open, sparsely vegetated sites, on extremely dry and eroded clay scolds or heavy clay or loam soils. This suggests that the species may not survive or flourish when subject to competition from other plant species.

Although Winged Peppergrass is regarded as an annual, it has been documented as behaving like a short-lived perennial, particularly during extended wet periods (Scarlett 2000, Tonkinson 2003, pers. comm.). Anecdotal evidence suggests that populations may fluctuate in response to local climate variables, making it difficult to obtain an accurate total population size for the species.

Life history and ecology

Little is known of the biology of the Winged Peppergrass. Further research should be completed in order to gain a greater understanding of the biological and ecological characteristics of the species.

Although conditions required for recruitment or rates of seed production are unknown, it is suggested that like many annual species located in semi-arid and arid environments, a proportion of seed produced in any one year by Winged Peppergrass individuals remains dormant in the soil. This ensures an adequate store of seed is available at the end of prolonged dry periods, during which individual plants may have either failed to emerge or emerged for only a short time, allowing little or no seed production for the year.

Reproduction appears to occur in the first year of germination; ongoing research at Snape Reserve will provide more knowledge of the age and condition of reproductive plants. Grazing may threaten the species by reducing the amount of seed produced by individuals through defoliation, prior to critical periods of flowering and seed production.

Wide-scale clearing of the species' habitat (shrublands, grasslands woodland) in semi-arid and arid regions is a major threatening process. Large areas have been cleared for agriculture, leading to the fragmented distribution of a small number of known existing populations in National Parks, reserves and roadsides.

No information exists regarding flooding regimes required to maintain the species habitat or perhaps assist or facilitate germination. Changes to hydrological cycles (mostly through increased irrigation) may have disrupted such a balance. Further research is required to fully examine this process and its consequences.

Conservation status

Lepidium monoplocoides is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Lepidium monoplocoides is listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988* and endangered under the New South Wales *Threatened Species Conservation Act 1995*.

Lepidium monoplocoides is considered endangered in the Department of Sustainability and Environment's *Advisory List of Rare or Threatened Vascular Plants in Victoria - 2005* (DSE 2005).

Potentially threatening processes

The processes listed below are considered to have the potential to threaten Winged Peppergrass populations or habitat. They may or may not be listed as potentially threatening processes under the *Flora and Fauna Guarantee Act 1988*. An indication of the degree of threat is also provided.

Altered Hydrology

Potentially High - The regulation of rivers and the modification to drainage patterns has altered the flooding regime (flooding seasonality, depth, duration etc) on the floodplains of south eastern Australia. This may have resulted in the degradation of habitat. Long-term drought conditions and the implications of climate change could further exacerbate this threat.

Weed invasion

High - Many environmental weeds persist at the majority of sites and may occupy part of or the entire niche of The Winged Peppergrass. Of

particular note are annual exotic grass species in the genera *Vulpia*, *Bromus*, *Lolium* and *Avena*. Other herbs include *Salvia verbenaca*, *Carrichtera annua* and *Echium* species. Weed invasion is associated with causal factors such as modified flooding and stock grazing.

Grazing / trampling

High - the Winged Peppergrass is highly palatable and is subsequently very susceptible to grazing. It appears that particular grazing regimes may be detrimental, as most extant sites for the species are not subject to set stocking (continuous grazing). Set stocking on travelling stock routes (TSR) is considered a major threat. High densities of kangaroos also pose a threat. Additionally, the return of the rabbit to pre-*Calici* virus levels is considered a high risk. The impact of wild pigs is not yet known, however may be a threat.

Physical damage to individuals

Medium - At several sites individuals are located adjacent to or near a track and are at risk of direct physical damage by vehicles or persons walking, camping etc.

Road works are considered a threat to roadside populations, through the removal or damage to vegetation and/or indirect effects such as weed invasion and soil erosion.

Inappropriate biomass reduction & habitat loss

High - While Native Vegetation Retention controls in Victoria have eliminated wide-scale clearing of land for cropping and pasture, the direct or indirect loss of individuals and/or habitat through small scale land clearance, grazing by stock and pest animals, human activities and changes to hydrological cycles remains a threat. Inappropriate biomass reduction and loss of habitat is considered a major threat to the future survival of the species, possibly increasing in risk as salinity levels result in greater land degradation.

