National Recovery Plan for the Whipstick Westringia Westringia crassifolia

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Australian Government



Department of Sustainability ictoria and Environment Prepared by Geoff Nevill and Mary Camilleri (Department of Sustainability and Environment, Victoria).

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Summary

The Whipstick Westringia *Westringia crassifolia* is a small shrub that is endemic to Victoria. It is known from only two widely separated locations, in north central and western Victoria, comprising a total of 20 populations with about 640 plants. The species is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. Major threats include browsing by native and feral herbivores, inappropriate fire regimes, disturbance and small population size. This national Recovery Plan details the species' distribution and biology, conservation status, threats, and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

Whipstick Westringia *Westringia crassifolia* is an erect spindly shrub growing to 2 m high, with slender, longitudinally ribbed branchlets sparsely covered with short soft hairs. Leaves are dark green, 5–15 mm long and 1.5–2.5 mm wide, narrowly elliptic to slightly oblong and arranged in whorls of three. Leaf margins are entire, the leaf blades are sparsely to moderately hairy and rather thick, and the apex is obtuse with a slight callose point. The upper surface is concave and both surfaces are slightly rough from the presence of minute tubercules. The pink, blue to lavender flowers are borne freely towards the ends of the branches, in August and September. The cup-shaped calyx is about 5 mm long, has five equal teeth and is covered externally with minute greyish hairs, and the corolla is externally hairy and 12–14 mm long. The fruit is dry, splitting at maturity into four one-seeded nutlets, and enclosed by the persistent calyx.

The biology and ecology of Whipstick Westringia is poorly known. Lifespan may only be 10–15 years. Plants are killed by fire, although germination appears to be dependent upon or is enhanced by some disturbance. In the Little Desert, germination has been observed after fire, successive flooding and after soil disturbance by road grading (Diez *et al.* 1999). Some shading from neighbouring plants such as Broombush *Melaleuca uncinata* may also assist germination (O'Keefe 2003). Some seed appears to remain viable for several years (Diez *et al.* 1999) although the overall viability of seed may be quite low (O'Keefe 2003). The level of genetic variation within and between populations is unknown, and pollinators have not been identified.

Distribution

Whipstick Westringia is endemic to Victoria, where it is restricted to two locations, one near Bendigo in north-central Victoria, within the Victorian Midlands Bioregion (*sensu* DEH 2000), and the second in the western part of the Little Desert in western Victoria, in the Murray-Darling Depression Bioregion (*sensu* DEH 2000) (Fig. 1).



Figure 1. Current distribution of Whipstick Westringia

Maps showing the detailed distribution of Whipstick Westringia are available from the Department of Sustainability and Environment.

Habitat

The currently known populations are all found within Broom-bush Mallee Ecological Vegetation Class, an open scrub to low open forest that occurs on gentle rises with shallow, infertile, stony soils derived from Ordovician sediments. This community occupies areas adjacent to drainage lines or subject to seasonal inundation. North of Bendigo, Whipstick Westringia is found on gully flats, fringing lower slopes and in shallow gullies. Overstorey species include Red Ironbark *Eucalyptus tricarpa*, Yellow Gum *Eucalyptus leucoxylon*, Blue *Mallee Eucalyptus poybractea*, Bull Mallee *Eucalyptus behriana* and Green Mallee *Eucalyptus viridis*. Understorey species include Totem Poles *Melaleuca decussata*, Drooping Cassinia *Cassinia arcuata*, Gold-dust Wattle *Acacia acinacea*, and occasionally Broombush *Melaleuca uncinata*. In the Little Desert, the species occurs on seasonally inundated flats, and on a low buckshot gravel ridge. Overstorey species are mallee eucalypts including Green Mallee, Slender-leaved Mallee *Eucalyptus leptophylla* and Yellow Mallee *Eucalyptus incrassata*. The understorey species include Broombush, Violet Honey-myrtle *Melaleuca wilsonii*, Desert Hakea *Hakea muelleriana*, Mint-bush *Prostanthera aspalathoides* and Gold-dust Wattle. Recovery actions include mapping of habitat that is critical to survival of the Whipstick Westringia.

Population Information

A total of 20 populations of Whipstick Westringia are known, comprising about 640 plants. There are 17 wild populations, including two that have been supplemented with cultivated plants, and three reintroduced (planted) populations. All populations in north-central Victoria occur within the Greater Bendigo National Park, while in western Victoria all occur within the Little Desert National Park.

