

Remnant Native Vegetation Investigation

FINAL REPORT



March 2011

VICTORIAN ENVIRONMENTAL ASSESSMENT COUNCIL

The Victorian Environmental Assessment Council (VEAC) was established in 2001 under the *Victorian Environmental Assessment Council Act 2001*. It provides the State Government of Victoria with independent advice on protection and management of the environment and natural resources of public land.

The five Council members are:

Mr Duncan Malcolm AM (*Chairperson*)

Mr Barry Clugston

Mr Ian Harris

Mr Ian Munro PSM

Dr Airlie Worrall

ADVISORY GROUPS FOR THE REMNANT NATIVE VEGETATION INVESTIGATION

Community Reference Group

Ms Christine Forster AM, *Chair*

Mr Russell Costello, *Victorian National Parks Association*

Ms Ailsa Fox, *Victorian Farmers Federation*

Dr Jenny Lau, *Victoria Naturally Alliance*

Ms Jill McFarlane, *Victorian Conservation Management Network Statewide Advisory Group*

Mr Euan Moore, *Birds Australia*

Mr Luke Murphy (to September 2010), *Municipal Association of Victoria*

Mr Ian Stevenson, *Country Fire Authority*

Ms Simone Stuckey (from September 2010), *Municipal Association of Victoria*

Mr Glen Terry, *Greening Australia, Victoria*

Scientific Advisory Committee

Mr Rod Gowans PSM, *Chair*

Professor Andrew Bennett

Dr Sue McIntyre

Dr Denis A Saunders AM

CONTACT DETAILS

Victorian Environmental Assessment Council

Level 6, 8 Nicholson Street

PO Box 500

East Melbourne, Victoria 3002

Phone (03) 9637 9902 or 1800 134 803 (toll-free)

Fax (03) 9637 8024

E-mail veac@dse.vic.gov.au

www.veac.vic.gov.au



Victorian
Environmental
Assessment
Council

31 March 2011

The Hon Ryan Smith MP
Minister for Environment and Climate Change
8 Nicholson St
East Melbourne VIC 3002

Dear Minister

REMNANT NATIVE VEGETATION INVESTIGATION

In accordance with the requirements of Section 23 of the *Victorian Environmental Assessment Council Act 2001*, the Victorian Environmental Assessment Council is pleased to submit to you the final report for the Remnant Native Vegetation Investigation and copies of each submission received in relation to the investigation.

Duncan Malcolm
Chairperson

8 Nicholson Street
PO Box 500
East Melbourne
VIC Australia 3002

T 03 9637 9902
F 03 9637 8024
Toll Free 1800 134 603
E veac@dse.vic.gov.au
www.veac.vic.gov.au

Published by the Victorian Environmental Assessment Council
8 Nicholson Street, East Melbourne, 3002, Victoria, March 2011

Also published on www.veac.vic.gov.au

© The State of Victoria,
Victorian Environmental Assessment Council 2011

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

Printed by Complete Colour Printing
The report cover is printed on Forest Stewardship Council (FSC)
Mixed Sources Certified Monza Satin Recycled with text sections
printed on ecoStar 100% Recycled, which is also FSC accredited.

Design by Designgrant

ISBN 978-1-74287-027-4 (print)
ISBN 978-1-74287-028-1 (online)

For more information contact the Victorian Environmental
Assessment Council on (03) 9637 9902 or 1800 134 803
toll-free Australia-wide, or email veac@dse.vic.gov.au

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 which may arise from you relying on any
information in this publication.

Photographic credits

Sarah Brown
Mel Mitchell

Remnant Native Vegetation Investigation

FINAL REPORT

March 2011

Acknowledgment of Country

The Victorian Environmental Assessment Council acknowledges and pays its respects to Victoria's Native Title Holders and Traditional Owners, their rich culture and their spiritual connection to Country. The Council also recognises and acknowledges the contribution and interest of Indigenous people and organisations in the management of land and natural resources. The Council acknowledges that the past injustices and continuing inequalities experienced by Indigenous peoples have limited, and continue to limit, their proper participation in land and natural resource management processes.

Council members (left to right): ►
Ian Harris, Barry Clugston,
Duncan Malcolm (Chairperson),
Airlie Worrall, Ian Munro



FOREWORD

Management of remnant native vegetation in Victoria is central to biodiversity conservation, ecological connectivity and resilience, landscape sustainability, many recreational pursuits and industries, fire protection, and the way in which Indigenous and non-Indigenous Victorians identify with land.

There are many strategies, government programs, policies, projects and other individual activities applied to conserving remnant native vegetation. Across the fragmented landscapes of Victoria, this investment amounts to millions of dollars and thousands of hours every year. Much of this investment is in-kind and voluntary. Many of these programs and activities are partnerships involving a range of organisations and individuals operating over several different tenures of land and across the public land-private land interface.

Despite this activity, however, the substantial majority of Victoria's biodiversity that occurs in fragmented landscapes continues to decline, even though there has been significant abatement of some of the major threatening processes, such as broad-scale land clearing, in recent decades.

In carrying out this investigation, the Council has been conscious that there are many agencies and organisations working in this area. We have not tried to comprehensively cover all aspects of the management of remnant native vegetation. Instead, the Council has developed a tightly focused group of recommendations which reflect the key issues highlighted in our consultations and we believe that these have the potential to make the most difference to ecological condition and landscape connectivity.

Many conservation practitioners highlighted the often substantial gap between the resources currently available and what they see as necessary to reverse the decline in ecological resilience and connectivity in fragmented landscapes. Given that resources will probably always be limiting, it is important to be as cost-effective as possible in what we do. This requires a focus on identifying and capitalising on the best opportunities to improve ecological condition and landscape connectivity. It is clear that in most fragmented landscapes, many opportunities are currently not realised.

The opportunity-focused approach requires removal of impediments at a statewide scale via policy and administrative means. Identifying and capitalising on opportunities is best done at the landscape scale where there is a more detailed understanding of the natural assets, including threats, and the social setting within which the opportunities for improvements arise. These two elements underpin the recommendations in this final report: a biodiversity action program to capitalise on opportunities at the landscape scale and a series of other recommendations to provide the appropriate policy and administrative settings. The recommendations are not intended to add to the already complex list of stakeholders, strategies and programs in local landscapes. Rather, they would bring together and support existing activities, and extend them to other places where the opportunities exist.

The Council wishes to gratefully acknowledge the guidance and assistance it received throughout the investigation from the Community Reference Group, the Scientific Advisory Committee, and many experienced and knowledgeable individuals in departments, agencies and community organisations. Completion of this final report and its submission to Government marks the conclusion of VEAC's role in the investigation.

Duncan Malcolm
Chairperson

CONTENTS

Acknowledgment of Country	iv
Foreword	1
Executive Summary	3
1 INTRODUCTION	8
1.1 Background to the investigation	8
1.2 The Victorian Environment Assessment Council	9
1.3 Terms of reference for the investigation	10
1.4 Scope of the investigation	10
1.5 The structure of this final report	11
1.6 The investigation process	11
1.7 Community views	12
2 THE VALUE OF REMNANT NATIVE VEGETATION	19
2.1 The ecological values of remnant native vegetation	19
2.2 The social and economic values of remnant native vegetation	20
2.3 Cost-effectiveness of improving ecological connectivity	22
2.4 Bioregional priorities	22
3 CASE STUDIES	30
3.1 Introduction	30
3.2 Case studies	30
4 RECOMMENDATIONS	36
Integrated delivery of biodiversity actions	37
Incentives for biodiversity actions on private land	42
Road and rail reserves	43
Riparian public land	51
Small public land reserves	52
Protected area system	54
Knowledge, information and awareness	56
Implementation and ongoing public land management	58
Acronyms	59

EXECUTIVE SUMMARY

The analysis of remnant native vegetation in the discussion paper for this investigation, based on the Department of Sustainability and Environment's comprehensive modelling of native vegetation across Victoria, has revealed that:

- ▶ the history of significant decline in the biodiversity of Victoria's fragmented landscapes is continuing
- ▶ the surviving landscapes nevertheless support significant and highly valued natural assets, especially biodiversity
- ▶ there is considerable regional variation in this overall picture
- ▶ while there are some important new findings, the broad picture revealed in this analysis has been well known for many years
- ▶ retaining existing habitat is the most cost-effective strategy and is the key determinant of the trajectory of change in ecological connectivity in any given landscape
- ▶ many opportunities remain to improve ecological connectivity on private land and, especially, on public land
- ▶ multiple government agencies and other organisations have a role in improving ecological resilience and connectivity
- ▶ there are many supporters and volunteers who are keen to assist in programs and actions to reverse the decline of biodiversity in fragmented landscapes.

This final report is strongly focused on recommendations to identify and activate the most cost-effective measures to improve ecological connectivity. Victoria is fortunate in having an excellent base of scientific research and data on native vegetation and landscape ecology, as well as an energetic and motivated community. However, the next challenge is to integrate community support, science and data into the most effective actions.

SCOPE OF THE INVESTIGATION

The purposes of the investigation were to:

- a identify and evaluate the condition, values, resources and uses of these areas of remnant native vegetation and associated fauna outside largely intact-landscapes;
- b assess these areas for their connectivity and contribution to sustainable landscapes in relation to climate change;
- c report on the contribution of these areas of remnant native vegetation to biodiversity conservation, recreation activities, community uses, commercial

opportunities, services and utilities in the context of improving connectivity with largely-intact landscapes and freehold land; and

- d report on opportunities for management to achieve improved ecological connectivity.

The full terms of reference are provided in section 1.3.

As indicated in the discussion paper, the Council has taken the view that this investigation is statewide to regional in scale, and therefore it is not making public land use recommendations for the many thousands of individual public land reserves and sites across Victoria. Council also decided to present information for both public and private land, recognising that private land supports half of the remnant native vegetation in fragmented landscapes in patches closely embedded with and abutting those on public land. There was strong support from stakeholders to take this interface into account when considering measures to improve ecological connectivity.

The analysis and findings documented in the discussion paper about the characteristics of remnant native vegetation inform the scope and framework for the final report for the investigation.

CONSULTATION PROCESS

There were four major elements to the public consultation process for the Remnant Native Vegetation Investigation.

- ▶ A Community Reference Group and a Scientific Advisory Committee were established to advise Council on various aspects of the investigation. These bodies each met six times.
- ▶ Two formal submission periods of at least 60 days each attracted more than 190 written submissions. The submissions can be viewed on VEAC's website.
- ▶ A total of 14 workshops held at eight locations across Victoria attracted 250 participants who discussed key issues and put their views to Council.
- ▶ Numerous meetings and other discussions were held with stakeholder groups and individuals at their request.

The major issues arising from the consultation are documented and discussed in chapter 1.

THE VALUE OF REMNANT NATIVE VEGETATION

Ecosystems, biodiversity and natural resources underpin economies, societies and individual wellbeing. Native vegetation has many and diverse values, listed and described in numerous national, state and regional assessments and strategies. Native vegetation plays a major ecological role in maintaining the quality of soil, water and air, in maintaining critical ecosystem processes, and is a significant component of the biodiversity of the state, both in itself and in the habitats it provides for fauna. Native vegetation also contributes significantly to the cultural and aesthetic values of the landscape, and provides economically important products such as timber. It is an integral part of both Indigenous and non-Indigenous Australian culture.

Native vegetation in Victoria's fragmented landscapes supports the majority of the state's biodiversity. Around 40 percent of Victoria's native land vertebrate species (mammals, bird, amphibians, reptiles and fish not confined to marine or coastal habitats) are virtually restricted to fragmented landscapes. A further 45 percent rely on fragmented landscapes across a major part of their distribution in Victoria. Only about 15 percent of land vertebrates are mostly restricted to largely-intact landscapes.

The 200 or so land vertebrates that rely on fragmented landscapes include many familiar and much-appreciated species, e.g. brolga, Murray river tortoise, carpet python, bush stone-curlew, grey-crowned babbler, peaceful dove, silver perch, golden perch (yellowbelly), growling grass frog, rainbow bee-eater, brush-tailed phascogale, squirrel glider, budgerigar, cockatiel and red-tailed black-cockatoo.

The history of land use in Victoria has left a legacy of fragmented native vegetation with a high proportion of animal and plant species now threatened or extinct. Generally the most heavily cleared bioregions have proportionately lost the highest number of species. The most significant losses of vegetation in Victoria have occurred in native grasslands, grassy woodlands and box-ironbark forests.

Native vegetation loss in Victoria is continuing with the greatest losses occurring in fragmented landscapes. The ongoing deterioration in the condition of retained native vegetation is now the major source of overall loss. Compounding the adverse effects of vegetation loss and fragmentation are the effects of more erratic rainfall and increased temperatures associated with climate change.

Knowledge of the processes and patterns of socio-economic changes taking place in Australia, and research

into the changing social landscape of rural Victoria, provide opportunities for regionally-tailored responses that take account of the demographic, land use, climatic and socio-economic trajectories of specific landscapes.

CASE STUDIES

Several Victorian case studies, along with one international example, are presented to illustrate a variety of on-ground community-based action programs. They demonstrate how different conservation programs may evolve, the focus of biodiversity priorities and the range of partnerships involved. These case studies show that community-based conservation programs can be successful in changing the trajectory of decline in ecological connectivity in local landscapes.

A number of characteristics recur as critical components of these successful programs for biodiversity action in modified landscapes. The critical components of these programs that have contributed to their success is that they have endured over a relatively long period; they have focussed on opportunities; frequently key individuals have maintained momentum, particularly in developing partnerships; and information is shared across tenures and management agencies.

RECOMMENDATIONS

This investigation has highlighted a need to improve the link between statewide strategies and priorities with local-scale opportunities for protection, management and restoration.

Preventing habitat loss and improving the condition of native vegetation is, by many orders of magnitude, more cost-effective than revegetation and has significantly better conservation outcomes. Revegetation has an important role but, because of the cost and resources required, revegetation should be strongly targeted to key strategic areas. Recognising the primacy of retaining and enhancing existing native vegetation, VEAC has identified several areas where prudent investment can achieve measurable conservation goals provided adequate resourcing is available.

VEAC's recommendations are aimed at consolidating management to improve biodiversity protection and increase ecological connectivity in fragmented landscapes. The objective is to build on the recent focus of attention on improving ecological resilience in landscapes and a functional understanding of biolinks as more than simply vegetation corridors. The challenge in the task lies in successfully working with the complexities resulting

from the multitude of land tenures, the responsibilities of numerous government agencies and differing emphases and interests of the various stakeholders. VEAC has identified a cost-effective approach to improve the protection of remnant native vegetation and achieve the overarching goals of biodiversity conservation and mitigation against the effects of climate change.

In summary, VEAC is recommending:

- ▶ a biodiversity action program to translate statewide priorities into enduring action that make the most of opportunities in local landscapes, and improve coordination and clarity across land tenures and between stakeholders
- ▶ support for existing and new incentives for conservation of native vegetation on private land
- ▶ cataloguing the remnant native vegetation of road and rail reserves, which the investigation has revealed as making a significant contribution to ecological connectivity
- ▶ improving the conservation management of small and/or linear patches of remnant native vegetation on public land, including road and rail reserves, stream frontages and other small blocks
- ▶ public land use investigations of regions with scope to fill gaps in the protected area system
- ▶ continuing and expanding the collection and analyses of data on native vegetation
- ▶ improving the communication to interested stakeholders of information, policy and actions for the conservation of remnant native vegetation
- ▶ increasing awareness and understanding of the importance of and threats to remnant native vegetation
- ▶ resourcing for implementation of the recommendations.

RECOMMENDATIONS

Integrated delivery of biodiversity actions

- R1** Government support the integrated on-ground delivery of biodiversity actions by progressively establishing – in general accordance with the guidelines on page 39 – an ongoing program across fragmented landscapes in Victoria, at three levels:
- a) *local* programs for all suitable landscapes with a nominated coordinator from an appropriate agency to enhance existing programs and drive planning and implementation, focusing on mapping and realising opportunities to improve ecological connectivity
 - b) *regional* administrative support, prioritisation of local programs building on existing expertise and initiatives, and support for a stakeholder steering committee
 - c) *statewide* coordination of program establishment, regional prioritisation, reporting and monitoring.

Incentives for biodiversity actions on private land and the public land-private land interface

- R2** Government continue to support and expand existing programs to encourage and assist private landholders to contribute to landscape connectivity and biodiversity enhancement on private land and adjacent public land.
- R3** Government conduct an assessment of the wide range of potential mechanisms and incentives for private landholders to contribute to connectivity and biodiversity enhancement with a view to augmenting the range of mechanisms and incentives currently available.

Road and rail reserves

- R4** A comprehensive inventory of road reserves in use and used and unused rail reserves across the state be developed, populated with survey data collected according to the schedule in table 4.1 on page 45 and recording:
- a) location (GIS polygons mapped)
 - b) extent and ecological vegetation class (EVC) of native vegetation
 - c) other known biodiversity values such as presence of threatened species
 - d) site condition, landscape context, and likely trends in and threats to these
 - e) current and proposed management responsibilities and arrangements

RECOMMENDATIONS continued

and maintained in an up-to-date spatially explicit database accessible to interested organisations and community groups.

- R5** A system be developed to identify and map significant native vegetation values on road reserves in use and used and unused rail reserves, and appropriate management objectives and guidelines be developed for categories including:
- significant native vegetation within such reserves
 - reserves with little or no native vegetation but relevant to ecological connectivity (e.g. for revegetation or maintaining the condition of nearby native vegetation)
 - other native vegetation on road and rail reserves

and that, using the data collected for the inventory recommended above, all appropriate rail and used road reserves across Victoria be managed accordingly.

- R6** Managers, contractors and on-ground workers be made aware of their responsibilities and appropriate work protocols whilst working around native vegetation, and that mandatory formal education and training be incorporated into all accredited training courses.

- R7** A statewide advisory committee comprising relevant government agency, public authority, local government, scientific and community representation be established to oversee the establishment and maintenance of the inventory of road reserves in use and used and unused rail reserves, the identification of significant native vegetation values for the management of road and rail reserves, the accredited training of managers, contractors and on-ground workers, and other relevant matters;

and that consideration be given to establishing and operating the advisory committee within the scope of the Victorian Local Sustainability Accord or its successor.

- R8** Government develop a policy to facilitate and guide the adoption of biodiversity conservation and ecological connectivity as management objectives for appropriate unused road reserves, with options for maintaining potential for future access where required.

Riparian public land

- R9** That within ten years, at least 75 percent of public stream frontages abutting private land be managed, under grazing licence or other arrangements, primarily for biodiversity and water quality by undertaking:

- fencing to control stock grazing, where appropriate, and
- revegetation and habitat restoration of cleared frontages

and through measures such as incentives including those for reviewing Crown land licences and converting to conservation licence.

Small public land reserves

- R10** Within five years, a program be completed to identify and reduce impediments to local-scale cooperative actions between public land managers and willing community members, and to establish a simple system to facilitate the uptake by organisations and individuals of stewardship agreements over small public land reserves, incorporating:

- a small number of standard agreement templates
- both voluntary and payment-based agreements, including conservation licences
- a range of public land categories (mostly bushland areas and other categories of lesser conservation status, and mostly less than ten hectares in size)
- resolution of potential legal liability issues
- clarification of the appropriate public land use category of small public land blocks subject to stewardship agreements
- training programs for organisations and individuals entering into stewardship agreements
- procedures for monitoring and reporting uptake and efficacy of stewardship agreements, and
- a framework for prioritising locations and tenures of small public land reserves for stewardship agreements.

- R11** Government provide adequate additional resources for stewardship agreements.

RECOMMENDATIONS continued

Protected area system

R12 Government initiate investigations of public land use in the following bioregions (in descending order of priority) for, amongst other things, assessment against the need to provide for the creation and preservation of a comprehensive, adequate and representative system of protected areas:

- a) Wimmera (south), Dundas Tablelands and Glenelg Plain
- b) Gippsland Plain and Strzelecki Ranges
- c) Central Victorian Uplands.

Knowledge, information and awareness

R13 A project be established to:

- a) identify and map the current extent, condition and landscape context of remnant native vegetation in fragmented landscapes where:
 - i) sites are at most risk of significant decline, and
 - ii) prioritise measures to prevent or mitigate biodiversity loss in sites in (i), where appropriate
- b) initiate ongoing statewide monitoring and reporting on trends in extent, site condition and landscape context, and
- c) continue to refine and update statewide native vegetation modelling with particular attention to improving extent and site condition modelling of grassy native vegetation.

R14 Government continue to encourage new approaches and research such as NaturePrint and Landscape Logic to address new and emerging information needs, particularly the quantification of the improvements in conserving remnant native vegetation.

R15 Statewide mapping of wetland vegetation, site condition, EVCs and natural values be undertaken incorporating the effects of changes to water regimes and the ephemeral or dynamic nature of many wetlands.

R16 Government support measures to increase awareness, appreciation, education and interpretation of remnant native vegetation and ecological connectivity across Victoria.

R17 Communication of information arising from the implementation of these recommendations and any new or ongoing government work pertinent to remnant native vegetation be greatly expanded and streamlined, including:

- a) presentation of a single well-publicised internet location of all relevant Victorian current and new data, analysis, interpretation, policy, and programs
- b) a program to alert stakeholders as new information becomes available.

