

National Recovery Plan for the Lima Stringybark *Eucalyptus alligatrix* subspecies *limaensis*

Anna H. Murphy and Judy Downe



Australian Government

Prepared by Anna H. Murphy and Judy Downe (Department of Sustainability and Environment, Victoria).

Published by the Victorian Government Department of Sustainability and Environment (DSE) Melbourne, November 2006.

© State of Victoria Department of Sustainability and Environment 2006

This publication is copyright. No part may be reproduced by any process except in accordance with the provisions of the *Copyright Act* 1968.

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

ISBN 1 74152 185 8

This is a Recovery Plan prepared under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, with the assistance of funding provided by the Australian Government.

This Recovery Plan has been developed with the involvement and cooperation of a range of stakeholders, but individual stakeholders have not necessarily committed to undertaking specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence that may arise from you relying on any information in this publication.

An electronic version of this document is available on the DSE website www.dse.vic.gov.au

For more information contact the DSE Customer Service Centre 136 186

Citation: Murphy, A.H. and Downe, J. 2006. National Recovery Plan for the Lima Stringybark *Eucalyptus alligatrix* subspecies *limaensis*. Department of Sustainability and Environment, Melbourne.

Cover photograph: Lima Stringybark *Eucalyptus alligatrix* subspecies *limaensis*, by Janice Mentiplay-Smith. An iconic old Lima Stringybark in Swanpool, recently protected and rejuvenated through community, local and State Government efforts.

Table of Contents

Summary	3
Species Information	3
Description.....	3
Distribution.....	3
Populations Information.....	4
Habitat.....	4
Mapping of habitat critical to survival of the species.....	4
Threats	4
Recovery Information	5
Overall Objective.....	6
Program Implementation.....	6
Program Evaluation.....	6
Recovery Actions and Performance Criteria.....	7
Management Practices	10
Affected interests.....	10
Role and interests of indigenous people.....	10
Benefits to other species/ecological communities.....	11
Social and economic impacts.....	11
Acknowledgments	11
Bibliography	11
Priority, Feasibility and Estimated Costs of Recovery Actions	12

Figures

Figure 1. Distribution of the Lima Stringybark in Victoria.....	3
--	----------

Tables

Table 1. Major threats to Lima Stringybark.....	5
--	----------

Summary

The Lima Stringybark *Eucalyptus alligatrix* subspecies *limaensis* is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Threatened under the Victorian Government *Flora and Fauna Guarantee Act 1988*. The species is endemic to a small area near Swanpool in north-eastern Victoria, where fewer than 1500 plants occur in about 140 wild populations. Major threats to populations include weed invasion, grazing and lack of regeneration and road works. This national Recovery Plan for the Lima Stringybark details the species' distribution and biology, conservation status, threats, and recovery objectives and actions necessary to ensure its long-term survival.

Species Information

Description

The Lima Stringybark *Eucalyptus alligatrix* subspecies *limaensis* is a large tree growing up to 30m tall, with rough bark persisting to small branches. Leaves on mature trees (adult leaves) are lanceolate to falcate, shiny and green to olive in colour, and up to 12 cm in length, with petioles 9–25 mm long. Juvenile leaves are glaucous and orbicular to ovate. Epicormic growth is intermediate, with a broadly ovate leaf blade to 30 mm wide and 50 mm long, and a short petiole of 0.5–5 mm long. Buds are green, diamond-shaped and sessile. The inflorescence is 3–8 mm long, with flattened peduncles. Flowering occurs in April. The cone to bell-shaped fruit occurs in threes, is sessile and 4–5 mm wide and 3.5–5 mm long (description from Brooker & Slee 1995; Walsh & Entwisle 1996).

Distribution

The Lima Stringybark is endemic to Victoria, where it is confined to a small area near Lima and Swanpool, south of Benalla, in north-eastern Victoria, in the Victorian Midlands IBRA Bioregion (DEH 2000).

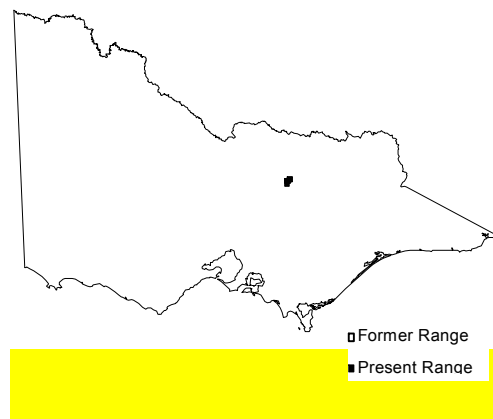


Figure 1. Distribution of the Lima Stringybark in Victoria

Maps showing the detailed distribution of the Lima Stringybark are available from the Department of Sustainability and Environment Flora Information System (DSE-FIS). The FIS is a state-wide repository for flora grid and site distribution data, photographs and text descriptions. This information is available on request in a variety of formats for natural resource management purposes. The Swanpool and District Land Protection Group have also mapped the distribution of the Lima Stringybark with greater accuracy using a Geographic Information System, and the data is held in the North East Region, DSE.