Population name	Status						
Greater Bendigo National Park (approx 260 plants)							
South of Merlots	wild						
Merlots Central	wild						
Hills Gully	wild						
Stand 2A	wild						
Stand 2B	wild						
Stand 2C	wild						
Stand 2D	wild						
Stand 2E	wild						
Stand 2F	wild						
Stand 2G	wild						
Stand 3	wild						
Stand 5 / Quarry	wild						
Kamarooka Stand 4	wild/planted						
Phillip's Gully	wild/planted						
Bessie Mavis Gully	planted						
Stand 2H	planted						
Wallace's Gully	planted						
Little Desert National Park (approx 380 plants)							
Broughton's Waterhole	wild						
Ridge Site	wild						
Chinaman's Flat	wild						

Table 1. Population information for Whipstick Westringia

Decline and Threats

The Whipstick Westringia has only been known from the two current but widely separated locations in Victoria, and there is no direct evidence of any substantial decline in range or abundance. However, substantial clearing and fragmentation of habitat has occurred around Bendigo, and between the two current locations. Much of the habitat within the Greater Bendigo National Park has a history of disturbance, from gold prospecting and timber collection. It is therefore reasonable to assume that the species was once probably more widespread and abundant, but has most likely declined due to habitat destruction and disturbance.

The two locations where Whipstick Westringia occurs are within national parks, and therefore secure from threats such as habitat clearing. However, excessive browsing, erosion/siltation, changed fire regimes, and potentially wildfire suppression measures, are current threats. There also appears to be insufficient regeneration from seed at most, if not all, sites to maintain populations. These threats are examined in more detail, as follows:

<u>Browsing</u>: Whipstick Westringia is highly palatable to herbivores, and browsing by native mammals including Eastern Grey Kangaroo *Macropeus giganteus*, Western Grey Kangaroo *Macropeus fuliginosus* and Swamp Wallaby *Wallabia bicolor*, and introduced mammals including Brown Hare *Lepus capaensis*, European Rabbit *Oryctolagus cuniculus* and feral Goat *Capra hircus* is an on-going threat. Excessive levels of browsing by Swamp Wallaby on the Bendigo populations has had a severe impact on vigor and reproductive capacity, resulting in plants that are stunted and bear few, if any, flowers. Prior to 2000, the Bendigo populations had declined to the point where it is believed that the soil seed bank contained little or no seed (in Diez *et al.* 1999). Five populations are now fenced, but all unprotected sites still suffer browsing pressure. Many of the Little Desert populations were also reported to be heavily browsed (O'Keefe 2003).

<u>Inappropriate fire regimes</u>: Little is known regarding the response of Whipstick Westringia to fire, although fire seems to generally kill plants. However, fire may also be an important stimulus for seed germination, so periodic fires may be required to stimulate regeneration of populations, though removing senescent or dead plants and temporarily reducing competition from surrounding vegetation. Where seedling regeneration has been observed in the Bendigo populations, it has been on bare ground or amongst dead vegetation, indicating that reduced competition may be an important factor in recruitment. However, too frequent fires may deplete the soil seed bank, and kill young plants before they have flowered and set seed, potentially eliminating populations (Davies1992). Likewise, the complete absence of fire may also lead to population decline and eventual extinction, as plants age and die, and are not replaced because of little or no seedling establishment. There is also a potential risk to all populations posed by wildfire suppression activities.

<u>Erosion/siltation</u>: Many populations within the Greater Bendigo National Park occur in gullies that are actively eroding, or near roads/tracks where erosion and siltation continue to degrade the sites and threaten the future viability of these populations.

<u>Disturbance/vehicle movement</u>: Several of the Bendigo populations grow close to roads and tracks, and could potentially be at risk from road maintenance, and visitor impacts such as prospecting activities and illegal off-road driving. There has been at least one recent instance of a vehicle being driven off-track and through a population of Whipstick Westringia. One of the Little Desert populations (Ridge Site) is on the edge of a main road and may be at risk from road-widening or maintenance activities. The plants are also quite visible when flowering, increasing the risk of illegal collection (McGuckin 1994).

<u>Restricted distribution/small population size</u>: Most populations of Whipstick Westringia are small (<50 plants), and being restricted to just two localities, are at risk from a range of stochastic events. The level of genetic variation within and between populations is not known, but may be reducing through isolation and reduced regeneration of populations.