Implementation and ongoing public land management

R18 State and local governments work collaboratively with relevant industries, stakeholder groups and communities to implement the approved recommendations.

R19 Government allocates adequate financial and staff resources for implementation of these recommendations and to ensure that the objectives of the recommendations are achieved.

R20 Government allocates additional resources to address current and future public land needs across fragmented landscapes, with priority given to maintenance or improvement of site condition and landscape connectivity, pest plant and animal control, and an on-ground management presence.

1

INTRODUCTION

1.1 Background to the investigation

Recent assessments conclude that Australia's biodiversity is under considerable pressure from the alteration of landscapes through vegetation clearing, introduced pests and weeds, highly modified and overcommitted water resources, widespread use of fertiliser and other chemicals, changed fire regimes, urbanisation, mining, and over-harvesting. Climate change adds a further degree of complexity to the effects of landscape modification and is likely to exacerbate stresses on flora and fauna.

A recent assessment of the current state of Victoria's biodiversity for *Victoria's Biodiversity Strategy 2010 to 2015* is alarming: that despite the efforts of governments, non-government organisations, communities and individuals over many decades, the health of our species

and ecosystems continues to decline. Victoria is the most cleared state in Australia; about half of our original vegetation cover has been cleared including 80 percent of the original cover on private land. One third of Victoria's major streams are in poor or very poor condition, while two thirds of our wetlands have been either lost or degraded and nearly half of our major estuaries are significantly modified. The highest number of threatened species in any one region in Australia occurs in north western Victoria, and 43 percent of plants and 27 percent of our native animals are threatened, and 1 percent and 3 percent extinct, respectively.

A key finding of the *Assessment of Australia's Terrestrial Biodiversity 2008* is that native vegetation is a cost-effective and powerful surrogate for biodiversity. Australian federal and state agencies recognise the importance of vegetation extent and condition as proxies for regional biodiversity status, and have instituted policies and requirements to monitor native vegetation at landscape scales using these two indicators. In its reporting of

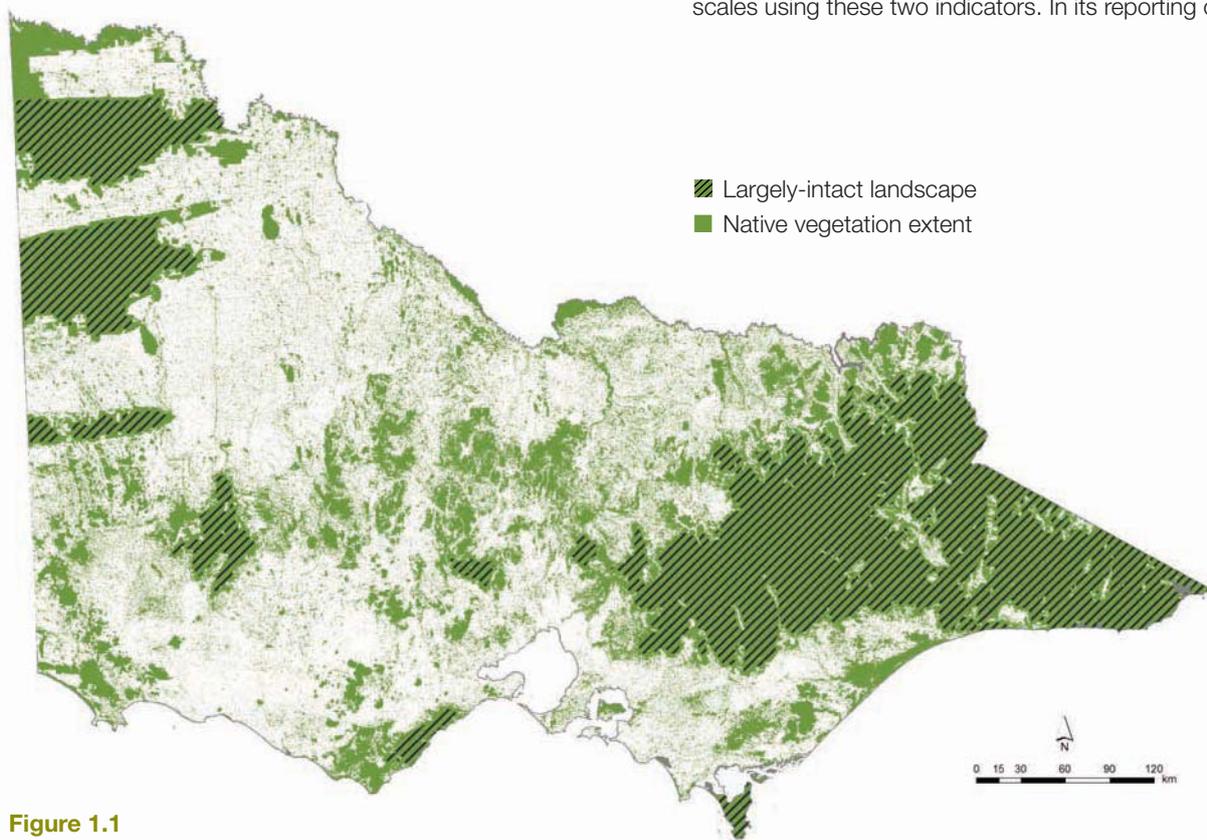


Figure 1.1
Native vegetation and areas considered largely-intact landscapes. Source: Department of Sustainability and Environment (2008) *Native vegetation net gain accounting first approximation report*. State of Victoria, Melbourne.

1.2 The Victorian Environmental Assessment Council

changes in native vegetation in Victoria, the Department of Sustainability and Environment (DSE) distinguishes between 'largely-intact landscapes' and 'fragmented' landscapes (see figure 1.1 opposite and box below). *Victoria's Catchment Condition Report 2007* and *2008 State of the Environment* report also use this framework for reporting. Fragmented landscapes are the focus of this investigation.

While the clearing of native grasslands remains of concern, it is no longer the largest source of native vegetation change in Victoria. Recent work undertaken by DSE has provided the first statewide data-driven model of native vegetation quality, and the major source of change is now recognised to be chronic degradation of habitat condition over a long period and across large areas of retained native vegetation.

The Victorian Environmental Assessment Council (VEAC) has been requested by the Victorian government to investigate remnant native vegetation on public land outside the largely-intact landscapes and to identify opportunities for ecological linkages (see section 1.3 below).

A discussion paper was released for public comment in June 2010. Taking a bioregional approach, the purpose of the discussion paper was to present a clear picture of remnant native vegetation in fragmented landscapes across the state which, together with a discussion of the causes of the observed patterns and threats, could provide a basis for identifying priorities and the appropriate actions to address them.

Largely-intact landscapes: defined for the purposes of Net Gain Accounting for the Native Vegetation Management Framework as 'contiguous areas of native vegetation greater than 20,000 ha, with high Landscape Context score and Site Condition scores that are high (or if scores are not high, this is primarily due to natural or semi-natural disturbances)'; 'underlying stock' of native vegetation is generally considered to be stable; natural or semi-natural dynamics are the dominant drivers. Largely-intact landscapes correspond closely with Victoria's major parks and state forests.

Fragmented landscapes: areas outside largely-intact landscapes where there has been widespread removal and on-going use of native vegetation for economic development. Here, the 'underlying stock' of native vegetation is generally considered to be declining or at risk of decline; degradation and recovery from degradation are the dominant factors in vegetation change.

The *Victorian Environmental Assessment Council Act 2001* (VEAC Act) came into effect on 31 December 2001. This Act repealed the *Environment Conservation Council Act 1997* and established the Victorian Environmental Assessment Council (VEAC) to conduct investigations and make recommendations relating to the protection and ecologically sustainable management of the environment and natural resources of public land.

The current five members appointed to VEAC are Mr Duncan Malcolm AM (Chairperson), Mr Barry Clugston, Mr Ian Harris, Mr Ian Munro PSM and Dr Airlie Worrall. A brief biography of each of the Council members can be found on VEAC's website at www.veac.vic.gov.au. The Council is supported by a small research, policy and administrative staff. The VEAC Act requires the Council to consult with departments and public authorities, and requires departments and public authorities to give practicable assistance to the Council in carrying out investigations. However, VEAC papers and reports are prepared independently.

The Council conducts its affairs in accordance with the VEAC Act. In particular, Section 18 specifies that "Council must have regard to the following considerations in carrying out an investigation and in making recommendations to the Minister-

- a the principles of ecologically sustainable development;
- b the need to conserve and protect biological diversity;
- c the need to conserve and protect any areas which have ecological, natural, landscape or cultural interest or significance, recreational value or geological or geomorphological significance;
- d the need to provide for the creation and preservation of a comprehensive, adequate and representative system of parks and reserves within Victoria;
- e the existence of any international treaty ratified by the Commonwealth of Australia which is relevant to the investigation;
- f any agreement at a national, interstate or local government level into which the Government of Victoria has entered, or under which the Government of Victoria has undertaken any obligation in conjunction with the Commonwealth, a State, Territory or municipal council, which relates to the subject matter of the investigation;
- g the potential environmental, social and economic consequences of implementing the proposed recommendations;
- h any existing or proposed use of the environment or natural resources."

1.3 Terms of reference for the investigation

In July 2008, the then Minister for Environment and Climate Change requested that VEAC undertake an investigation into remnant native vegetation. The terms of reference are below. The terms of reference specify four purposes and also require VEAC to take into account relevant government policies, strategies, programs and plans.

TERMS OF REFERENCE

Pursuant to section 15 of the *Victorian Environmental Assessment Council Act 2001* the Minister for Environment and Climate Change hereby requests the Council to carry out an investigation of remnant native vegetation on Crown land and public authority land outside of largely-intact landscapes* across Victoria to identify opportunities for ecological linkages.

The purposes of the investigation are to:

- a identify and evaluate the condition, values, resources and uses of these areas of remnant native vegetation and associated fauna outside largely intact landscapes;
- b assess these areas for their connectivity and contribution to sustainable landscapes in relation to climate change;
- c report on the contribution of these areas of remnant native vegetation to biodiversity conservation, recreation activities, community uses, commercial opportunities, services and utilities in the context of improving connectivity with largely-intact landscapes and freehold land; and
- d report on opportunities for management to achieve improved ecological connectivity.

In addition to the considerations specified in Section 18 of the *VEAC Act*, the Council must also take into consideration relevant State Government policies, programs, strategies and Ministerial Statements, and relevant regional programs, strategies and plans.

The Council is required to consult the community in accordance with the *VEAC Act*, to release a Discussion Paper, and to submit a Final Report on the results of its investigation. The Final Report must be submitted by March 2011.**

**Largely-Intact landscapes have been defined for the purposes of Net Gain Accounting for the Native Vegetation Management Framework as 'contiguous areas of native vegetation greater than 20,000 ha, with high Landscape Context scores and Site Condition scores that are high (or if scores are not high, this is primarily due to natural or semi-natural disturbances)'.*

*** Originally March 2010*

1.4 Scope of the investigation

As indicated in the discussion paper, the Council has taken the view that this investigation is statewide to regional in scale, and therefore it is not making public land use recommendations for the many thousands of individual public land reserves and sites across Victoria. Council also decided to present information for both public and private land, recognising that private land supports half of the remnant native vegetation in fragmented landscapes in patches closely embedded with and abutting those on public land. There was strong support from stakeholders to take this interface into account when considering measures to improve ecological connectivity.

The analysis and findings documented in the discussion paper about the characteristics of remnant native vegetation inform the scope and framework for the final report for the investigation. In summary:

- ▶ Fragmented landscapes comprise almost 80 percent of the area of Victoria but support only 54 percent of its native vegetation, in some 2.7 million patches. The patches on public land are scattered across hundreds of thousands of public land sites.
- ▶ There is great regional variation in the condition, extent and patterns of occurrence of remnant native vegetation in fragmented landscapes. In this investigation, Victoria's 28 terrestrial bioregions were used as the framework to deal with this variation. For higher level characterisation, the bioregions were grouped into three broad categories according to the extent of loss of native vegetation: most cleared, moderately cleared and least cleared. This categorisation facilitated a clear but sufficiently detailed account of Victoria's remnant native vegetation as a basis for identifying the best opportunities to improve ecological connectivity.
- ▶ Among the key findings from the analysis was that a substantial extent of native vegetation is on road reserves (used and unused) in many of the most cleared landscapes. In three large bioregions, for example, more than 15 percent of public land native vegetation is on road reserves.
- ▶ The analysis also revealed that generally native vegetation on private land was in poorer condition than that on public land. Furthermore native vegetation on public land tends to be better connected structurally than vegetation on private land, mostly because the larger patches of native vegetation are on public land.
- ▶ Overall, the loss and fragmentation of native vegetation outside largely-intact landscapes has been extensive and, in many landscapes, severe. Up to 2005, several thousand hectares – mostly in native grasslands – was estimated to be lost annually and there is no reason

1.6 The investigation process

to believe that this rate of loss has slowed. More substantial now, however, is the effect of ongoing pervasive degradation – as a result of weed invasion, and activities such as stock grazing and removal of undergrowth and fallen timber – across the remaining remnant native vegetation.

- ▶ Remnant native vegetation is a major part of our natural heritage and is essential to landscape sustainability, but there is much work to be done, additional to that already underway, if we are to arrest the decline and ultimately improve the ecological connectivity of Victoria's fragmented landscapes.

Nineteen key issues and discussion points were presented in the discussion paper as a starting point for community response. A summary of those responses and others issues raised in submissions and community meetings is presented in section 1.7 below.

This final report is strongly focused on recommendations to identify and activate the most cost-effective measures to improve ecological connectivity. Victoria is fortunate in having an excellent base of scientific research and data on native vegetation and landscape ecology, as well as an energetic and motivated community. However, the next challenge is to integrate community support, science and data into the most effective actions.

1.5 The structure of this final report

This report presents background on the major issues raised in the investigation and the rationale for the recommendations. The report has four parts:

Chapter 1 introduces the investigation, providing some context and a summary of the issues raised during public consultation.

Chapter 2 provides background on the major issues that form the rationale for the recommendations.

Chapter 3 presents case studies as examples showing key characteristics of a range of successful conservation initiatives in fragmented landscapes in Victoria and elsewhere.

Chapter 4 introduces and presents the recommendations.

The process for the Remnant Native Vegetation Investigation is formally specified in the VEAC Act and the terms of reference for the investigation. The process is shown in figure 1.2. There were two formal submission periods (each a minimum of 60 days), the second following the release of the discussion paper in June 2010. One hundred and twenty submissions were received in this second period and they can be viewed on VEAC's website. These submissions contain much valuable information and perspectives on the investigation, and were a major input to this final report. In addition, VEAC held a total of 14 workshops throughout Victoria and attended many meetings with stakeholders over the course of the investigation. See section 1.7 below for a summary of matters put to VEAC in public consultations since the publication of the discussion paper.

This final report completes the investigation and was submitted to the Minister for Environment and Climate Change, the Hon Ryan Smith MP on 31 March 2011.



Figure 1.2 Investigation process and timeline.

1.7 Community views

COMMITTEES

Under section 12 of the VEAC Act, the Council may appoint any committees that it considers necessary. For the Remnant Native Vegetation Investigation, VEAC established a Scientific Advisory Committee. The four members of the Scientific Advisory Committee are listed on the inside front cover of this final report. The Committee met six times and provided advice to the Council on current scientific research and data, including any gaps in knowledge, related to remnant native vegetation, ecological fragmentation and connectivity; and on techniques and approaches that would assist VEAC in the conduct of this investigation.

Under section 13 of the VEAC Act, a Community Reference Group is required to be established for each VEAC investigation. The group was made up of representatives of a broad range of interests related to the investigation. Members are listed on the inside front cover of this final report. Over the course of its six meetings, the Community Reference Group provided advice and input to VEAC on many aspects of the investigation, and made a particularly valuable contribution to the consultation processes and methods for gaining the community's views on remnant native vegetation.

Following the release of the discussion paper, VEAC sought input from community organisations, government agencies, landholders and interested individuals.

OVERVIEW OF CONSULTATION

The submission process is one of the key methods for VEAC to hear community views on issues and values. VEAC received 120 submissions following the release of the discussion paper. The submissions came from across the state including rural areas, regional towns and Melbourne, and included individuals, statewide and local conservation groups, government agencies, recreational user groups, industry groups, ecological consultants, landholders, lawyers, scientists and fire agencies. Collectively, the submissions are a valuable resource for VEAC and the Council is very grateful to all who took the trouble and time to contribute to the investigation and make a submission. Council members and staff have read every submission and analysed and considered relevant issues, comments and proposals during the development of the final report. The submissions can be viewed at VEAC's website (www.veac.vic.gov.au).

In addition to the written submissions, a series of community and stakeholder workshops were held in various locations in July and August 2010: Benalla, Hamilton, Horsham, Bendigo, Traralgon, Mildura, Dandenong and Melbourne. In total 250 people attended these workshops. Participants were invited to comment on the results presented in the discussion paper and contribute to framing the recommendations in the final report. Additional discussions were held with local community groups, conservation groups and government agencies responsible for natural resource and public land management. In total, VEAC met with about 500 people during the second consultation phase.

OVERVIEW OF FUTURE DIRECTIONS AND ISSUES RAISED IN THE DISCUSSION PAPER

Chapter 7 of the discussion paper presented 19 key issues and discussion points as a basis for community input on future directions. The vast majority of submissions agreed with the points raised in this chapter, with many making specific additional recommendations and comments on each of these points. With some exceptions, stakeholders commended the new information presented in the discussion paper, with a number commenting on omissions or providing information to correct what were seen as errors.



A significant number of submissions expressed the view that biodiversity conservation is most effective if addressed in a coordinated manner across all land tenures. They expressed the opinion that the many government and non-government groups and individuals wishing to contribute to landscape restoration and protection require a framework and a consistent approach in order for biodiversity conservation to be effective.

The issues and proposals raised through the consultation process covered multiple social, economic, scientific, legislative and policy areas. This is not surprising given the broad range, complexity and inter-relatedness of factors that affect remnant native vegetation and vice versa, and the vital role that native vegetation plays in providing for human needs. It is a reflection of the wide-ranging and complex nature of the investigation that some submissions and workshop participants also raised matters outside the terms of reference, such as detailed planning and management issues relating to private land.

This section outlines the issues raised and proposals presented in the submissions and regional workshops. Most of the issues discussed below are not discrete; for example, nearly all issues and proposals have a social dimension and require resourcing.

Socio-economic factors

Many millions of dollars in unpaid labour and resources are invested by volunteer groups and individuals in on-ground conservation work. These groups form part of the social fabric of communities and are often especially important in rural areas. Overwhelmingly, submissions and workshop participants wanted this effort recognised and supported by government. There is a strong demand for professional guidance to assist volunteers to implement strategic and scientifically sound conservation programs.

Partnerships between individuals, conservation groups, Indigenous groups and government agencies were a consistent theme in most of the submissions and workshops.

It was recognised that restoration of native vegetation is expensive and preventing further loss is the most cost-effective means to achieve conservation objectives.

Public land in fragmented landscapes is valued by different members of the community for many reasons. Most submissions and workshop participants focused on flora and fauna values and potential for enhancing these values. Others highlighted the importance of public land in fragmented landscapes for various recreational, commercial, resource, infrastructure and social uses, such as access for beekeeping, mining

and extractive industries, prospecting and adjoining agricultural production. Some submissions highlighted the spiritual values of natural landscapes and Indigenous peoples' sense of belonging to and being responsible for Country. Across virtually all submissions and comments in workshops was an implied – and often explicit – appreciation of the central contribution of native vegetation to Victoria's much-loved rural landscapes.

Integrated framework

An appreciation that biodiversity is blind to the different public and private land tenures was evident in submissions. Many submissions and participants in workshops and meetings also highlighted the involvement of individuals, as well as government and non-government organisations, in conservation and restoration projects across both public and private land, and promoted a whole-of-landscape approach to conservation. Some submissions expressed the need for an integrated framework to implement a coordinated cross-agency and cross-tenure approach to biodiversity conservation in fragmented landscapes. Although relatively few submissions made this proposal explicitly, it was implied in numerous examples and comments.

Several submissions proposed, as models, examples of successful integrated programs (at various scales) for conservation, including Conservation Management Networks, the Ballarat Environmental Network model for divested community management of small reserves, and the United Kingdom's Biodiversity Action Plan model (www.ukbap.org.uk).

Many submissions called for spatially explicit prioritisation of native vegetation so that available funding can be directed to maximise benefits. Statewide strategic plans are considered by some as too broad for on-ground practical implementation; finer-scale plans are considered to be required.

Resourcing

There was an overwhelming view expressed in the submissions and workshops that financial investment in conservation of biodiversity in Victoria is lamentably disproportionate to the vitally important ecosystem services it provides. Many submissions, especially those from scientists and professional conservation organisations, suggested funding needs to be increased many orders of magnitude to prevent further degradation and improve ecosystem resilience.

