

Mallee Native Vegetation Plan



January 2008



The Mallee CMA acknowledges the Commonwealth Government and the Victorian State Government for funding the Native Vegetation Plan.

Mallee Native Vegetation Plan

ISBN 1 74152 373 7 (CD-ROM)

ISBN 1 74152 379 6 (Hardcopy)

© Mallee Catchment Management Authority

January 2006

January 2008 (An update of the data and conservation status regarding Ecological Vegetation Classes only according to information received from the Department of Sustainability and Environment).

Disclaimer

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

Copies of this document can be found on the Mallee Catchment Management Authority website

www.malleecma.vic.gov.au

TABLE OF CONTENTS

<u>1</u>	<u>PART A - CONTEXT / INTRODUCTION</u>	<u>1</u>
1.1	Scope.....	4
1.2	Process for Plan Development.....	4
1.3	Power of the Plan.....	5
1.4	Regional Policy and Strategic Planning Framework	6
1.4.1	Native Vegetation Conservation Strategy	6
1.4.2	Government Policy and Context	6
1.5	Vision.....	8
<u>2</u>	<u>INFORMATION BASE ANALYSIS</u>	<u>9</u>
2.1	Overview of Region.....	9
2.2	Aboriginal History	11
2.3	European History	12
2.4	Native Vegetation Assets.....	14
2.5	Mallee Flora and Fauna	16
2.6	Native Vegetation Resources.....	17
2.6.1	Ecological Vegetation Classes	17
2.6.2	Bioregions.....	18
2.6.3	Biodiversity Action Plans.....	20
2.7	Landscape Features of Mallee Native Vegetation	23
2.7.1	Current Extent of Native Vegetation in the Mallee.....	29
2.8	Role of Native Vegetation in Reducing Degradation	40
2.9	Threatening Processes.....	41
2.9.1	Grazing	42
2.9.2	Regimes	44
2.9.3	Introductions	45
2.9.4	Agricultural practices	47
2.9.5	Landscape	49
2.9.6	Usage	49
<u>3</u>	<u>PART B - THE STRATEGY</u>	<u>51</u>
3.1	Principles of Native Vegetation Management	51
3.1.1	Victorian Priorities for Native Vegetation Management.....	52
3.2	A Shared Understanding of the Net Gain Goal	52
3.2.1	Extent and Quality of Native Vegetation	53
3.2.2	Achieving and Accounting for Net Gain.....	54
3.2.3	Land Protection and Conservation Significance in Net Gain.....	56
3.2.4	Ensuring Individual Protection and Clearance Decisions Contribute to Net Gain goals	57
<u>4</u>	<u>TARGETS FOR NATIVE VEGETATION</u>	<u>64</u>
4.1	Outcomes and Targets	64
4.2	Monitoring and Evaluation	65

5	<u>IMPLEMENTATION ARRANGEMENTS</u>	<u>72</u>
5.1	Stakeholders and Roles	73
5.2	Cost Sharing Principles	77
5.2.1	The Commonwealth Government	78
5.2.2	State Government	78
5.3	Links between Regional/Local Plans and National and State Plans	79
5.4	Relevant State and National Plans	81
5.5	Regional Strategies and Plans	81
5.5.1	Regional Catchment Strategy	81
5.5.2	Salinity Management Plans	83
5.5.3	Waterway and Floodplain Management Strategies	83
5.6	Knowledge Gaps	84
5.7	Benchmarking, Monitoring, Evaluation and Reporting	84
5.8	Resource Condition Monitoring	85
5.9	Monitoring and Evaluation Programme	85
	<u>APPENDICES</u>	<u>89</u>
	Appendix 1 - Policy and Legislation	89
	Appendix 2 - Glossary of Terms and Abbreviations	92
	Appendix 3 - Further Reading	99
	Appendix 4 - Land Protection Hazard for Net Gain Outcome	104
	Appendix 5 - Assessing Bioregional Conservation Status of Ecological Vegetation Classes	105
	Appendix 6 - Determining Conservation Significance	108
	Appendix 7 – Summary of Responses and Offset Criteria	109
	Appendix 8 - Timber Harvesting Offset Criteria	111
	Appendix 9 – Bioregional Conservation Status of Ecological Vegetation Classes	112

LIST OF FIGURES

Figure 1 - Map of Mallee CMA Region	10
Figure 2 - Map of Aboriginal Community Areas, Native Title , and Cultural Heritage Regions	12
Figure 3 - Map of Bioregions	19
Figure 4- The Origin of Biodiversity Strategies	22
Figure 5 - Map of Current Native Vegetation (based on Amalgamated Ecological Vegetation Classes)	35
Figure 6 - Map of Pre 1750 Native Vegetation (based on Amalgamated Ecological Vegetation Classes)	36
Figure 7 - Status of Ecological Vegetation Classes across Bioregions	37
Figure 8 - Status Integrating Multiple Values into the Mallee Regional Catchment Strategy	82

LIST OF TABLES

Table 1 - Extent of Remnant Native Vegetation for each Bioregion (all land based)	20
Table 2 - Depleted Ecological Vegetation Classes	34
Table 3 - Summary of Status of Ecological Vegetation Classes in the Mallee	38
Table 4 - Native Vegetation can play in reducing various landscape issues	40
Table 5 - Proposed Net Gain Reporting Sheet.....	63
Table 6 - Minimum Matters for Targets	85
Table 7 - Monitoring and Evaluation Actions	87

FOREWORD

The Mallee Catchment Management Authority is proud to present the Mallee Native Vegetation Plan (Mallee NVP) as a strategic document intended to guide regional activities in native vegetation management and issues relating to native vegetation.

Comprising approximately 1000 vascular plants, the flora of the Mallee is diverse and to a large degree, unique in Victoria. This plan highlights the extent, the status of ecological vegetation communities represented in the Mallee, as well as the threatening processes occurring. The communities of the Mallee have identified the priority issues for the region and the threats to the vegetation assets, and have also contributed to the development of the plan, outcomes and targets for five years from 2004, as outlined in this Mallee Native Vegetation Plan.

The Mallee Catchment Management Authority has consulted with and engaged key stakeholders, partner agencies and the wider community through an extensive consultative process, which began in 1997. The community engagement process sought the views of stakeholders and the community through meetings, workshops, media campaigns, written submissions, distribution of drafts of the document, and direct approaches to relevant individuals.

The resulting Mallee Native Vegetation Plan translates the policy objectives of Victoria's "Native Vegetation Management – A Framework for Action" to actions and targets specific to the Mallee Region. The Mallee Native Vegetation Plan is complemented by a suite of documents which forms the implementation framework, and which provides the level of detail often sought when translating broad level strategies into on-ground actions. These supporting documents include the Salinity and Water Quality Management Plan, Mallee River Health Strategy, Biodiversity Action Plans, Frontage Action Plans, and Weed and Soil Conservation Action Plans.

The Mallee CMA acknowledges the input from the Natural Heritage Trust, in funding the finalisation of the Mallee Native Vegetation Plan. The Mallee CMA would also like to thank the key stakeholders and members of the community who made comment, attended workshops and meetings, and made individual submissions during this process.

The Board of the Mallee CMA endorsed this Mallee Native Vegetation Plan in September 2004, and commended it to the relevant Commonwealth and State Ministers for endorsement.



Joan Burns

Board Chair,

Mallee Catchment Management Authority

1 PART A - CONTEXT / INTRODUCTION

The Mallee Native Vegetation Plan (Mallee NVP) is a strategic document intended to guide regional activities in native vegetation management and issues relating to native vegetation.

The plan sets targets for up to and including the year 2009. This plan translates the policy objectives of *Victoria's Native Vegetation Management – a Framework for Action* to the specific circumstances of the region. The framework sets the state policy context and reflects the national context for the plan. It also describes the principles of net gain, the evaluation of native vegetation quality using the habitat hectare method, the hierarchy of protecting and enhancing significant values. The plan seeks to implement the principals of net gain using the three-tier approach; to **avoid** the need to remove native vegetation, **minimise** any necessary losses of native vegetation and provide **off-set** measures for losses to ensure the outcome is a net gain.

The desired outcomes for the Mallee Native Vegetation Plan are as follows:

1. Extent, diversity and condition of all Ecological Vegetation Classes maintained above self-sustaining thresholds;
2. Threatened ecological communities and threatened populations of flora recovered to self-sustaining levels and secured against further decline;
3. All ecologically invasive plant species controlled;
4. Ecological processes restored to meet ecological needs;
5. Native vegetation on private land managed according to Biodiversity outcomes;
6. Ecosystem services managed sustainably; and
7. Communities across the Mallee with the capacity to fully protect and improve our native vegetation.

Targets and Management Actions have been developed for each of these outcomes as outlined in the Mallee Regional Catchment Strategy, 2003 (Mallee RCS, 2003).

These are the first targets of their kind to be established for native vegetation management in the Mallee. The targets represent an ambitious but necessary attempt to achieve significant change in the management of native vegetation.

Strategies are discussed for the following aspects in implementation of the plan:

- Identifying vegetation resources and threatening processes;
- Involving the stakeholders who are likely to have an interest and role in implementing the plan;
- Sources of funding;
- Role of incentive schemes;
- Providing technical support;
- Identifying actions; and
- Monitoring and evaluation.

Acknowledgments

The Mallee Native Vegetation Plan Steering Committee from 1998 to 2000 included:

Dorothy Brown	Chair, Steering Committee / Mallee CMA Board, farmer;
Reg Wilkinson	Mallee CMA Board, farmer;
Stuart Thomson	Mallee CMA Mallee Lands Committee, farmer;
Christiane Jaeger	Mallee CMA Irrigation Environment Implementation Committee, farmer;
Steve Erlandsen*	Programme Manager, Mallee CMA;
Tiffany Schultz*	Regional Bushcare Facilitator, Mallee CMA (project manager);
Daryl Walters*	Greening Australia Victoria;
Peta McKay	Mid-Murray Field Naturalists;
Melanie Bucik	Environmental Officer, Mildura Rural City Council;
Neil Davis	Mallee Lands Committee (part), farmer;
Patricia Curtis	Mallee Lands Committee (part);
Geoffrey Allen*	Mallee Ecosystems Coordinator, Department of Natural Resources and Environment;
Ken Harrison	Catchment Management Officer, Department of Natural Resources and Environment; and
Cheryl Wouters	Environmental Programme Manager, Parks Victoria.

**Also a member of the Technical Sub-Committee for the plan to 2000.*

Other input to the plan during this phase included:

Greg Dalton	Creation Care Pty Ltd;
David Clarke	Efect Pty Ltd;
Dr John Cooke	Manager Flora and Fauna, Department of Natural Resources and Environment;
Carolyn Balint	Programme Leader, Catchment and Agriculture Services Department of Natural Resources and Environment;
David Parkes	Parks Flora and Fauna, Department of Natural Resources and Environment;
and	
Peter Richardson	Collation of photos.

A technical group worked on the plan at various stages between 2001 and 2004 including:

Jenny Alexander	Biodiversity Manager, Mallee CMA;
Steve Erlandsen	Manager Land Resources Mallee CMA;
Claire Wilkinson	Biodiversity Officer Mallee CMA;
Jodi Cant	Native Vegetation Officer Department of Primary Industries;
Cheryl Wouters	Native Vegetation Officer Department of Primary Industries;
Geoffrey Allen	Mallee Ecosystems Co-ordinator Department of Sustainability and Environment;
Robyn Major	Native Vegetation Project Leader, Department of Natural Resources and Environment, and later Environment Officer, Swan Hill Rural City Council;
Alex Holmes	Biodiversity Officer Mallee CMA;

Roger Heeps Land Information Group, Department of Sustainability and Environment; and
Dr John Cooke Manager, Sunraysia, Department of Sustainability and Environment.

The following were members of the Biodiversity Technical Reference Committee, which finalised the plan:

Robert McClelland	Chair, Mallee CMA Board member, farmer
Dallas Hunt	Mallee Irrigation and Environment Implementation Committee;
Ian Arney	Mallee Lands Committee, farmer;
Matt White	Arthur Rylah Institute, Department of Sustainability and Environment;
Robyn Major	Environment Officer, Swan Hill Rural City Council;
Geoffrey Allen	Mallee Ecosystems Coordinator, Department of Sustainability and Environment;
Greg Ogle	Mallee Coordinator, Trust for Nature;
Lorraine Ludewigs	Environment Projects Manager, Parks Victoria;
Miriam Hopkins	Environmental Officer, Department of Primary Industries;
Brendan Thomas	Regional Landcare Coordinator, Mallee CMA;
Claire Wilkinson	Biodiversity Officer, Mallee CMA;
Donna Tidey	Threatened Species Planning Officer, Mallee CMA;
Noel Hayward	Monitoring Coordinator, Mallee CMA.

Policy advice throughout the project was provided by:

Caroline Douglass, Sharon McDonell, Karen Barton, Lisa Munro, David Cummings and Adam Muir, Catchment and Water Division, NRE and later DSE

Steve Erlandsen and Michele Nettlefold, Sunraysia Environmental Pty Ltd, Editing and target setting

1.1 Scope

The Mallee Native Vegetation Plan (Mallee NVP) is a strategic document intended to guide regional activities in native vegetation management to achieve a reversal of the long-term decline in the extent and quality of native vegetation across the region (and the consequent loss of biodiversity), leading to a 'Net Gain'. Reversing the decline in native vegetation will assist in improving habitat values for fauna and prevent further extinction of rare or threatened species and communities. It will also help maintain vital ecosystem services (*i.e.* clean air, water and soil provided most effectively by our natural systems). The plan forms a basis for community action and government support to address a range of threatening processes. This plan is about protecting and enhancing native vegetation by encouraging active and ongoing management. The decline in native vegetation resources will continue to have an increasing salinity impact on our water and land resources, unless it is adequately and urgently addressed.

The Mallee Catchment Management Authority (Mallee CMA) has a stewardship role over land, water and vegetation management in the Mallee and will be responsible for co-ordinating the implementation of the plan. The plan covers the years 2003 to 2008.

1.2 Process for Plan Development

The Mallee CMA appointed a Steering Committee and a technical sub-committee in 1998 to oversee development of the plan. The Regional Bushcare Facilitator coordinated development of the earlier draft plan.

The steps taken to develop the Mallee Native Vegetation Plan were:

1. Adopt *Victoria's Native Vegetation Management, A Framework for Action* (see Section 3) and the Net Gain Goal (see Section 3.2);
2. Identify native vegetation resources and threats;
3. Analyse native vegetation threats against resources;
4. Obtain background information on the Mallee and the importance of native vegetation resources;
5. Develop the Vision, Outcomes and Targets;
6. Develop Management Actions; and
7. Obtain the comments of key stakeholders.

Preparation of regional Native Vegetation Plans commenced in 1997 with guidelines that stipulated a two stage plan. Stage 1 related to local interpretation of the clearance controls and stage 2 was to address management actions and regional priorities. Subsequently government revised the guidelines in order to combine the two stages into one document with the main focus on management action and regional priorities. This draft plan was completed and released by the Mallee CMA in mid 2000 for public consultation.

Comments from submissions received during the consultation process were incorporated into the plan. Finalisation of regional vegetation plans was then put on hold pending completion of the state vegetation framework, which was released in 2002. New guidelines for native vegetation plans were released in early 2003. In the north west of the state the completion of a major information project to map vegetation classes delayed further progress until mapping and preliminary analysis of the data was completed in early 2004. The plan has now been modified to take account of this new information. A second consultation period was held in August 2004 prior to inclusion of comments and submitting the plan for government approval in October 2004.

1.3 Power of the Plan

The Mallee Native Vegetation Plan is a strategic document intended to guide the activities of all stakeholders with an interest in native vegetation for the next five years. The Mallee CMA, with an overall role for land, water and vegetation management in the Mallee will be responsible for coordinating implementation of the plan. Effective implementation will rely on the commitment of many stakeholders.

The Mallee Native Vegetation Plan seeks to deliver over the next five years towards the following long-term outcomes:

- Increase the extent, diversity and condition of all regional Ecological Vegetation Classes (Outcome 1);
- Recover to self-sustaining levels all threatened ecological communities and threatened populations of flora in the region (Outcome 2);
- Control ecologically invasive plant species, restore ecological processes, manage ecosystem services sustainably (Outcomes 3,4 and 6);
- Manage native vegetation on private land according to biodiversity outcomes (Outcome 5);
- Generate informed and experienced groups across the Mallee with the capacity to fully protect and improve our remnant vegetation (Outcome 7).