Recovery Information

Existing Conservation Measures

A number of initiatives are already in place to conserve the Whipstick Westringia, as a result of actions implemented under the previous Recovery Plan, and other efforts. These include:

- Five populations within Greater Bendigo NP have been fenced to prevent browsing.
- Three new populations established within Greater Bendigo National Park through reintroduction of cultivated plants, and two very small wild populations there supplemented by addition of cultivated plants.
- Remedial works carried out in Greater Bendigo NP to prevent siltation from road run-off affecting populations.
- Most populations are regularly monitored.
- Locations of all populations recorded in relevant fire protection plans.
- Investigation of ecology and conservation management.

Strategy for Recovery

The strategy for recovery of the Whipstick Westringia will focus on protection of existing populations, and understanding more about its biology and ecology to better target conservation management. Research into factors such as pollination, seed viability and germination, response to fire and flooding, soil pH preference, genetic variability, seed predation, and the relationships between Whipstick Westringia and associated flora is a high priority. Actions to be implemented under this plan include surveys that will identify areas of habitat critical to the long-term survival of the species. These surveys will target areas that may support potentially suitable habitat within the Greater Bendigo National Park, Little Desert National Park, and other areas where similar vegetation types occur. An aim is to increase the number of populations and plants, to achieve long-term viability. This will be achieved by further searches to locate new populations, and continuing reintroductions to establish additional populations.

Recovery Objectives

The **overall objective** of recovery is to minimise the probability of extinction of Whipstick Westringia in the wild and to increase the probability of important populations becoming self-sustaining in the long term.

Within the life span of this Recovery Plan, the **specific objectives** for recovery of Whipstick Westringia are to:

- Determine distribution, abundance and population structure
- Identify habitat requirements
- Ensure that all populations and their habitat are protected and managed appropriately
- Manage threats to populations
- Identify key biological functions
- Determine the growth rates and viability of populations
- Establish populations in cultivation
- Establish new populations in the wild
- Build community support for conservation

Program Implementation

This Recovery Plan guides recovery actions and will be managed by the Department of Sustainability and Environment. A Threatened Flora Recovery Team, consisting of scientists, land managers and field naturalists has been established to oversee threatened flora recovery

in Victoria in general. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist sub-committees on research, *in situ* management, community education and cultivation. Regional Recovery Teams will be responsible for preparing work plans and monitoring progress toward recovery.

Program Evaluation

The Recovery Team will be responsible for annual assessments of progress towards recovery. This Recovery Plan will be reviewed within five years of the date of its adoption under the EPBC Act.

Recovery Objectives, Actions and Performance Criteria

No.	Action		Performance Criteria							
Specific Objective 1: Determine distribution, abundance and population structure										
1.1	Determine the extent and abundance of existing populations.	٠	Surveys of all populations determine area occupied/number of							
	Responsibility: DSE		plants.							
1.2	Search for new populations, including locations of previously recorded populations and other potential locations with similar habitat type.	•	Searches planned and implemented at previously recorded locations in Victoria.							
	Responsibility: DSE									
1.3	Determine the genetic variability and structure of existing and new populations.	٠	Population structure and variability determined and information							
	Responsibility: DSE/RBG		used for conservation management.							
1.4	Map existing and new populations.	٠	Population maps prepared and used in conservation							
	Responsibility: DSE		management.							
Specific	c Objective 2: Identify habitat requirements									
2.1	Survey known habitat and collect floristic and environmental information describing community ecology and condition.	٠	Habitat critical for survival identified and defined.							
	Responsibility: DSE									
2.2	Identify and survey potential habitat, using ecological and bioclimatic information indicating habitat preference.	•	Predictive model for potential habitat developed and tested.							
	Responsibility: DSE									
2.3	Map areas of important and potentially suitable habitat.	•	Habitat critical for survival and potential habitat mapped.							
	Responsibility: DSE									
Specific Objective 3: Ensure that all populations and their habitat are protected and managed appropriately										
3.1	Incorporate protective actions in relevant park or reserve management plans (Greater Bendigo National Park, Little Desert National Park).	•	Actions to protect species incorporated in relevant management plans.							
	Responsibility: DSE/PV									