Conservation of remnant native vegetation provides a diverse array of social, ecological and economic benefits and this was reflected in specific proposals put to VEAC. Needs identified in submissions and by workshop participants included more resourcing for the following areas: scientific research and monitoring, collation and maintenance of databases (e.g. mapping and fauna and flora atlases), enforcement and compliance officers, conservation support officers and facilitators, pest plant and animal management, government land acquisition, funding for new programs, conservation covenants, and biodiversity protection incentives for landholders.

Submissions from local councils strongly emphasised the difficulty they experienced in obtaining scientific expertise and funding to deal with biodiversity conservation issues, and to manage road reserves in use and other native vegetation for which they are responsible either directly or through statutory planning responsibilities. This was of particular concern in rural regions, where the rate-payer base is low compared to areas with urban and regional centres. There was a common perception that while state government agencies such as DSE have more expertise and financial resources to deal with native vegetation management, much of the responsibility falls to local government.

Road and rail reserves

The new information about vegetation on road reserves presented in the discussion paper prompted comments in almost half of the submissions and was a major focus of discussion at all workshops. The prominence of road reserves in discussions throughout the investigation suggests that the community places a high value on this landscape feature.

Issues relating to road reserves in use were: inappropriate fire regimes; inadequate pest plant and animal control; unnecessary or excessive clearing or damage by landholders, fire protection managers, firewood collectors and utilities and their contractors; incremental road widening; and lack of enforcement and prosecution for wilful damage. Concern that the protection of native vegetation would override the maintenance of safe road conditions in fire-prone areas was also raised in some submissions.

Confusion surrounding accountability for specific management issues on road reserves, especially weeds, and identification of the responsible authority, was a common theme. Again, the issue of inadequate funding and resources for local government to manage road reserves was raised by many local councils, and many submissions suggested that greater support was



required. Several submissions proposed reinstating a Roadside Conservation Advisory Committee or similar body. This committee was considered to have played an important role and its work in the 1990s was frequently commended in regional workshops, particularly by local government. The Country Fire Authority (CFA) has an active role in road reserve management in many areas, and proposals included further developing and expanding current appropriate management protocols with the CFA and other agencies. In addition, formal training for heavy machinery operators was proposed.

Unused road reserves have been managed mainly under licence to adjoining landholders. Only a small number of stakeholders made specific reference to unused roads and their potential and actual important contribution to ecological connectivity. However, a number of workshop participants and submissions called for grazing licences on unused road reserves (or generically on all public land) to be phased out. Other proposals included management of unused roads under biodiversity agreements, particularly for strategically important unused roads.

Many of these road reserve issues were also raised in relation to rail reserves (both in use and unused) in a small number of submissions. These submissions emphasised that rail reserves frequently support vegetation of high conservation value, and that changes in management regimes are adversely affecting the quality of remnant native vegetation within these reserves.

Small public land reserves

The difficulty of managing the vast number of small scattered public land remnants was noted by many, although tangible proposals to address this issue were few, other than improved resourcing. There was a widespread view that state government was best placed to manage issues on Crown land requiring skilled resources such as fuel reduction, ecological burning, weed and pest animal control, and ensuring compliance with licence conditions.

Suggestions to address management of small reserves included a significant expansion of Conservation Management Networks across the state as an effective model and, along similar lines, the integration of all relevant public land blocks in appropriate landscapes under a single conservation management entity as has been done around the Broken-Boosey State Park near Numurkah.

Some submissions and many workshop participants highlighted the need to explore devolved community management models for small public land reserves, exemplified by the Ballarat Environment Network model, (see chapter 3) while others suggested ways to improve the involvement of farmers and private landholders in managing adjacent public land.

Protected areas

Throughout the investigation, VEAC indicated that it was not proposing to make recommendations for individual public land reserves. While acknowledging this approach, some submissions identified particular public land sites of high conservation value for management to address specific threats or for addition to the protected area system: for example, as nature conservation reserves or additions to national parks. These proposals varied from single blocks of a few hectares to many thousands of hectares, to multiple blocks across bioregion-scale landscapes. In a similar but more strategic vein, several proposals suggested that VEAC analyse and identify landscapes that provide the most effective opportunities to enhance the existing protected area system in accordance with the criteria for a comprehensive, adequate and representative (CAR) reserve system. In particular it was proposed that VEAC explore opportunities in landscapes with significant areas of native vegetation on Crown water frontages, road reserves, and uncommitted Crown land. Another suggestion was to upgrade the status of existing conservation reserves, particularly in bioregions that have little remaining native vegetation.

Licences over public land

Unused roads and public land frontages of waterways and lakes are typically licensed to nearby landholders for agricultural purposes, usually grazing and, in the case of water frontages, access to drinking water for stock. Licences can also reduce the need for fencing, provide flexibility for farming operations, provide routes for stock movement, and give landholders some management control over adjoining land. From the government's point of view, these licences generate a little revenue and provide, through licence conditions, management and stewardship.

Many stakeholders advocated strongly for the removal of grazing from public land on water frontages, unused road reserves and other Crown land, citing their value from a number of perspectives including cost-effectiveness, sites of environmental heterogeneity, and their role as long narrow strips providing existing or potential structural connectivity. Proposals from stakeholders regarding the management of these areas varied, depending on the significance of the natural values. Suggested measures included exclusion of livestock, conversion of agricultural licences to conservation licences, raising fees to a level commensurate with commercial rates, and reducing institutional resistance and barriers to alternative arrangements for currently licensed public land.

Private land

While some people supported VEAC making comments or recommendations about native vegetation on private land, others took the view that this was beyond VEAC's role. Submissions proposing that private land be explicitly considered did so on the grounds that nature conservation in fragmented landscapes is a cross-tenure issue, and because private land supports the majority of remnant native vegetation in the most cleared bioregions. Generally it was asserted that there was a need to increase opportunities and incentives for conservation on private land.

Several mechanisms are currently available for achieving conservation across land tenures over large landscapes (see chapters 3 and 4, for examples) and many submissions and workshop participants suggested expanding or modifying these mechanisms. Again, Conservation Management Networks were perceived to be successful and there were proposals for more to be established. In addition, many people made suggestions in relation to BushTender, BushBroker and similar existing incentive programs. Such suggestions covered a range of perspectives from advocating that the programs be reviewed to evaluate their effectiveness, to suggesting

they be expanded to cover a much larger area and/or maintained for longer periods. Additional resourcing and incentives for conservation covenants was also proposed.

During public consultation many expressed the view that there was a need to revise the current policy and planning arrangements relating to the protection of remnant native vegetation on private land. Some proposed a revision of the *Catchment and Land Protection Act 1994* to clarify and improve standards of land management on private land. Many put the view that the Native Vegetation Framework was failing in several respects and needed review. There were numerous criticisms of the technical application of the Native Vegetation Framework, including a widespread perception that there was insufficient application of the 'avoid' step of the 'avoid-minimise-offset' three step approach. A number of submissions, including from local government stressed the need to simplify the assessment process, provide expertise and other support, and clarify the technical application of the Net Gain approach.

Several submissions proposed that statutory planning provisions be reviewed to improve consistency and the identification of native vegetation at the early stage in the planning process. Others specified that there should be ready availability of up-to-date GIS mapping and fauna and flora data from DSE; more comprehensive and resolute application of Vegetation Protection Overlays (VPO) and Environmental Significance Overlays (ESO); and revision of the statewide planning provisions to increase opportunities for pro-active protection of biodiversity on private land.

Role of government agencies

It was clear from the submissions and workshops that many stakeholders are confused about the roles of the various levels of government, the responsibilities of different agencies, different legislation, and the multitude of funding arrangements, programs and processes involved in the management of native vegetation on both public and private land.

Many also expressed confusion over responsibilities for different aspects of Crown land reserve management. This was particularly the case for used road reserves in rural areas. Furthermore, many local councils expressed the view that funding for public land under their management is not commensurate with the costs for pest and other management requirements. One submission saw the shift of responsibility for small Crown land reserves from DSE to local councils as a threatening process in itself.

Several stakeholders recounted their experience of difficulties and administrative impediments or resistance to improving the status or management of specific blocks of Crown land. Cross-agency issues were described with regard to management arrangements, as well as inconsistencies in policy and in some cases, differences in approach between individuals within the same agency.

Knowledge management, awareness raising and education

Communicating information and obligations relating to native vegetation, both to people with a particular interest in the issue and to the wider community, was a recurring theme throughout VEAC's consultation process.

Stakeholders saw a need to engage and inform the wider community as to why and how the conservation of native vegetation is important for ecological sustainability and to buffer the impacts of climate change. Many felt that increasing the awareness and appreciation of remnant native vegetation across the broader public is fundamental to obtaining the support required to address the issue of degradation and loss.

There is strong demand for ready public access to information on mapping data, research, policies and conservation programs. During the course of the investigation it became apparent that even practitioners (including government employees) and interested individuals were not fully aware of the availability or the details of the many programs and types of information. Communication by government agencies to the community and other stakeholders of often ground-breaking developments in research, programs or data is considered to be inadequate or erratic. While the multitude of policies, programs and information generated through different government agencies might partly explain this situation, poor dissemination of information was highlighted as a factor that limits engagement, collaboration and potentially the effectiveness of conservation programs across the state.

The communication of the duty of care and legal obligations relating to native vegetation is perceived by many stakeholders to be inadequate. This issue is confounded by inconsistent and sometimes conflicting policy and legislative requirements. Notifying landholders of their obligations in protecting native vegetation (e.g. native grasslands) was described as a successful pro-active approach to conservation.

Fire

Several of the findings and recommendations of the 2009 Victorian Bushfires Royal Commission have a direct impact on remnant native vegetation. The need for asset and community protection from fire was unanimously accepted during consultation for this investigation. However, there was a concern that many of the recommendations may have long-term adverse effects on native vegetation. Of particular concern was the five percent statewide target for prescribed burning of public land. Many participants were concerned that the target would adversely affect many ecosystems as it did not take into consideration the diversity of vegetation types and the fire-age-class requirements of species they support. Furthermore it was put to Council that there is a lack of scientific research as to the appropriate fire regime for many of the different vegetation types found across Victoria.

Road reserves were perceived to be a high priority for prescribed burning and clearing. Many expressed concern at the loss of understorey components of road reserves to reduce fuel loads and the adverse impact this would have on biodiversity. An example was given that the landscapes in which road reserves contain a high proportion of remnant native vegetation – e.g. in the northwest Wimmera – do not have a history of that vegetation contributing to wildfires that have caused significant loss of life or property. The fear is that large areas of highly significant native vegetation might be degraded in the process of meeting broad targets, but with negligible mitigation of the effects of wildfire.

On the other hand, several submissions put the view that appropriate and sensitive fire management along road reserves, particularly those with native grasslands and grassy woodlands invaded by highly flammable weeds such as Phalaris, could simultaneously aid native vegetation restoration and reduce the risk of fire. The CFA recognised that a holistic and strategic approach is required to balance the needs of public safety and remnant native vegetation.

Climate change and carbon sequestration

Only a small number of submissions made specific reference to climate change, which probably reflects the conceptual difficulty of translating this complex issue into concrete actions. Several submissions expressed the opinion that the final report should include more detailed consideration of the impacts of climate change. A small number were of the view that discussion of the impacts of climate change needed to be expanded and others expressed the view that the discussion paper omitted strategies for addressing climate change.

A number of submissions highlighted the potential link between a carbon market and revegetation or other management to enhance native vegetation that also captures carbon. Proposals included bringing together expertise and community groups to execute a strategic revegetation program where economic benefits could be obtained under a carbon market system. Other proposals focused on the biodiversity outcomes and the mitigation against climate change that revegetation programs could provide.

Isolated paddock trees

The majority of submissions agreed, some emphatically, with the need to preserve and replace paddock trees on private land. Suggestions included incentives for landholders, registration of individual trees (particularly those of cultural importance to Aboriginal people), improved mapping techniques, implementation of programs to mitigate losses, and evaluation of the impact of land use intensification.

Approach to recommendations and their implementation

Many land management agencies and conservation groups operating across large regions or the whole state thought VEAC should explicitly evaluate native vegetation assets and prioritise them for protection and enhancement. Several referred to priorities outlined in various state government policies and strategies and proposed more specific 'sub-priorities' be identified, or at least a framework established for their identification. Biolinks and riparian zones were commonly flagged as requiring more detailed identification of locations and/or actions of greatest urgency.

Similarly, stakeholders mentioned the lack of guidance or any clear framework on how or where to implement statewide strategies. Although not always explicitly stated, submissions from private individuals and local conservation groups often indicated a desire for detailed, explicit and specific guidance on conservation priorities.

Omissions

A number of stakeholders felt that there was not enough detail in the discussion paper on ecological threats, climate change, coastal reserves and other specific issues, although it was also acknowledged that there was an enormous body of scientific literature and relevant documents available in the public domain.

Several people expressed the opinion that there was insufficient emphasis on the limitations of the scientific modelling presented in the discussion paper and, in particular, that the site condition model generally over-estimated the actual condition and hence did not adequately represent the degradation of native vegetation across all of Victoria. Some submissions and workshop participants also expressed the view the discussion paper did not place enough emphasis on the contextual contribution of largely-intact landscapes, with some additional comment that the term 'largely-intact landscapes' should not lead to complacency about the threats that these landscapes also face.

Other issues

Because of the diversity of issues covered in the investigation, there were many other suggestions and comments not covered in the major points listed above. Although some issues may have been raised on only a few occasions, they are not necessarily any less important. Collectively they highlight the complexity and range of issues covered in the investigation.

Firewood collection as a threat to site condition of native vegetation and to biodiversity was raised in several submissions and workshops. Suggestions were made to phase out firewood collection along roadsides (increasing clarity, restrictions and compliance) and in state forests, and establish strategic alternatives.

Other comments related to recreational activities and emphasised the importance of tourism, prospecting, bushwalking, four-wheel driving, camping and cycling for personal enjoyment, and the importance of remnant native vegetation to these pursuits. A submission called for the banning of recreational shooting, while others wanted to maintain shooting in designated areas. Several submissions highlighted the problems caused by the expansion of informal tracks for mountain bikes and trail bikes in environmentally sensitive areas.

Many native vegetation remnants contain culturally significant places and objects of Indigenous and non-Indigenous origin. It was suggested that consideration be given to the preservation of such sites along with the protection and improvement of their native vegetation.

Others submissions made comments in regard to methods for prioritising landscapes, and additional analyses that could be undertaken by VEAC such as the inclusion of mapped EVC and fauna data, identification of refugia for fauna and flora, and the impacts of climate change. Some stakeholders provided additional information on threatening processes or specific vegetation types – for example, grassy plains and coastal areas. A small number of submissions made comments regarding the cessation of timber harvesting in state forests and investigating the consequences of the shift in timber production resulting from the 2009 bushfires.

2 THE VALUE OF REMNANT NATIVE VEGETATION

Native vegetation has many and diverse values, listed and described in numerous national and state assessments and strategies. Native vegetation plays a major ecological role in maintaining the quality of soil, water and air, maintaining critical ecosystem processes, and is a significant component of the biodiversity of the state, both in itself and in the habitats it provides for fauna. Native vegetation also contributes significantly to the cultural and aesthetic values of the landscape, and provides economically important products such as timber.

2.1 The ecological values of remnant native vegetation

Despite the extent of the loss of native vegetation compared to Victoria's largely-intact landscapes, fragmented landscapes still support the majority of Victoria's biodiversity. Around 40 percent of Victoria's native land vertebrate species (mammals, bird, amphibians, reptiles and fish not confined to marine or coastal waters) are virtually restricted to fragmented landscapes in Victoria, and a further 45 percent rely on fragmented landscapes across a major part of their distribution in Victoria. That is, only about 15 percent of our land vertebrates are mostly restricted to largely-intact landscapes. Fragmented landscapes are likely to be similarly important for other species: land invertebrates, fungi and plants.

There are a number of potential reasons why fragmented landscapes are especially important for biodiversity. They have been strongly favoured for agriculture because they tend to be more biologically productive, and as a result may support more species and more individuals in an area of given size. Potentially related to this difference in biological productivity is the generally more benign climates and soils of fragmented landscapes – certainly the coldest climates and majority of rocky landscapes are in the hills and mountains of the largely-intact landscapes.

In addition, apart from mountain streams, the majority of Victoria's wetland types are largely found in fragmented landscapes, especially the ecologically rich shallow ephemeral freshwater lakes and swamps. This is reflected

in the reliance of wetland birds and fish on fragmented landscapes, both of which have higher proportions of species occurring in fragmented landscapes than the overall averages for land vertebrates given above. On the other hand, the reverse is true for frogs, mostly due to several species more or less restricted to mountain or coastal streams with distributions coming into eastern Victoria from further north along the Great Dividing Range. Notwithstanding various potential reasons and variations, the overall pattern is clear: fragmented landscapes support a major part of Victoria's biodiversity.

There are many familiar species among the 200 or so land vertebrates that rely on fragmented landscapes and they are a substantial component in many people's love of the bush. Such species include brolga, Murray river tortoise, carpet python, bearded dragon, little corella, bush stone-curlew, grey-crowned babbler, peaceful dove, freshwater catfish, silver perch, growling grass frog, rainbow bee-eater, brush-tailed phascogale, squirrel glider, budgerigar, cockatiel, crested pigeon, red-tailed black-cockatoo golden perch (yellowbelly), regent honeyeater and zebra finch. Again, there will be many land invertebrates, fungi, plants and ecosystems that also epitomise the bush for many people.

The extent and condition of biodiversity in Victoria is declining. Expanding urbanisation, agricultural land use changes, invasive species, altered water regimes, climate change and a multitude of other inter-related threats continue to adversely affect remaining native biodiversity. More than 2000 species or subspecies of plants and animals are listed as threatened or extinct in DSE advisory lists. This total includes 250 terrestrial birds, reptiles and mammals and 178 invertebrates.

Victoria's historic land use practices, particularly clearing for agriculture, have left a legacy of fragmented landscapes and generally the most heavily cleared bioregions have the highest proportion of threatened flora and fauna. For example, the Gippsland Plain and Victorian Volcanic Plain each have 100 vertebrates listed as threatened, followed by the Murray Mallee (82), the Otway Plain (79), and East Gippsland Lowlands (78). The remaining bioregions have between 12 and 72 fauna species recorded as threatened. Similar trends are reflected in the threatened flora in each bioregion – the Murray Mallee has the highest number of threatened plant species (100), with the East Gippsland Uplands, Victorian Riverina, Wimmera and the Victorian Volcanic Plain each having 74-88 plant species listed.

2.2 The social and economic values of remnant native vegetation



The most significant losses of vegetation in Victoria have occurred in the native grasslands, temperate woodlands and box-ironbark forests. The extent of habitat lost varies among the vegetation types; however, the ecosystems that were once most widespread have been appropriated for agriculture and little of the original extent remains. Native grasslands are the most depleted and the most endangered vegetation type in Victoria. The state's most heavily cleared bioregion, the Victorian Volcanic Plain, has only 0.1 percent of high quality grasslands remaining. Prior to European settlement temperate woodlands occupied 7 million hectares – 42 percent of the state – but by 1987 this figure had dropped to 8 percent. Not surprisingly there have been major changes to the fauna associated with these vegetation types including global extinction, regional declines of populations and simplification of species assemblages. Compounding the plight of species' persistence in these heavily cleared landscapes are the effects of more erratic rainfall and increased temperatures associated with climate warming.

While the rate of loss has declined in recent decades, reversing the decline requires further measures to actively combat specific threats. In the first instance, the manifestation of extinction debt – the future extinction of species due to events in the past, as explained in more detail in the discussion paper – means that there will be further losses. In the longer term, however, the well-documented substantial declines of farmland and woodland birds in Europe, and the United Kingdom in particular, provide a salutary lesson for Victoria. Despite a much longer history of agricultural use than Victoria, the disappearance of birds from these landscapes has continued, and perhaps accelerated in recent decades. These declines are mostly the result of intensification of agricultural practices. Such changes in agriculture are also underway in Australia and especially Victoria.

Native vegetation in fragmented landscapes is valued by the Victorian community for opportunities in recreation, tourism, economic gains (direct and indirect) as well as the crucial role it provides for ecosystem function. Remnant native vegetation in fragmented landscapes has many different values, uses and issues depending on size, quality and location.

Work carried out in Victoria and elsewhere acknowledges that the value of biodiversity is inherently difficult to define and seldom possible to estimate. In the environmental economics discipline, economic values or benefits are generally classified into use and non-use benefits. Economic value is one of many possible ways to define and measure value, but is useful to consider when making choices that involve tradeoffs in allocating resources. Other values of natural landscapes fall outside those that are considered to be either strictly environmental or economic. These values are cultural and social in nature and may be important for Indigenous culture, for aesthetic reasons and, more generally, because of the significance that the natural landscape occupies in our image and sense of ourselves as a nation. Some values can be considered to be both social and economic, such as recreation and education.

Any appraisal of the social and economic values of biodiversity generally, or remnant native vegetation specifically, must acknowledge the processes and patterns of socio-economic changes taking place in Australia. Key socio-economic changes that were identified in a recent assessment of the vulnerability of Australia's biodiversity to climate change include the decline of agriculture in marginal landscapes; different or new landscape uses such as carbon sequestration; high-density urban living; 'sea change' and 'tree change' movements; the expanding Indigenous estate as land is restored to Aboriginal ownership; and private sector conservation. These trends have been characterised as a movement in developed nations towards non-agricultural production land uses. Research into the changing social landscape of rural Victoria has identified that, economically and socially, Victoria consists of four regions, or landscapes: agricultural production, rural amenity, rural transition and irrigation.