The Mallee CMA recognises it alone cannot do the work proposed in the Mallee Native Vegetation Plan, and that there are many land managers and other stakeholders with an interest and role in undertaking aspects of implementation. The Mallee CMA will therefore work collaboratively with private and public land managers and other stakeholders to develop effective and efficient means of implementing the plan.

This cooperation, plus the required investments by government and other stakeholders, should be sufficient to implement most of the proposed management actions. To complement this approach there is a range of legislative powers at local, State and Commonwealth government level that can be used to achieve the objectives of the plan. Legislation including the *Catchment and Land Protection Act* 1994, *Flora and Fauna Guarantee Act* 1988, *Planning and Environment Act* 1987 and government regulations can be used to control illegal works and protect native vegetation resources threatened by certain activities or in some cases inaction.

However, the role of the Mallee CMA is to work cooperatively with public and private land managers and other stakeholders to enable implementation of the Mallee Native Vegetation Plan and ensure resources are directed according to the priorities and actions in the plan. The plan will not significantly alter the way native vegetation management has been delivered in the Mallee, but it will focus activities on vegetation management priorities.

The actions and timelines required to monitor, evaluate and review the plan are outlined in Section 5.6 and 5.7. It is proposed to review the Mallee Native Vegetation Plan in three years from release. However, prior to the proposed three year review there may a possible need to revise some aspects of particular offset provisions during the life of the regional native vegetation plan as a result of new information becoming available and through experience gained in the application of the Net Gain policy.

1.4 Regional Policy and Strategic Planning Framework

The key drivers at regional level for native vegetation management since 1997 have been the Regional Catchment Strategies, which received government endorsement in 1997 and 2004 respectively. However an earlier planning document developed locally has had an influence on regional policy and priorities.

1.4.1 Native Vegetation Conservation Strategy

In 1991, the then Department of Conservation and Environment developed a draft *Native Vegetation Conservation Strategy* for the Mildura Region, with input from the Land Protection Regional Advisory Committee (McLennan 1991). This strategy related to a geographical area almost coinciding with the Mallee CMA region. It had as its principal objective:

‘To protect all significant remnant vegetation for intrinsic fauna and recreation values and to rehabilitate areas in which specific vegetation types are threatened’

It recommended a range of management actions, many of which have been implemented or are continuing to be implemented today. It also provided a priority list of actions that have been used to direct the efforts of the Department and the Mallee CMA. This strategy guided early development of the Mallee Native Vegetation Plan.

1.4.2 Government Policy and Context

The policy of the Victorian State Government is to: incorporate environmental and conservation considerations into all aspects of planning and government programme delivery and build the principles of ecologically sustainable development into the process of decision-making across the whole of Government (NRE 2002).

The Government is committed to:

- Restoring Victoria’s rivers and catchments;
- Reducing land clearance and promotion of revegetation programmes to expand the coverage of our native bushland.

- Actively promoting the responsible management and expansion of our natural ecosystems including the protection of remnant vegetation along stream sides, roadways, wetlands and the conservation of native vegetation on private land, backed by an improved system of native vegetation retention controls;
- Undertaking a trial programme in a selected region in which formal contractual arrangements will be entered into between volunteer landowners and Government agencies covering the management of native vegetation on private land; and
- Establishing a Commissioner for Ecologically Sustainable Development to provide an ombudsman role for considering public complaints and auditing compliance with environmental legislation.

In November 2001 the Victorian Government released *Growing Victoria Together*, providing the signposts for Government action for the next decade. *Growing Victoria Together* balances economic, social and environmental goals and action with a vision in which protecting the environment for future generations is built into everything we do. One of the priority actions of this vision is to increase and provide greater protection for areas of high conservation value.

The Victorian Government Policy Statement on Forests - *Our Forests, Our Future, Balancing Communities, Jobs and the Environment* was released in February 2002. *Our Forests, Our Future* outlines the substantial investment in forestry reform required to ensure that the public land forestry industry is managed on a sustainable and commercial footing and to improve the stewardship of our forests.

The development of Victoria's Native Vegetation Management A Framework for Action in 2002 has been guided by these State policies and gives effect to the native vegetation goals of *Victoria's Biodiversity Strategy*. The Framework is further discussed in Section 3.

This Framework also reflects a range of Victoria's commitments to national policies, principally:

- The '*National Framework for the Management and Monitoring of Australia's Native Vegetation*' (ANZECC 1999). The National Framework provides a vehicle for the implementation of the Natural Heritage Trust Partnership Agreement between the Commonwealth and the State and Territory Governments. Its primary objective is to reverse the long-term decline in the quality and extent of Australia's native vegetation cover.
- *The National Strategy for Ecologically Sustainable Development* (ESD) (1992), with the goal, endorsed by all Australian governments, of: ***Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.***

The core objectives of ESD are to:

- Enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- Provide for equity within and between generations; and
- Protect biological diversity and to maintain essential ecological processes and life support systems.

The Native Vegetation Plan also complements the approach taken in the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* by recognising the importance of:

- World Heritage properties;
- Ramsar Wetlands of international significance, and
- Listed threatened species protected under international agreements.

1.5 Vision

The landscapes of the Mallee have changed significantly in the last 150 years, prompting significant investment to curtail the increasing effects of land and water degradation and subsequent loss of biodiversity. Land productivity, the integrity of our water resources and the status of our biodiversity all heavily depend on the maintenance of ecological functions within the catchment. It is essential to continue to advance techniques for sustainable development that take into consideration ecological processes and conserve and enhance our unique biodiversity and natural heritage. To assist in the achievement of these outcomes, the Victorian Government has set a **vision** for the state's native vegetation:

Management of native vegetation provides a sustainable landscape and protects the long-term productive capacity and environmental values of our land and water resources. The unique beauty and diversity of Victoria's landscapes and the importance of the underlying complex ecosystems are recognised internationally.

The vision of the state will be **achieved** by:

Our land managers understanding and actively promoting improved native vegetation practices that provide real benefits for their businesses and the community.

Our state and local governments and Catchment Management Authorities driving a comprehensive and scientifically-based native vegetation management programme that provides certainty to land managers and investors.

The Mallee Native Vegetation Plan has developed its own unique vision, in line with that of the Victorian Government, but one in which the local community of the Mallee can strive to attain. The **vision** of the Mallee Native Vegetation Plan is:

Native vegetation is enhanced in quality and extent, valued as essential for catchment well being, and managed to protect its unique qualities.

2 INFORMATION BASE ANALYSIS

2.1 Overview of Region

The Mallee Catchment Management region (hereafter referred to as the Mallee) covers an area of almost 4 million hectares in northwest Victoria – almost 20 per cent of the state. It is not a surface catchment, but nevertheless consists of parts of five recognised drainage basins: the Murray Darling basin in the north and the Millicent Coast, Wimmera- Avon, Avoca and Loddon in the south. The Mallee has a semi-arid climate with a low, unreliable rainfall ranging from 250 mm per annum in the north to 400 mm per annum in the south. Because of the sandy permeable soils through most of the region rainfall generally enters the soil where it falls and there is little or no net surface runoff. The region is prone to drought and bushfire.

Occasionally localised runoff and minor flooding results from high rainfall events in the region. Runoff is more likely to occur on the light clay soils in the south and south-east and east, although this has been markedly reduced by cultivation and the widespread use of gypsum.

The boundaries of the region are shown in Figure 1. The Murray River forms the northern and eastern boundaries, which extends from Nyah, just downstream of Swan Hill, to Lindsay Point. The South Australian border forms the western boundary. The southern and eastern boundary extends from Nyah in the east to a point north of Kaniva. The boundary intersects with Lalbert, Tyrrell, Dunmunkle, Outlet and Yarriambiack Creeks, which flow in a northerly direction and terminate in the Mallee in a series of ancient lakes, including Lake Tyrrell. Prolonged heavy rainfall in the upper catchments of the Murray or Darling Rivers or the southern Mallee creeks may cause localised flooding within the floodplains of these waterways. The Mallee is home to Victoria's most diverse flora and fauna populations, including many unique flora species, and is an important ecological interface zone between the more arid zones to the north and cooler moister climates to the south. The interaction of the Murray River trench, the floodplain and the semi-arid terrestrial environments creates a range of unique habitats for flora and fauna species. Unlike most of Victoria the majority of the soils are highly alkaline.



Murray River

The Murray River provides water for irrigation, industrial, stock and domestic uses throughout the region. Industries in the region include diverse irrigated horticulture, wine grapes, dried fruits and citrus, livestock and dryland farming, as well as significant recreation and tourism activities. All depend on water supplied from outside the region.

The population of the Mallee is approximately 62,500, of which some 37 per cent live in the city of Mildura. Other main centres include Robinvale, Ouyen, Underbool, Murrayville, Sea Lake, Nyah, Hopetoun, Rainbow and Birchip. Swan Hill urban area is not in the region. The population along the river corridor is rapidly growing, particularly in Mildura, Robinvale and Swan Hill, mainly through the expansion of irrigated horticulture and flow on effect to other industries.

[illegible]

2.2 Aboriginal History

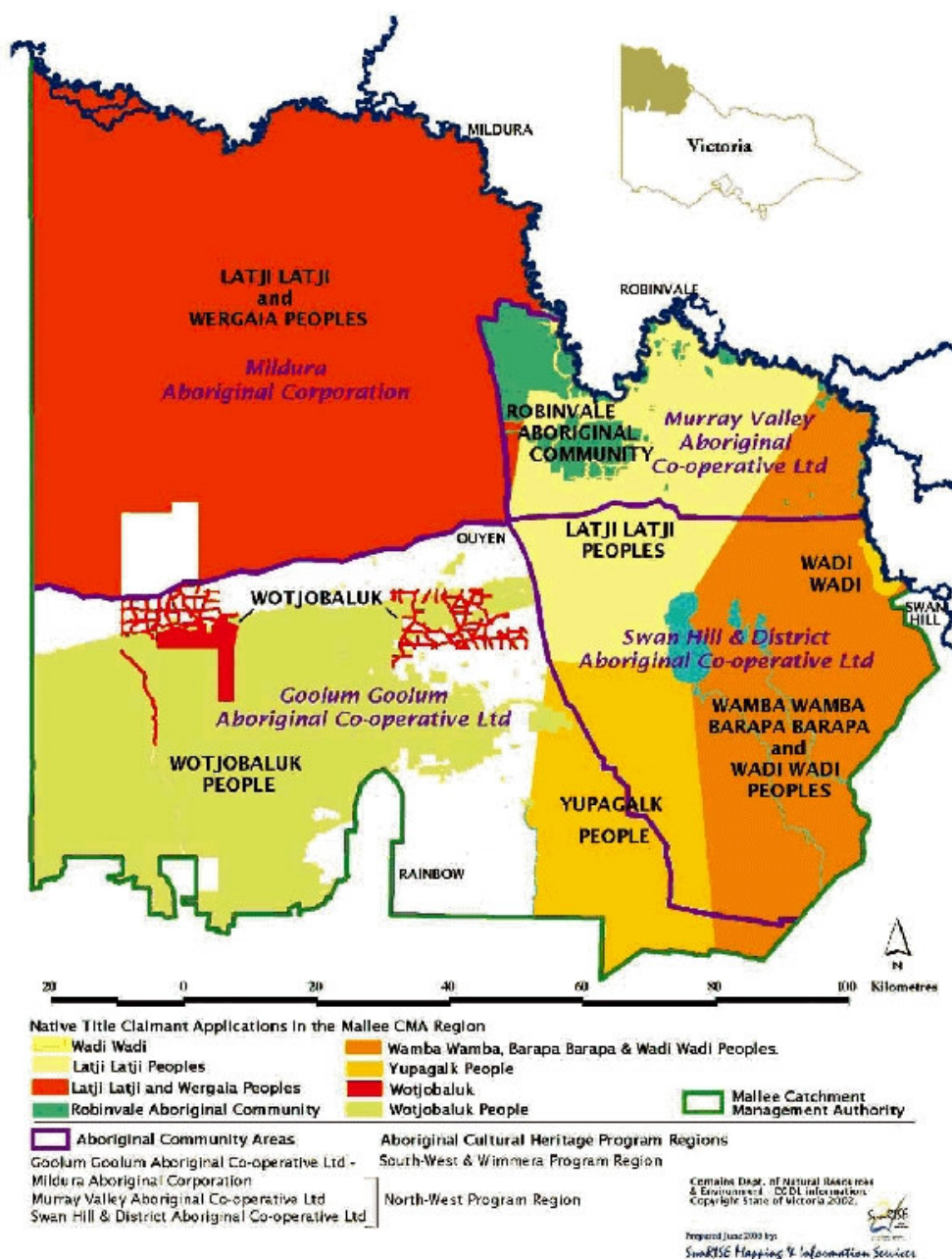
The first inhabitants of the Mallee region were numerous Aboriginal tribes of eight language groups, including Latji Latji, Wergaia, Wadi Wadi, Wamba Wamba, Jari Jari, and Dadi Dadi (see Figure 2). The Latji Latji, Wadi Wadi and Wamba Wamba peoples made extensive use of the Murray River while the Wotjobaluk people whose main language was Wergaia occupied most of the southern Mallee. The Yupagalk occupied the south-eastern Mallee. These tribes occupied the region on a permanent and opportunistic basis 40 000 – 60 000 or more years before European settlement.

The majority of tribes used the abundant resources of the Murray River and associated lakes and waterways. These waterways were important sources of food, water and shelter, as well as providing habitat for many species of Mallee fauna, which were a major food source. Occupation of the dryland increased in good seasons. Away from more reliable water sources, water was obtained from interdunal soaks, rock holes (gammas), clay pans and the roots of a range of mallee and hakea (Land Conservation Council 1987). Nonetheless, freshwater lakes like Lake Hindmarsh to the south of the region were focal points that offered abundant food and water. These were the sites of large gatherings of several hearth groups.

Across the Mallee approximately three per cent of the population is of indigenous origin. Descendants of the original inhabitants retain strong links to the Mallee landscape and retain a great deal of knowledge on the local land including native vegetation. All public land in the Victorian Mallee has been claimed under native title (Figure 2). New activities planned for this land are now subject to a notification process designed to ensure the Aboriginal community has the opportunity to comment before any works are started. Moreover, works carried out on public land must involve the Aboriginal community to ensure cultural heritage issues are addressed. A state-wide document, the *Victorian Strategy for Aboriginal Managed Land 2003* identifies areas under aboriginal management or care and outlines the issues confronting aboriginal people in effectively managing these lands.

More than 3,800 archaeological sites in the Mallee (*Aboriginal Affairs Victoria Site Register*) provide evidence of this history and include some very important cultural heritage sites. The majority of these sites are located close to a water source and includes fresh-water shell middens, scarred trees, ochre pits and surface scatters of stone tools. Sites are located throughout the Mallee, including southern Raak Plains, Horseshoe Bend Burial Site, Merbein Common, Lindsay Island, Nyah Vinifera Forest Mounds, Bumbang Island, Robinvale Burial Site, Ross Spring Wells and Hattah Kulkyne National Park and Murray Kulkyne Park (Mallee Catchment and Land Protection Board 1996).

Figure 2 - Map of Aboriginal Community Areas, Native Title, and Cultural Heritage Regions



2.3 European History

The explorers Sturt and Mitchell were the first Europeans to explore the Mallee in the 1830's. European settlers first took up land in the 1840's as squatters to graze sheep. Early occupation was recorded at Lake Boga in 1845 and Mildura in 1846. By 1848 squatters' grazing runs bordered the Murray River and the southern limits of the Big Desert. Dryland cropping expanded from the Wimmera into the Mallee during the 1870's and 1880's. By 1907, 1.3 million hectares of the Mallee had been taken up for selection. These cropping activities required extensive clearing of native vegetation.