Populations Information

The Lima Stringybark now exists as numerous individual or small groups of trees, occurring mainly along roadsides in the Lima and Swanpool area. A total of about 1500 individuals occur in 138 populations, so individual populations are not listed due to this high level of fragmentation. Most populations occur in the following locations:

Roadsides (VicRoads)

Midland Hwy, Lima

Roadsides (Benalla Rural City)

Pearce Rd, Lima

Lima East Rd, Lima

Tulley Rd, Lima

Jensens Lane, Lima

Williams Rd, Lima South

Swanpool – Lima Rd, Lima

Swanpool Rd, Swanpool

Warnock Rd, Swanpool

Private Land

Lima, four populations

Swanpool, one population

Habitat

The Lima Stringybark occurs predominantly in the 'Valley Grassy Forest' Ecological Vegetation Class (EVC) on unconsolidated sediments of dark grey or brown gritty loam soils of the valleys of foothills, at about 220 m above sea level. Associated species include *Eucalyptus macrorrhyncha*, *Eucalyptus radiata*, *Eucalyptus polyanthemos*, *Eucalyptus melliodora*, *Eucalyptus goniocalyx*, *Acacia melanoxylon*, *Acacia mearnsii*, *Acacia dealbata* and *Acacia pravissima*. Valley Grassy Forest EVC is itself a highly threatened habitat. The Lima Stringybark also occurs in Herb-rich Foothill Forest, Montane Riparian Thicket, Floodplain Riparian Woodland and Swampy Riparian Woodland EVCs.

Mapping of habitat critical to survival of the species

Maps showing the distribution of the *Eucalyptus alligatrix* subsp. *limaensis* are available from the Flora Information System (FIS), curated by DSE, Heidelberg. The FIS is a statewide repository for flora grid and site distribution data, photographs and text descriptions and is updated regularly. Selected data are available on request in a variety of formats for biodiversity and conservation purposes. Recovery actions include mapping of habitat critical to the survival of the taxon.

Threats

The Lima Stringybark was undoubtedly much more common in the district, but has suffered a massive decline in abundance, and possibly some decline in range, due to almost total loss of habitat through extensive clearing, principally for agriculture. Land clearance of native vegetation is listed as a Key Threatening Process under the *Environment Protection and Biodiversity Conservation Act 1999*. Remaining populations are small (some consisting of just single trees) and highly fragmented, and are all facing substantial current threats. Almost all populations are subject to severe habitat degradation primarily indicated by the loss of understorey species and subsequent weed invasion. About 90% of the total population are old, mature trees, the remainder being immature trees, and there is very little natural regeneration occurring (Mentiplay-Smith 2005). Regenerative potential for the Lima Stringybark is more likely to increase if threats are controlled. However, most sites are significantly degraded to the extent that complete restoration of the vegetation community will be difficult. Management of

exotic grasses, particularly *Phalaris*, at many sites will be the biggest challenge. All populations occur on either private land or roadsides within the Benalla Rural City municipality. As such, threatening processes tend to be associated with agricultural activities, roadside maintenance or fragmentation and population shape and size. There are currently no populations in conservation reserves.

Current threats for private land sites include ring barking of trunks by stock, excessive accumulation of nutrients in the soil and soil compaction resulting in tree decline, and therefore potential loss, and lack of natural regeneration. Ringbarking by stock is the most serious of these threats. Threats occurring on both roadside and private land sites include weed invasion, soil degradation, excessive exposure to the elements, and the loss of understorey species. As a result, many trees exhibit signs of dieback and a general lack of recruitment. The key threatening processes facing the Lima Stringybark are:

Table 1. Major threats to Lima Stringybark

Threat	Comments
Ring-barking of trunks by stock	High – ring barking will kill trees if severe. Private land sites are commonly subjected to this threatening process
Soil degradation	High – soil degradation such as compaction and nutrient accumulation is also likely to lead to loss of habitat species (Prober <i>et al.</i> 2002). These threats may also compromise recruitment (Spooner & Lunt 2002). Soil degradation occurs mostly on private land, however it has also been found on public roadside sites.
Weed invasion	High – weed invasion will significantly reduce recruitment through competition, and is a threat on both public and private land.
Isolation / fragmentation	High – increased isolation and fragmentation is likely to reduce plant health for the taxon and associated species in the long term
Loss of associated species	High – loss of native habitat species is likely to lead to increased competition by weeds. It is also likely to lead to alterations in microclimatic factors as well as soil quality. These changes will impact upon the health of the Lima Stringybark. Loss of native associated vegetation occurs on both public and private land.
Slashing and removal of fallen timber	High – this activity directly prevents seedling establishment. Slashing occurs mostly on roadside sites. Removal of timber occurs at most sites and is a threat to the habitat value in general. Appropriate management needs to be developed to achieve conservation aims whilst addressing fire risk in the district.
Grazing	High – grazing will directly lead to reduced seedling recruitment and is found mostly on roadside sites
Loss of genetic variability	High – loss of genetic variability may lead to greater impacts to the species from stochastic events. Loss of genetic variability is often found to result from reduced population size and / or increased isolation of populations.
Clearing	Low – clearing will continue to be a potential risk as few sites are currently reserved for nature conservation. Land Clearance is listed under the EPBC Act, 1999 as a Key Threatening Process.

Recovery Information

Directions for recovery of the Lima Stringybark include habitat conservation, restoration and management, combined with an understanding of the species' ecological and biological requirements. To achieve this, recovery actions are primarily structured to (i) acquire baseline data, (ii) assess habitat condition including ecological and biological function, (iii) protect populations to maintain or improve population growth and (iv) to engage the community in recovery actions.

Overall Objective

The **overall objective** of recovery is to minimise the probability of extinction of the Lima Stringybark 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** of recovery of the Lima Stringybark are to:

- Acquire accurate information for conservation status assessments.
- Identify habitat that is critical, common or potential.
- 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.
- Build community support for conservation.

Program Implementation

The Recovery Plan will run for five years from the time of implementation and will be managed by the Department of Sustainability and Environment. A Threatened Flora Recovery Team, consisting of scientists, land managers and field naturalists will be 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 adoption.

Recovery Actions and Performance Criteria

Action	Description	Performance Criteria
Specific objective 1		
Acquire accurate information for conservation status assessments		
1.1	<p>Acquire baseline population data by conducting detailed surveys including (a) identification of area and extent of populations; (b) estimates of number, size and structure of populations and (c) estimation of population change.</p> <p>Responsibility: DSE, with support from SDLPG</p>	<ul style="list-style-type: none"> • Determination or update of conservation status for inclusion on state and national threatened species lists. • Target populations for protection and management, determined.
Specific objective 2		
Identify habitat that is critical, common or potential		
2.1	<p>Accurately survey known habitat and collect floristic and environmental information relevant to community ecology and condition.</p> <p>Responsibility: DSE, with support from SDLPG</p>	<ul style="list-style-type: none"> • Requirements for completion of essential life history stages, recruitment and dispersal identified at known sites. • Habitat critical to survival of the taxon is mapped.
2.2	<p>Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference.</p> <p>Responsibility: DSE, with support from SDLPG</p>	<ul style="list-style-type: none"> • Predictive model for potential habitat developed and tested.
Specific objective 3		
Ensure that all populations and their habitat are legally protected		
3.1	<p>Protect populations on public land.</p> <p><i>NB these planning mechanisms and tools apply to private land and are the main influence on changes to private land use at the planning level.</i></p> <p>Responsibility: DSE / Rural City of Benalla</p>	<ul style="list-style-type: none"> • Environmental Significance Overlays for all populations developed and incorporated into Local Planning provisions, for the Rural City of Benalla. • Local Planning Policy & provisions to protect unknown locations of Lima Stringybark. • Damage or loss to populations prevented.
3.2	<p>Protect populations on private property.</p> <p>Responsibility: DSE, with support from SDLPG</p>	<ul style="list-style-type: none"> • Initiate private land management agreements in consultation with private land owners under the <i>Victorian Conservation Trust Act 1972</i> at all private land sites. • Encourage landholders with Lima Stringybark populations to use vegetation protection incentives. • Selected private land sites protected voluntarily. • Damage or loss to populations prevented.