These trends provide opportunities for regionally-tailored responses that take account of the demographic, land use, climatic and socio-economic trajectories of specific landscapes.

ECONOMIC VALUES

The use benefits of biodiversity can be considered in two categories; direct use benefits such as production and consumption and indirect use benefits from ecosystem services, for example, clean water quality. Non-use benefits include existence value, deriving from the knowledge that an environmental resource exists, independent of any current or foreseen use of the resource. Bequest value derives from the benefit gained from the knowledge that something is retained for the benefit of future generations while option value represents the value we receive from conservation now so we retain the option of using biodiversity at some future date.

As well as numerous small blocks, there remain many large accessible blocks of high quality native vegetation in Victoria that are used by large numbers of people for recreation and tourism. Several population centres are fortunate to be particularly close to such areas of bush, e.g. Bendigo, Ballarat, Castlemaine, Portland, Seymour, Wodonga, Sale, Bairnsdale, and the outer eastern suburbs of Melbourne. Accessibility to these areas is, for many people, the reason why they live where they do.

These blocks of native vegetation are used for a diverse range of activities including horse riding, bushwalking, bird watching and nature study, cycling, metal detecting, car touring, four wheel driving, picnicking, camping, car rallying and trail bike riding. Most of these activities would be much poorer in the absence of native vegetation and associated fauna, if they would be possible at all. Many of Victoria's iconic attractions are dependent upon their native vegetation setting e.g. Puffing Billy.

Near population centres these activities may be undertaken on day trips, but more distant regions are often enjoyed on excursions of several days. The visitors bring with them significant financial contributions to local economies through the purchase of food and drink, equipment, local products and accommodation.

Agriculture, the vast majority of which occurs in fragmented landscapes, contributes \$10.2 billion annually to the Victorian economy. Native vegetation contributes to the overall productivity of landscapes in a myriad of ways. It is crucial to water production and management, maintaining water quality, flood mitigation, salinity control and catchment management. Native vegetation mediates the exchange of nutrients, improves soil quality, helps prevent soil erosion and provides shelter for stock. Loss of native vegetation contributes to the degradation of these ecosystem processes. The adverse consequences of vegetation clearing is often most apparent in the most heavily cleared regions, where salinity, and soil compaction

and erosion can be widespread and detrimental to environmental, social and economic values.

Some public land in fragmented landscapes provides economic returns from mining and extractive industries (albeit not directly dependent on the vegetation itself), bee keeping (including crop pollination), timber harvesting, seed collection, and commercial and domestic firewood collection. Collectively, these industries and uses make an important contribution to the state economy but can be particularly important to some regional economies and the viability of small towns.

SOCIAL VALUES

Native vegetation is an integral part of both Indigenous and non-Indigenous Australian culture, and our culture and society have significant impacts on the way that we use and manage it.

There are social values additional to those stemming from the economic values listed above. Public land in fragmented landscapes can provide opportunities for social interactions and for creating or supporting social networks. Many local community groups focus on maintaining and improving the quality of locally important remnants of native vegetation. The visual and landscape amenity of mature roadside vegetation in rural landscapes (e.g. northeast Victoria or the Great Ocean Road) contribute to enjoyment of driving and a sense of well being. As well as their accessibility for the sorts of recreational activities listed earlier, many people choose to live in particular areas because of the landscape character largely provided by the remnant native vegetation of the area – the examples are plentiful from all around the state in places such as Daylesford, Beechworth, Kinglake, Maldon, the Grampians, the Otways, along the Murray River, the Yarra Valley, the Ovens Valley, the ironbark forests, the Gippsland Lakes and the Dandenongs.

Native vegetation and associated biodiversity are appreciated by much of the wider community for their intrinsic values. Many recognise and value the vital ecosystem services that native vegetation provides to humanity. This includes direct appreciation of the visual amenity of animals and plants. Large mammals, birds and wildflowers are particularly conspicuous and are often the focus of recreational activities such as bushwalking, bird watching and camping. Iconic species such as malleefowl, Murray cod and lyrebirds are often the focus of volunteer groups involved in conservation programs and provide a depth of understanding and empathy to people's engagement with the bush.

2.3 Cost-effectiveness of improving ecological connectivity

In developing the recommendations in chapter 4 of this report, VEAC has identified a cost-effective approach to improving ecological connectivity in fragmented landscapes. Given the geographic and thematic scales of the problem, and the great difference between the costs of inaction and the benefits of prompt action, the recommendations represent a very modest investment at the overall state budget scale. This is particularly so given the opportunities to work under and with existing programs, inspire substantial contributions from volunteers and attract funding from other sources. The recommendations focus strongly on approaches that have proven successful in the past (chapter 3) and aim to integrate with current and future key developments in legislation, policy and research.

The benefits of prompt action are important to state. Apart from the loss of the biodiversity values themselves, revegetation and rehabilitation of degraded landscapes is many orders of magnitude more costly than preventing further loss and improving the condition of moderately degraded existing native vegetation. Despite the tempering of many threats in recent decades, Victoria's biodiversity remains in steady decline. Delays in mitigating losses now will not only increase costs in the future, but will lead to irreversible losses. Without action we are very likely to lose more of our iconic species and some numerous and widespread species will become much rarer and localised.

2.4 Bioregional priorities

OVERVIEW

Based on the statewide and bioregional analysis presented in chapters 4 and 5 of the discussion paper, this section explores the priorities for action on remnant native vegetation where the need is urgent i.e. in the 14 bioregions where clearing native vegetation has been most extensive. These priorities form the basis to guide the development of new, or augmentation of existing, action programs for conservation in each bioregion.

The key findings of the statewide analysis of remnant native vegetation found that 21 of the 28 bioregions were heavily or moderately cleared. Within the heavily cleared bioregions, road reserves were significant in the proportion of native vegetation they supported. The condition and connectivity of remnant native vegetation was found to be generally better on public land than on private land. Statewide, there are some 2.7 million patches of native vegetation, the vast majority of which are less than one hectare in size.

The accounts below are presented in order from the most to the least cleared of the 14 bioregions considered. Although the 14 least cleared Victorian bioregions are not considered in detail here, the principles and recommendations presented in this report still apply where appropriate in these bioregions.

The characteristics of each bioregion below are discussed with reference to the actions that will most assist in the enhancement and protection of remnant native vegetation. Because each of the bioregions has unique attributes, the emphasis on priorities and targets for action vary. Even within each bioregion, there may be different priorities for different landscapes. It is important to note that these priorities cannot be comprehensive at finer scales. The analysis presented by VEAC used native vegetation as a surrogate for all biodiversity and does not take into account the distribution and conservation status of individual fauna and flora species, for example. Consequently, the development of biodiversity action programs will entail more detailed spatial analysis and consideration of threatening processes.

Victorian Volcanic Plain



Although this is the most cleared bioregion in Victoria, there is considerable variation in the extent of native vegetation remaining in different parts of the bioregion. Four divisions are apparent.

- ▶ West of Caramut, the proportion of native vegetation remaining is generally higher than elsewhere and there are some especially large, good condition blocks in the extreme east at Mount Napier, Mount Eccles, Annya and Narrawong – albeit dominated by forests and woodlands rather than the grassy plains characteristic of the rest of the bioregion.
- ▶ The central part of the bioregion is the most heavily cleared.
- ▶ The area around Lake Corangamite extending north to around Rokewood supports proportionately more native vegetation than the central area.
- ▶ The area east of about Shelford and particularly west and north of Werribee also supports proportionately more native vegetation than the central area.

In all these areas, a high proportion of native vegetation is on private land, so measures to facilitate conservation actions on private land and across the public-private interface would be expected to have a prominent place here. This also applies to road and rail reserves; a little less so in the west and around Lake Corangamite where these reserves are not as predominant. More public land has been alienated in this bioregion than in any other, so there are unlikely to be many opportunities to improve ecological connectivity along water frontages, or through enhancing the protected area system or the management of small public land reserves. The Lake Corangamite hinterland and, in particular, the western part of the bioregion may be an exception in this regard. The combination of high levels of loss and fragmentation of native vegetation, and the complexities of native grassland management mean that landscapes in this bioregion require detailed planning to identify fine-scale opportunities to improve ecological connectivity.

Several recent initiatives in this bioregion reflect the nature of this setting; for example, the establishment of a Volcanic Plains Conservation Management Network, and the designation of public acquisition overlays for planned public conservation reserves on the Werribee Plains.

Wimmera



The Wimmera is one of Victoria's most cleared bioregions, with two distinctly different zones of clearing patterns.

- ▶ The eastern, central and northwest Wimmera are the most heavily cleared, with public land native vegetation occurring very largely as roadside or fragmented remnants. In some of these landscapes large paddock trees have been comprehensively cleared for broadacre cropping. Some exceptions include areas surrounding Lake Buloke, Donald and Cope Cope.
- ▶ In the southwest of the bioregion, moderate to large-sized remnants remain associated with ancient beach ridges. These include Mount Arapiles–Tooan State Park and Jilpanger and Tallageira Nature Conservation Reserves. Some of these reserves support the most southerly populations of mallee-associated fauna and flora. Connectivity in these areas is relatively high. A finger of the bioregion in the southeast between the Grampians and Goldfield bioregions retains moderate to highly connected remnants.

In the east and northwest of the bioregion, private land supports highly fragmented and degraded remnant native vegetation so measures to facilitate conservation actions on private land and across the public-private interface would be expected to have a prominent place here. This also applies to road and rail reserves in these landscapes as they support a high proportion of the remnant native vegetation in this bioregion. The alienation of public land has been extensive in the centre of the bioregion and the opportunities to improve ecological connectivity are few, being limited largely to water frontages (e.g. Yarriambiak Creek) and road reserves. The southwest contains a large number of remnants and there are opportunities to fill gaps in the protected area system, particularly where land is not heavily committed to other uses.

The Wimmera bioregion has several active and high profile initiatives in habitat restoration including the Yarri Links program and Habitat 141, which evolved out of the Hindmarsh Biolink project.

Murray Mallee



The largest bioregion in Victoria is also one of the most uniformly cleared, beyond its relatively small area of largely-intact landscape in the northern Sunset Country. Road and rail reserves, along with fence lines and former channel lines, support a high proportion of remaining native vegetation in the bioregion and, in more localised landscapes, may be all that remains. A number of riparian zones associated with Lakes Tyrrell, Wahpool and Timboram, and the Wimmera River and Outlet Creek system including Lakes Albacutya and Hindmarsh, support native vegetation although they are relatively narrow strips. In addition, native vegetation on private land is scarce. Given these patterns, measures to facilitate conservation actions on private land and across the public-private interface would be expected to have a prominent place.

The landscape between the Murray-Sunset National Park and Wyperfeld/Big Desert reserve complex has some limited opportunities to fill gaps in the protected area system, particularly where land has not been committed to other uses. This landscape is strategically important for improving connectivity between reserves with similar vegetation communities.

Victorian Riverina



Much of this large bioregion is heavily fragmented and degraded. The patterns of clearing and site condition are relatively homogenous whether on public or private land. Most remaining native vegetation is on private land, and any large patches are of at least regional significance given the overall paucity of native vegetation. Despite being in relatively poor condition, several landscapes are relatively well connected.

As noted in the discussion paper, road reserves make a significant contribution to the total amount of native vegetation on public land. Measures to conserve and augment road reserves should have priority in this bioregion. Riparian vegetation along major rivers and streams is mostly on public land reserves, and likewise contributes substantially to the proportion of remaining native vegetation in the bioregion. However, because of grazing much of this vegetation is degraded. Both of these public land features typically abut private agricultural land so measures to facilitate conservation actions on private land and across the public-private interface would be appropriate for much of the bioregion.

This bioregion has a number of conservation programs, many of which focus on the protection and enhancement of the heavily depleted native grasslands on both public and private land. These include the Northern Plains Conservation Management Network in the northwest of the bioregion where Terrick Terrick National Park forms the nucleus of a number of conservation reserves and private land sites supporting the best remaining examples of this once widespread vegetation type. The grassland areas of the national park have been purchased from sheep farmers over the last 20 years. The high biodiversity values of these areas with a long history of sheep grazing illustrates the potential for manipulating grazing in sympathy with biodiversity conservation and is reflected in the 2009 Northern Plains Bush Tender scheme to assist private landholders to this end.

Warrnambool Plain and Otway Plain



These two relatively small adjacent bioregions are similar biophysically and in terms of their key landscape characteristics. Although not large bioregions, the Warrnambool Plain and the Otway Plain are heavily cleared. About 24 percent of remnant native vegetation remains with about half on private land. Most of the remaining native vegetation occurs in large-sized blocks in the foothills of the Otway Ranges, in the southwest of the Otway Plain bioregion and adjacent eastern end of the Warrnambool Plain. These remnants are of at least regional significance given the overall extent of vegetation clearance. Elsewhere, particularly further away from the Otway Ranges, the alienation of public land has been extensive and native vegetation has been cleared for agriculture or urban development.

Remaining native vegetation around Werribee, Geelong and on the Bellarine Peninsula is mainly grassy and heathy woodlands, and is threatened by urban expansion and semi-rural development. The narrow coastal reserve strip is also highly fragmented and is also threatened with further degradation and loss from increasing visitor numbers and residents drawn to the various attractions of the coast. In areas outside the urban fringes and the foothills of the Otway Ranges, road reserves support much of the remaining native vegetation, although to a lesser extent than other heavily cleared bioregions. The bioregion also supports a modest area of riparian vegetation along numerous rivers, small streams and creek systems. However, generally the site condition of riparian vegetation tends to be low and little is on public land water frontage. In these two bioregions opportunities to increase connectivity and site condition are somewhat limited; however where the potential exists, it would be predominately on road and rail reserves and water frontages. The combination of high levels of loss and fragmentation of native vegetation means that landscapes in these bioregions require detailed planning to identify fine-scale opportunities to improve ecological connectivity. Given the high proportion of remnant native vegetation on private land and linear public land reserves, measures to facilitate conservation actions on private land and across the public-private interface should be features of future programs.

In summary, these two bioregions are typical of the most cleared group of bioregions in that improved ecological connectivity requires attention to native vegetation on (1) private land and where it interfaces with public land; (2) along road and rail reserves; and (3) along stream frontages, albeit more on private land than other most cleared bioregions.

Gippsland Plain



The Gippsland Plain retains native vegetation of disparate pattern, reflecting a variety of land use histories in the bioregion. Five different districts are apparent.

- ▶ The western end of the bioregion encompasses the southeastern suburbs of Melbourne, and here remnants are few and of poor quality. Generally remnants occur in small public land reserves or road reserves. Despite this, they are highly valued by the community for their contribution to liveability.
- ▶ The Mornington Peninsula in the far west of the bioregion retains a large number of small, highly fragmented remnants, mostly on private land. Here incentives directed towards land owners for the conservation of native vegetation should have a high priority in programs to improve ecological connectivity.
- ▶ The far east to the centre of the bioregion near Rosedale (excluding the Gippsland Lakes area) supports patches of native vegetation that are small in size and highly fragmented. Incentives directed towards land owners for the conservation of native vegetation should have a high priority. River and stream frontages on public land also feature in this area. Where appropriate, negotiation of public land licences to meet conservation objectives is a high priority, along with measures to facilitate conservation actions across the public-private interface.
- ▶ In the north-central and south-central areas of the bioregion, alienation of public land has been extensive. Here native vegetation remnants are small and scattered, and occur mostly on private land, along public land water frontages and road and rail reserves. Where appropriate, negotiation of public land licences

to meet conservation objectives should be a high priority, along with measures to facilitate conservation actions across the public-private interface.

- ▶ The Gippsland Lakes area to Port Welshpool and inland to Rosedale retains blocks of remnant native vegetation of significant size, many of which are in the protected area system. However private land retains some large-size high quality conservation blocks and incentives for the conservation of native vegetation directed towards private land owners would be appropriate here. Furthermore, opportunities to fill gaps in the protected area system feature strongly within this landscape.

The contrast in the condition and connectivity of native vegetation at fine scales within the bioregion means that detailed planning is required to identify opportunities and priorities for ecological connectivity and enhancing the protected area system. For example, native vegetation along coastal areas is highly fragmented in some local landscapes but well connected in others. Likewise, within the highly cleared landscapes some local areas retain moderately sized blocks of remnant native vegetation and they need to be considered in the context of local land tenure and use, and conservation value.

Dundas Tablelands



The Dundas Tablelands occurs in two blocks, separated by the Greater Grampians bioregion. Both blocks have been heavily modified, although to a much lesser extent in areas adjoining the Greater Grampians and Glenelg Plain bioregions.

In the eastern block of the bioregion a very high proportion of remaining native vegetation occurs on private land and includes a large number of ephemeral wetlands. Site condition is generally poor, although connectivity in places is moderate to high, particularly northwest of Dunkeld. Throughout the entire eastern block remnant native vegetation associated with streams and wetlands is of poor to moderate site condition but is comparatively well connected compared to other most cleared bioregions. A number of major roads retain highly connected remnant native vegetation, albeit in poor condition. Improved management of road and rail reserves would result in considerable biodiversity gains in this bioregion. Within the eastern block, measures to facilitate conservation actions should focus on private land incentives, with particular regard to wetlands. Where appropriate, negotiation of public land licences to meet conservation objectives would contribute substantially to improving connectivity and site condition of remnant native vegetation. In addition conservation actions across the public-private interface should have a high priority.

The extent of landscape modification across the western block of the Dundas Tablelands varies substantially. The north-east flank of the block retains significant sized blocks of native vegetation, much of which is in the protected area system. The western half of the block is more heavily cleared than the east, notwithstanding larger patches on the periphery of the bioregion adjoining the Glenelg Plain bioregion. In the heavily modified landscapes, road reserves and public land water frontages retain a high proportion of remaining native vegetation. Where appropriate, negotiation of public land licences to meet conservation objectives should be a priority, along with measures to facilitate conservation actions across the public-private interface. With the exception of the highly modified landscapes, opportunities exist to enhance the protected area system and the management of small public land reserves.

Strzelecki Ranges



The pattern of vegetation clearance across the Strzelecki Ranges is sharply dichotomous, with areas of reasonably well connected remnant native vegetation adjoining heavily modified landscapes. The bioregion falls into two main districts.

- ▶ The eastern third of the bioregion retains extensive areas of reasonably well connected remnant native vegetation of high quality. Much of this occurs on public land, and as such there is potential for enhancing the protected reserve system within this area of the bioregion. This part of the bioregion is also scattered with numerous moderately sized remnants, both on small public land reserves and private land. Nevertheless where land has been cleared for agriculture, there are few small remnants remaining on private land or road reserves.
- ▶ The central and western part of the bioregion is generally heavily cleared, with the exception of the Mount Worth, Mt Eccles and Mirboo area. Some road reserves contribute substantially to the proportion of remaining native vegetation, although this tends to be highly localised. Moderately sized, scattered remnants occur throughout the region, particularly south of Moe and southeast of Leongatha.

With the exception of the public land in the east of the bioregion, a high proportion of remaining native vegetation is on private land so measures to facilitate conservation actions on private land and across the public-private interface should be prominent in future programs. This also applies to road and rail reserves, although this would be localised corresponding to where significant remnants remain. A number of public land water frontages traverse the bioregion, and where appropriate negotiation of public land licences to meet conservation objectives would contribute substantially to improving connectivity and site condition of remnant native vegetation. Native vegetation communities within this bioregion are under-represented in the system of protected areas and opportunities exist for enhancing the protected areas system and the conservation management of small public land reserves.

Murray Fans



The Murray Fans is one of the smallest of the most cleared bioregions. It is reasonably well connected structurally but contains native vegetation of poor to very poor site condition. The riparian zones of the recently active floodplains are mostly on public land and comprise mainly river red gum forests. These forests are of poor site condition mostly because of reduced floodplain inundation in recent years. Private land on the floodplain has been largely separated from flooding by levees, and native vegetation in these landscapes has degraded as a result of agricultural use.

Much of the area south of the floodplains has been intensively developed for irrigated agriculture. The irrigation districts once supported expansive Plains Grassy Woodlands dominated by grey box. Remnant native vegetation now mainly occurs on road reserves, along rivers and streams and as small remnants mostly on private land. Irrigation has increased soil moisture, often detrimentally to Plains Grassy Woodlands, while tending to favour weedy grasses. The change in hydrological processes is pervasive and has resulted in the site condition of native vegetation being equally poor on both public and private land. These changes are also prevalent in the western Victorian Riverina.

The configuration of remnant native vegetation and complexity of ecosystem function within this bioregion requires detailed planning to identify fine-scale opportunities to improve ecological connectivity. In this bioregion, opportunities for improving the quality and extent of native vegetation requires attention to native vegetation (1) along road reserves, particularly where road reserves are important for threatened species; (2) on private land and where it interfaces with public land; and (3) along stream frontages. Measures to facilitate conservation of native vegetation on private land should be features of future programs, although priorities would be expected to be directed to areas where natural hydrological processes remain relatively unaltered or can be managed to minimise impacts on native vegetation.