Elevated saline groundwater

High - Several populations are in physiographic low points in the Murray Darling Basin and may be subject to the impacts of elevated levels of saline groundwater. An increase in salinity and saline affected areas is considered a high risk to this species, and many others, in the future.

Previous Management Action

General Management Actions

A Recovery Team was established in 2008 for the Wimmera region, encompassing management of the Winged Peppergrass as well as other EPBC listed species in that part of the State. The Recovery Team has representation from the Royal Botanic Gardens, Wimmera Catchment Authority,

Trust for Nature and DSE and will importantly facilitate coordination of management actions, implement legislation and policies and maintain communication and knowledge exchange for Winged Pepperpress conservation.

Multiple collection of high quality Winged Pepperpress seeds was undertaken between 2005 and 2009 at a number of sites as part of the Millennium Seedbank Project (RBG), an initiative that aims to conserve and research rare and useful plant species. Samples of the reproductive material gathered were used in germination and establishment and growth trials in the field and in nursery conditions. Results showed high viability rates.

Ongoing quadrats were initiated in 2008/09 to allow more comprehensive survey of potential Winged Pepperpress populations or habitat in the Horsham area.

Fencing construction and maintenance works

Rabbit exclusion fences were repaired at sites at Reedy Lagoon (Gunbower) and Snape Reserve. Three enclosures were constructed in 2008 at Snape Reserve to protect a large number (approximately 7000 - 8000) of plants.

Specific management actions

Snape Reserve (managed by Trust for Nature)

Experimental trials have begun at Snape Reserve to better understand the species and characteristics of its preferred habitat. Surveys will continue in 2009/10 to enable further investigation.

Barmah State Park (managed by Parks Victoria)

- Reserved as State Park
- Fire protection
- VROTPop monitoring

- *Barmah Management Plan: Barmah State Park, Barmah State Forest* produced
- Stock grazing is managed on an agistment basis, with both a summer and winter quota system

Gunbower Island Reserve (within State forest managed by DSE)

- Reservation status
- Cattle is actively excluded from the reserve through ongoing maintenance of cattle grids and fencing
- Fire protection
- Rabbit and kangaroo control when required
- VROTPop monitoring; surveillance monitoring of populations conducted in 2004/05 and 2006/07.
- Control of weeds including Horehound (*Marrubium vulgare*) in the Reserve
- *Mid-Murray Forest Management Plan* produced

Hattah-Kulkyne NP (managed by Parks Victoria)

- Reserved as a National Park
- Part of population fenced in 1986
- Kangaroo and rabbit control
- Fire protection by Parks Victoria/DSE
- Monitored as part of the Mallee Mandatory Monitoring Project
- VROTPop monitoring
- Prescription of management guidelines in 1977 and review of these in 1989 (i.e. LCC reviews)
- *Mallee Parks Management Plan* produced

Conservation Objectives and Intended Management Actions

The intended management actions listed below are further elaborated in DSE's Actions for Biodiversity Conservation (ABC) system. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities.

Long term objective

To ensure that the Winged Pepperpress can survive, flourish and retain its potential for evolutionary development in the wild.