Action	Description	Performance Criteria
Specific objective 4		
Manage threats to populations		
4.1	Control threats from pest plants, animals, and physical damage by preventing access, using integrated pest plant and animal control, signposting and fencing sites. Responsibility: DSE/Rural City of Benalla, with support from SDLPG	<ul style="list-style-type: none"> • Measurable seedling recruitment at 90 percent of private land populations and 60 percent of roadside populations. • Measurable reduction in plant mortality at 90 percent of private land populations and 60 percent of roadside populations. • All roadside populations marked with appropriate signage. • 50 percent of private land sites fenced, or protected and managed to achieve improved health and natural regeneration.
Specific objective 5		
Identify key biological functions		
5.1	Evaluate current reproductive capacity by determining seed bank status, fecundity and longevity. Responsibility: DSE, with support from SDLPG	<ul style="list-style-type: none"> • Seed bank potential quantified for each target population.
5.2	Determine seed germination requirements by conducting laboratory and field trials aimed to identify key stimuli. Responsibility: DSE, with support from SDLPG	<ul style="list-style-type: none"> • Stimuli for recruitment identified at target populations. • Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival.
Specific objective 6		
Determine the growth rates and viability of populations		
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. Responsibility: DSE, with support from SDLPG	<ul style="list-style-type: none"> • Techniques for monitoring developed and implemented. • Annual census data at target populations.
6.2	Collate, analyse and report on census data and compare with management histories. Responsibility: DSE	<ul style="list-style-type: none"> • Population growth rates determined and Population Viability Analysis completed for target populations.

Action	Description	Performance Criteria
Specific objective 7		
Establish populations in cultivation		
7.1	Establish a seed bank and determine seed viability. Responsibility: DSE	<ul style="list-style-type: none"> • Long-term storage facility identified. • Seed from target populations in storage.
7.2	Maintain a database of threatened plants in cultivation including records of provenance, numbers, cultivation technique, location planted at, and other relevant information. Responsibility: DSE	<ul style="list-style-type: none"> • Threatened flora database established and maintained.
Specific objective 8		
Build community support for conservation		
8.1	Identify opportunities for community involvement in the conservation of Lima Stringybark. Responsibility: DSE	<ul style="list-style-type: none"> • Leaflet or Brochure developed and distributed to communicate data or information on the taxon. • Information sign erected in Swanpool township. • Inform private landholders of fencing incentives provided by DSE and the threatened species network. • Educate local shires, including contractors of roadside work.

Abbreviations

DSE – Department of Sustainability and Environment, Victoria
 SDLPG – Swanpool and District Land Protection Group

Management Practices

Management practices that will aid recovery

On-ground site management will aim to mitigate threatening processes to prevent declines and create conditions for maintenance or increase of population size. Major threats requiring management include accidental destruction, competition from pasture grasses and pest plants, grazing and other damage caused by domestic stock. A range of strategies will be necessary to alleviate these threats including weed control and fencing. In addition, some *ex situ* conservation measures including seed storage and germination trials, will be required. Addressing major knowledge gaps is also required, especially determining the mechanisms underlying recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between the Lima Stringybark and associated flora, and its response to environmental processes. These are directly linked to biological function and are thus vital to recovery. Demographic censusing will be necessary to gather life history information and to monitor the success of particular management actions. Surveys of known and potential habitat should continue to better define the distributions and size of populations. Providing information to land owners, managers and the broader community in the region will increase awareness of the species, provide for increased protection of existing populations, an increased likelihood on new populations being found, and reducing the risk of inadvertent damage occurring.

Management practices that will avoid significant adverse impacts

Providing land owners and managers with information on the location, distribution, habitat and ecology of the Lima Stringybark will help to protect existing populations from inadvertent damage, and raising general awareness that may result in the location of any new populations. Populations occurring in potentially high-risk locations such as roadsides may need appropriate signposting. Negotiation with landowners with populations or suitable habitat on their properties will be required for protection of populations. Surveys in potential habitat likely to be impacted by any development proposals (including roadworks) will be required to avoid damage to or destruction of any currently unknown populations. Identification and protection of current and potential habitat such as through planning scheme overlays and restrictions on clearance of native vegetation is a high priority.

Affected interests

As the Lima Stringybark is now entirely restricted to roadsides and private land, major stakeholders in its conservation include the Benalla Rural City, VicRoads and private landholders, both individuals and members of the Swanpool District Land Protection Group (SDLPG). Both the Benalla Rural City and VicRoads have been consulted during the preparation of this Recovery Plan, and both have approved the prescribed actions. Ongoing liaison and negotiation with private landholders will continue to be undertaken during the implementation of this Recovery Plan. The SDLPG has worked to raise the profile of the Lima Stringybark within the local community and been involved in habitat restoration for a number of years. A change in community values regarding the conservation of the Lima Stringybark will assist in changing existing land use practices. The SDLPG has expressed considerable interest in implementing some aspects of this Recovery Plan, in particular actions relating to threat mitigation. Given the group's long association with the Lima Stringybark, their involvement is highly favourable.