Of the current activities improving ecological connectivity in this bioregion, the Superb Parrot Project deserves special mention. The project has been working for several decades now to improve native vegetation on and adjacent to road reserves and small remnants of Plains Grassy Woodland near the southern boundary of Barmah forest. Formerly widespread, the Victorian distribution of the superb parrot is now restricted to this area, where the birds nest in mature river red gums in the forest and feed in the nearby Plains Grassy Woodlands. Through activities such as planting of shrubs within these remnants, and fencing and regeneration of adjoining areas (usually private farmland), the project has been able to draw the local community together to assist in stabilising the Victorian population of this nationally vulnerable species.

Central Victorian Uplands



The Central Victorian Uplands is a large bioregion covering the hills of the Victorian Midlands from near Ararat almost to Myrtleford. However, the bioregion is by no means consolidated, being broken up into numerous isolated or narrowly connected blocks, many of them small or with convoluted boundaries. As noted in the discussion paper, the Central Victorian Uplands is notable for the generally poor site condition of its remnant native vegetation relative to other moderately cleared bioregions. This is a consequence of its land use history, notably gold mining in places such as Ballarat, heavy farming use of the relatively fertile valleys and river flats bisecting the hills, and long period of wood product harvesting from the easily accessed forests. The varied topographic relief and relatively high rainfall of the Central Victorian Uplands are also atypical of more cleared bioregions and result in a denser network of riparian strips, including public land stream frontages, than most such bioregions.

As for other bioregions with comparable levels of native vegetation loss, a significant proportion of remnant native vegetation in the Central Victorian Uplands is on road and rail reserves which would therefore be a focus for endeavours to improve ecological connectivity. However, more than for these comparable bioregions, the generally poor condition of remnant native vegetation in the Central

Victorian Uplands suggests that there is greater need for extra management effort to arrest further degradation and pro-actively improve condition, particularly in small isolated public land blocks that currently receive little management attention. The work of the Ballarat Environment Network in managing many such reserves is a good example to this end (see chapter 3 for more details). Also, given the prominence of riparian strips in this bioregion, measures focusing on public and private stream frontages should be given a high priority.

Physical connectivity of native vegetation (i.e. landscape context) in the Central Victorian Uplands is reasonably good given its history of clearing. The relatively high proportion of remnant native vegetation on private land is often interwoven through the landscape with that on public land. Accordingly, measures to encourage management for biodiversity on private land and across the public-private interface are likely to be priorities.

Finally, as flagged in the discussion paper, the Central Victorian Uplands protected area system represents considerably less of its original native vegetation than the statewide average, despite having a moderate overall level of public land.

Glenelg Plain



The Glenelg Plain comprises of three blocks, each of which varies in the extent of vegetation loss and fragmentation at local scales.

- ▶ The northwest block between Dergholm and Chetwynd retains native vegetation that is highly connected and of good site condition with the vast majority on public land.
- ▶ The northern block (west of Langkoop) is a mix of highly connected native vegetation on public land and a highly modified landscape, the latter mostly on private land. The level of connectivity of remnant native vegetation in the modified landscape varies, although overall site condition is low. A high proportion of road reserves contain native vegetation.
- ▶ The main block of the Glenelg Plain is generally dichotomous in pattern and extent of vegetation fragmentation and loss. The centre of the bioregion to the South Australian boarder is heavily cleared, as are areas flanking the Bridgewater and Victorian Volcanic Plain bioregions. Within these modified landscapes a high proportion of remaining native vegetation occurs on road reserves, water frontages and on private land. Moderately-sized public land blocks are also scattered within the landscape. In many instances these are structurally linked by vegetation on road reserves.

In the highly modified landscapes, the configuration of a scatter of small public land blocks, road reserves and water frontages with native vegetation means that the highly modified landscapes requires fine-scale planning for opportunities to increase connectivity. Also within the modified landscapes, incentives directed to private land owners should feature in future programs. Where appropriate, negotiation of public land licences to meet conservation objectives would contribute substantially to improving connectivity and site condition of remnant native vegetation. Elsewhere, large areas of public land provide opportunities to enhance the protected area system.

Northern Inland Slopes and Goldfields



The Northern Inland Slopes bioregion is discontinuous, with a number of outlying blocks in the west and centre surrounded by the highly cleared Victorian Riverina bioregion – the woodlands of Terrick Terrick National Park, west of Echuca, being a notable example. The Goldfields bioregion is more consolidated, comprising two large blocks separated by the Loddon River. Like the Central Victorian Uplands, the gold mining history of the Northern Inland Slopes and Goldfields is reflected in the site condition of native vegetation which is poor relative to other moderately cleared bioregions. Another shared feature is the relative abundance of riparian strips bisecting the foothills that comprise these three bioregions. Accordingly, any measures to improve ecological connectivity should focus on riparian areas and additional management effort to reverse the loss of site condition, particularly in isolated small public land blocks that currently receive little attention.

Also in common with the Central Victorian Uplands, the landscapes of the Northern Inland Slopes and Goldfields typically contain substantial areas of private land with native vegetation in a closely knit mosaic with native vegetation on public land, suggesting a priority should be given to encouraging effective action on private land and its boundaries with public land.

While the contribution of road and rail reserves to the extent of remnant native vegetation in the Northern Inland Slopes and Goldfields is not as great as in other more cleared bioregions, these reserves often have features – notably large old trees – that are rare in the generally poor condition native vegetation of the bioregions and certainly warrant consideration in programs to improve ecological connectivity.

3

CASE STUDIES

3.1 Introduction

As highlighted in chapter 2, biodiversity in Victoria is in decline, especially in fragmented landscapes. Over the past two decades a large number of community-based networks for the conservation of biodiversity within fragmented landscapes have evolved in rural and semi-rural areas of Victoria. Many have arisen from grassroots community conservation groups and land managers, and some have been initiated in the first instance by government. Several have evolved under the umbrella of Conservation Management Networks (detailed below), and others are autonomous although they all seek to achieve the same fundamental objective: to improve the conservation of biodiversity and ecosystem function within their neighbourhood.

This investigation has identified the difficulty in translating statewide strategies and priorities into on-ground actions. The need to develop finer-scale plans to implement statewide strategies and priorities was recognised by DSE's predecessor, the Department of Natural Resources and Environment. In the late 1990s and early 2000s biodiversity plans for local landscapes were developed for a number of bioregions. They identified priorities and mapped significant areas for native biodiversity conservation. However in many cases these plans were not translated into action.

Many grassroots organisations have achieved significant gains in local conservation, through partnerships with interested individuals, local government, state government agencies, land managers and industry groups. The case studies described below give details of some successful examples drawn from the many current programs in Victoria, as well as an example from overseas.

First discussed is the United Kingdom Biodiversity Action Plan (UK BAP). Unlike most of the Victorian conservation programs in fragmented landscapes, the UK BAP was a national government initiative, is comprehensive in area (the entire United Kingdom) and dovetails policy and legislation with multi-scale plans and local landscape actions. Significant elements of the UK BAP are that the framework is well resourced, a range of partnerships are involved, biodiversity objectives and actions are specified, and outcomes are documented through a national reporting system.

The remaining case studies are presented to illustrate how a number of Victorian community-based conservation networks have evolved, the focus of biodiversity priorities and the range of partnerships involved. The success of these groups lies in their ability to work across land tenures with a range of partnerships. The critical components of these programs that have contributed to their success is that they have endured over a relatively long period; frequently key individuals have maintained momentum, particularly in developing partnerships; and information is shared across tenures and management agencies.

3.2 Case studies

UNITED KINGDOM BIODIVERSITY ACTION PLAN

The United Kingdom Biodiversity Action Plan (UK BAP) commenced in 1994 as part of the UK response to the 1993 Convention on Biological Diversity. The UK BAP integrates existing instruments and programs for nature conservation throughout the UK. It sets specific biological targets and actions for the recovery of species for a 20 year period to drive forward their conservation.

Government-based conservation of biodiversity in the United Kingdom sits within an international framework that includes commitments under the Convention on Biological Diversity and various European Union agreements. The UK BAP framework is, in turn, supported by strategies for each country (Wales, England, Northern Ireland and Scotland) and delivery programs for the United Kingdom's international policy and legislative commitments. Each country has its own priorities which reflect different responsibilities, needs and views at local scales (see www.ukbap.org.uk).

The UK BAP approach is an integrated one, linking top-down biodiversity strategies and policy with local-scale biodiversity priorities, actions and objectives delivered through partnerships. The key elements to this approach are:

- ▶ legislative mechanisms and policy to guide country-wide priorities
- ▶ multi-scale strategies incorporating targets, guiding scientific principles and research
- ▶ specified on-ground actions, objectives and targets
- ▶ measurable benchmarks
- ▶ standardised national reporting.

The relevance of the UK BAP to the landscapes of Victoria, despite the much longer duration of agricultural use in the landscapes of the United Kingdom, is that the overall pattern of biodiversity and habitat scattered through and operating within an intensively agricultural matrix is similar. Another key similarity is the administrative and social settings of the two places, stemming from a shared history in this regard.

UK Biodiversity Partnership

At the centre of the UK BAP is the UK Biodiversity Partnership. The UK Biodiversity Partnership is made up of a wide range of interest groups involved in biodiversity conservation. They include those who provide funds, amateur and professional experts, private individuals, business, government and non-government representatives and biodiversity conservation practitioners. A number of committees and specific groups have been set up to facilitate the involvement of the various stakeholders in the appropriate context for each of them: e.g. an information and reporting group, groups at different geographic or administrative scales (national, county, etc), and specialists habitat groups.

Local Biodiversity Action Plans

In practice, conservation in fragmented landscapes largely occurs at local scales, and consequently local plans and actions are needed. The UK BAP has a series of Local Biodiversity Action Plans (LBAPs) that detail geographical coverage, funding, partnerships, status of initiatives, individual species and habitat action plans in local landscapes.

The LBAPs cover individual counties (mostly between 50,000 and 400,000 hectares in area) and the number and membership of partnerships varies according to local interest groups. The species and habitats listed for action reflect national and local priorities. The LBAPs detail

actions and measurable targets e.g. to establish 100 new populations in unoccupied habitat by 2015. Outcomes of actions are reported on annually to a national body so that trends, declines and increases are accurately documented.

The advantage of the LBAP approach is that individuals working in local areas are able to identify opportunities in the local landscape for conservation programs. This may include for example, developing new partnerships or identifying and prioritising sites for conservation targets. Links to UK LBAPs can be found under the UK Biodiversity Partnership dropdown menu at www.ukbap.org.uk/

VICTORIAN CONSERVATION MANAGEMENT NETWORKS

Conservation Management Networks (CMNs) are both a physical and a social network across a landscape bringing together groups to improve land management and biodiversity outcomes. CMNs typically focus on the protection, management and enhancement of a particular vegetation community or species that is threatened or under-represented in the conservation reserve system. CMNs create opportunities for the protection of biodiversity and improved land management practices within their region. They develop and assist in the delivery of planning, research and a range of on-ground actions.

The physical basis of a CMN is a network of public and private land, usually with some level of conservation protection such as a Trust for Nature covenant or protected area status. Often the network contains significant parcels of public land of high biodiversity value. During the past decade ten CMNs have been established across the state, each with their own direction and links to the community but working to a statewide Strategic Plan. The current CMNs are the Mid-Loddon, Wedderburn, Whroo Goldfields, Broken-Boosey, East Gippsland Rainforest, Gippsland Plains, Northern Plains, Victorian Volcanic Plains and Longwood Plains CMNs with the latest CMN being established in the Kara Kara area south of St Arnaud.

The social network of CMNs is made up of government agencies, conservation organisations, agribusiness, scientists, individuals, landholders and investors who own or manage land or in some way influence biodiversity outcomes within the CMN area. The social network provides an opportunity for these relationships to be strengthened by sharing ideas, experience and knowledge.

There are two organisational models of CMNs in Victoria. Firstly, there are those that are housed by a lead agency and these have generally been initiated by government in high priority conservation areas (e.g. Broken-Boosey CMN). Secondly, there are those CMNs that are independent entities under the *Associations Incorporation Act 1981* (e.g. East Gippsland Rainforest CMN). These CMNs have arisen out of grass roots community action. The strength of this institutional arrangement is that no one central agency has responsibility for or control over all CMNs. Decision making is devolved to those with an understanding of local environmental issues and community. This arrangement makes CMNs flexible and able to respond to changes in their institutional environment. As a result, there is considerable diversity in the scope and operations of CMNs, not able to be fully covered in the three examples detailed below and not always equally applicable to the issues grappled with in this investigation.

With the expansion of CMNs across the state there was a need to strengthen the role and directions of CMNs whilst maintaining their diversity within each network. A statewide Strategic Plan was launched in 2008 to guide CMNs into the medium term. As a result of the plan a statewide advisory group has been established made up of representatives of each CMN and major partners.

Facilitators are considered a crucial strength of CMNs. The number of facilitators within each CMN varies depending on funding arrangements. Aspects of this role that ensure CMNs achieve goals and objectives are:

- ▶ building and maintaining the momentum of the CMN
- ▶ providing a central contact within the CMN
- ▶ knowledge of the roles of the diverse agencies and partnerships
- ▶ essential sources of information
- ▶ providing continuity for projects and knowledge
- ▶ building and sustaining relationships with agencies and the community
- ▶ providing planning and coordination.

There are many challenges for CMNs, beyond the lack of consistent funding arrangements – particularly for facilitators. Challenges include maintaining momentum where resources are finite and largely dependent on in-kind community input and goodwill. There is a need to demonstrate the effectiveness of CMNs for funding arrangements and currently there is no framework within which this can occur. Reporting and monitoring is also an additional costing requirement. The Strategic Plan has established directions and actions for greater

consistency and knowledge sharing between CMNs. The CMN Strategic Plan can be found at www.dse.vic.gov.au ('conservation & environment' ➔ 'biodiversity' ➔ 'rural landscapes').

The different CMNs in the following examples demonstrate different features of successful programs. Common to all of them, however, is a measure of broader oversight and support provided by the statewide advisory group, the coordination and clarity provided by a facilitator, and a flagship species or habitat which often provides a focus which facilitates the translation of broader priorities into local action.

Longwood Plains CMN

The Longwood Plains cover approximately 137,000 hectares of riverine plain between the Goulburn River and Strathbogie Ranges on northeast Victoria.

The Longwood Plains are predominantly freehold (97 percent) and contain few public land reserves. The largest protected area is the Balmattum Nature Conservation Reserve (220 hectares). Due to extensive clearing for agriculture, the plains only retain about 4 percent of their original native vegetation, with about 80 percent of remaining tree cover concentrated in road reserves and riparian areas. The road reserves and creek lines that bisect the landscape are particularly noted for outstanding examples of mature woodland trees of high habitat value.

Despite the extensive loss of habitat, the Longwood Plains are a stronghold for four threatened fauna species dependent on mature woodland habitat: grey-crowned babbler, squirrel glider, brush-tailed phascogale and tree goanna. The woodlands also support substantial populations of the endangered swift parrot and bush stone-curlew. Threatened plants include buloke mistletoe, Euroa guineaflower, Mueller's daisy and swamp leek-orchid.

Since the late 1980s there has been considerable research and conservation attention given to the Longwood Plains. This was due to the relative abundance of threatened species and degradation of creek lines. By the mid 1990s a range of on-ground projects had been initiated to help improve the status of threatened species and the condition of the creeks. Evolving from an initial trial of the state government's Biodiversity Action Plan program the Longwood Plains Biodiversity Project commenced in 2001 with funding from the Department of Sustainability and Environment (DSE), the Goulburn Broken Catchment Management Authority (GBCMA) and WorldWide Fund for Nature. This program became the Longwood Plains CMN.

Over the last decade Nagambie LandCare Group, Birds Australia, Euroa Environment Group, GBCMA, Department of Primary Industries, DSE, Parks Victoria, Trust for Nature and individual landholders have undertaken a series of projects focusing on augmenting linear remnants of vegetation along creek lines and road reserves. This has included extensive fencing, improving vegetation structure by revegetating understorey components and land covenants.

One of the outstanding themes, consistent throughout the history of work on Longwood Plains, has been the incorporation of science in all stages of the project, from planning to monitoring and reporting on implementation. As a result, in addition to a long list of activities undertaken, the project has a long and detailed record of demonstrable broad-scale achievements including:

- ▶ habitat protection and restoration works totalling more than 1,000 hectares, targeted to improve habitat availability and quality for the grey-crowned babbler, has resulted in a 50 percent increase in numbers where work has been undertaken
- ▶ an average 20 percent improvement in habitat quality at protected compared to unprotected sites
- ▶ increased species richness of woodland dependent birds in many habitat types.

Perhaps more than any other area in Victoria, the Longwood Plains demonstrates the extent of landscape-scale improvements that can be achieved with sustained effort – effort spanning more than two decades in this instance. The work undertaken over this period is also characterised by a focus on opportunities as opposed to a focus only on assets; clarity and coordination in planning and implementation; and the use of a flagship species (the grey-crowned babbler) which has assisted in the translation of statewide priorities to local application.

Wedderburn CMN

The Wedderburn CMN was established in 2003 and covers an area of approximately 170,000 hectares between Wedderburn and Wychitella in north central Victoria. The area includes fragmented public land and private properties important for the conservation of Box-Ironbark forests and woodlands. The Wedderburn CMN is made up of residents and landholders, along with representatives from the Loddon Shire Council, Department of Sustainability and Environment, Parks Victoria, Bush Heritage Australia and the North Central Catchment Management Authority.

The Wedderburn CMN covers an area that retains fragments of native vegetation in one of the most heavily cleared Box-Ironbark landscapes in Victoria. Despite this, these fragments still support a number of nationally threatened species. The malleefowl is the flagship species of the CMN, and other nationally threatened species in the area include the bandy bandy (snake), woodland blind snake, northern golden moth orchid, spiny rice-flower and Kamarooka mallee. Recently, the robust greenhood orchid – which was thought to be extinct, having not been seen for 70 years – was rediscovered in the area. Many of these species are particularly vulnerable to the effects of habitat fragmentation, or predation by foxes and feral domestic animals.

Significant activities initiated and supported by the Wedderburn CMN include:

- ▶ the purchase of the 245 hectares Nardoo Hills Reserve by Bush Heritage Australia
- ▶ indigenous seed collection and substantial protection and revegetation of malleefowl habitat
- ▶ fencing and direct seeding of wildlife corridors, particularly aimed at re-connecting fragments
- ▶ ecological thinning on both public and private land
- ▶ pest plant and animal (especially fox) control to reduce predation on malleefowl and other indigenous species
- ▶ education programs at local schools on the conservation of biodiversity
- ▶ targeted mosaic burns to enhance spiny rice-flower recovery.



The Wedderburn CMN exemplifies the potential for government initiation of successful local action programs. The CMN was initiated by the state government as part of the implementation of approved recommendations from the Environment Conservation Council (ECC) Box-Ironbark Investigation. From the large area covered by this investigation the ECC identified the Wedderburn area as a priority for the establishment of a CMN because of the fragmented distribution and tenure of native vegetation in the area, and the susceptibility of its numerous significant natural values to the effects of that fragmentation e.g. impacts of pest plants and animals.

Also worth mentioning here is the Broken-Boosey CMN, covering around 350,000 hectares centred on the Broken, Boosey and Nine Mile Creeks between Nathalia and Benalla. This CMN was also initiated by the state government following a recommendation in the ECC Box-Ironbark Investigation. Although the geography of this area differs somewhat from that around Wedderburn, the long narrow nature of the Broken-Boosey State Park and other protected areas around which the CMN is based generates a lengthy boundary with adjoining private landholders, and the CMN has been successful at addressing the consequent biodiversity and land management issues.

Gippsland Plains CMN

The Gippsland Plains CMN was formed in 2001, making it the second oldest CMN in Australia. It covers an area of around 70,000 hectares of fertile grassy woodlands, known locally as the Red Gum Plains, between Traralgon, Yarram and Bairnsdale. Only about 3 percent of the original Plains Grassy Woodland remains in this area.

Membership of the CMN includes about 80 managers and owners of land supporting native vegetation as well as Trust for Nature, Parks Victoria, DSE, VicRoads, Hancock Victorian Plantations, East and West Gippsland Catchment Management Authorities, East Gippsland Shire Council, Wellington Shire Council, and East Gippsland Rail Trail. The Gippsland Plains CMN maintains a close working relationship with the neighbouring East Gippsland Rainforest CMN.

The CMN was largely initiated through local Trust for Nature staff, and early efforts focused on establishing covenants with willing landholders to protect their native vegetation, particularly around the relatively small protected areas that existed at that time.

Since then the CMN has become well known in the region through a broad range of activities improving ecological connectivity including:

- ▶ addition of 2,700 hectares of private and public land to the protected area system
- ▶ brokering long-term protection of small private land remnants through section 69 agreements under the *Conservation, Forests and Lands Act 1987*
- ▶ fencing, grazing control and/or restoration of strategically located remnants
- ▶ the Scattered Trees Project to provide landholders with incentives to retain and recruit isolated paddock trees of the Red Gum Plains, including fencing of red gum and coast grey box trees, management plans for landholders and permanent protection of sites under Trust for Nature covenants
- ▶ installation of nest boxes for peregrine falcons.