Unreliable rainfall, droughts, locusts and rabbits coupled with inadequate technology and often a low level of management skills thwarted cropping activities, and massive dust storms occurred in the 1930's and 40's. These dust storms were so severe they led to the introduction of Victorian soil conservation legislation. However, more advanced farming practices, phosphate fertilisers along with the breeding of disease resistant wheat varieties more suited to local conditions, allowed the continued development of dryland agriculture. Although a third of the Mallee remained unalienated public land, uncleared land was generally grazed by livestock, under license until the late 1980's. Rabbits and to a lesser extent weeds inevitably followed the livestock wherever disturbance by livestock or other activities occurred. Other pest animals rapidly colonised parts of the Mallee including the feral goat, fox, feral cat, wild dog and feral pig. Plague locusts and mice periodically added to the hardships.

The problem of obtaining water for stock and domestic purposes restricted the early agricultural settlement of the Mallee. Up until the 1920's water was carted by train through most of the region. In the early years of the century an extensive earthen channel system was developed in the Wimmera and Mallee. The system was designed to distribute water collected and stored in the Grampians, to farms and towns throughout north west Victoria.

Riverboats were used to transport produce and supplies in and out of the Mallee from 1853 until the 1880's, when the railway system was greatly expanded. Large amounts of timber were removed along the river during this time to provide fuel for the riverboats as well as for domestic and agricultural use.



Paddle steamers are a significant icon of this region and its history.

The first irrigation settlement in Mildura was commenced by the Chaffey brothers in 1887, with fruit production occurring by the mid 1890's. Irrigation settlements also based on pumped districts were later established at Swan Hill, Merbein, Red Cliffs Nyah and Robinvale with some of these areas settled by returned soldiers after the First World War.



Psyche Pumps, a major supplier of irrigation water to the district.

Prior to 1989 irrigation development by private diverters along the Murray River

corridor often involved extensive clearing of native vegetation. Since 1994 the Mallee has experienced sustained and rapid growth in the irrigation sector. This has been driven by water trade into the Mallee and the boom in the wine export market. Expansion of irrigation has almost all occurred due to a major increase in the area of irrigated horticulture by private diverters developing dryland farmland.

2.4 Native Vegetation Assets

The name ‘mallee’ is of Aboriginal origin and is used generically to refer to a particular group of eucalypt species, to the vegetation formation in which they occur, and to the region in Victoria that was predominantly covered by this vegetation. Mallee vegetation comprises a sparse-dense cover of several layers of dwarf to tall shrubs and low trees. Mallee eucalypts are characterised by their growth form of several slender trunks arising from a large underground lignotuber and producing an umbrella-like crown. The term ‘mallee’ is also used to describe the bioregions in which mallee eucalypts dominate.

The range of the Mallee bioregions extends into South Australia and New South Wales. Western Victoria also contains a large area of Mallee bioregion. Three of the six bioregions that occur in the Mallee are described and mapped in the *Victoria's Biodiversity Strategy* (DSE A, DSE B and DSE C, 1997).

Ground flora in the Mallee consists of grass hummocks or bushes and semi-shrubs and/or annual grasses and perennial herbs. Interspersed with Mallee communities throughout the region are considerable areas of what are broadly known as; Pine Belah and Buloke Woodland, Grassy Woodland, Floodplain Woodland, Grassland, Halophytic Shrubland, Alluvial Shrubland, Lakebed Communities and Mallee Heath communities.



There is a wide range of vegetation types – Mallee (left) and Mallee and Halophytic Shrubland (right).

Native vegetation in the Mallee region has three important values:

- It is essential for the protection and enhancement of all flora and fauna species and communities;
- It is essential for the management of land and water resources and the amelioration of the degradation to those resources; and
- It is essential to the economic and social wealth derived from the region through dryland and irrigated agriculture, recreation and tourism, and other developments and activities.

However, there are significant challenges to be met in ensuring the above values are protected and enhanced into the future including:

- Restoring the hydro-geological balance;
- Understanding, maintaining and improving biodiversity;
- Maintaining ecological processes;
- Accepting the importance of native vegetation and the need for change;
- Balancing native vegetation management with production and other values;
- Overcoming lack of recruitment;
- Dealing with economic imperatives and pressures;
- Stopping the losses in native vegetation and increasing native vegetation gains; and
- Maintaining political will to protect native vegetation.

The protection and enhancement of native vegetation in the Mallee is essential to maintain necessary ecosystem services and to provide habitat for flora and fauna species and populations, particularly threatened fauna species.

The outcome of the Mallee Area Review and Final Recommendations in 1989 permanently protected substantial areas of native vegetation on large blocks of public land mainly in the west of the region and many small reserves throughout the agricultural area.

During the last 15 years private landowners and government agencies have conducted an enormous amount of good work in native vegetation management. This includes efforts by both dryland and irrigation farming families and other rural residents on private land and roadsides. Where there has been payment of government incentives projects are recorded on a database. A summary of completed projects has been obtained from the incentive database managed by the Mallee CMA known as the *Catchment Activity Management System*. On ground achievements for native vegetation protection and enhancement includes:

- Fencing of approximately 12,800 ha since 1989. This includes areas fenced to protect remnant native vegetation and areas for revegetation;
- Completion of fencing of the Tyrrell Creek;
- Approximately 3,000 ha of revegetation completed since 1989;
- Approximately 350,000 native trees (tube-stock) have been planted since 1993; and
- Completion of 986 projects in total. Taking account of multiple projects by some landowners, it is estimated at least 600 farms have undertaken works with incentive since 1993.

There has also been a great deal of work completed in threat reduction on public and private land including coordinated intensive rabbit and fox control, control of the environmental weeds boxthorn, prickly pear and boneseed, and reduction of erosion by farmers.

2.5 Mallee Flora and Fauna

The flora of the Mallee is diverse and, to a large degree, unique in Victoria. There are approximately 1000 vascular plant species (including 11 mallee eucalypts, five other eucalypt species), 300 bird species, 39 species of native mammal and 74 species of reptile. The Mallee represents the edge of the range of many species, so populations of these species, which also occur to the north and south of the region, are likely to be genetically distinct from their relatives, and therefore important from a biodiversity perspective (*Atlas of Victorian Wildlife 2003* – data base).

Both plant and animal species and their individual populations are closely linked to functioning ecosystems, which, in turn, create and depend largely on clean air, land, and water resources. Therefore, protecting them is an integral component of maintaining these functions in the region.

Fauna Changes

Protecting native vegetation is essential to protect fauna species and habitat in the Mallee. The mammalian fauna has undergone significant change since European settlement due to extensive clearing, predators and grazing (NRE 1997C). Generally this means that mammalian fauna populations have been extinct, reduced and/or genetically isolated. In recent years three new species of small mammals have been discovered: the Little Pygmy Possum; Mallee Ningau; and Paucident Planigale.

Some of the fauna species of conservation significance found within the Mallee are:

- **Mammals** — Mallee Ningau, Silky Mouse, Mitchell's Hopping Mouse;
- **Birds** – Malleefowl (Victoria's only megapode), Black-eared Miner, Regent Parrot and Plains Wanderer, all nationally threatened;
- **Reptiles** — The greatest diversity of reptiles in Victoria, with threatened species including; Carpet Python, Bandy Bandy, Beaked Gecko and Mallee Worm-lizard;
- **Fish** — Nine threatened fish species, including Murray Cod, Southern Purple-spotted Gudgeon and Silver Perch; and
- **Invertebrates** — Four threatened invertebrate species, including *Ogyris otanes*, and *Synemon nais*.



From left to right: Silvery Emubush (rare), Bandy-bandy (threatened), Carpet python (endangered), Bossiaea walkeri (endangered).

Flora Changes

Flora communities and species have undergone significant changes since settlement due to the impact of threatening processes:

- **Pine-Buloke / Pine Belah Woodlands** – now listed as threatened communities;
- **Grasslands** — have been largely removed from the landscape particularly in the agricultural areas;
- **Floodplain and aquatic vegetation** — reduction in the condition of this vegetation within the Murray River channel, floodplain and anabranches;
- **325 rare or threatened flora species** in the Mallee (20 per cent of all those threatened in Victoria), of which 12 are threatened nationally (Flora Information Systems 2003 – data base); and
- **104 threatened fauna species** in the Mallee (41 per cent of all of those threatened in Victoria) (*Atlas of Victorian Wildlife 2003* – data base).

While the large areas of public land in the Mallee provide for some of the threatened species of flora and fauna to survive, these areas do not provide adequate protection for many species and communities. Approximately three per cent of the freehold landscape contains remnant native vegetation (MVMWG 1991). The composition, conservation status and level of significance of these remnants have recently been intensively studied through the Ecological Vegetation Class (EVC) mapping, vegetation condition mapping and depletion analysis.

Large blocks of public land rely heavily in some cases on relatively narrow corridors of native vegetation for links between them. In some cases these corridors are on private land and not well protected. In other instances roadsides are the only links remaining.

Remnant vegetation on private land is crucial for the protection and enhancement of native flora and fauna.

Road and rail reserves often represent a significant proportion of the vegetation that remains, and act as important corridors in an otherwise largely cleared agricultural landscape. In the south, south east and east, the creek systems also act as important remnants and corridors.

The protection and enhancement of native vegetation is essential for the protection of all flora and fauna species, and maintenance of biodiversity in the Mallee.

2.6 Native Vegetation Resources

2.6.1 Ecological Vegetation Classes

Ecological Vegetation Classes are mapping units based on vegetation structure and floristics (the species that occur at a site) and land systems. Other environmental information taken into account included aspect, slope, elevation, rainfall, fire frequency and ecological responses to disturbance. They describe

local patterns of vegetation diversity and are more complex, variable and specific than Broad Vegetation Types (BVTs). Like Broad Vegetation Types, Ecological Vegetation Classes are not bioregion (see 2.5.2) specific. Ecological Vegetation Classes are important for regional strategic planning and have been mapped at a range of scales from 1:25,000 to 1:100,000. They provide valuable information about the level of depletion and threat status of different vegetation types. The status of each Ecological Vegetation Class within each bioregion in the Mallee is described in Appendix 9. Bioregions in the Mallee are listed below.

2.6.2 *Bioregions*

In considering the natural resource issues and attributes of Victoria, *bioregions* have been adopted as the main regional units, defined primarily on biological and geographical criteria. The bioregion delineates common ecological characteristics within the landscape and is seen as a natural framework for recognising and responding to biodiversity values (NRE 1997).

The state-wide plan proposes the bioregion as a suitable perspective through which to view relationships between natural resource based activities and biodiversity assets. Bioregions are the basis for determining the conservation status of Ecological Vegetation Classes.

Bioregions identified in Victoria form part of a national framework (IBRA - Interim Biogeographical Regionalisation of Australia). Of the 21 Victorian bioregions, six are represented in the Mallee, refer to Figure 3. These are:

- Lowan Mallee Bioregion;
- Murray Mallee Bioregion;
- Wimmera Bioregion;
- Murray Scroll Belt Bioregion;
- Robinvale Plains Bioregion; and
- Muray Fans Bioregion.

Figure 3 - Map of Bioregions

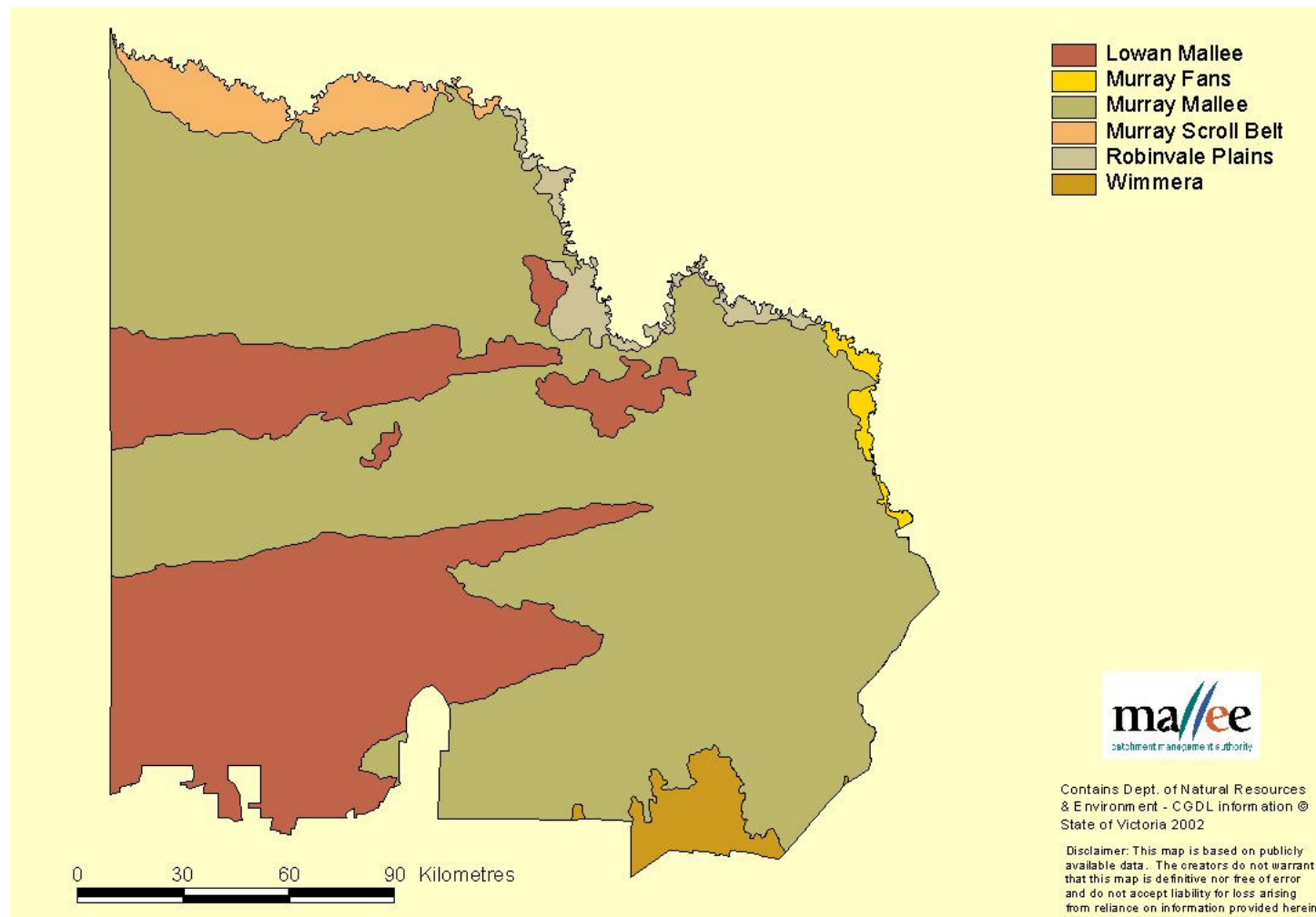


Table 1 - Extent of Remnant Native Vegetation for each Bioregion (all land based)

Bioregion	Pre 1750 area (ha)	Current area (ha)	Proportion remaining (%)
Lowan Mallee	1,077,185	1,001,153	93
Murray Mallee	2,562,157	693,027	27
Wimmera	80,943	6,466	8
Murray Scroll Belt	114,490	104,087	91
Robinvale Plains	63,323	55,741	88
Murray Fans	21,789	11,759	54
Total	3,919,887	1,872,233	48

An analysis of current total area of remnant vegetation for each bioregion is compared against pre 1750 extent in Table 1.

2.6.3 Biodiversity Action Plans

Biodiversity Action Planning (BAP) is a structured approach to identifying priorities and mapping significant areas for native biodiversity conservation at the catchment, bioregional, landscape and local scales (Platt & Lowe 2002). Biodiversity action planning takes a strategic approach to conservation of native biodiversity assets by looking for opportunities to conserve groups of species in priority remnant vegetation types on all land tenures.

Native vegetation priorities identified in the Native Vegetation Plan are included in the Biodiversity Action Plans and supplemented by other biodiversity priorities (*e.g.* threatened species, wetlands and river health). Using existing information on biodiversity assets and current understanding of species requirements for habitat within the local landscape, the Biodiversity Action Plan identifies the options for restoring native vegetation to recover biodiversity. These options can be mapped with related information on land and/or water protection and land-use potential to enable local communities to visualise how sustainable landscapes can be achieved. This approach allows the knowledge of people in the local community to be used in applying the priorities identified in the regional Native Vegetation Plan.