Role and interests of indigenous people

Indigenous communities on whose traditional lands Lima Stringybark occurs will be advised, through the relevant DSE Regional Indigenous Facilitator, of the preparation of this Recovery Plan and invited to provide comments if so desired. 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 tree occurs predominantly in the threatened Valley Grassy Forest EVC, and protection and management of this vegetation is a high priority in the bioregion. 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 the Lima Stringybark, particularly those species with similar life forms and/or flowering responses. 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 significant adverse social and economic impacts. There is already a strong local community support through the Swanpool and District Land Protection Group for conservation of the Lima Stringybark, and conservation on private land will be achieved through negotiation and where appropriate, provision of incentives. Authorities responsible for managing roadsides in the district also support conservation of the Lima Stringybark.

Acknowledgments

The authors would like to thank the many people who provided advice and assistance during the preparation of this Recovery Plan. They include Sue Berwick, David Cameron, Oberon Carter, Fiona Coates, Mark Sheahan, Kate Stothers, Andrew Straker and Gary Backhouse (all DSE), Chris Engert (Rural City of Benalla), Mike Kerr (VicRoads), Sally Mann (Euroa Arboretum Inc.) and Janice Mentiplay-Smith (Department of Primary Industries).

Bibliography

- Brooker, M.I.H. and Slee, A.V. 1995. A taxonomic revision of *Eucalyptus* ser. *Argyrophyllae*. *Australian Systematic Botany* 8: 499–520.
- DEH 2000. *Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1. - Summary Report*. Environment Australia, Canberra.
- Mentiplay-Smith, J. 2005. Condition and Management of Fourteen Lima Stringybark Roadside Sites (*Eucalyptus alligatrix* subspecies *limaensis*) in the Lima Swanpool District, Victoria. Department of Primary Industries, Victoria.
- Prober, S.M., Thiele, K.R. and Lunt, I.D. 2002. Identifying ecological barriers to restoration in temperate grassy woodlands: soil changes associated with different degradation states. *Australian Journal of Botany* 50: 699–712.
- Spooner, P. and Lunt, D. 2002. Is fencing enough? The short-term effects of stock exclusion in remnant grassy woodlands in southern NSW. *Ecological Management and Restoration* 3(2): 117–126.
- Walsh, N.G. and Entwisle, T.J. 1996. *Flora of Victoria*. Inkata Press, Melbourne.

Priority, Feasibility and Estimated Costs of Recovery Actions

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					Total
					Year 1	Year 2	Year 3	Year 4	Year 5	
1	Conservation status									
1.1	Collect baseline data	2	100%	DSE	\$15,000	\$0	\$0	\$0	\$0	\$15,000
2	Habitat requirements									
2.1	Survey known habitat	1	100%	DSE	\$20,000	\$20,000	\$0	\$0	\$0	\$40,000
2.2	Identify, survey potential habitat	2	75%	DSE	\$0	\$20,000	\$0	\$0	\$0	\$20,000
3	Legal protection of habitat									
3.1	Protect public land habitat	1	75%	DSE/Benalla City	\$10,000	\$6,000	\$5,000	\$5,000	\$2,000	\$28,000
3.2	Protect private land habitat	1	50%	DSE	\$10,000	\$6,000	\$5,000	\$5,000	\$2,000	\$28,000
4	Manage threats									
4.1	Control threats	1	75%	DSE/Benalla City	\$50,000	\$50,000	\$40,000	\$20,000	\$20,000	\$180,000
5	Identify key biological functions									
5.1	Evaluate reproductive status	2	75%	DSE	\$12,000	\$12,000	\$12,000	\$10,000	\$0	\$46,000
6	Growth rates, pop. viability									
6.1	Conduct censusing	2	100%	DSE	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
6.2	Collate, analyse and report	2	100%	DSE	\$0	\$0	\$0	\$0	\$10,000	\$10,000
7	Establish pops. in cultivation									
7.1	Establish, maintain a seed bank	2	50%	DSE	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$20,000
8	Education, communication									
8.1	Community extension	1	100%	DSE	\$5,000	\$0	\$0	\$0	\$5,000	\$10,000
					\$141,000	\$133,000	\$81,000	\$59,000	\$58,000	\$472,000