Key features in the success of the Gippsland Plains CMN have been the coordination and clarity of the program sustained by familiar dedicated workers over the CMN's history, and assisted by the adoption of a cogent unifying flagship for the CMN and its activities, i.e. the key landform and its native vegetation of the Gippsland 'Red Gum' Plains. The CMN has also maintained a strong focus on linking land tenure, social setting, and cost-effective actions to identify and realise opportunities as they arise to improve management for biodiversity.

OTHER NETWORKS

Bass Coast LandCare Network

LandCare on the Bass Coast began in the late 1980s and the alignment of individual LandCare groups evolved into the Bass Coast LandCare Network (BCLN). The BCLN was formed in 2003 to promote sustainable land use and management. BCLN is made up of 11 LandCare groups which assist over 850 members (comprising around 65 percent of rural properties in the area) including landholders, urban residents, agencies and business groups. From French Island and Phillip Island in the west, the BCLN extends east to Korumburra and south to Inverloch.

The Bass Coast LandCare Network was formed to increase the effectiveness of broader scale network LandCare planning, provide greater opportunities for attracting funds for larger projects, enhance relationships with government agencies and sponsors, and improve coordination and exchange of information.

In contrast to CMNs, LandCare focuses on private landholders, although not exclusively given the diversity of cross-tenure partnerships and social networks.

The BCLN covers a range of socio-economic areas including coastal districts, farming landscapes and popular tourist destinations. As a result, the range of projects within the BCLN varies substantially. For example, projects include the fencing of native vegetation remnants, erosion stabilisation, riparian protection, direct seeding, incentives for weed control, rabbit control programs, and the installation of walkways along sensitive coastal reserves.

Major achievements under the BCLN umbrella include:

- ▶ training of eFARMER – a web based farm and catchment planning tool
- ▶ land stewardship training
- ▶ establishment of the Jack and Albert Riparian Restoration (JARR) Project to improve the environmental health and productivity of the Jack-Albert Catchment and Corner Inlet Catchment Ecosystem; this includes a Biodiversity Blueprint to coordinate on-ground works across the JARR area and make better use of investment streams
- ▶ revegetation manuals
- ▶ revegetation at high priority sites.

The oversight and support provided by BCLN to its member groups has been a major factor in its successes, the whole being greater than the sum of the parts. In particular, the broader network has enabled a level of

monitoring and evaluation of actions that is rarely possible in smaller, less well coordinated groups. Also, dating from before the formation of the network, the sustained history of action in the region has also been a major contributing factor to the network's success.

Ballarat Environmental Network

The Ballarat Environmental Network (BEN) was formed in 1993 as an umbrella group to link the many environment and conservation-focused groups in the Ballarat region (www.ben.org.au). An impetus for focus and formation of the group was the community's awareness of the continued degradation of public land in the region that contained significant stands of threatened flora.

BEN covers a broad area of central and southern Victoria that stretches west to east from Ararat to Bacchus Marsh and north to south from Avoca and Daylesford to Geelong and Colac. This area includes parts of the North Central, Corangamite, Glenelg Hopkins and Port Phillip Catchment Management Authority areas.

BEN initiated a program to assess, secure and manage remnants of native vegetation on public land reserves which have become part of the BEN Biodiversity Reserves network. BEN now actively manages about 45 reserves covering 800 hectares. To provide resources for this task, BEN has established a commercial arm, from which surplus profits are directed towards the maintenance of the reserves.

The major achievements of BEN are:

- ▶ the provision of on-ground actions through BEN Biodiversity Services
- ▶ support of the Ballarat Region Seedbank
- ▶ funding for woody weed control programs on Crown land in the Leigh and Woody Yaloak catchments
- ▶ in partnership with Ballarat University, formation of the Rare Trees Project to map and protect rare trees in the region
- ▶ production of the Wild Plants of the Ballarat Area CD-ROM
- ▶ the Right Environment Program (BEN 3BBB radio program)
- ▶ operation of the Greening Ballarat Community Nursery in partnership with the City of Ballarat and the University of Ballarat.

The history of BEN and its activities exemplifies the benefits of sustained action with a clear and well coordinated focus, and provides a model for devolved community management of small public land reserves.

4 RECOMMENDATIONS

As outlined in chapter 2, the remnant native vegetation of Victoria's fragmented landscapes provides a wide range of highly significant scenic, cultural, recreational, natural resource management, economic and ecological values. However, many of these values are under threat for a variety of reasons. Halting the loss of biodiversity, in particular, has widespread community support and a great deal of biodiversity conservation and restoration in these fragmented landscapes is achieved through community-driven and locally based projects.

Victorians are fortunate in having comprehensive spatially explicit mapping and fauna and flora databases available to identify and plan priorities for conservation. As described in the discussion paper, there are some 2.7 million patches of remnant native vegetation in Victoria and this sheer number makes them a challenge to manage with limited resources. This investigation has highlighted a need to improve the link between statewide strategies and priorities with local-scale opportunities for protection, management and restoration.

Preventing habitat loss and improving the condition of native vegetation is, by many orders of magnitude, more cost-effective than revegetation and has significantly better conservation outcomes. Revegetation has an important role but, because of the cost and resources required, revegetation should be strongly targeted to key strategic areas. Recognising the primacy of retaining and enhancing existing native vegetation, VEAC has identified several areas where prudent investment can achieve measurable conservation goals provided adequate resourcing is available.

VEAC's recommendations are aimed at consolidating management to improve biodiversity protection and increase ecological connectivity in fragmented landscapes. The objective is to build on the recent focus of attention on improving ecological resilience in landscapes and a functional understanding of biolinks as more than simply vegetation corridors. The challenge in the task lies in successfully working with the complexities resulting from the multitude of land tenures, the responsibilities of numerous government agencies and differing emphases and interests of the various stakeholders. VEAC has identified a cost-effective approach to improve the protection of remnant native vegetation and achieve the overarching goals of biodiversity conservation and mitigation against climate change.

In summary, VEAC is recommending:

- ▶ a biodiversity action program to translate statewide priorities into enduring action that make the most of opportunities in local landscapes, and improve coordination and clarity across land tenures and between stakeholders
- ▶ support for existing and new incentives for conservation of native vegetation on private land
- ▶ cataloguing the remnant native vegetation of road and rail reserves, which the investigation has revealed as making a significant contribution to ecological connectivity
- ▶ improving the conservation management of small and/or linear patches of remnant native vegetation on public land, including road and rail reserves, stream frontages and other small blocks
- ▶ public land use investigations of regions with scope to fill gaps in the protected area system
- ▶ continuing and expanding the collection and analyses of data on native vegetation
- ▶ improving the communication to interested stakeholders of information, policy and actions for the conservation of remnant native vegetation
- ▶ increasing awareness and understanding of the importance of and threats to remnant native vegetation
- ▶ resourcing for implementation of the recommendations.

INTEGRATED DELIVERY OF BIODIVERSITY ACTIONS

Over recent decades many strategies and plans with similar objectives to VEAC's recommendations have come and, in many instances, gone. Very often, implementation of these strategies has not matched the ambitious, well-intentioned and soundly-based objectives. The last thing needed now is another worthwhile strategy with insufficient attention to implementation. Accordingly, VEAC's recommendations focus strongly on translating statewide priorities (recommendations R2-R11) into sustained efforts to capitalise on opportunities in local landscapes (R1).

The vast number and broad scattering of remnant native vegetation patches across different land tenures requires a whole of landscape approach to conservation planning and action. The science of landscape ecology is complex and its application is crucial for conservation. However, there is a perennial difficulty in translating this science into effective strategic on-ground action. Highlighted in the community workshops (see chapter 1) was the demand by local government, conservation and community groups for guidance to maximise the effectiveness of their actions. There is an abundance of goodwill, energy and enthusiasm to assist, as well as not inconsiderable other resources, but people want to know what is best to do and how and where to do it. Very often there seems to be great difficulty translating higher level (e.g. statewide) initiatives and priorities into local landscape initiatives and priorities.

About 15 years ago Biodiversity Action Plans (BAPs) were conceived and developed for some areas by the then Department of Natural Resources and Environment. The purpose of BAPs was to summarise at the landscape level the key biodiversity assets, actions and tools required to achieve statewide biodiversity goals and thereby initiate on-ground action. The BAP framework aimed to integrate a top-down approach – identifying priorities for action – and linking these with on-ground partnerships. BAPs were developed for 57 of 160 local Landscape Zones (planning units), although the program stalled and they were not rolled out across the entire state. Versions of BAPs are now used as part of strategic biodiversity plans by some Catchment Management Authorities. Ultimately, though, on-ground action was not systematically linked with priorities for actions.

On the other hand, versions of BAPs have been and continue to be successfully implemented in the United Kingdom (see chapter 3, www.ukbap.org.uk), as have similar programs in other parts of the world. A number of characteristics recur as critical components of successful programs for biodiversity action in modified landscapes.

Sustained effort

Biodiversity conservation has wide community support and, collectively, volunteers are prepared to provide many millions of dollars in unpaid labour and additional resources over many years to this end. Many conservation programs are achieved through partnerships with local government, and community-based conservation groups and individuals (see chapter 3 for some examples). In contrast, government commitment in Australia has been characterised by short-term programs and priorities (e.g. One Billion Trees, Decade of LandCare, National Action Plan for Salinity, National Heritage Trust¹, National Heritage Trust², Caring for Our Country) rather than sustained long-term consistent effort. This situation is unlikely to change at the broad level, but successful programs have shown that continuity in locally-based strategic programs anchored with dedicated ongoing staff can tap into cyclic short-term funding arrangements and effectively deliver sustained effort.

Focus on opportunities

Biodiversity planning often focuses first on assets such as locations supporting high species richness or threatened species. However, these are not necessarily the locations presenting the best opportunities for action. When the focus is on action rather than planning, locations of these opportunities for action become more important than locations of assets, although asset locations are still an essential input to opportunity mapping (see figure 4.1).

Opportunity mapping requires a more intimate knowledge of the landscape, including the social setting: how the landscape might present opportunities to enhance biodiversity, which of those opportunities are the most cost-effective, and how the opportunities might change with changes in the social and natural landscape. Such knowledge frequently lies with individual paid and unpaid conservation practitioners, embedded in local communities, who are key players in local programs built up over many years. They frequently understand the intrinsic attributes of species and can link their future security with a specific part of a local landscape, e.g. where an unused road intersects with high quality riparian zone, when others may be unaware even of the existence of the unused road reserve. Importantly they are able to initiate dialogue with local land managers and planners, landholders and conservation groups to translate opportunities into actions. In Victoria there are a range of tools that willing landholders and conservation groups can draw upon to assist with on-ground conservation actions, and recommendations R2-R11 are designed to open up further opportunities.

Linking statewide priorities and local actions

One of the key findings of the Remnant Native Vegetation Investigation has been the need to overcome impediments to the translation of broader strategic plans into local on-ground partnerships for action. There are many statewide strategic plans and programs in place or in development (e.g. the Strategy for Healthy Rivers, Estuaries and Wetlands; the Victorian Biodiversity Strategy, Parks Victoria's 2003 Conservation Reserves Management Strategy, DSE's NaturePrint initiative), and regional plans (e.g. Regional Catchment Strategies, Living Links) and landscape ecology principles guide biodiversity conservation at local scales. However, Victorian bioregions have differing biodiversity priorities that are largely a legacy of historical land uses. In addition they also have differing capacity in terms of human resources, socio-economic make-up and access to professional guidance. No single plan or model can therefore be expected to be effective across all areas and at all scales. However, the broad principle of having a local coordinator to identify and capitalise on opportunities to improve biodiversity conservation is likely to be widely applicable.

Figure 4.1 is an opportunity map for a fictional typical landscape. It illustrates the way in which opportunities to activate statewide priorities could be realised in local landscapes, and the links between actions for biodiversity conservation and land tenure and management.

Coordination and clarity

One of the inherent problems in programs for improving ecological connectivity is the large number of stakeholders involved. In a situation where these stakeholders are well coordinated and roles and responsibilities are clear, this is a strength, building resilience into programs by avoiding over-dependence on one or a few key players. However, in many landscapes the large number of people, organisations, land tenures and existing programs are confusing for many people. In a sustained program bringing together all the opportunities for action, the key contact in any local landscape would be easily contacted to explain the local program and its relationship to the various stakeholders, specific activities and different land tenures. Often, successful local or regional programs have used a distinctive local environmental feature, such as the grey-crowned babbler or Gippsland's red gum plains, to represent the program and this enhances the identity, recognition and clarity around the program.

The recommended biodiversity action program is not intended to add to the already complex list of stakeholders, strategies and programs in local landscapes. Rather, it would bring together and assist

existing activities, and replicate them in other places where the opportunities exist. As shown in chapter 3, there are some landscapes in which something close to the recommended biodiversity action program is already in place. However, in many other landscapes little is happening to improve ecological connectivity, or the activities already underway – however effective – are capitalising on only a subset of the potential opportunities.

Broader oversight and support

While realising opportunities in local landscapes is the focus of the recommended biodiversity action program, other key elements are required at the regional and statewide levels. The region (e.g. CMA region) is the most appropriate level at which to provide administrative support to local programs and coordinators, to prioritise local landscapes, and to convene a consultative committee with representatives from key stakeholders commonly involved in the local programs across the region: e.g. private landholders, local government, VicRoads, conservation and friends groups and other volunteers, LandCare groups, Trust for Nature, conservation management networks, VicTrack, the CMA, DSE, and DPI. The statewide level is the appropriate one for initiating, driving, overseeing, coordinating, monitoring and reporting on the overall program, and prioritising regions for action.

In conclusion, there are a number of features which characterise the recommended biodiversity action program, especially in the context of existing and earlier initiatives:

- ▶ the focus is on actions, not planning, and on opportunities as well as assets
- ▶ the program will not duplicate existing successful activities and personnel, but replicate them to other landscapes and bring all relevant activities into a coherent framework
- ▶ implementation can be staged and prioritised across fragmented landscapes
- ▶ the model allows flexibility to accommodate environmental and social differences between landscapes.

Guidelines for prioritising the establishment of local programs

The following guidelines give an indication of how VEAC envisages its recommended biodiversity action program would be established in local landscapes. There are many landscapes that would benefit from a local program, so some basis is required for identifying those for establishment in the initial phase. In the first instance, it would be sensible to prioritise landscapes:

1. where there is a clear need for improved ecological connectivity and biodiversity conservation
2. where there is at least moderate community interest or activity towards improving ecological connectivity
3. where there is not already a high level of activity
4. so that collectively they are spread across regions (e.g. CMA regions except East Gippsland which has little land outside largely-intact landscapes); ideally at least two in each CMA
5. so that collectively they are spread across bioregions in order to cover variations in landscapes
6. that have achievable initial outcomes.

Based on these guidelines, the initial implementation of local programs might have the following geographic spread, for an initial total of around 20 local programs:

Bioregion	Initial number of local programs
Victorian Volcanic Plain	3-4
Wimmera	2-3
Warrnambool Plain	0-1
Murray Mallee	2-4
Victorian Riverina	2-3
Gippsland Plain	2-3
Dundas Tablelands	1
Strzelecki Ranges	1
Otway Plain	0-1
Murray Fans	0-1
Central Victorian Uplands	2-3
Glenelg Plain	1
Northern Inland Slopes	1
Goldfields	2-3

RECOMMENDATION

Integrated delivery of biodiversity actions

R1

Government support the integrated on-ground delivery of biodiversity actions by progressively establishing – in general accordance with the guidelines on page 39 – an ongoing program across fragmented landscapes in Victoria, at three levels:

- a) *local* programs for all suitable landscapes with a nominated coordinator from an appropriate agency to enhance existing programs and drive planning and implementation, focusing on mapping and realising opportunities to improve ecological connectivity
- b) *regional* administrative support, prioritisation of local programs building on existing expertise and initiatives, and support for a stakeholder steering committee
- c) *statewide* coordination of program establishment, regional prioritisation, reporting and monitoring.

CMA region	Initial number of local programs
Mallee	2-4
North Central	3-4
Goulburn Broken	2-3
North East	1-2
Wimmera	2-4
Glenelg Hopkins	2-3
Corangamite	2-3
Port Phillip	3
West Gippsland	3
East Gippsland	0

Figure 4.1

SAMPLE DRAFT OPPORTUNITY MAP FOR PART OF A FICTIONAL BIODIVERSITY ACTION PROGRAM LANDSCAPE



INCENTIVES FOR BIODIVERSITY ACTIONS ON PRIVATE LAND

The discussion paper identified 50.2 percent of remnant native vegetation occurs on private land, and compared to public land has generally poorer site condition and is less well connected. Generally private land contains the greater proportion of remnant native vegetation in the most cleared and moderately cleared landscapes, which also support a disproportionate number of threatened species.

There is a wealth of relatively recent and authoritative material available in the international and national literature outlining the range of mechanisms that can be used to generate biodiversity conservation on private land. In Australia, CSIRO identified mechanisms for intervention in three categories: regulation; market and non-market based incentives; and other measures including the provision of information and support, and moral suasion. Another typology is as follows:

- ▶ property rights tools e.g. covenants, easements etc
- ▶ tax policies
- ▶ incentive-based tools including all market-based instruments
- ▶ private-public partnerships
- ▶ government programs
- ▶ voluntary initiatives.

Some general points can be made from a review of international experience:

- ▶ a crucial question is whether incentives should simply reimburse for additional costs or also for foregone income
- ▶ the voluntary nature of many schemes entails a degree of self-selection, and may result in poor targeting
- ▶ evidence from psychology and experimental economics suggests that extrinsic incentives can crowd out the intrinsic motivations that underlie voluntary contributions – and may even decrease overall public good provision
- ▶ decision-making costs can be very high: information on biodiversity, preferences and production costs, and negotiation costs
- ▶ some commentators suggest that a focus on individual contracts and payments in many schemes may work against coherent and integrated biodiversity protection.

Before 2000, payments to landholders for conservation management generally took the form of one-off grants in Australia. In other countries payments have been more frequently linked to management agreements over time, and tax relief is also common in some countries. Australia has been identified as having a taxation system that provides strong disincentive towards conservation. In the last decade Victoria has been at the forefront in trialling market-based instruments utilising auction systems such as BushTender.

There seems to be some scope to broaden the range of instruments utilised in Victoria learning from the experiences in other countries, while keeping in mind that the setting is critical. For example, some schemes in the European Union and the United States have developed in the context of subsidised agriculture which makes them very costly. In particular, the assessment and extension of incentives and other mechanisms to encourage landholders to conserve native vegetation on adjacent linear strips or patches of public land is worthy of further assessment and application. There is a significant body of work in Victoria on the effectiveness of different types of incentives for primary producers that may provide some guidance here, as will the major research project aimed at understanding the drivers of land use change that influence the maintenance of biodiversity.

RECOMMENDATIONS

Incentives for biodiversity actions on private land and the public land-private land interface

R2

Government continue to support and expand existing programs to encourage and assist private landholders to contribute to landscape connectivity and biodiversity enhancement on private land and adjacent public land.

R3

Government conduct an assessment of the wide range of potential mechanisms and incentives for private landholders to contribute to connectivity and biodiversity enhancement with a view to augmenting the range of mechanisms and incentives currently available.

ROAD AND RAIL RESERVES

The primary purpose of road and rail reserves is to provide access for the transport of people and goods. Often road and rail reserves also contain important infrastructure services such as water and gas pipelines, and telecommunication and power poles. Accordingly ongoing management of road and rail reserves is primarily for public safety, use and maintenance activities associated with transport and service utilities.

However, as shown in the discussion paper, road reserves (in use and unused) and rail reserves support a significant proportion of remnant native vegetation in fragmented landscapes. The investigation has revealed these linear reserves make a major contribution to ecological connectivity and in some landscapes provide key habitat for many species. Accordingly, VEAC has made a number of recommendations to maintain and enhance the contribution these linear strips of public land make to ecological connectivity while recognising the important transport role for which they were reserved in the first place.

Summary of recommendations

Most local councils have undertaken inventories of road reserves in use. Nevertheless, there are major gaps in the data, inconsistencies in the methods used and quality of data collected, no single repository, and the data are typically not readily available for interested stakeholders. No comprehensive native vegetation assessment and mapping of rail reserves has been undertaken. As part of an overall approach to improve conservation management of these linear features, VEAC is recommending a single comprehensive digital database be developed and surveys conducted to augment existing data (R4).

At present there is no statewide system to formally differentiate and improve the protection of significant native vegetation in road or rail reserves. The system of public land use categories has sometimes been applied to this end. For example, small nature conservation reserves have been designated in a few locations supporting nationally threatened plant populations. However, this approach has limited broader applicability, while the use of signs to identify strips of 'significant roadside vegetation' has been inconsistently and incompletely applied and affords little extra protection. Accordingly, VEAC is recommending that a simple system be developed to identify areas of significant native vegetation and that these be mapped for all appropriate road and rail reserves across the state (R5). It is expected that this system would utilise the methodologies employed in DSE's standard criteria for sites of biological significance (biosites) and adapt and build upon these if and as required.