The Biodiversity Action Plans summarise the key biodiversity assets of the bioregion, and the actions and tools required to achieve state-wide biodiversity goals. The Biodiversity Action Plans concept is being developed in partnership between Catchment Management Authorities (CMAs) and the Department of Sustainability and is being implemented across several CMA regions across Victoria. The plans will be developed in stages and with component sections that can be aggregated or separated depending upon the area of interest of the user.

Biodiversity Action Plans are comprised of several components at different scales. The **Strategic Overview** provides details of the framework and methodology used in developing bioregional Biodiversity Action Plans and an overview of the features and assets of the bioregion. Specific information on assets and priorities for actions within landscape *zones* is assembled in the Biodiversity Action Plans. These may be further appended with detailed Local Area Plans for conserving biodiversity.

Bioregional biodiversity assets

Biodiversity assets include:

- Native vegetation on public and private land;
- Native species of plants and animals; and
- Natural ecosystems and the services they provide.

Bioregional actions

Priority bioregional actions include:

- *Protection* of viable remnant habitats, including wetlands and streams and the flora and fauna populations they contain, usually involves removing or reducing the threats;
- *Management* to enhance the condition of these habitats by active intervention; and
- *Restoration* of at least some of the former extent of these habitats by revegetation.

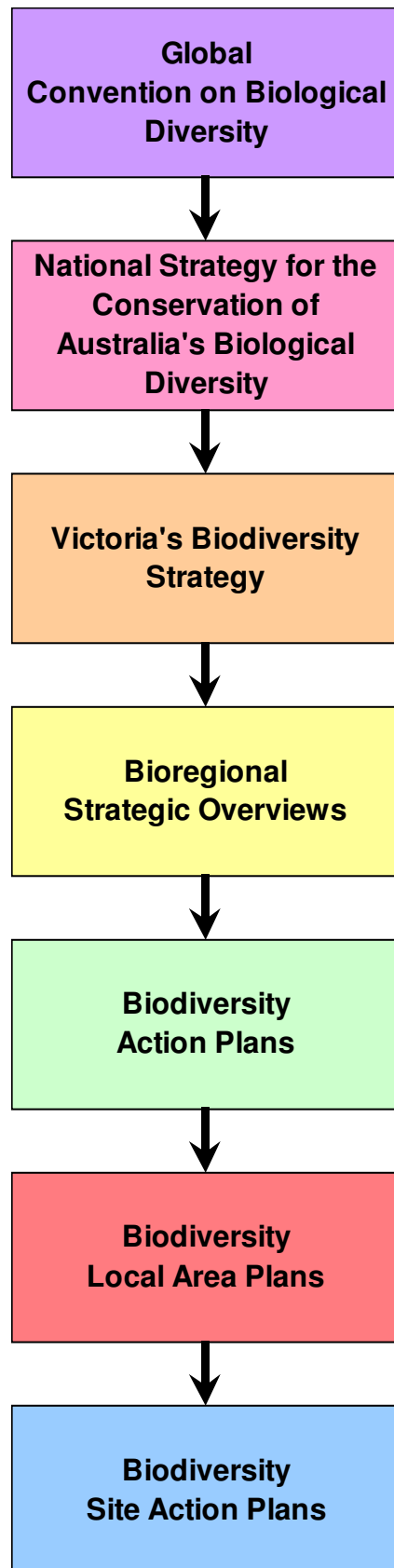
Bioregional tools

The actions will require the use of a variety of tools including:

- Planning and assessment tools – *e.g.* Bioregional Network Analysis, flagship and focal species, habitat hectares;
- Legislative tools – *e.g.* the use of local government planning schemes;
- Voluntary tools – *e.g.* voluntary agreements with landholders; and
- Market tools – *e.g.* new policy instruments employing social choice and market forces to encourage land use change and development of more environmentally benign agricultural systems.

Figure 4 illustrates the origin of Biodiversity Action Plans.

Figure 4- The Origin of Biodiversity Strategies



2.7 Landscape Features of Mallee Native Vegetation

'Landscape features' describes components of the native vegetation resources of the Mallee, which are easily grouped and distinguishable based on physical characteristics or land status. They have particular natural resource characteristics, quality issues, threats and management requirements. Each landscape feature may contain more than one Ecological Vegetation Class.

Eight landscape features have been identified as being significant for the region:

- Remnants less than 10 ha;
- Native vegetation greater than 10 ha;
- Roadside corridors;
- Strategic links;
- Unused roads;
- Murray River corridor;
- Southern Mallee creeks; and
- Wetlands.

Remnants less than 10 ha

Many patches of remnant native vegetation are relatively small, isolated blocks less than 10 ha in area. The upper limit of 10 ha for small remnants is arbitrary. It has been selected to highlight the importance of small remnants in the agricultural landscape.

Thousands of these remnants are scattered throughout the Mallee on private land. Their protection and enhancement is crucial as small remnants are often the only native vegetation throughout most districts. There are also more than 30 public land reserves of less than 10 ha. One or more Broad Vegetation Types and Ecological Vegetation Classes may be represented in a small remnant.



A small remnant of Belah showing effects of stock grazing.

Remnants comprising less than 10 ha are often isolated in paddocks when the remainder of the landscape has been cleared for agriculture and other purposes. Many of these smaller remnants are highly disturbed, because they have a high edge to area ratio. This may threaten their viability, due to a dominant 'edge effect' making them highly susceptible to a range of threats, including weeds and pest animals, clearing, encroachment of adjoining land use or grazing by livestock. They are often characterised by mature trees and an absence of understorey, which threatens their ability to survive and regenerate. Even these highly disturbed small remnants are valuable and worthy of protection in an otherwise cleared landscape. Small remnants often occur as single isolated large trees, either dead or alive, scattered through cropland. This is frequently the case for Cypress-pine/Buloke woodlands in the southern Mallee or Belah or Cypress-pine woodlands on the ridges in the northern Mallee. Single trees are usually senescent with little chance

of regeneration or enhancement without changes to management. Not many of these woodland remnants are regenerating. There are, however, some small remnants in exceptionally good condition with some of the very best examples of Buloke Woodlands and grasslands occurring on private land in the southern Mallee. Small remnants are important habitat for many threatened species such including Bush stone Curlew and Plains Wanderer.

Small remnants may contain or provide habitat for rare or threatened species or form part of an important corridor for threatened species. Examples of these respectively are the Major Mitchell's Cockatoo which nests in tree hollows in old Cypress-pine, Belah or Buloke, and Regent Parrot, which requires mallee for flight paths through cleared areas. The corridors could be either a series of small remnants or preferably a continuous belt of mallee.

At least 30 species of flora associated within Cypress-pine/Buloke communities are also identified as under threat. Exclusion of grazing is the first priority in protection of small remnants as livestock usually camp amongst trees.

Small remnants are often the focus of farmer and broad community activity to undertake vegetation improvement works on their property. Indeed a great deal of work has been done by the Mallee farming community in the last 20 years to fence off and carefully manage small remnants on private land to improve their quality. Where this work has involved a cost share from Government a voluntary Management agreement has been signed by the landowner. The effectiveness of voluntary and permanent agreements in respect to completed projects needs to be assessed.

The Buloke Biolink programme in the southern Mallee is an example of a co-operative community project to protect and connect many small remnants on private and public land. Another achievement of many farmers was to fence off small remnants and eliminate rabbits when rabbits dominated farm management prior to arrival of Rabbit Haemorrhagic Disease in 1996.

Native vegetation greater than 10 ha

Along with the Mallee parks and other public land blocks there are significant areas of native vegetation on private land that are greater than 10 ha. Again the lower threshold for this is somewhat arbitrary. Large parcels of public land include Murray-Sunset National Park, Wyperfeld National Park, Hattah-Kulkyne National Park, Murray-Kulkyne Park, Big Desert Wilderness Park, and Big Desert State Forest. There is an additional 140,000 ha of vegetation in other public land reserves greater than 10 ha (LCC 1989) for example Annuello Flora and Fauna Reserve. Black-eared Miner relies on dense very old mallee and is one of Australia's rarest and most endangered birds. Clearing has reduced its habitat drastically. Malleefowl which is vulnerable in Victoria also requires large areas of old mallee as habitat. Regent Parrot relies on large patches of mallee for their feeding grounds, which must be within 20 km of their Red Gum habitat along the Murray River and Wimmera River system.

On private land, significant remnants include in some cases entire blocks often on the poorer soils in the dune fields where land is unsuitable for cropping or remote from irrigation. Examples of large remnants on private land occur on the perimeter of the Big Desert and Murray Sunset National Park, in the river country between Ned's Corner and Merbein, and in the Nangiloc, Wemen, Annuello and Kooloonong areas. Some large or significant remnants have been the subject of donation, purchase or exchange to add to the public land estate set aside for conservation. Some large remnants on private land have also been permanently protected by voluntary binding agreements. Efforts to permanently protect large remnants with voluntary binding agreements should be accelerated.

In 1991, it was estimated that 105,600 ha of freehold land remained under native vegetation in blocks greater than 100 ha (MVMWG 1991). The major threats to these larger remnants are overgrazing by feral animals, native herbivores or livestock, weeds, unregulated human access and inappropriate fire regimes.

Roadside Corridors

A significant amount of remnant vegetation in the Mallee exists on roadside corridors. In parts of the region, notably the south, roadside corridors are the major remnant in an otherwise largely cleared agricultural landscape. Roadside corridors are subject to a number of threats, including weeds, rabbits, road construction and maintenance works, unauthorised fire prevention activities, movement of livestock and soil



A roadside corridor in the northern mallee.

deposition from erosion events on adjacent cultivated land. Many roadsides are in poor condition as a result. However in some areas such as the eastern Mallee there are a number of five chain roads in excellent condition. In the southern Mallee roadsides are often the last examples of grasslands and may provide habitat for threatened species such as Chariot Wheels.

The Regent Parrot relies on roadside corridors to feed in and to access large patches of mallee daily and return to the Red Gum communities for nesting and breeding. These parrots are threatened by destruction or fragmentation of corridors along roads and on private land. This threat is particularly evident in the irrigation areas, and within 20km of the riverine corridor, including both the Murray River and the southern Mallee Creeks.

A characteristic of the Mallee is that much of the disturbed landscape is ideal rabbit harbour and roadsides are an example of this. A considerable achievement of Landcare Groups over the last decade or more is the co-ordinated rabbit control programmes carefully undertaken mainly targeting the roadsides with support from Government. The Buloke Biolink Project has enhanced many roadsides and created links to nearby remnants.

Strategic Links

Most of the larger blocks of public land, although now well protected in their own right, are linked to one another in most cases by narrow corridors. Well functioning corridors are important to enable interchange of genetic material and movement of wildlife between the large blocks. Many of the links are mainly located on private land, and may be less than 100 m in width. Some of these have been protected by fencing and other enhancement activities undertaken by the landowner. Other links between some large public land blocks rely on roadsides often in poor condition and not particularly recognised for their strategic value.



The Regent Parrot (classified as vulnerable in Victoria) follows remnant roadside vegetation to travel between feeding and breeding grounds.

Examples of strategic links include connections between Wathe Flora and Fauna Reserve and Wyperfeld National Park, or between Murray Sunset National Park and Annuello Flora and Fauna Reserve. To effectively manage strategic links on private land requires assistance from Government.

Unused Roads

Throughout the Mallee there are many 'unused' roads. Unused roads include those no longer in use and therefore not maintained but still managed by the Council and those that have never been developed and have been declared 'unused' under the *Lands Act 1958*, thereby returning management responsibility to the Crown (Robyn Major *pers. comm.*). Crown land management often licence 'unused roads' to the adjacent landholder. Unused roads provide vitally important networks of native vegetation in an otherwise fragmented landscape. In the southern Mallee they may contain native grasslands and provide habitat for threatened species such as Plains Wanderer and Chariot Wheels. These remnants are important to regionally significant bird species, such as Blue Bonnets, for both nesting and roosting. There is evidence that the Regent Parrot uses a number of unused road reserves near Wemen as flight paths to feeding grounds further south (I. Sluiter, 1999 *pers. comm.*). It is vital that these unused roads do not become further fragmented in order to provide these flight paths for the Regent Parrot. For the majority of unused roads, the fencing is now in disrepair on at least one side, hence they are grazed by livestock and in some cases may be partially used for cropping.

Murray River Corridor

The Murray River is part of the Murray Darling Basin rising near Mount Kosciusko and terminating near Goolwa in South Australia. It forms the northern boundary of the Mallee. The Murray River is a complex environment and is conjoined by many billabongs and anabranches. Several tributaries enter the river in the region. As the largest permanent river system cutting through Australia's semi-arid zone, it creates a unique conjunction of otherwise disparate ecosystems.

Pressey (1986) recognises three distinct stretches of the Murray River in the Mallee based on the geomorphology and hydrology of the floodplain. The boundaries between these sections in part correspond to biological changes along the length of the river, and are recognised in the three riverine bioregions.



The Murray River provides an important corridor through the landscape

The Murray River is characterised by Floodplain and Grassy Woodlands. The River Red Gum Woodland communities of the Murray River corridor have an extremely high conservation value. They are habitat for numerous threatened flora and fauna. For example, the Regent Parrot (classified as vulnerable to extinction in Victoria and nationally – CNR 1995) nests in Red Gum trees along the Murray River and feeds in adjacent mallee. This species is inextricably linked to the presence of the Murray River in the semi-arid zone. These birds are threatened by the destruction and death of old trees in both the Murray River corridor and the Wimmera River.

Red Gum and Black Box Woodland provide habitat for the endangered Murray Darling form of the Carpet Python. The Carpet Python is known to exist largely within the Red Gum forests along the Murray River and southern Mallee Creeks. It occurs in a small number of isolated populations in the less disturbed tracts of Red Gum. Destruction of Red Gum communities by logging and gathering of fallen logs for firewood threaten survival of the Carpet Python. The Murray River corridor is also characterised by extensive areas of alluvial shrubland particularly between Merbein and the South Australian border that has been traditionally used for rangeland grazing. The shrublands have been subjected to severe overgrazing by livestock and rabbits during drought years in the past, but with careful management can be recovered.

Red Gum and Black Box Woodlands of the riparian corridor and lower alluvial terraces are threatened by river flow regulation, timber harvesting, firewood collection, overgrazing, recreational pressure, rising saline groundwater; and drainage water disposal. Some areas show severe decline of the over-storey due to insufficient flooding.

Southern Mallee Creeks

Lalbert, Tyrrell, Dunmunkle, Outlet and Yarriambiack Creeks all have their headwaters to the south, south-east and east of the region, and occasionally flow into the Mallee, terminating in a series of lakes. They are characterised by floodplain vegetation communities of Black Box woodland with some Red Gum and a complex understorey system.

The southern Mallee creeks represent significant vegetation remnants on a strip of public land in an otherwise largely cleared agricultural landscape. They act as habitat and corridors for a range of threatened flora and fauna species, including Regent Parrot, Carpet Python, Yellow Chat, Plains Wanderer and Bush Stone Curlew (*Atlas of Victorian Wildlife 2003* – data base). The decline of the Creek corridors will impact on the survival of these threatened fauna.

The southern Mallee creeks are threatened by inadequate water flow regimes, fire, weeds, pest animals, encroachment of adjoining land uses, grazing, erosion and salinity. The Creeks are locally highly valued for their landscape and wildlife qualities, and are subject to local recreational usage. Some sections of the creeks support stands of native vegetation in excellent condition, largely due to the long-term custodianship by the neighbouring farmers. Of significance is the recent revision of the Yarriambiack Creek Management Plan, which establishes agreed priorities for directing resources from both the Mallee and Wimmera CMAs to improving the creek environment.

Wetlands

The Mallee features an extensive range of wetland ecosystems. The majority of these are located on the Murray River and its associated anabranches, though some also occur on the southern Mallee creeks and associated lake systems. Wetlands also occur in low-lying areas where saline discharge reaches the land surface. Nine hundred and thirteen wetlands have been identified of which 23 are recognised as being of national significance. These



There are more than 900 wetlands in the Mallee.

include: Belsar Island, Beveridge Island, Bunguluke Wetlands, Hattah Lakes, Heard's Lake, Heywoods Lake, Kings Billabong Wetlands, Lake Albacutya, Lake Lalbert, Lake Ranfurly, Lake Tyrrell, Lake Wallawalla, Lindsay Island, Major Mitchell Lagoon, Pink Lakes, Raak Plain, Walpolla Island and Wargan Basins (ANCA 1996). Lakes in Hattah Kulkyne National Park and Lake Albacutya Park were designated under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) in 1982 (Mallee Parks Management Plan 1996).