No.	Action	Performance Criteria				
Specifi	c Objective 4: Manage threats to populations					
4.1	Identify current and potential threats to the species and its habitat.	Prescriptions prepared for threat abatement.				
	Responsibility: DSE					
4.2	Install fences and barriers to manage vehicle and pedestrian access.	A measurable reduction in the impact of weeds on all sites.				
	Responsibility: DSE/PV					
4.3	Establish, upgrade and maintain fences to exclude native and feral herbivores.	Appropriate vegetation structure maintained and seedling				
	Responsibility: DSE/PV	recruitment/vegetative regeneration occurring at all sites.				
4.4	Protect populations and habitat from fire suppression activities.	Ecological burning regime developed and implemented.				
	Responsibility: DSE/PV					
4.5	Manage erosion and sedimentation to protect populations within Greater Bendigo National Park	Appropriate hydrology maintained at all sites.				
	Responsibility: DSE/PV					
Specifi	c Objective 5: Identify key biological functions					
5.1	Determine longevity, fecundity, recruitment levels and seed viability.	• Seed bank/regenerative potential quantified for each population.				
	Responsibility: DSE					
5.2	Determine seed germination requirements.	Stimuli for recruitment/regeneration identified.				
	Responsibility: RBG					
5.3	Investigate impacts of soil disturbance, fire and inundation on recruitment.	Management strategies identified to maintain, enhance or				
	Responsibility: DSE	restore processes fundamental to reproduction and survival.				
Specifi	c Objective 6: Determine the growth rates and viability of populations					
6.1	Develop population monitoring protocols.	Techniques for monitoring developed and implemented.				
	Responsibility: DSE					
6.2	Monitor population trends and responses against recovery actions.	 Annual census data collected, population growth rates 				
	Responsibility: DSE	determined and Population Viability Analysis completed.				
Specifi	c Objective 7: Establish populations in cultivation					
7.1	Maintain ex situ collections for display, research and to safeguard against loss.	At least 10 mature genetically distinct plants in cultivation.				
	Responsibility: RBG					
7.2	Collect and store reproductive material.	 Seed from all populations in long-term storage. 				
	Responsibility: RBG/DSE					

No.	Action	Performance Criteria				
Specifi	c Objective 8: Establish new populations in the wild					
8.1	Identify potential reintroduction sites.	Criteria for site suitability identified and 10 suitable sites				
	Responsibility: DSE	selected.				
8.2	Propagate plants for reintroduction, ensuring maximum possible genetic diversity.	• At least 200 healthy, genetically diverse plants in cultivation.				
	Responsibility: RBG					
8.3	Prepare reintroduction plan.	Preparation of reintroduction plan with agreement from all				
	Responsibility: DSE	stakeholders.				
8.4	Implement reintroduction plan.	Plants established at three new sites.				
	Responsibility: DSE					
8.5	Maintain and monitor reintroduced plants.	• Minimum 50% survival of reintroduced plants after two years.				
	Responsibility: DSE					
Specifi	c Objective 9: Build community support for conservation					
9.1	Identify opportunities for community involvement in the recovery plan.	Presentations to community nature conservation groups.				
	Responsibility: DSE					

Abbreviations: DSE – Department of Sustainability and Environment; PV – Parks Victoria; RBG – Royal Botanic Gardens, Melbourne

Affected interests

All populations of Whipstick Westringia (both wild and planted), are within the Greater Bendigo National Park and the Little Desert National Park, managed by Parks Victoria, who have been consulted and have approved the actions outlined in this plan.

Role and interests of indigenous people

Indigenous communities on whose traditional lands Whipstick Westringia occurs are being advised, through the relevant DSE Regional Indigenous Facilitator, of this Recovery Plan and invited to provide comments. Indigenous communities will be invited to be involved in the implementation of the Recovery Plan.

Benefits to other species / ecological communities

The Recovery Plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with Whipstick Westringia, particularly those species with similar life forms and/or flowering responses. The decline of Whipstick Westringia in this vegetation community may well be indicative of the fate of other palatable species under intensive grazing pressure from introduced and native herbivores. Addressing the grazing pressure in this vegetation community will have broader impacts on the conservation of other highly palatable species. Highlighting the importance of this vegetation community (Broombush Mallee EVC) may also serve to increase community awareness of the intrinsic value of the Little Desert National Park, and the mallee areas of the Greater Bendigo National Park. The Recovery Plan will also provide an important public education role as threatened flora have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation.