Highlighted in the workshops and submissions was a need to improve work practices around native vegetation to minimise unnecessary impact. Many examples were given of contractors, for instance, unnecessarily or excessively destroying important native vegetation with heavy machinery. Usually this was considered to be done inadvertently and, with improved training contractors would be aware of the value of native vegetation, how to recognise it and how to minimise damage to it. It was also felt that such a program would also reduce direct damage – examples cited included bulldozing in a clearly signposted significant roadside area – by making operators aware of the broader community expectations and possible penalties. While the recommendation to address this issue (R6) is also applicable to machinery and other works undertaken in or near other remnant native vegetation, the overwhelming majority of such works are undertaken in road or rail reserves.

Managing biodiversity values on road and rail reserves is complex because of the multitude of stakeholders with diverse interests (e.g. local government, VicRoads, VicTrack, adjoining landholders, CFA, conservation groups, DSE, CMAs, the transport industry and other road users). VEAC is recommending an advisory committee with representatives from these interests to oversee, coordinate and provide a focus for improving the contribution of road and rail reserves to ecological connectivity (R7).

The Victorian Local Sustainability Accord is a successful model for bringing together state and local government interests to address environmental sustainability issues facing local governments. All 79 local governments are partners in the accord, which currently has a focus on climate change issues. There would seem to be scope to consider the inclusion of the recommended road and rail reserves advisory committee within the scope of the accord given the high priority placed on roadsides issues by local governments and highlighted in workshops and submissions. This would provide the framework and support required that was not adequately provided for the former statewide Roadsides Conservation Advisory Committee in the 1990s.

In the following background information, used and unused road reserves are considered together and then separately, and then rail reserves are considered.

Road reserves (used and unused)

One of the key findings of the Remnant Native Vegetation Investigation has been the surprisingly large proportion in some landscapes of native vegetation on road reserves. Road reserves form an extensive network across Victoria providing access for the movement of people as well as supporting significant tracts of remnant native vegetation. Often they are important easements for infrastructure such as stormwater drains, footpaths and utilities. Land set aside for roads is almost all Crown land resulting from reservation at the time of land survey for European settlement, but also includes some land purchased by VicRoads for specific road construction projects some of which have not been completed or even commenced. Land owned by state government entities is public land under the *Victorian Environmental Assessment Council Act 2001*.

Rural Victoria is criss-crossed by freeways, arterial, non-arterial (local) and unused road reserves. The width of these road reserves typically varies from one chain (20.1 metres) to three chains (60.3 metres) depending on their original intended use. In some places, road and railway reserves are five chains wide (100.6 metres). Local used roads may or may not be sealed, depending on the extent of their use. Road reserves, particularly local roads and unused roads, frequently retain significant stands of native vegetation and associated fauna.

Extent

The total area of used and unused road reserves in fragmented landscapes of Victoria is in the order of 555,000 hectares. About 245,000 hectares of road reserves support native vegetation, of which some 123,000 hectares are in use. The remaining 122,000 hectares are on unused road reserves, mostly in fragmented landscapes.

Landscape prioritisation

Road reserves account for a significant proportion of total remnant native vegetation on public land in three of Victoria's bioregions, namely the Victorian Riverina (27.8 percent), Wimmera (17.5 percent) and Dundas Tablelands (17.4 percent). However, at more local scales the significance of road reserves is even greater where surrounding landscapes have been most heavily cleared. The most notable such area straddles the boundary between the Wimmera and Murray Mallee bioregions where extensive tracts of land have been cleared for broadacre dryland cropping and patches of remnant vegetation outside the road reserves are small and isolated. A similar configuration occurs in the southwest and the Gippsland Plain, where woody and grassy plains have been replaced with exotic pastures for sheep and cattle grazing. Priority landscapes identified for road reserves and other landscape-scale features are given in table 4.1.

Table 4.1

Priority landscapes for road reserves

Location	Bioregions
High priority	
North-west and central-west Victoria, excluding northwest of the Murray Sunset National Park. Encompassing landscapes: <ul style="list-style-type: none"> • between the Sunset Country and the Murray River • between the Sunset Country and the Big Desert • the north and east parts of the Wimmera bioregion, south to the Grampians and west to the South Australian border 	<ul style="list-style-type: none"> • Murray Mallee • Wimmera, north and east of the Little Desert
Southwest Victoria, encompassing landscapes: <ul style="list-style-type: none"> • west of Geelong to the Dundas Tablelands excluding the Otway Ranges and Otway Plain 	<ul style="list-style-type: none"> • Victorian Volcanic Plain • Warrnambool Plain
Northern plains of Victoria, encompassing landscapes: <ul style="list-style-type: none"> • between Albury and Swan Hill south of the Murray River floodplain and north of the Goldfields bioregion 	<ul style="list-style-type: none"> • Victorian Riverina
Dundas Tablelands	<ul style="list-style-type: none"> • Dundas Tablelands
Central, south and west Gippsland, encompassing landscapes: <ul style="list-style-type: none"> • between the southern foothills of the Dividing Range and Wilsons Promontory and western Strzelecki Ranges, southeast of Melbourne and west of Bairnsdale 	<ul style="list-style-type: none"> • Gippsland Plain • Strzelecki Ranges
Moderate priority	
Far west of the Glenelg Plain along the South Australian border	<ul style="list-style-type: none"> • Glenelg Plain
Murray Fans between Albury and Swan Hill, centred on the Barmah and Gunbower forests	<ul style="list-style-type: none"> • Murray Fans
Lower northern foothills of the Dividing Range between Benalla and Corryong	<ul style="list-style-type: none"> • Northern Inland Slopes
Central Victoria between Stawell and Mansfield	<ul style="list-style-type: none"> • Goldfields • Central Victorian Uplands

Road reserves – in use

Social and economic values

In many areas of Victoria, roads and their reserves provide a sense of community identity. As well as being important for biodiversity, vegetation along road reserves offers scenic amenity and local character, often being the only distinctively Australian or regional feature in many landscapes. Roads are important for tourism, enhancing the economy of local communities. Examples of well-known tourist routes include the Pyrenees Highway, Great Ocean Road, Grand Ridge Road and the Great Alpine Road. Roadside vegetation provides shade and interest for motorists, reducing the monotony of long country drives. Road reserves also provide for recreational activities with associated pedestrian paths, cycling routes and rest areas.

Roads are an integral part of the Victorian economy, providing access for the movement of people, freight, services and utilities. Much of the Victorian economy relies on the efficient management of road networks. The Victorian arterial road network is estimated to carry more than 460 million tonnes of freight per annum and provides infrastructure for public and private transport.

Biodiversity values

Complemented with isolated remnants and rail reserves, road reserves provide important corridors and stepping stones to facilitate the movement of flora and fauna across fragmented landscapes. In many cases road reserves provide the best or only examples of native vegetation in heavily cleared, fertile landscapes such as the Victorian Riverina, Victorian Volcanic Plains and the Wimmera bioregions. In these and other heavily cleared landscapes,

Table 4.2

Responsible authorities for road types in Victoria

Type of Road	Approximate length (km)	Responsible Authority
Freeways (tollways)	61	VicRoads, ConnectEast, Transurban
Freeways	880	VicRoads
Arterial – urban and non-urban	21,500	VicRoads
Municipal	129,000	Municipal councils
Non-arterial State road, local roads and tracks	50,000	Department of Sustainability and Environment, Parks Victoria

not only do road reserves act as corridors but they also comprise much of the remaining crucial habitat for many species. Often these road reserves preserve structurally diverse vegetation with a mix of large hollow-bearing trees, small shrubs, and ground-layer herbs and grasses.

The major value in the road network system is its geographical extent. The network provides a skeleton upon which future revegetation and restoration of degraded habitat can be based for improving the population viability and conservation status of species in these landscapes. Opportunities for augmentation could include:

- ▶ nodes of intersections where overall vegetation extent is relatively greater than linear areas
- ▶ alongside intersecting waterways
- ▶ adjacent to small public land reserves
- ▶ connecting small strategic gaps to improve structural connectivity.

Responsible authorities and management

The management and maintenance of Victorian road reserves is shared primarily among municipal councils, the Department of Sustainability and Environment, VicRoads, Transurban and ConnectEast, depending on the type of road. VicRoads is responsible for the major freeways and arterial roads. Municipal councils are responsible for about 129,000 kilometres of rural roads, while the remainder of non-arterial State roads, minor roads, unused roads and tracks are the responsibility of the Department of Sustainability and Environment and Parks Victoria (table 4.2). The *Road Management Act 2004* and associated Regulations and Codes of Practice provide an overall management framework for roads. However, outside the major freeways and arterial roads, the responsibility for management of weed and pests on local rural road reserves has been contentious, with a lack of clarity as to whether adjoining landholders or municipal councils are responsible.

Assessment and cataloguing of the quality and extent of native vegetation along road reserves has been conducted around the state, but not systematically. Consequently a comprehensive statewide database of roadside vegetation and associated fauna does not exist.

Fire

The 2009 Victorian Bushfires Royal Commission acknowledged that differing objectives for road safety, biodiversity protection and bushfire prevention can be difficult to reconcile. The Commission's final report noted the unresolved tensions between mitigation of bushfire risk and environmental conservation in the approach to roadside clearing and the legislative complexities to do with road safety, biodiversity and bushfire risk mitigation that affect roadside management.

The Royal Commission noted that in the case of bushfires, roads and roadsides can be important fuel breaks, and that roads are also essential for people seeking to escape fires and for emergency services seeking access to fires. Since the 2009 fires land and road managers and the CFA have identified high-risk roads and are carrying out fuel-reduction work to reduce the future risks of bushfire.

As a general rule these findings are least applicable in the landscapes identified by VEAC as having high priority for road reserves (table 4.1). These landscapes are generally the most cleared in Victoria and as a result are less prone to catastrophic wild fires. They are also often relatively sparsely populated and likely to have alternative escape routes. Finally, the native vegetation in these landscapes is often too short or sparse to be likely to impede escape: e.g. mallee, grasslands and grassy woodlands. Given that the Royal Commission noted that roadside vegetation had little effect on the spread of fires, there is considerable scope for achieving favourable biodiversity conservation and fire protection outcomes in these landscapes.

Key issues

Native vegetation on road reserves is highly valued by the wider community for its biodiversity and its role in ecosystem function. Management of roadside vegetation was a major focus of all workshops and many submissions. Issues relating to road reserves vary depending on the region, personal perspectives and experiences, and the use of road reserves (see chapter 1 for community views). Nevertheless, VEAC identified key underlying themes, including:

- ▶ the need to clarify responsibility for local roads, particularly relating to weed and pest control; effective weed and pest control can only be achieved by coordinated responses by all local land managers
- ▶ inadequate resourcing for maintenance activities such as weed and pest control and fence maintenance; resourcing available to municipal councils is disproportionately low relative to the length of road reserves in rural areas
- ▶ the lack of enforcement by responsible authorities to illegal damage and removal of native vegetation
- ▶ inappropriate fuel reduction measures (mechanical or fire) that adversely impact on native vegetation. The 2009 Victorian Bushfires Royal Commission recommended changes to native vegetation retention controls to facilitate clearing of vegetation for fire protection. In some areas concerns were raised about inappropriate protocols leading to the replacement of native herbs and grasses that are considered a lower fire hazard
- ▶ the removal of coarse woody debris that provides shelter for ground-dwelling animals
- ▶ the removal of excessive vegetation alongside fences to protect fences from fires
- ▶ disturbance to soil and vegetation from fuel reduction, farm maintenance or road maintenance activities
- ▶ the need to increase awareness of the importance of native vegetation along roadsides, including formal training for on-ground maintenance staff and managers
- ▶ the potential for loss of biodiversity and other values along road reserves when other (non-transport) infrastructure is installed or renewed, especially when on a wide scale such as for the proposed national broadband network.

Unused road reserves

Unused road reserves are found throughout Victoria wherever land has been surveyed for settlement. They are the product of nineteenth century land-use planning that aimed to densely settle that part of Victoria that we now call fragmented landscapes. As part of this planning, an extensive network of linear reserves was surveyed and set aside for future roads. However because denser settlement did not eventuate, roads were never built on many of these road reserves, and others that were built fell into disuse, at least as public roads. These are now known as unused road reserves.

In terms of opportunities to improve ecological connectivity, unused road reserves differ from used road reserves in several respects. There has been no need to

manage unused road reserves for public safety as there is no built road. For example, there has been no need to clear vegetation to improve visibility or remove potentially dangerous trees that could fall onto roads.

The number of stakeholders is also small, comprising mainly adjoining landholders, the Department of Sustainability and Environment and in some cases, individuals and groups interested in local conservation. Because access is generally much more restricted there is typically less threat from weed invasion and activities such as firewood collection, rubbish dumping, fire protection works and disturbance to fauna, ground vegetation and soils.

The prevalence of unused road reserves transecting large rural properties has resulted in landholders using them as part of their farm activities via licence. Each licensee is responsible for management and control of the unused road reserve covered by the licence. The licence provides landholders a measure of control over activities that are carried out within the boundary of their property. This enables contiguity of land use and exclusion of incompatible or undesirable activities. Licensed unused roads are typically utilised for farm access, windbreaks, shelter for stock, grazing and cropping. In recent years, there has also been an increasing trend for licences to be held for conservation, although they do not provide long-term conservation security. Depending on the adjacent use of land, unused road reserves may or may not be fenced. In many areas unused roads have been fully integrated into the adjoining land use (e.g. for cropping) and are visually indistinguishable, while other unused roads – particularly those that have been fenced – retain native vegetation of variable condition and extent.

The absence of road maintenance activities and exclusion of other uses such as timber harvesting has resulted in some unused roads retaining locally significant stands of native vegetation and associated fauna. In heavily cleared regions such as the fertile flat lowlands, these stands of native vegetation frequently contain values such as endangered species of plants, native grasslands and large old trees that have been removed elsewhere in the landscape. The nature of these linear features also makes them important in structurally connecting native vegetation remnants.

Perhaps even more significant than their current values, unused road reserves hold great strategic potential to improve structural and ecological connectivity in many landscapes. Because they are public land, unused road reserves are potentially more readily available for actions to improve ecological connectivity than the private land they traverse. That is, their strategic potential for contributing

to ecological connectivity is often much greater than their extent or current values would initially indicate. They provide a focal point for those responsible for public land and biodiversity to demonstrate commitment to reversing biodiversity decline in otherwise generally hostile locations.

Extent

There are estimated to be about 122,000 hectares of unused road reserves in Victoria. Of these about 85,000 hectares are licensed to about 24,000 licences statewide with an average size of 3.5 hectares, although typically licences are contiguous with other road reserves making up linear features much greater than 3.5 hectares in size.

Social and economic values

Despite some contrary assertions or perceptions, unused roads are part of the Victorian public land estate. In many areas, unused roads are inconspicuous because all native vegetation has been degraded through land-use activities or neglect. However, where their native vegetation remains intact, unused roads frequently support significant biodiversity and are valued by members of local communities for their visual amenity

and biodiversity values.

Unused roads make a relatively minor economic contribution to licensees through direct gains in production. However, they can be integral to whole-of-farm activities, adding to their value for some licensees.

Biodiversity values

Very many unused road reserves have been historically used for agriculture and as a consequence about half of the total area of native vegetation is estimated to have been fully cleared of native vegetation, with a substantial remaining proportion in a degraded condition. Despite this, in some areas unused roads frequently contain biodiversity representative of local landscapes. The quality and extent of remnant biodiversity within unused road reserves varies depending on use. Unused road reserves grazed by stock tend to have no understorey, recruitment of trees is minimal and soils are damaged through compaction. Not all road reserves are heavily exploited by land holders. Unused road reserves may be fenced and strategically grazed to control weeds or excluded from grazing entirely.



An example of unused roads illustrating the differences in understorey structure of (from left to right) unfenced, fenced with access track, and fenced to exclude use.

Rail reserves

The rail network is made up of used railways and unused railways with closed tracks. The former includes the extensive metropolitan network, rural transport service (VLine) and freight service lines that do not carry passengers. Due to socio-economic changes, notably the rise of the private motor vehicle, and centralisation of freight transport in rural areas, many small branch lines have become uneconomic and been closed to rail use, usually with the tracks removed.

Extent

The cumulative length of rail reserve in Victoria (all public railways ever used) is around 7,600 kilometres. Of that, about 4,400 kilometres remains in use for rail transport, and about 1,000 kilometres is now used as recreational rail trails (see below). Of the remaining 2,200 kilometres no longer in use for rail transport or as rail trails, some is retained in public ownership as either Crown land or VicTrack freehold but some has also been sold to private landholders.

Social and economic values

Together with roads, railways are integral to the Victorian economy providing for the movement of people, services and freight. There are a number of volunteer and not-for-profit organisations that run limited tourism services along heritage lines, a famous example being the Puffing Billy Railway running from Belgrave to Gembrook. Disused assets such as heritage buildings and land are frequently leased to the community for social and cultural use. Parcels of land are also leased for agricultural use and to local councils for rail trails.

Rail trails are disused rail reserves that have been converted to multi-use paths for walking, cycling and horse riding. Some of these are on Crown land, others on VicTrack land leased to local municipalities. The characteristics of these trails – flat and gently sloping terrain in scenic areas – make them appealing to recreational users. There are currently nearly 50 rail trails in regional Victoria such as the Murray to Mountains (Wangaratta to Bright) rail trail, and more are proposed. Trails benefit local economies through the tourism they bring. Towns dotted along the trails offer accommodation, refreshments and other recreational opportunities.

Biodiversity values

Other than along and immediately adjacent to embankments and the tracks, there has been relatively little systematic clearing of native vegetation on rail reserves and, compared to road reserves, their more restricted access has also limited incremental removal of native vegetation. As a result, much of the rail reserve estate retains native vegetation, although their high edge to area ratio means that rail reserves are also prone to degradation from ‘edge effects’.

Where rail reserves retain native vegetation, more often than is usual it is of high conservation significance because of the historical absence of grazing by domestic stock and other unique aspects of their management histories. For example, prior to the introduction of diesel locomotives, rail reserves were managed by regular burning to prevent fires caused by sparks from steam locomotives. This management regime enhanced retention of native vegetation, particularly native grasslands, although in recent years the change of management and ongoing track maintenance is threatening the quality of remaining native vegetation. Nonetheless, rail reserves support a disproportionately high number of nationally significant grassland sites for instance. Like road reserves, rail reserves typically take the form of transects of native vegetation on public land through flat, often fertile landscapes which are otherwise largely cleared private land. As a result, they are more likely to support severely depleted vegetation types and their flora and fauna than other public land in such landscapes which tend to be the ‘left-over’ areas after the most fertile parts of the landscape were taken up for agriculture.

In 2006, VicTrack (the authority responsible for rail reserves) and the Department of Sustainability and Environment undertook a joint inventory identifying significant biosites (sites with significant biodiversity values) on rail reserves. Also, in partnership with LandCare, VicTrack sponsors restoration of native grasslands in and along railway reserves.

Responsible authorities and management

VicTrack is the responsible authority for rail reserves which are mostly either Crown land – which may or may not be vested in VicTrack – or VicTrack freehold land. Land owned by state government entities is public land under the *Victorian Environmental Assessment Council Act 2001*. VicTrack leases some of this land and various other assets to numerous parties including VLine, local community groups, councils and farmers. Responsibility for weed and pest management is with the leasee.

Key issues

The key issues impacting on native vegetation along rail reserves identified in VEAC's community consultations were similar to those for road reserves. The inaccessibility and inconspicuousness of rail reserves in the landscape, while reducing the likelihood of adverse impacts, also reduces the likelihood of detection should they occur. After a long period of relatively little change in the middle 20th century, recent decades have seen considerable change through corporatisation and privatisation of rail management and maintenance, development of rail trails, and new rail or major upgrades such as the Regional Fast Rail project. These sorts of changes are likely to continue into the foreseeable future and, unless appropriately managed, have the potential to impact on the significant role that rail reserves play in ecological connectivity. In addition, there has been little done to actively enhance this role.

Native vegetation of regional significance is often associated with rail reserves and the conservation management of rail reserves may be inadequate or absent. Activities associated with upgrades, track maintenance and rail safety can impact on sensitive native vegetation. For example, track maintenance was formerly undertaken from the track and is now largely conducted from the side of the tracks. Activities associated with maintenance include the dumping of old ballast, depositing earth, herbicide spraying, bulldozing of access tracks. Other potential issues include:

- ▶ lack of clear management responsibilities of licensees with regard to biodiversity values, weed and pest management
- ▶ potential degradation of significant vegetation types in the absence of active management
- ▶ ongoing loss and degradation of native vegetation due to licensing and sale of land for uses that are incompatible with conservation.

RECOMMENDATIONS

Road and rail reserves

R4

A comprehensive inventory of road reserves in use and used and unused rail reserves across the state be developed, populated with survey data collected according to the schedule in table 4.1 on page 45 and recording:

- a) location (GIS polygons mapped)
- b) extent and ecological vegetation class (EVC) of native vegetation
- c) other known biodiversity values such as presence of threatened species
- d) site condition, landscape context, and likely trends in and threats to these
- e) current and proposed management responsibilities and arrangements

and maintained in an up-to-date spatially explicit database accessible to interested organisations and community groups.