2.7.1 Current Extent of Native Vegetation in the Mallee

Figure 5 shows the current extent of tree cover/native vegetation in the Mallee in 2004. Table 3 provides estimates of the current extent of each Ecological Vegetation Class in the Mallee (Total extant area) and also allows a comparison to be made with pre 1750 levels. Table 3 indicates that the pre 1750 area of vegetation in the Mallee was 3,919,887 ha, which has since been reduced to the current area of 1,872,233ha, a substantial reduction of 52.24 per cent. However, of the pre 1750 area of native vegetation, 33.66 per cent (1,319,304 ha) has now been reserved, predominantly in large parks such as Murray-Sunset, Big Desert, Wyperfeld and Hattah-Kulkyne. Of the pre 1750 extent of native vegetation, six per cent remains on private land, mainly in the form of tree lines at the edge of paddocks, in a largely altered landscape. However, if the remaining native vegetation on private land is considered in the context of extant vegetation (2004), it contributes a significant 12 per cent.

A number of previously well-represented Ecological Vegetation Classes in the Mallee are now quite heavily cleared and poorly reserved, a factor that would highlight them as important targets for action via the Mallee Native Vegetation Plan. A brief description and status of four of the more prominent Ecological Vegetation Classes is provided below (note that each class is given a reference number). These are Parilla Mallee, Plains Savannah, Ridged plains Mallee and Woorinen Mallee. The full list of reference numbers for the Mallee and the corresponding classes is in Table 3. The complete list and description of Ecological Vegetation Classes is available on CD from the Mallee CMA in the publication *Vegetation of North West Victoria – A Report to the Mallee Wimmera and North Central CMAs* (2003). Digital imagery of the Ecological Vegetation Class mapping is available, at cost, from SunRISE 21.

Figures 5 and 6 illustrate current Native Vegetation and pre 1750 Native Vegetation respectively, based on amalgamated Ecological Vegetation Classes. Figure 7 demonstrates the status of some of the depleted, vulnerable and endangered Ecological Vegetation Classes across the region.

Parilla Mallee (20)



Typically Parilla mallee consists of tall open mallee to 10 metres supported by shallow accumulations of aeolian material that have been deposited on the slopes of Parilla Sandstone ridges.

Parilla Mallee is often found on topographic high points in the landscape, on the crests and eastern sides of broad weathered sandstone ridges. Specifically it is supported on deep relatively “loose” drifts of loamy sand of aeolian origin built up by a series of depositional episodes, including recent events promoted by widespread clearing. As a consequence, much of the recently dumped material has severely degraded small or linear remnants of this class. It is characterised by medium to tall Mallee woodland to 10 metres with a well-developed small tree Cypress-pine (*Callitris gracilis*) and large shrub stratum above a field layer of grasses and forbes. The annual flora is particularly rich in intact remnants.

It is dominated by *Eucalyptus socialis*, *Eucalyptus oleosa*, and *Eucalyptus dumosa*. Cypress-pine is a frequent co-dominant tree species. Other mallee Eucalypt species are occasional and rarely dominant. The understorey is highly variable comprising numerous floristic variants, many of which appear to be strongly influenced by land use and fire regime. A well-developed woody shrub layer is typical in relatively undisturbed remnants and includes common species such as *Melaleuca lanceolata*, *Acacia pycnantha*, *Acacia wilhelmiana*, *Acacia brachybotrya*, *Senna artemisioides*, *Pittosporum angustifolium*, *Beyeria lechenaultii* and *Rhagodia crassifolia*. Smaller shrubs include *Maireana* spp.

The distribution of this EVC is concentrated in the central Mallee, particularly in the Patchewollock, Speed and Tempy area and the northern Wimmera. This Class has largely been destroyed for cereal cropping – few intact remnants remain in the landscape. The loose surface soils render this Ecological Vegetation Class susceptible to invasion by exotic grasses and disturbance by rabbits. The understorey is often dominated by environmental weeds and a few “weedy” indigenous perennials such as *Sclerolaena diacantha*, *Enchylaena tomentosa* and *Maireana brevifolia*.

Table 3 indicates that the original pre1750 extent of this Ecological Vegetation Class was 161,654 ha. However, 90.40 per cent (146,130 ha) of this Class has subsequently been developed leaving a remaining 14,235 ha. Only 4.74 per cent (7,658 ha) of the original pre 1750 extent has been reserved. The extensive development and lack of reservation for this Ecological Vegetation Class suggests various restoration and enhancement works are urgently required in the near future to maintain this Class within the region.

Plains Savannah (22)



Plains Savannah is a structurally diverse vegetation unit, which includes ‘grassy openings’ of a few to many hundreds of hectares, with a variable tree density ranging from sparse savannah to woodland. It occurs on flat to slightly undulating loamy clay plains in areas receiving average rainfall of less than 450 mm per annum.

Buloke (*Allocasuarina luehmannii*) is the predominant tree species. There is anecdotal evidence to suggest Cypress-pine (*Callitris gracilis*) may have been far more common than its current abundance indicates. Eucalypts are notably absent although *Eucalyptus largiflorens*, *Eucalyptus leucoxylon*, *Eucalyptus camaldulensis* or *Eucalyptus microcarpa* (the latter two in southern, higher rainfall zones only) may occasionally occur at the ecological margins.

Shrubs are sparse; only the occasional presence of *Acacia pycnantha*, *Senna artemisioides*, *Santalum acuminatum*, *Acacia oswaldii*, *Rhagodia spinescens* and *Bursaria spinosa* add to structural diversity.

The grassy layer tends to be of relatively low biomass with an open tussock structure. Dominant grasses are *Austrostipa scabra*, *Austrodanthonia setacea* and *Austrostipa caespitosa*. Other grasses include *Austrostipa nodosa*, *Enneapogon nigricans*, and *Enteropogon acicularis*. Characteristic forbes include *Convolvulus angustissimus*, *Oxalis perennans*, *Enchylaena tomentosa*, *Maireana enchylaenoides*, *Minuria leptophylla*, *Sida corrugata*, *Vittadinia* spp., *Goodenia pinnatifida*, *Einadia nutans*, *Atriplex semibaccata*, *Ptilotus exaltatus*, *Lomandra effusa*, *Bulbine bulbosa*, *Tricoryne elatior* and *Arthropodium minus*. Other forbes include *Calocephalus citreus*, *Leptorhynchos squamatus*, *Chenopodium desertorum*, *Maireana excavata*, *Maireana decalvans*, and *Wahlenbergia* spp.

Most remnants occur on five and three chain roads, which have historically been used as travelling stock routes, as well as some remnants on private land. All sites have experienced stock grazing pressure, and many road reserves are ploughed to some extent.

Both Buloke and Cypress-pine were popular as a timber resource amongst early settlers, which has probably compounded the scarcity of both species, in addition to the apparent predation of seedlings by introduced rabbits and hares. Table 3 indicates the pre 1750 extent of Plains Savannah was 115,020 ha, but subsequent development of 92.79 per cent (106,727 ha) of the Ecological Vegetation Class has reduced the extent to a small 8,293 ha. Virtually none of this Class has been reserved (0.40 per cent of the original pre 1750 extent, or 454 ha).

Ridged Plains Mallee (25)



Ridged Plains Mallee is open, grassy mallee woodland, to low open woodland with a chenopod dominated understorey and a tussock grass dominated field stratum. It is typical of the undulating plains of the Wimmera and southern Mallee.

Across the majority of the extensive range of Ridged Plains Mallee, *Eucalyptus dumosa* and/or *Eucalyptus behriana* typically dominates the over storey. However, *Eucalyptus calycogona*, *Allocasuarina luehmannii*, and in the disjunct northern occurrences of this Ecological Vegetation Class, *Eucalyptus porosa* and *Casuarina pauper* (Belah) may be locally significant dominants. The nature of the sub-strata in the vegetation is highly variable and greatly modified by land use history. Small trees and tall shrubs such as *Eremophila longifolia*, *Exocarpos aphylla*, *Pittosporum angustifolium*, *Acacia oswaldii*, *Acacia melvillei* (this species may be locally prominent to dominant); *Myoporum platycarpum* and *Alectryon oleifolius* may be scattered or prevalent depending on the site characteristics and prior land use. It is also thought that Cypress-pine (*Callitris gracilis*) was once a relatively common component species of this Class. The low shrub layer is difficult to characterise. Shrubs typical of heavy soils will often co-occur with species typical of slightly lighter soils. Common species probably would have included *Maireana brevifolia*, *Maireana decalvans*, *Rhagodia spinescens*, *Acacia hakeoides*, *Templetonia sulcata*, *Dodonaea viscosa*, *Acacia acinacea*, (but are easily eliminated by heavy grazing), *Acacia halliana*, *Senna artemisioides*, *Eremophila glabra*, *Maireana aphylla* and *Maireana rohrlachii* (the last two species would have been prominent on the heaviest soil substrates). Low to prostrate sub-shrubs of the family Chenopodiaceae are also common including *Chenopodium desertorum*, *Maireana enchylaenoides*, *Atriplex semibaccata*, *Sclerolaena diacantha*, *Enchylaena tomentosa*, *Maireana excavata* (the green prostrate form of this taxon) and *Einadia nutans*. The field layer is dominated by *Lomandra effusa* and tussock grasses such as *Austrodanthonia caespitosa*, *Austrostipa eremophila*, *Austrostipa scabra*, *Austrostipa nodosa*, *Enteropogon acicularis*, *Austrostipa setacea*, *Austrodanthonia fulva*, and large grasses such as *Austrostipa platychaeta* and *Austrostipa elegantissima*. A diverse suite of inter tussock herbs is also present - common species include *Oxalis perennans*, *Zygophyllum apiculatum*, *Zygophyllum glaucum*, *Sida corrugata*, *Brachyscome ciliaris*, *Goodenia pinnatifida*, *Chrysocephalum semipapposum*, *Rhodanthe stuartiana*, *Ptilotus spathulatus*, *Vittadinia cervicalaris* and *Vittadinia gracilis*.

This was formerly a wide-ranging, but now almost entirely depleted with few remnants apart from road reserves. It was once extensive in the Wimmera and southern Mallee with scattered occurrences on heavy soils in the central Mallee and Manangatang areas. Table 3 indicates the pre1750 extent of the Class was 343,243 ha, with subsequent development of 93.22 per cent (319,962 ha) of the Class leaving a remaining 23,281 ha. Virtually none of the class has been reserved (0.48 per cent of pre 1750 extent, or 1,641 ha, indicating this Ecological Vegetation Class requires immediate action to maintain a viable representation within the region.

Woorinen Mallee (50)



Woorinen Mallee is widespread and associated with the east west orientated calcareous dune fields of the Woorinen Formation.

It comprises mallee woodland to 12 m - typically with projected canopy foliage cover of less than 30 per cent. A sparse tall shrub stratum of approximately 4 m is present in less disturbed sites.

A low open (to 1 m tall) chenopod dominated shrub understorey is ubiquitous in less disturbed remnants. A diverse array of sub shrubs, forbes and grasses are also present. The almost ubiquitous mallee woodland tree dominating this Ecological Vegetation Class is *Eucalyptus oleosa*. Other common woodland mallee trees – in order of frequency of occurrence - are *Eucalyptus dumosa*, *Eucalyptus gracilis*, *Eucalyptus calycogona* and *Eucalyptus socialis*. *Callitris gracilis* may also be an infrequent over storey component in less disturbed remnants of this Class.

A sparse stratum of small trees such as *Pittosporum angustifolium*, *Exocarpos aphyllus*, *Melaleuca lanceolata*, *Alectryon oleifolius*, *Acacia oswaldii*, *Myoporum platycarpum*, *Santalum acuminatum*, *Santalum murrayanum*, is also characteristic of this EVC. The shrub stratum is dominated by species from the family Chenopodiaceae – the most important of which are *Chenopodium curvispicatum*, *Rhagodia spinescens*, *Maireana erioclada*, *Maireana pentatropis*, *Maireana brevifolia*, *Einadia nutans* and *Enchylaena tomentosa* (particularly the grey leaved shrub form of this taxon). Other common shrubs include *Eremophila glabra*, *Acacia colletioides*, *Senna artemisioides*, *Acacia sclerophylla* *Grevillea huegelii* and *Templetonia sulcata*. A range of sub shrubs may also be important at particular sites. *Zygophyllum aurantiacum* is often a dominant understorey species and *Westringia rigida*, *Beyeria opaca*, *Olearia pimeleoides*, *Olearia muelleri*, are typically common.

The field stratum is composed of a range of caespitose grasses and forbes. Common species include, *Zygophyllum apiculatum*, *Sclerolaena diacantha*, *Chenopodium desertorum*, *Ptilotus seminudus*, *Austrostipa elegantissima*, *Senecio glossanthus*, *Calandrinia eremaea*, *Stenopetalum lineare*, *Brachyscome lineariloba*, *Crassula colorata*, *Rhodanthe pygmaea*, *Calotis hispidula*, *Vittadinia dissecta*, *Daucus glochidiatus*, *Crassula sieberiana*, *Salsola tragus*, *Omphalolappula concava*, *Senecio pinnatifolius*, *Vittadinia* spp., *Oxalis perennans*, *Austrodanthonia caespitosa*, and *Podolepis capillaris*.

Table 3 indicates the pre 1750 extent of the Ecological Vegetation Class was 674,212 ha. However, 75.00 per cent (505,625 ha) has since been developed, leaving a remaining 168,587 ha of vegetation. There has been 17.84 per cent (120,312 ha) of the pre 1750 extent of the Class reserved but a large discrepancy remains between development and conservation, which probably needs to be addressed to some extent in the near future if the long-term viability of this Ecological Vegetation Class is to be maintained.

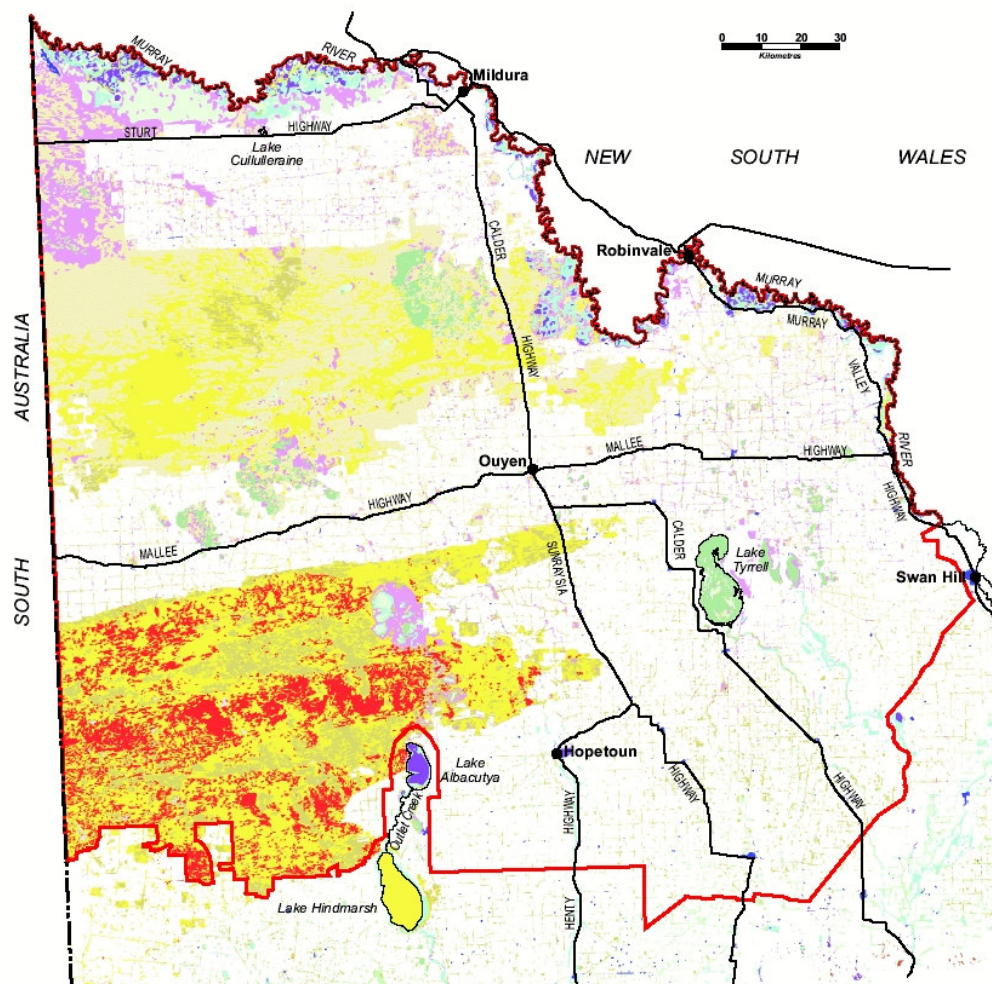
A suite of other EVCs is also severely depleted and in the majority of cases insufficiently reserved and are summarised in Table 2.