Specific Objectives and Actions

Objective I To improve knowledge of biology, ecology and management requirements

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
1. Acquire baseline population data. Acquire baseline population data by conducting detailed field and electronic/archive surveys including (a) identification of the area and extent of populations; (b) estimates of the number, size and structure of populations and (c) inference or estimation of population change.	<ul style="list-style-type: none"> ▪ The location of previously recorded populations in Wyperfeld NP, West Wail Flora and Fauna Reserve (FFR) & Barmah revisited to confirm the presence or absence of Winged Pepperpress. ▪ Baseline data is collected. ▪ Conservation status is reassessed. ▪ Populations are accurately mapped. 	DSE Parks Victoria
2. Assess habitat characteristics and/or condition. Accurately survey known habitat and collect floristic and environmental information relevant to community ecology and condition.	<ul style="list-style-type: none"> ▪ Habitat data is collected and analysed. ▪ Important habitat is mapped. 	DSE Parks Victoria
3. Conduct survey to identify and search suitable habitat. Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference.	<ul style="list-style-type: none"> ▪ A predictive model for potential habitat is developed and tested. ▪ Potential habitat is searched. 	DSE Parks Victoria
4. Undertake research to identify key biological functions. Continue tests of seed viability and treatments to stimulate seed germination. Evaluate reproductive status.	<ul style="list-style-type: none"> ▪ Critical life history stages are identified. ▪ Recruitment and dispersal are investigated at known sites. ▪ Seed bank/regenerative potential is quantified for each target population. ▪ Age at reproductive maturity is determined. ▪ Stimuli for recruitment/regeneration are identified. ▪ Seed viability is tested at all important populations. ▪ Germination treatments are identified. 	DSE Royal Botanic Gardens
5. Undertake detailed population monitoring and collect demographic information.	<ul style="list-style-type: none"> ▪ Techniques for monitoring are developed and established. ▪ Census data for target populations are collected. 	DSE Parks Victoria
6. Analyse population trends. Collate, analyse and report on census data and compare with management histories.	<ul style="list-style-type: none"> ▪ Population growth rates are determined and Population Viability Analysis completed for target populations. 	DSE

Objective II To secure populations or habitat from potentially incompatible land use or catastrophic loss.

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
7. Incorporate actions in relevant park or reserve management plan.	<ul style="list-style-type: none"> ▪ Park management plans identify species and provide for its protection and active management. 	Parks Victoria
8. Develop management prescriptions	<ul style="list-style-type: none"> ▪ Forest management plan identifies species and provides for its protection and active 	DSE

and/or zoning for State forest.	management.	
9. Collect and store reproductive material as a safeguard against catastrophic loss.	<ul style="list-style-type: none"> Reproductive material is securely stored. 	Royal Botanic Gardens

Objective III To improve the extent and/or condition of habitat

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
10. Identify disturbance regimes to maintain habitat.	<ul style="list-style-type: none"> Management strategies to maintain, enhance or restore habitat are identified. The importance of flooding regimes in maintaining suitable habitat and/or the perpetuation of the species is assessed, particularly in Gunbower Island State Forest and Hattah Kulkyne N.P. 	DSE Parks Victoria
11. Manage environmental weeds.	<ul style="list-style-type: none"> <i>Marrubium vulgare</i> (Horehound) is controlled near the Gunbower Island Reserve population. Measurable reduction in the cover/abundance of weeds at roadside populations and at significant populations is achieved. 	DSE Parks Victoria
12. Manage impact of browsing animals.	<ul style="list-style-type: none"> Adequate fencing is constructed or maintained around Hattah Kulkyne N.P. population. The Winged Peppergrass population in Barmah State Park is fenced. Grazing regimes in the Park are examined and a grazing management plan devised if required. Measurable increase in seedling recruitment/vegetative regeneration is achieved at Barmah State Park. Rabbit and/or kangaroo control programs are implemented when required, notably at Hattah Kulkyne NP, Wyperfeld NP and West Wail FFR. 	DSE Parks Victoria
13. Manage human disturbance.	<ul style="list-style-type: none"> The impact of human activities in the vicinity of populations is monitored. Measures such as fencing off access are taken where necessary to mitigate human disturbance; monitoring indicates that such mitigation measures are effective. 	DSE Parks Victoria

Objective IV To increase community awareness and support

<i>Action</i>	<i>Targets</i>	<i>Responsible</i>
14. Involve community groups and volunteers in recovery activities.	<ul style="list-style-type: none"> Opportunities for community involvement are identified, promoted and supported. 	DSE Parks Victoria

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This Action Statement has been prepared under section 19 of the Flora and Fauna Guarantee Act 1988 under delegation from Mr Peter Harris, Secretary, Department of Sustainability and Environment, July 2009.

Published by the Victorian Government Department of Sustainability and Environment

Melbourne, July 2009

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ISSN 1448-9902

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