R5

A system be developed to identify and map significant native vegetation values on road reserves in use and used and unused rail reserves, and appropriate management objectives and guidelines be developed for categories including:

- a) significant native vegetation within such reserves
- b) reserves with little or no native vegetation but relevant to ecological connectivity (e.g. for revegetation or maintaining the condition of nearby native vegetation)
- c) other native vegetation on road and rail reserves and that, using the data collected for the inventory recommended above, all appropriate rail and used road reserves across Victoria be managed accordingly.

R6

Managers, contractors and on-ground workers be made aware of their responsibilities and appropriate work protocols whilst working around native vegetation, and that mandatory formal education and training be incorporated into all accredited training courses.

R7

A statewide advisory committee comprising relevant government agency, public authority, local government, scientific and community representation be established to oversee the establishment and maintenance of the inventory of road reserves in use and used and unused rail reserves, the identification of significant native vegetation values for the management of road and rail reserves, the accredited training of managers, contractors and on-ground workers, and other relevant matters;

and that consideration be given to establishing and operating the advisory committee within the scope of the Victorian Local Sustainability Accord or its successor.

R8

Government develop a policy to facilitate and guide the adoption of biodiversity conservation and ecological connectivity as management objectives for appropriate unused road reserves, with options for maintaining potential for future access where required.

RIPARIAN PUBLIC LAND

As noted in the discussion paper, Victoria is fortunate in that most of the frontages of wetlands and permanent streams have been retained as public land and most contain native vegetation. Some of these frontages have been set aside as streamside or nature conservation reserves in recognition of the contribution native vegetation makes to biodiversity conservation. Nevertheless, much of the rest of the landscape has been modified for agricultural cropping and domestic livestock grazing, which has severe impacts on riparian biodiversity and associated water bodies. In Victoria 79 percent of streamside areas are classified as moderately to highly degraded, primarily due to grazing by livestock, and about one third of the state's original wetlands have been lost due to altered water regimes and replacement with cropping.

Riparian zones are among the most important of landscape features in terms of the diversity of plants and animals they support and their contribution to the health of associated water bodies and catchments. Research shows that riparian areas are usually the most productive areas of the landscape and, as such, are important core areas for many species. Vegetation associated with permanent water bodies is particularly important as refugia for species during periods of prolonged environmental stress such as drought.

Two critical aspects of streamside riparian zones make these features important for long-term species persistence and ecosystem resilience in the face of climate change. Firstly, the high productivity of riparian areas means that populations of species occupying these features typically have higher reproductive success than counterparts in less productive landscapes and act as sources of individuals for new populations. Secondly the linear configuration of riparian zones facilitates dispersal of individuals which is a crucial aspect of population dynamics and long-term species viability.

Riparian areas are of great importance to the Victorian community because they:

- ▶ provide fresh drinking water
- ▶ provide water for irrigation and industry
- ▶ provide nursery areas for fish
- ▶ are focal points for tourism and recreation
- ▶ have strong cultural and heritage values and
- ▶ are important for biodiversity.

The quality of water bodies is greatly influenced by the quality and extent of the vegetation buffer at the riparian interface and consequently protection and maintenance of

riparian vegetation has great influence on how the water can be used in the future.

The crucial contribution of riparian areas to the health of waterways, estuaries and catchments is widely recognised and has been an important element in the implementation of the 2002 Victorian River Health Strategy. The Victorian River Health Program Report Card 2002-2009 noted that under the strategy 7,066 kilometres of fencing and protection measures has improved the condition of about a quarter (25,351 hectares) of the statewide extent of public stream frontages abutting private land. VEAC is recommending ongoing extension of the current protection measures.

RECOMMENDATION

Riparian public land

R9

That within ten years, at least 75 percent of public stream frontages abutting private land be managed, under grazing licence or other arrangements, primarily for biodiversity and water quality by undertaking:

- a) fencing to control stock grazing, where appropriate, and
- b) revegetation and habitat restoration of cleared frontages

and through measures such as incentives including those for reviewing Crown land licences and converting to conservation licence.

SMALL PUBLIC LAND RESERVES

As noted in the discussion paper, there are currently many thousands of small blocks of public land supporting patches of remnant native vegetation. Many of these have been already set aside as bushland areas and streamside areas in order to recognise and maintain the contribution that this native vegetation makes to biodiversity conservation and local landscapes. A smaller number of such small blocks that are known to support specific important natural values such as populations of rare or threatened species, have typically been set aside as nature conservation reserves to afford greater protection.

These bushland areas, streamside areas and nature conservation reserves are usually assigned to Parks Victoria for management as part of the protected area estate. However, particularly in landscapes where they are widely dispersed and small, these reserves are costly to manage compared to larger patches, both in absolute terms because of typical consequences of fragmentation such as habitat isolation and edge effects, and especially on a per hectare or per visitor basis. In this setting, it is not surprising that the continual pressure of unfavourable cost comparisons with larger blocks has led to the under-resourcing of small reserve management becoming a perennial problem.

In addition to these reserves, there are many thousands more, generally smaller and equally widely dispersed, public land blocks such as unused road reserves, and uncategorised and unreserved public land blocks. Although many of these blocks contain no native vegetation, some tens of thousands have at least some native vegetation, and even those without vegetation may have great strategic potential for revegetation to contribute to ecological connectivity. Not surprisingly, given the lower conservation status of the public land categories, management of these blocks is generally even more poorly resourced than the small widely scattered bushland areas. DSE is responsible for these blocks, either directly or through delegation to committees of management, except for a relatively small proportion owned or managed by public authorities such as water authorities.

It is important to recognise that amid the general picture of insufficient management attention there are many exceptions that serve as pointers to the way forward more generally. Many people and organisations provide a substantial management input, formally or informally, to small public land reserves. Examples include numerous adjoining landholders, Friends groups, 'Good Neighbours', 'Bush Guardians', conservation licensees and committees of management (although relatively few committee of management arrangements have significant

ecological objectives). The substantial role of the Ballarat Environment Network in managing many reserves in that area deserves particular mention (see chapter 3). Statewide, however, there is relatively little systematic adoption, and even less clarity and coordination, of innovative stewardship models for biodiversity protection, despite the considerable potential advantages such as the obvious cost savings of engaging adjoining landholders in the management of remote small public land reserves.

In addition, VEAC is now recommending more generally that smaller blocks be managed at least in part for protection of native vegetation and enhancement of ecological connectivity, e.g. road reserves in use, unused road reserves, rail reserves, public land water frontages. In addition, many other existing miscellaneous small blocks, often uncategorised public land, would be identified in the development of local biodiversity programs (recommendation R1). More effective and innovative arrangements for management of small public land reserves are integral to the success of these recommendations.

RECOMMENDATIONS

Small public land reserves

R10

Within five years, a program be completed to identify and reduce impediments to local-scale cooperative actions between public land managers and willing community members, and to establish a simple system to facilitate the uptake by organisations and individuals of stewardship agreements over small public land reserves, incorporating:

- a) a small number of standard agreement templates
- b) both voluntary and payment-based agreements, including conservation licences
- c) a range of public land categories (mostly bushland areas and other categories of lesser conservation status, and mostly less than ten hectares in size)
- d) resolution of potential legal liability issues
- e) clarification of the appropriate public land use category of small public land blocks subject to stewardship agreements
- f) training programs for organisations and individuals entering into stewardship agreements
- g) procedures for monitoring and reporting uptake and efficacy of stewardship agreements, and
- h) a framework for prioritising locations and tenures of small public land reserves for stewardship agreements.

R11

Government provide adequate additional resources for stewardship agreements.

PROTECTED AREA SYSTEM

While there may often be debate over their extent or location, protected areas are widely recognised and supported as the cornerstone of biodiversity conservation. Protected area establishment is often one of the most cost-effective, reliable, secure and timely options for conserving biodiversity.

Protected area establishment delivers more than simply removing or reducing pre-existing threatening activities, typically associated with recreational or commercial exploitation of earth resources or native plants and animals. By setting overarching objectives for nature conservation and an appropriate management framework, protected area establishment enhances the opportunities for long-term strategic planning for nature conservation in and around protected areas, and for pro-active management to mitigate a much broader range of threatening processes.

Along with a relatively small but expanding private protected area estate, Victoria's protected area system is principally composed of national, state and some other parks; nature conservation reserves; wilderness areas; and bushland and streamside areas.

Largely as a result of the work of the LCC, ECC and VEAC since 1971, Victoria now has one of the Australia's most comprehensive protected area systems, especially considering the high level of loss of native vegetation across large areas of goldfields and fertile agricultural land prior to 1970. However, partly because of the staged, regional nature of LCC, ECC and VEAC studies and investigations, there still remains a few substantial regions of the state with protected areas well short of, for instance, nationally agreed criteria for a comprehensive, adequate and representative system of reserves for forests.

While most comment on protected areas in submissions and regional workshops focused on particular areas (see chapter 1), rather than statewide strategic priorities, the data presented in the discussion paper enable such a prioritisation without being diverted by details such as those in the nationally agreed criteria.

The identification of bioregions with significant opportunities to address generally deficient protected area systems involves the systematic elimination of bioregions that have: (1) extensive existing protected area systems, (2) been covered in recent public land use investigations, or (3) little public land outside protected areas, and which is not in small, narrow or fragmented blocks and not already tightly committed to a specific use. This process results in the following categorisation of bioregions.

Bioregions with extensive existing protected area systems:

- Wilsons Promontory
- Bridgewater
- Murray Scroll Belt
- Greater Grampians
- Otway Ranges
- Lowan Mallee
- Victorian Alps
- Robinvale Plains
- Highlands - Northern Fall
- Highlands - Southern Fall
- East Gippsland Uplands
- Monaro Tablelands
- East Gippsland Lowlands
- Highlands - Far East

Bioregions covered in recent ECC/VEAC investigations:

- Murray Fans
- Otway Plain (southern part)
- Northern Inland Slopes
- Goldfields

Bioregions with little public land outside protected areas, and which is not in small, narrow or fragmented blocks and not already tightly committed to a specific use:

- Murray Mallee
- Warrnambool Plain
- Otway Plain (northern part)
- Wimmera (north and east of Little Desert)
- Victorian Volcanic Plain
- Victorian Riverina

Remaining bioregions – priorities for strategic assessment of the protected area system:

- Glenelg Plain
- Dundas Tablelands
- Wimmera (south of Little Desert)
- Gippsland Plain
- Strzelecki Ranges
- Central Victorian Uplands

This summary matches the conclusions in the Commissioner for Environmental Sustainability's 2008 Victorian State of the Environment report, reflected in recommendation LB1.10 (page 269) in that report.

Strategic regionally based assessments of public land use, taking into account the need to provide for a comprehensive, adequate and representative system of parks and reserves, are a core VEAC function in investigations, specified in section 18 of the VEAC Act. Assessments of the six priority bioregions above would best be done as consolidated regional investigations – a south west investigation covering the first three bioregions in the list above, a Gippsland investigation covering the Gippsland Plain and Strzelecki Ranges, and perhaps a somewhat different approach based on further details of the protected area gaps in the rather disparate Central Victorian Uplands (e.g. subdividing the bioregion).

The geographic boundaries of such regional investigations should not necessarily follow the often convoluted bioregion boundaries. For example, it would be sensible to include the Bridgewater bioregion, and perhaps part of the Victorian Volcanic Plain and Warrnambool Plain bioregions, in any investigation in the south west to avoid an investigation area boundary that most stakeholders would find difficult to understand. In addition, while assessment of protected area gaps would be a key focus of the recommended investigations, they would include the full range of issues usually considered in typical VEAC regional investigations, as well as any regionally specific or other relevant issues.

RECOMMENDATION

Protected area system

R12

Government initiate investigations of public land use in the following bioregions (in descending order of priority) for, amongst other things, assessment against the need to provide for the creation and preservation of a comprehensive, adequate and representative system of protected areas:

- a) Wimmera (south), Dundas Tablelands and Glenelg Plain
- b) Gippsland Plain and Strzelecki Ranges
- c) Central Victorian Uplands.

KNOWLEDGE, INFORMATION AND AWARENESS

VEAC's discussion paper for the Remnant Native Vegetation Investigation presented a large amount of information about remnant native vegetation in Victoria but this information was only a small part of a vast information base on native vegetation that has been compiled principally by the Department of Sustainability and Environment in recent years. The presentation of this information raised a number of issues.

Firstly, it highlighted the value of the information and the importance of keeping the data and analyses current and relevant. Many people, having digested the information in the discussion paper about the condition and landscape context of native vegetation, quickly saw the need to identify trends, that is, how, where and why these things were changing with a view to arresting declines and accelerating improvements. They understood that the loss of native vegetation quality would not be uniform across the state.

However, identifying trends is not as straightforward as it may seem, particularly in relation to the obvious approach of comparing site condition and landscape context as presented in the discussion paper (i.e. as at 2005) with more recent data. In the first instance, a new assessment would require new satellite and air photo imagery, which would require the development of new models to map native vegetation extent and condition. As a consequence, some of the differences between the 2005 and more recent assessments would be the result of differences in the two models. Although such differences might be small, this is a significant problem because most of the real differences in native vegetation will also be small, being a comparison over the last eight or so years of a nearly 200 year history of major change. In reality, only the most dramatic changes would be identified with confidence, that is, where the most significant losses have occurred, at which point it is likely to be too late or less cost-effective to intervene.

What is likely to be more effective is a project to target likely current and potential threats to native vegetation extent and condition, such as changes to agricultural practices or residential development patterns, or new weed invasions, and mitigate them before extensive loss occurs. This work would lead to the identification of sites most at risk of significant decline and measures to mitigate declines. Assessment of improvements in the extent and condition of native vegetation, and opportunities to enhance these, could also be included in such a project. An important component of such a project would be ongoing monitoring of the relevant trends and regular

public reporting. Such a project would also be the most appropriate means to address the questions that many stakeholders have about the veracity of the expanded extent of grassy native vegetation mapped as a result of the currently available modelling.

Secondly, one of the hallmarks of DSE's information on native vegetation is its use of innovative approaches, notably the assessment and modelling of site condition and landscape context. Already DSE is moving to the next stage of analyses with new approaches such as NaturePrint and, with others, the Landscape Logic project which has been assessing the effectiveness of interventions to improve native vegetation at the landscape scale. It is important that this encouragement of new approaches continues into the future. As flagged in the discussion paper, there is a particular need to improve the quantification of the benefits of conserving native vegetation.

Thirdly, another unfilled information requirement mentioned in the discussion paper and acknowledged in public consultations, was the need for a comprehensive system for mapping wetland extent and condition that takes account of their natural variability and dependence on water regimes. The system used to assess terrestrial native vegetation assumes a relatively static situation of native vegetation presence or absence at any location as a result of factors played out at that location. This system has limited utility when applied to wetlands which can be destroyed or created by changes in water regimes generated many kilometres away from the wetland and which, in the case of ephemeral wetlands, can change greatly in character over the course of a natural flooding and drying cycle. Initial steps by DSE to set up such a system require government support through to completion.

Fourthly, a recurring message from public consultations was the need for increased awareness in the broader community regarding the loss of biodiversity in fragmented landscapes. This is not surprising; public consultations on any issue will attract stakeholders who are passionate about their issue and who advocate for broader engagement. Perhaps the difference in this instance is not just the view that more people should be concerned about biodiversity conservation but that, in particular, there should be more focus on fragmented landscapes where biodiversity is most at threat (see chapter 2) than on more intact landscapes. Some people expressed this as the paradox of the relatively high level of awareness of rainforest conservation in the general community, despite almost negligible threats to Victorian rainforests from conscious direct human actions, compared to the

great threat posed to biodiversity by such routine things as changes in agricultural commodity prices, which are viewed as benign by most of the small number of people who would even consider them in relation to biodiversity. VEAC agrees with this perception of public attitudes to biodiversity in fragmented landscapes and is recommending measures to increase the understanding and appreciation of remnant native vegetation. It would be particularly important to do so in landscapes where the biodiversity action program (see recommendation R1) is being implemented, to increase both local engagement and broader understanding of what can and is being done to address the issues.

Finally, the discussion paper generated some surprise about the existence of some of the information that was presented, even from stakeholders who were heavily engaged in remnant native vegetation issues. Clearly there is a need for greater accessibility of such information. Part of the problem is that the issue cuts across a number of other rural land management issues and engages many agencies. So, while much of the information presented by VEAC was already available, it is spread across a range of websites – DSE, DPI, CMAs, for example – and often scattered over several parts of these websites, without clear links between them. There is a clear need for a single webpage from which all relevant available information – including data, maps, analysis, research, policy and its derivation, conservation programs planned and underway, stakeholder organisations – can be readily accessed through weblinks. Like the recommended biodiversity action program, much of the relevant information is already available but by having a centralised native vegetation webpage with links to all these would greatly improve overall clarity, coordination, accessibility and understanding for all stakeholders. Because new information and developments are becoming available frequently, it would also be useful make provision for key stakeholders to be alerted when this occurs.

RECOMMENDATIONS

Knowledge, information and awareness

R13

A project be established to:

- a) identify and map the current extent, condition and landscape context of remnant native vegetation in fragmented landscapes where:
 - i) sites are at most risk of significant decline, and
 - ii) prioritise measures to prevent or mitigate biodiversity loss in sites in (i), where appropriate
- b) initiate ongoing statewide monitoring and reporting on trends in extent, site condition and landscape context, and
- c) continue to refine and update statewide native vegetation modelling with particular attention to improving extent and site condition modelling of grassy native vegetation.

R14

Government continue to encourage new approaches and research such as NaturePrint and Landscape Logic to address new and emerging information needs, particularly the quantification of the improvements in conserving remnant native vegetation.

R15

Statewide mapping of wetland vegetation, site condition, EVCs and natural values be undertaken incorporating the effects of changes to water regimes and the ephemeral or dynamic nature of many wetlands.

R16

Government support measures to increase awareness, appreciation, education and interpretation of remnant native vegetation and ecological connectivity across Victoria.

R17

Communication of information arising from the implementation of these recommendations and any new or ongoing government work pertinent to remnant native vegetation be greatly expanded and streamlined, including:

- a) presentation of a single well-publicised internet location of all relevant Victorian current and new data, analysis, interpretation, policy, and programs
- b) a program to alert stakeholders as new information becomes available.

IMPLEMENTATION AND ONGOING PUBLIC LAND MANAGEMENT

VEAC recognises that its recommendations for the investigation will raise a series of complex implementation issues that will need to be addressed. Council notes the effectiveness of implementation teams formed for the River Red Gum Forests Investigation and the Box-Ironbark Forests and Woodlands Investigation conducted by the Environment Conservation Council as a means of engaging with local government, government agencies, relevant industries, stakeholder groups and communities.

Council does not foresee that any individual or sector will be adversely affected by implementation of its recommendations if they are accepted by government. Regional economies would potentially benefit from additional employment to undertake work resulting from the recommendations such as planning, mapping, fencing, surveying and monitoring, extension, native plant propagation and more intensive land management more generally.

As noted in chapter 1, one of the most commonly asserted community views in this investigation, as in most others, is the perceived inadequacy of resourcing for ongoing, on-ground public land management. This final report contains several recommendations to address specific aspects of this issue, notably those regarding regional integration (recommendation R1) and small public land reserves (recommendations R10-R11), but there is clearly a more general need to at least maintain current levels of resourcing for ongoing public land management. Core aspects commonly mentioned included pest plant and animal control, visible on-ground indications of management interest and presence, and mitigation of a variety of activities that undermine the condition and connectivity of native vegetation, such as illegal or poorly planned fire protection works, firewood collection or stock grazing.

Council recognises that support for management to improve biodiversity conservation, including in kind support, comes both from private sources and from government at local, state and federal levels. Broadly, this setting is unlikely to change. However within this setting, improvements can be made by explicitly attempting to align efforts and priorities across these four sources of support, including alignment to favour sustained efforts.

RECOMMENDATIONS

Implementation and ongoing public land management

R18

State and local governments work collaboratively with relevant industries, stakeholder groups and communities to implement the approved recommendations.

R19

Government allocates adequate financial and staff resources for implementation of these recommendations and to ensure that the objectives of the recommendations are achieved.

R20

Government allocates additional resources to address current and future public land needs across fragmented landscapes, with priority given to maintenance or improvement of site condition and landscape connectivity, pest plant and animal control, and an on-ground management presence.

ACRONYMS

BAP	Biodiversity Action Plan
CFA	Country Fire Authority
CMA	Catchment Management Authority
CMN	Conservation Management Network
CRG	Community Reference Group for VEAC's Remnant Native Vegetation Investigation
DPI	Department of Primary Industries, Victoria
DSE	Department of Sustainability and Environment, Victoria
ECC	Environment Conservation Council, Victoria
EVC	Ecological Vegetation Class
LCC	Land Conservation Council, Victoria
UK BAP	United Kingdom Biodiversity Action Plan
VEAC	Victorian Environmental Assessment Council