Table 2 - Depleted Ecological Vegetation Classes

EVC Name	Pre 1750 Extent (ha)	Current Extent (ha)	Level of Depletion (%)	Pre 1750 Extent Protected in Conservation Reserves (%)
Cane Grass Wetland	242	27	89	0
Chenopod Mallee	249,231	79,600	68	16
Low Rises Woodland	27,074	1,421	95	0.21
Plains Grassland	4,596	327	93	1.09
Plains Woodland	15,864	987	94	0.47
Semi-arid Chenopod Woodland	69,630	27,646	60	11
Semi-arid Parilla Woodland	23,603	5,872	75	16
Semi-arid Woodland	385,119	119,744	69	21
Woorinen Sands Mallee	471,967	225,315	52	39

Figure 5 - Map of Current Native Vegetation (based on Amalgamated Ecological Vegetation Classes)

Simplified Current Native Vegetation (based on EVC groupings)

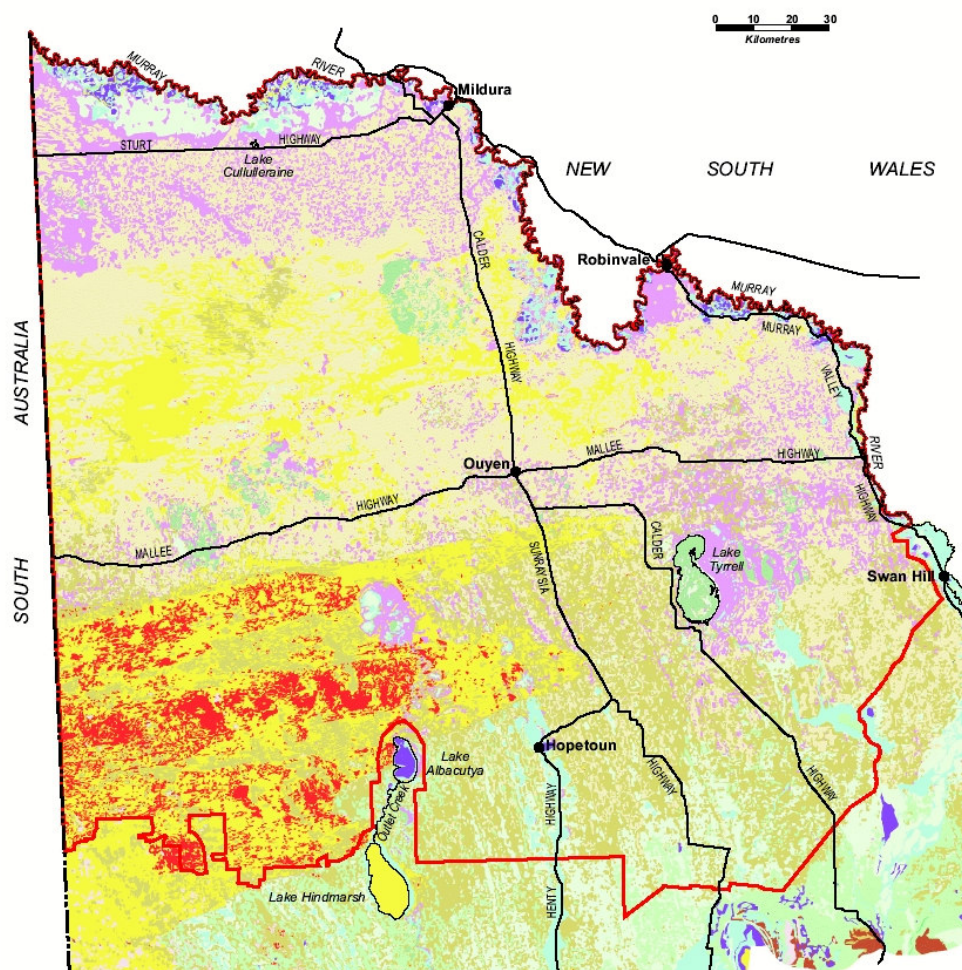


Source: North West EVC Mapping Study, funded by Mallee, Wimmera and North Central CMAs
Cartography by Spatial Vision, 2003

Figure 6 - Map of Pre 1750 Native Vegetation (based on Amalgamated Ecological Vegetation Classes)

Simplified Pre-1750 Native Vegetation (based on EVC groupings)

- | | |
|---|---|
| 5.2 Lower Slopes or Hills Woodlands - grassy | 16.1 Heathlands - sandy and/or well-drained |
| 8.2 Riparian Forests or Woodlands | 17.1 Mallee - siliceous sands |
| 12.1 Plains Grasslands and Chenopod Shrublands - clay soils | 17.2 Mallee - calcareous sands, loams and clays |
| 13.1 Plains Grassy Woodlands or Forests - freely-draining | 17.3 Mallee - clay plains and sandstone rises |
| 13.2 Plains Grassy Woodlands or Forests - poorly-draining | 18.1 Wetlands - freshwater |
| 13.3 Plains Grassy Woodlands or Forests - rises and lunettes | 19.2 Salt-tolerant and/or succulent Shrublands - inland |
| 13.4 Plains Woodlands or Forests - semi-arid | Not vegetated - dunes and rock outcrops |
| 14.1 Riverine Grassy Woodlands or Forests - broader plain | Mallee CMA boundary |
| 14.2 Riverine Grassy Woodlands or Forests - creekline and/or swampy | |



Source: North West EVC Mapping Study, funded by Mallee, Wimmera and North Central CMAs
Cartography by Spatial Vision, 2003

Figure 7 - Status of Ecological Vegetation Classes across Bioregions

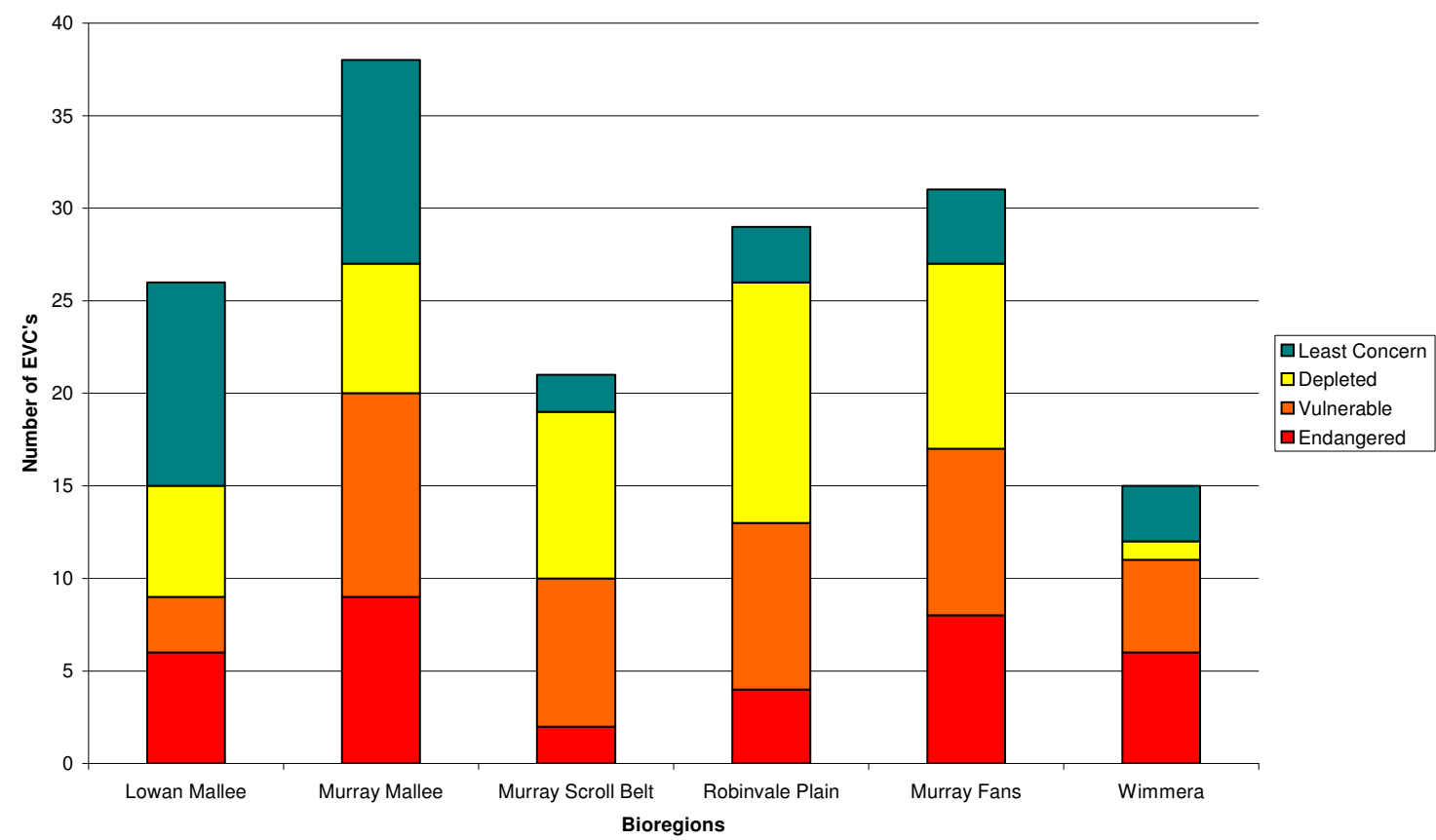


Table 3 - Summary of Status of Ecological Vegetation Classes in the Mallee

	Ecological Vegetation Class	Pre1750 Area (a) (ha)	Reserved Area (C) (ha)	Other Public land (O) (ha)	Private (P) (ha)	Unknown (U) (ha)	Total Extant Area (b) (ha)	Depletion a-b (ha)	% EVC Reserved from 1750 Extent 100 (C/a)	% developed from 1750 Extent 100(a-b)/a
1	Alluvial Plains Semi-arid Grassland	3,510	1,768	1,340	384	11	3,503	7	50.36	0.21
2	Cane Grass Wetland	242	0	2	25	0	27	215	0.00	88.89
3	Chenopod Grassland	6,397	4,695	128	91	12	4,927	1,470	73.40	22.98
4	Chenopod Mallee	249,231	40,061	21,302	18,056	182	79,600	169,631	16.07	68.06
5	Disused Floodway Shrubby Herbland	23	13	10	0	0	23	0	56.14	0.01
6	Dunefield Heathland	138,798	109,921	28,260	69	2	138,251	547	79.20	0.39
7	Floodplain Grassy Wetland	89	17	65	8	0	89	0	18.51	0.09
8	Floodway Pond Herbland	1,018	515	406	72	20	1,013	5	50.57	0.56
9	Heathy Mallee	302,926	208,295	91,604	804	0	300,703	2,223	68.76	0.73
10	Intermittent Swampy Woodland	8,968	6,602	1,488	732	50	8,872	96	73.62	1.07
11	Intermittent Swampy Woodland/Riverine Grassy Woodland Complex	712	709	2	0	0	711	1	99.57	0.14
12	Lake Bed Herbland	3,041	2,292	144	64	403	2,903	138	75.37	4.51
13	Lignum Shrubland	16,655	6,663	5,236	3,705	57	15,660	995	40.00	5.97
14	Lignum Swamp	3,177	854	766	1,277	0	2,898	279	26.93	8.78
15	Lignum Swampy Woodland	27,875	5,052	5,976	7,789	141	18,958	8,917	18.13	32.00
16	Loamy Sands Mallee	471,109	336,248	31,675	11,444	114	379,480	91,629	71.37	19.45
17	Low Chenopod Shrubland	48,809	9,613	6,460	27,017	92	43,182	5,627	19.69	11.53
18	Low Rises Woodland	27,074	57	10	1,351	3	1,421	25,653	0.21	94.75
19	Low Sand Mallee	21,927	19,595	2,264	5	0	21,864	63	89.36	0.29
20	Parilla Mallee	161,654	7,658	1,346	6,467	54	15,524	146,130	4.74	90.40
21	Plains Grassland	4,596	50	33	245	0	327	4,269	1.09	92.88
22	Plains Savannah	115,020	454	282	7,527	30	8,293	106,727	0.40	92.79
23	Plains Woodland	15,864	74	31	881	1	987	14,877	0.46	93.78
24	Red-swale Mallee	57,110	28,807	11,073	1,927	0	41,807	15,303	50.44	26.80
25	Ridged Plains Mallee	343,243	1,641	791	20,799	49	23,281	319,962	0.48	93.22
26	Riverine Chenopod Woodland	84,626	19,805	7,592	16,339	156	43,894	40,732	23.41	48.13
27	Grassy Riverine Forest	3,498	2,780	461	204	39	3,484	14	79.47	0.40
28	Riverine Grassy Forest / Floodway Pond Herbland Complex	1,155	775	325	47	0	1,147	8	67.12	0.65
29	Riverine Grassy Forest / Riverine Swamp Forest Complex	236	70	166	0	0	236	0	29.86	0.00
30	Riverine Grassy Woodland	4,702	3,753	598	137	0	4,518	184	80.46	3.91
31	Riverine Swamp Forest	520	246	160	53	0	458	62	47.25	11.96
32	Saline Lake Aggregate	16,877	12,322	4,395	16	106	16,840	37	73.02	0.22
33	Salt Paperbark Woodland / Samphire Shrubland Mosaic	485	479	0	6	0	485	0	98.81	0.01

	Ecological Vegetation Class	Pre1750 Area (a) (ha)	Reserved Area (C) (ha)	Other Public land (O) (ha)	Private (P) (ha)	Unknown (U) (ha)	Total Extant Area (b) (ha)	Depletion a-b (ha)	% EVC Reserved from 1750 Extent 100 (C/a)	% developed from 1750 Extent 100(a-b)/a
34	Samphire Shrubland	47,055	14,310	16,504	6,998	45	37,857	9,198	30.41	19.55
35	Samphire Shrubland / Saline Lake Mosaic	2,171	2,101	10	26	21	2,157	14	96.79	0.65
36	Sandstone Ridge Shrubland	89,502	63,965	19,166	1,391	47	84,569	4,935	71.47	5.51
37	Sedgy Riverine Forest	608	262	107	88	0	457	151	43.14	24.95
38	Sedgy Riverine Forest / Riverine Swamp Forest Complex	135	56	79	0	0	135	0	41.42	0.02
39	Semi-arid Chenopod Woodland	69,630	7,913	7,893	11,727	113	27,646	41,984	11.36	60.30
40	Semi-arid Parilla Woodland	23,603	3,854	599	1,400	19	5,872	17,731	16.33	75.12
41	Semi-arid Woodland	385,119	79,650	18,124	21,650	321	119,744	265,375	20.68	68.91
42	Shallow Freshwater Marsh	618	313	298	6	0	618	0	50.73	0.07
43	Shallow Sands Woodland	1,596	1,358	130	14	0	1,502	94	85.11	5.91
44	Shrubby Riverine Woodland	7,948	4,384	2,938	553	75	7,930	18	55.16	0.23
45	Spike-rush Wetland	249	145	75	18	0	237	12	58.08	4.88
46	Sub-saline Depression Shrubland	1,009	208	365	422	2	995	14	20.64	1.38
47	Tall Marsh	121	82	19	13	0	114	7	67.49	5.41
48	Tea-tree Scrub	3,187	3,153	10	8	0	3,171	16	98.94	0.50
49	Woorinen Mallee	674,212	120,312	9,899	38,057	318	168,587	505,625	17.84	75
50	Woorinen Sands Mallee	471,967	185,461	19,432	20,081	303	225,276	246,691	39.30	52.27
	TOTALS	3,919,899	1,319,270	320,102	230,001	2,804	1,872,179	2,047,720	33.66	52.24

2.8 Role of Native Vegetation in Reducing Degradation

The land and water resources of the Mallee are affected by a number of forms of degradation (Mallee CALP Board 1996). Table 4 illustrates the role that native vegetation can play in the reduction of impacts of the threats to land and water and demonstrates the protection and enhancement of native vegetation is essential for protection of the land and water resources in the Mallee.