Social and economic impacts

The implementation of this Recovery Plan is unlikely to cause any significant adverse social and economic impacts. All populations occur within national parks where management for biodiversity conservation and management of threatened species is already a high priority.

Management Practices

On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, and inappropriate fire regimes. A range of strategies will be necessary to alleviate these threats including protective fencing, signage, weed control, and fire management.

Broadscale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers including private landholders. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The Recovery Plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of the mechanisms underlying recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between Whipstick Westringia and associated flora, and its response to environmental processes. Demographic censusing will be necessary to gather life history information and to monitor the success of particular management actions.

In addition to the above, *ex situ* conservation measures will be required and will include seed storage and plant cultivation. Cultivating *ex situ* populations will also aim to increase the amount of seed available for reintroduction to sites. Reintroduction of cultivated plants will be considered as there is a high chance of success where secure site(s) can be found.

Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

Management practices required for conservation of the Whipstick Westringia include:

- Control of pest plants and animals.
- Identification and protection of populations in instruments such as public land management plans.
- Investigation of the biology and ecology of the species to enable better targeted conservation management actions.
- Maintenance of ex-situ populations.
- Establishment of new populations at protected sites.

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Priority, Feasibility and Estimated Costs of Recovery Actions

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Distribution abundance									
1.1	Extent & abundance	1	100%	DSE	\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
1.2	Searches for new pops.	2	75%	DSE	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
1.3	Determine genetic variability	1	100%	RBG	\$5,000	\$5,000	\$0	\$0	\$0	\$10,000
1.4	Map populations	2	100%	DSE	\$0	\$1,000	\$0	\$1,000	\$1,000	\$3,000
2	Habitat requirements									
2.1	Survey known habitat	1	100%	DSE	\$3,000	\$3,000	\$0	\$0	\$0	\$6,000
2.2	Identify, survey potential habitat	2	75%	DSE	\$0	\$5,000	\$5,000	\$5,000	\$0	\$15,000
2.3	Map habitat	1	100%	DSE	\$0	\$0	\$2,000	\$2,000	\$2,000	\$6,000
3	Habitat protection									
3.1	Public land management plans	1	100%	DSE	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000
4	Threat management									
4.1	Identify current, potential threats	1	100%	DSE	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$7,500
4.2	Install, maintain barriers	1	100%	DSE/PV/LGA	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
4.3	Upgrade & maintain fences	1	100%	DSE/PV	\$3,000	\$3,000	\$2,000	\$2,000	\$2,000	\$12,000
4.4	Protect from fire suppression	2	50%	DSE	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$12,500
4.5	Manage erosion, siltation	1	50%	DSE	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
5	Biology & ecology									
5.1	Determine longevity, viability	2	75%	DSE	\$5,000	\$5,000	\$3,000	\$0	\$0	\$13,000
5.2	Determine seed germination	2	75%	RBG	\$3,000	\$3,000	\$0	\$0	\$0	\$6,000
5.3	Investigate disturbance impact	2	75%	DSE	\$0	\$0	\$10,000	\$10,000	\$5,000	\$25,000

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
6	Growth rates, pop. viability									
6.1	Develop monitoring protocols	1	100%	DSE	\$2,000	\$0	\$0	\$0	\$0	\$2,000
6.2	Monitor population trends	1	100%	DSE	\$3,000	\$3,000	\$6,000	\$6,000	\$8,000	\$26,000
7	Cultivation									
7.1	Maintain ex-situ populations	2	100%	RBG	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$20,000
7.2	Collect, store reprod. material	2	100%	DSE/RBG	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000
8	New populations									
8.1	Identify sites	2	75%	DSE	\$3,000	\$3,000	\$3,000	\$0	\$0	\$9,000
8.2	Propagate plants	2	100%	RBG	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
8.3	Prepare reintroduction plan	2	100%	DSE	\$0	\$0	\$3,000	\$0	\$0	\$3,000
8.4	Implement reintrod. plan	2	75%	DSE	\$0	\$0	\$1,000	\$2,000	\$2,000	\$5,000
8.5	Maintain, monitor reintrod. pops.	2	100%	DSE	\$0	\$0	\$2,000	\$2,000	\$5,000	\$9,000
9	Community support									
9.1	Community extension	1	100%	DSE	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$15,000
	TOTAL				\$59,000	\$63,000	\$64,000	\$57,000	\$52,000	\$295,000