Other strategies and reports referenced in Table 4 have highlighted the importance of native vegetation in protecting the health of land and water resources.

Table 4 - Native Vegetation can Play in Reducing Various Landscape Issues

Degradation issue	Description of Issue; Role of native vegetation in ameliorating issue
Dryland salinity	It is estimated there is 88,000 ha of land salinised naturally by regional groundwater and about 9,000 ha have formed since European settlement (NRE, 2002a). It is estimated that in the next 50 years up to 10 per cent of the dryland farming area and five per cent of public land may be salinised (MDSCWG, 1993). Perennial native vegetation plays an important role in reducing recharge to groundwater tables and rehabilitating saline sites. Under native vegetation recharge is about 0.2 mm per annum, while for cleared dryland used for annual cropping, recharge is between 5mm and 20 mm per annum. Lucerne is also another option. (Mock and Grinter, 2004).
Wind erosion	There is 2.4 million ha of agricultural land potentially threatened by wind erosion, up to 7 per cent of the land may be eroding in March of any year (Mallee CMA, 2003). When in good condition, native vegetation plays a role in reducing wind erosion by stabilising erodible land on which the vegetation occurs. Livestock may benefit from shelter provided by remnants
Water erosion	Gully, sheet and rill erosion occurs along the Murray River and on lunettes and escarpments <i>e.g.</i> Raak Plains. Riparian native vegetation is suffering from reduced flooding, and in some cases trees are dying - increasing the risk of erosion. (Mallee CMA, 2003) Native vegetation plays an important role in protecting waterways from erosion of during flood events and by stabilising soils during rainfall, utilising rainfall and retarding runoff. Environmental flows will help restore riparian vegetation.
Greenhouse Effect	The increase in carbon dioxide in the atmosphere caused by the use of fossil fuels is causing the greenhouse effect and contributing to climate change (Victorian Government, 1998). Enhanced Carbon sequestration provides a possible solution to the greenhouse effect. Carbon sequestration can be increased by increasing the extent and quality of native vegetation.

Weeds	Weeds threaten agricultural industries (<i>e.g.</i> Silver-leaf nightshade) and farm management (<i>e.g.</i> Horehound). Some weeds will not readily spread into healthy undisturbed native vegetation in the semi-arid climate, which in the case of a roadside may act as a buffer to prevent spread of weeds. Management of native vegetation to enhance the understorey can help prevent the spread of agricultural and environmental weeds, as outlined in the Mallee Weed Action Plan 2000.
Water salinity	Approximately 100 000 tonnes of salt are added to the Murray River as it passes through the Mallee region. Extra river salinity caused by irrigation in the Mallee is estimated to cost \$1.5 million annually, (Mallee Salinity Management Plans). Perennial native vegetation can assist in managing irrigation drainage, reducing dryland recharge to groundwater tables and rehabilitating saline sites.
Nutrient pollution	Nitrogen and phosphorus pollutants from irrigation, domestic livestock and urban areas are a causal factor in algal blooms and reduced water quality, (Mallee Water Quality Management Plan Inception Report, 2000). Native vegetation is an effective filter for nutrient pollution before it enters waterways hence is important to improve water quality in the Murray River and other waterways.

2.9 Threatening Processes

Changes to the natural environment since European settlement have had lasting effects on native vegetation resources in the Mallee. Many of these changes continue in the form of threatening processes (LCC 1987). Threatening processes are listed in the *Flora and Fauna Guarantee Act* 1988.

Fundamental to the retention, protection and enhancement of native vegetation is the pro-active management of these threatening processes. Significant improvements in the quality of native vegetation and ultimately biodiversity protection can be achieved through the ongoing management of threatening processes. Threatening processes are those processes, such as habitat disturbance, destruction or pollution that threaten the survival, abundance or evolutionary development of a species, population or ecological community. The following list summarises the key threatening processes for public land and private land in the Mallee, and provides some explanation of how they are a threat to the values of native vegetation (Mallee CMA 2003). The importance of social and economic benefits and costs are indicated where relevant. For private land the threats to native vegetation should be addressed in an integrated way using a whole farm planning approach along with the threats to land resources, water resources and agricultural enterprises. The cost of this planning needs to be shared with Government.

Impacts, risks and threats:

The main threatening processes impacting on native vegetation assets in no particular order are:

2.9.1 *Grazing*

- **Domestic livestock grazing** – selective grazing of native flora species and of regenerated vegetation; compaction of soil by livestock also reduces regeneration; disturbance encourages introduced weed species via faeces and fur and increases risk of wind erosion. Cattle and sheep also damage the bark of trees during heavy stocking and in times of drought. The impact of livestock since settlement has caused decline in quality of the remnants on both private land and Crown land now reserved (LCC 1987). The Land Conservation Council scheduled a phase out of stock grazing on parks and reserves between 1990 and 1996 (LCC 1989). Roadsides in the past have been severely damaged by livestock, either through droving or by longer term grazing. These activities are now controlled by local laws in most municipalities and not considered a big issue. There is, however, some damage still occurring as a result of droving of livestock (Mallee CMA 1998). Although grazing pressure has been removed from much of the public land in the Mallee substantial areas continue to be licensed for grazing by livestock. The impact of past activities will be long lasting particularly without further intervention in many cases. Where grazing by livestock occurs, it is one of the major threatening processes on both dryland and riparian areas of public and private land (Mallee CMA 2003). The sheep industry, in particular lambs for meat, is important to the income of many farms and economies of small towns and complements grain-growing enterprises. The impact of livestock on the land during periods of shortage of pasture can be reduced by the adoption of stock containment areas, which is an activity eligible for cost sharing with government (Mallee CMA 2003). Fencing off remnants to exclude grazing by livestock is a key aim of this plan. Provision of a share of the cost of this work by government is a high priority for this plan. Native grasslands, on the other hand, are likely to benefit from appropriate grazing regimes but should also be separated by fencing from cropping land with a share of the cost being met by government. Threatened species are protected under the *Flora and Fauna Guarantee Act 1988*;
- **Kangaroo grazing** – selective grazing of native species, reduced regeneration (kangaroo population has expanded since European settlement due to increased availability of water and grazing area). Kangaroo numbers increased rapidly when livestock and rabbits were removed from the large blocks of public land during the 1980s (DCE 1990). The grassy woodlands that were suitable for livestock also suited kangaroos and these woodlands and nearby farmland were put at risk by high kangaroo numbers. The kangaroo population increased throughout the northern and western Mallee. Managers of public land are working towards restoring the balance in the major parks by careful monitoring, strategic fencing, removal of artificial waters and culling as required (NPS 1996). The impact of kangaroos on both public land and private land in the Mallee has been intensively monitored and is well documented. Active kangaroo management will need to continue until woodland vegetation is restored. Private landowners are able to seek a permit under the *Wildlife Act 1975* to reduce Kangaroo numbers where damage to crops is occurring;

- **Rabbit grazing and control** – selective grazing of native flora species; reduced regeneration of vegetation; soil disturbance and erosion; rabbit control, *e.g.* rabbit warren ripping can damage and remove vegetation (NRE 2000). Rabbits were almost universal in their extent until 1996 when Rabbit Haemorrhagic Disease had a major impact on rabbit abundance (NRE 1998). However the impact of long-term damage caused by rabbits on disturbed areas of both public and private land particularly on roadsides will take years to recover (LCC 1987). Prior to 1996 rabbit control was a dominant programme for both private and public land managers alike (NRE 2000). Their control as declared pest animals is regulated by the *Catchment and Land Protection Act* 1994 for private land or occupiers of public land. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988. A standard has been prepared to guide control works to avoid off target damage. The document is titled *Resource Protection Guidelines for Rabbit Control - Mallee* (NRE 2000) and is available from DPI or DSE offices. Most Landcare groups have tackled coordinated rabbit control on roadsides in the last 10-15 years while avoiding off target impacts. There is the inevitable risk that the effectiveness of RHD will diminish, thus placing a heavy burden once again on all land managers to implement rabbit control (P. Sandell *pers comm.*). Despite the presence of biological control agents, there will always be a need for supplementary rabbit control. Support to landowners through Landcare groups to monitor and control rabbits should continue. Hares also have an impact on native vegetation throughout the region; and
- **Feral goats and feral pigs** – selective grazing of native flora species; competition with native fauna; soil disturbance and erosion; compaction of soil which hinders regeneration; reduced regeneration due to intensive grazing; may spread weed species; and overgrazing promotes additional degradation (LCC 1987). These pest animals inhabit specific areas and cause long-term environmental damage (NRE 2002). Feral goats are in significant numbers on the large blocks of public land while feral pigs have a major impact on and near the Murray River floodplain, often negotiating the Murray River from New South Wales. Feral pigs also have an economic impact on horticultural industries and dryland farming (Mallee CMA 2003). Both are regulated under the *Catchment and Land Protection Act* 1994 for private land or occupiers of public land. Recent initiatives to control feral goats by public land managers appear to be successful and are encouraged to continue.

2.9.2 *Regimes*

- **Altered flooding regimes** – changed natural wetting/drying cycle, death of species, and reduced regeneration. This is a significant issue along the Murray River and associated wetlands and waterways and the southern Mallee creeks. The size, frequency and duration of floods have all decreased since the rivers have been regulated and water diverted for other uses (LCC 1987). Local runoff has been diminished in the south by widespread use of gypsum. As a consequence ecosystems that depend on flooding to survive and regenerate are threatened. Some areas along the Murray River are permanently inundated that were previously intermittently under water. When coupled with the other threats to floodplain vegetation, reduced flooding is likely to have a major impact unless environmental flows are implemented and utilised effectively and complementary works undertaken (Mallee CMA 2001). It is expected that the construction of the Wimmera Mallee pipeline will increase the water available for the environment in the lower Wimmera River system (Mallee CMA 2003);
- **Inappropriate fire regimes** – Alters age structure of vegetation. For remnant vegetation on private land and roadsides this is a major long-term issue. Vegetation communities containing mallee are adapted to a fire regime of 20-40 years or longer to maintain the shrub and ground flora. Wildfire is a natural part of the landscape (LCC 1987). Fire on private land however, can have severe impacts on the economic and social well-being of the communities therefore fire protection and prevention measures are vital. Most of the understorey shrubs gradually disappear over time after wildfire, finally reaching a climax (long unburnt) mallee community. Most remnants on private land have rarely been burnt since settlement unless by accident. An emerging issue, particularly in the dunefields of the northern Mallee, is that most remnant vegetation on private land and roadsides consists of old or mature vegetation communities with little likelihood of regeneration of understorey due to the absence of fire. Trial sites could be established on farm with willing participating farmers with support from the Mallee CMA. Grasslands are also likely to benefit from careful use of burning;

2.9.3 Introductions

- **Agricultural and environmental weeds** – competition with native species; competition with regenerating vegetation; some varieties parasitic on native species; and changed composition of vegetation community. Weeds that impact on native vegetation spread along roadsides or through other agents such as vehicles and equipment, livestock or birds. The main environmental weeds include African Boxthorn, Prickly Pear, Horehound, African Boneseed and Bridal Creeper. Establishment of weeds usually needs disturbance to encourage and sustain an infestation. Some of the environmental weeds also have economic impacts *e.g.* Boxthorn and Horehound. Many roadsides, small remnants and even some single trees have been infested by Boxthorn at some time, and these shrubs provide ideal harbour for rabbits and foxes (NRE 2000). Co-ordinated control programmes for Boxthorn and Prickly Pear in the last 15 years by all land managers particularly through Landcare groups, has substantially reversed the spread of these weeds. The continuing spread of Bridal Creeper along some roadsides and in remnants is a concern and needs to be addressed before the problem becomes too great. With the increased planting of irrigated olives and almonds in recent years they are beginning to establish as volunteers in remnant vegetation on public and private land and will need monitoring and control (M Hopkins pers comm.). Other exotic species are endemic such as Barley Grass, Medic, Wild Turnip and Onion Weed are widely established in disturbed areas throughout the region including all the farming areas. These may out-compete native species for water and space and prevent regeneration. Their control is achieved by removal of the causes of disturbance rather than by active treatment (LCC 1987). The spread of Ward's Weed on roadsides and public land in the Millewa in the last 20 years is of great concern as it establishes in native vegetation even where there is a low level of disturbance. The continuing slow spread of the garden plant *Gazania* along many roadsides to adjacent native vegetation is a concern and needs to be assessed and appropriate action taken. This plan should continue to support control of the priority environmental weeds in a co-ordinated and targeted way through sharing the cost of initial knockdown with government, in conjunction with other biodiversity works. Control of declared noxious weeds is regulated under the *Catchment and Land Protection Act* 1994 on private landowners or occupiers of public land. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988;

- **Introduced predators** – predation on native species; may enhance the spread weeds. Predators include foxes, feral cats and wild dogs. Feral cats are an ongoing threat to wildlife throughout the region and are not subject to legislative control. Wild dogs are confined to the proximity of public land /private land boundaries around the major blocks of public land. There is some government assistance for control (Mallee CMA 2003). The control of feral cats is largely at the discretion of each land manager as there is no state-wide feral cat control programme. Public land managers and some private landowners shoot feral cats when shooting rabbits or foxes. There is a need to increase this effort with a coordinated regional and local programme. Domestic cats and dogs are required to be registered under the *Domestic (Feral and Nuisance) Animals Act 1994*, and they should display a registration tag, making identification of feral cats and wild dogs straightforward. Foxes are widespread through most of the Mallee and are subject to local control programmes. Declared pest animals are regulated under the *Catchment and Land Protection Act 1994* for private land and occupiers of public land;
- **Nutrients in water** – changed nutrient composition of water; effects growth of some species; and encourage weed growth (Mallee CMA 2003). This may not be a major issue for native vegetation in the Mallee;
- **Inappropriate seed source** – non-indigenous seed sources interfere with genetic diversity and integrity of communities. Many of the specialist nurseries have access to indigenous seed or will batch seedlings from supplied seed. A community seedbank at Swan Hill carries a wide range of indigenous species of local provenance. This is a significant issue for those undertaking revegetation, as the source of seed is often not documented or sources are mixed. In the past some revegetation activities often used non-indigenous species such as Western Australian ornamental Eucalypts as these were considered acceptable at the time and were readily available (Mallee CMA 1998). This was particularly the case along Highways and other main roads. Many of these species in the long term do not survive and should be replaced with indigenous species; and
- **Rubbish dumping** – damages native vegetation; may spread weeds; and encourages feral cats and other pest animals by providing harbour (Mallee CMA 2003). It is both an historic and current problem particularly on public land nearer to towns and along the Murray River (Mallee CMA 2001). Rubbish dumping is regulated under various legislation;
- **Pollution** – contaminants from various toxic pollutants may threaten land or water resources, for example landfill, petroleum distribution/ storage and chemical distribution/ storage (Mallee CALPB 1997).

2.9.4 Agricultural practices

- **Cropping** – cultivation within native vegetation damages small native plants and germinants and may adversely affect roots of larger species. Cultivation encourages dominance of exotic annuals which out compete native species for space and water. Native grassland is very susceptible to cultivation (LCC 1987). Cultivation will be regulated under the *Planning and Environment Act* 1987 where it is deemed to be clearing, or the *Flora and Fauna Guarantee Act* 1988 where threatened species are at risk. Stubble burning may damage or kill non fire-tolerant vegetation although this issue is probably decreasing with the adoption of new farming systems that reduce the need for stubble burning. Large single old trees and small remnants are at high risk from accidental damage by burning of all crop residues. Effort at all levels needs to be directed into ensuring this is monitored, and compliance is enforced. Sustainable farming systems have also reduced the incidence and severity of erosion as discussed below. The widespread use of gypsum coupled with cultivation of the soil and retention of stubble has reduced local runoff during heavy rainfall events. This has impacted on wetlands in the south of the region formerly fed from local runoff or from the southern creeks. The large agricultural machinery now in widespread use puts roadside vegetation at risk from damage on some roads. Obviously grain growing is very important to the economy of the Mallee and Victoria and the social fabric of the rural communities and small towns that largely depend on the revenue generated from farming to survive and prosper;
- **Siltation and deposition** – affects growth and may cause death of native species; affects regeneration; and may introduce weeds. Siltation due to water erosion is not common and may occur, during floods close to waterways and is likely to be a natural occurrence. As the Mallee is an aeolian landscape, movement of wind blown sand readily occurs when the land is disturbed (Rowan and Downes 1963) and anchored ground cover is removed. Since settlement vast amounts of sand drift have been deposited in remnants particularly on the roadsides (Mallee CMA 1998). Current practices however have seen the incidence and severity of the problem reduced but still occurring. Most erosion occurs during drought years when groundcover is removed by cultivation and grazing. The extent of the impact of drift sand on native vegetation is unknown but will be determined by the broadening of monitoring through the Soil Conservation Action Plan (Mallee CMA 2004). Soil management can be regulated under the general duties of a landowner identified in the *Catchment and Land Protection Act* 1994. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988. Soil erosion has other costs and risks such as impacting on human health and safety, and quality of horticultural produce etc;
- **Fragmentation** – reduces viability of communities; increased ‘edge effect’; and diminished habitat values. Fragmentation is a major issue in the Mallee as management areas are large and most remnants on private land are small and often remote and isolated from the vegetated road network (corridors) or parcels of reserved public land (Mallee CMA 1997). Further fragmentation continues to occur due to the net effect of one or more of the other threatening processes. Fragmentation is most evident in the southern Mallee where old single trees are dispersed through cropland

(McLennan 1991). Fencing off single trees or groups of isolated large trees and encouraging natural regeneration or planting of seedlings can reduce the impact of fragmentation. Government will share the cost of this work for priority projects. Clearing is regulated under the *Planning and Environment Act* 1987. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988;

- **Irrigation zone clearing** – loss and/or fragmentation of species; damage to other species; and disturbance leads to weed growth (Prebedon, 1990). The older established pumped irrigation districts were extensively cleared at the time of their settlement including the roadsides, which are heavily disturbed and now carry crops, or weeds and exotic grasses (Blum, 1993). For the area of private diverters outside the pumped districts it is important to note that even with the extremely high rate of new irrigation development in the Mallee on former dryland farming areas, the rate of development has not been constrained by native vegetation issues. Through the approval process for new irrigation development (J Cooke pers comm.) many areas of remnant native vegetation have been enhanced, corridors developed, and some significant and/or large areas permanently protected as substantial offsets for small amounts of clearing of low value native vegetation. Clearing is regulated under the *Planning and Environment Act* 1987. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988;
- **Dryland zone clearing** – loss and/or fragmentation of populations; damage to other species; and disturbance leads to weed growth. Clearing is regulated under the *Planning and Environment Act* 1987. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988. Since 1989 there has been very little clearing of native vegetation in the dryland area. An example of best practice is the construction of the Northern Mallee Pipeline. Over a ten year period for the pipeline during planning and construction the three tiered approach of avoid, minimise and offset was used and virtually no trees were cleared. The project demonstrated a strong co-operative partnership between the constructing authority and regulators (J. Cooke pers. comm.). There are other examples of major infrastructure, such as installation of gas pipelines and underground powerlines where avoiding impacts on native vegetation has been stringently applied and accepted, with no loss of native vegetation.
- **Chemical spraying** – chemicals cause harm / death of some native species. This may be an issue for single trees small remnants and roadsides. The main chemicals used in the dryland are herbicides and in irrigation, herbicides and fungicides. In international terms the extent of herbicide use is low (Mallee CMA 2003). Chemical usage is regulated through the *Agricultural and Veterinary Chemicals (Victoria) Act* 1994. The extent and severity of damage is unknown and may need further investigation. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988; and

- **Fertiliser application** – changes natural nutrient composition of soil; affects growth of some species; and encourages weed growth. This is not a major issue in the region as agriculture is based on relatively low inputs. Fertiliser usage is unregulated as there is no need to do so. The extent and severity of impacts is unknown.

2.9.5 Landscape

- **Salinity** – raised water tables entering the root zone of native vegetation due to increased recharge from dryland and irrigation zones causing the death of species and changes in the composition of vegetation communities, (*Mallee Dryland Community Salinity Working Group* 1993). This occurs on a localised and regional level and has impacted on a number of low-lying reserves, private land remnants and roadsides since settlement (Boevich 1993; SKM 2003). The current and future extent of impact of induced salinity on native vegetation is not known but is the subject of a current investigation. Raised water-tables have also extended the margins of naturally saline areas upslope by increasing the area of land where the surface is within two metres of the saline water table (Mallee CMA 2004). Salinity may be regulated under the general duties of a landowner through the *Catchment and Land Protection Act* 1994. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988. As a consequence of the Mallee being a waterway management district, irrigation induced salinity and drainage can be addressed through the *Water Act* 1989;
- **Drainage water** – irrigation and rainfall induced discharge into waterways and other low-lying areas, introduces similar adverse impacts as salinity to native vegetation and aquatic environments (McKane 1992; Bluml 1993; Predabon 1990). Drainage water of relatively low salinity may interact with highly saline groundwater bringing it to the surface and causing a substantial problem, as seen in certain areas of the Murray River floodplain. It is preferable to dispose of drainage water directly to the river or to disposal basins away from the floodplain (Predabon 1990). Irrigation drainage can be regulated through the *Water Act* 1989. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988; and
- **Climate change** – the ‘Greenhouse effect’ or other long-term trends in climate change are likely to impact on biodiversity. Some flora species or ecological communities will be favoured, while the long term survival of others will be at risk (Victorian Government 1998).

2.9.6 Usage

- **Firewood collection** – removal of woody debris (an important habitat requirement for some fauna species); damage to native species; and disturbance leads to weed growth and erosion. This is both an historic issue when in the past it was unregulated, and currently where domestic and commercial use is regulated but use of firewood for recreation is largely unregulated (Mallee CMA 2003). Firewood collection, both along the Murray River and the southern Mallee creeks remains an issue in particular because it depletes habitat for reptiles such as the Carpet Python. Firewood collection is a major issue near towns or where camping and other leisure activities occur (DSE 2004). A

solution could be to encourage community woodlots around towns for provision of firewood. This issue is regulated under the *Forest Act* 1958. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988;

- **Timber harvesting** – removes mature tree species (an important habitat parameter for some species); changed structure of communities; and disturbance can lead to weed growth and erosion (Mallee CMA 2003). Commercial logging of Red Gum is confined to specified river bends and is small scale in Victoria. However where it occurs logging has significant environmental impact. Logging is regulated under the *Forest Act* 1958. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988; and
- **Recreation** – vegetation damage and removal; spread of litter; tracks cause fragmentation; and fires at campsites can be hazardous (LCC 1987). Apart from causing a number of other threats previously discussed, human visitation to the public land causes compaction of the soil and trampling of native vegetation. The disturbance of the soil then favours annual weeds. Recreation is a major and expanding use and therefore a threat (mostly inadvertent) for most public land particularly the riparian land along the Murray River but has high social and economic benefits (DSE 2004). With education and awareness coupled with good access and signage, recreation can be compatible with environmental values for most areas. Visitor management is regulated under the *Forest Act* 1958 or the *National Parks Act* 1975. Threatened species are protected under the *Flora and Fauna Guarantee Act* 1988.

3 PART B - THE STRATEGY

3.1 Principles of Native Vegetation Management

Victoria's Native Vegetation Management Framework has the following four guiding principles for native vegetation management in Victoria. These principles have been developed by the Department of Sustainability and Environment.

1. Retention and management of remnant native vegetation is the primary method for conserving the natural biodiversity across the landscape.
 - a. All native vegetation has value.
 - b. Important habitats and populations of threatened species should be protected through voluntary or regulatory means.
 - c. Biodiversity values are not restricted to threatened and depleted vegetation communities. An adequate proportion of each non-threatened vegetation community must also be managed principally for conservation.
 - d. Large natural areas of remnant vegetation are of fundamental importance for nature conservation and are irreplaceable. All other things being equal, large remnants are inherently more valuable than small patches that total the same area.
2. The conservation of native vegetation and habitat in a landscape is dependent on the maintenance of catchment processes.
 - a. Maintaining ecological processes provides productivity, salinity, water quality and other land management benefits.
 - b. Native vegetation management strategies must be integrated with land protection and resource use, including productive agriculture, for both long-term success and for ensuring that land and water protection outcomes are achieved.
3. The cost of vegetation management should be equitably shared according to benefits accrued by the landholder, community and region.
 - a. Land managers have a responsibility to retain native vegetation.
 - b. Public resources are to be directed to increasing the extent of native vegetation or to enhancing the quality of native vegetation through appropriate management.
 - c. Public resources are to be used to facilitate voluntary actions by landholders and for shared investment in enhancing vegetation of conservation importance.
4. A landscape approach to planning native vegetation management is required. Goals for native vegetation management will be based on bioregions, or sub-units, within the region. Priorities for vegetation management should be specific for each bioregion and CMA region.
 - a. Multiple patches of the same vegetation community should be retained or enhanced across their geographic range;

- b. The position of remnants in the landscape affects their conservation value.

These principles along with cost sharing principles have guided the development of the Mallee Native Vegetation Plan.

Limited resources and the depleted and highly fragmented state of much of the remaining original vegetation in Victoria necessitate the prioritisation of management actions. Prioritising ensures actions that produce the best results take place first in the most important locations for maximising biodiversity outcomes. Central to this aim is the recognition that management for biodiversity must be integrated with the management of land and water resources to achieve conservation of functioning ecosystems across the state. This section identifies the principles for prioritisation of vegetation management actions.

3.1.1 Victorian Priorities for Native Vegetation Management

Within given vegetation category and for habitat of equal value, priority will be given to:

- Protection of remnants (*e.g.* reservation, covenants, management agreements, fencing, de-stocking);
- Management of existing remnants (weed control, maintenance of the hydrological regime, revegetation for buffering, promoting/enhancing natural species and/or structural and/or age class and/or size class diversity);
- Enhancement of degraded remnants;
- Enhancement of connectivity and integrity through re-creation of habitat (including riparian revegetation) *e.g.* corridors, buffers, restoration of ecological processes;
- Revegetation for land degradation mitigation works;
- Re-creation of isolated areas of habitat; then
- Revegetation works of lower order than above.

Within the above hierarchy consideration will be given to the:

- Contribution to protection or enhancement of land and water resources;
- Viability of existing or proposed vegetation and habitat;
- Feasibility of the proposed actions (probability of success, need for ongoing management);
and
- Benefits in relation to the cost of the project.

3.2 A Shared Understanding of the Net Gain Goal

As a basis for developing a consistent and more effective approach to accounting for native vegetation it is important to have a shared understanding regarding the significance of the key words used in defining the Net Gain goal.

3.2.1 *Extent and Quality of Native Vegetation*

At the regional scale, native vegetation is usually considered from the point of view of what type it is (and consequently how rare or depleted the type is) and in what tenures it occurs (and consequently how well protected the type is). At the local landscape-scale it is also important to focus on where the native vegetation occurs. It is important to determine not just how much native vegetation is present but how good it is. On-ground actions, including revegetation and improved management of existing vegetation, can increase the overall quantity and quality of habitats and ecosystem services across the local landscape - particularly in terms of the levels of biodiversity and catchment protection they can support.

How do we measure extent and quality?

In determining what scope of vegetation exists, what could be lost and what could be gained, there needs to be a measure. The simplest way would be to measure the area of native vegetation in hectares, but our goals suggest we must also consider the quality of vegetation. The quality of native vegetation is relevant to the effectiveness of both biodiversity conservation and catchment protection roles, but the biodiversity conservation role has more specific requirements and, accordingly, has been the primary focus when developing a quality assessment approach that serves both roles.

There is no absolute measure of general vegetation/habitat quality but there is a range of well-accepted indicators. A method of combining a number of such indicators to calculate a practical relative measure is required and a simple equation has been developed to achieve this measure. The two primary determinants of the general vegetation/habitat quality of an area are:

- Inherent **site condition** – *i.e.* how altered is the site from a notionally optimal state? and
- **Viability** in the **landscape context** – *i.e.* does the patch of vegetation that the site is within retain its broader ecological functions and linkages in a manner that enables it to respond successfully to natural fluctuations and other disturbance events?

DSE has developed a state-wide approach for estimating general vegetation/habitat quality using the following criteria:

For site condition:

- Retention of large old trees (for woodlands and forests);
- Retention of tree canopy cover (for woodlands and forests);
- Retention of the cover of, and diversity within, understorey life forms;
- Presence of appropriate recruitment;
- Absence of weeds;
- Presence of litter (decaying leaves and bark); and
- Presence of logs (for woodlands and forests).

For landscape context:

- Size of remnant vegetation patch; and
- Links to, and amount of, neighbouring patches.

Native vegetation at a site is assessed by comparing it to a benchmark that represents the average characteristics of a mature and apparently long-undisturbed stand of the same type of vegetation. General vegetation/habitat quality is scored from one (complete retention of natural quality as described by benchmark characteristics) to zero (complete loss) – Parkes *et al.*, 2002 (J. Ecol. Mgt. and Restore - *in press*). This approach has been successfully utilised in the Bush Tender Trial and will be reviewed after a further two years of use in the context of this Framework and refined in the light of research and operational experience.

The combination of this quality measure and the area of native vegetation that it refers to is known as a habitat hectare (habitat score X area = habitat hectare). A habitat hectare assessment can provide information for three key tasks - it:

- Provides a snap-shot of current quality;
- Can be the basis for estimating what and how much change will occur at a site under different management scenarios; and
- Provides a means of calculating net outcomes across losses and gains.

What is a Habitat Hectare?

A habitat hectare is a site-based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type. This measure can be consistently applied across the State.

If it is assumed that an unaltered area of natural habitat (given that it is large enough and is within a natural landscape context) is at 100per cent of its natural quality, then one hectare of such habitat will be equivalent to one habitat hectare. That is, the quality multiplied by the quantity. Ten hectares of this high quality habitat would be equivalent to ten habitat hectares and so on. If an area of habitat had lost 50per cent of its quality (say, through weed invasion and loss of understorey), then one hectare would be equivalent to 0.5 habitat hectares, ten hectares would be equivalent to five habitat hectares and so on.

3.2.2 Achieving and Accounting for Net Gain

What is Net Gain?

Net Gain is the outcome for native vegetation and habitat where overall gains are greater than overall losses and where individual losses are avoided where possible. Losses and gains are determined by a combined quality-quantity measure and over a specified area and period of time. Gains may be either required offsets for permitted clearing actions or as a result of landholder and government-assisted efforts not associated with clearing.

Net Gain comprises three essential components to ensure an overall increase in the extent and quality of native vegetation:

1. A reduction in losses in the extent of existing native vegetation;
2. A reduction in losses in the quality of existing native vegetation due to threatening processes and
3. The achievement of gains in extent and quality of native vegetation through its rehabilitation and revegetation with indigenous species for biodiversity conservation and land and water resource outcomes.

The Net Gain approach:

- Has as a priority, the avoidance of further permanent losses of existing native vegetation through clearing;
- Recognises that for native vegetation, although “natural is best”, it is possible to partially recover both extent and quality by active intervention and thus to effect the net result;
- Identifies a quantitative approach to the “reverse the decline” pathway, allowing us to set targets and measure performance;
- At the on-ground level, expresses the principle that where losses are directly permitted and/or incurred, effort should be made, at a minimum, to balance such losses with commensurate gains in some way;
- At the regional level, facilitates establishment of a complete picture of the native vegetation asset, against which incremental losses and emerging issues can be evaluated and;
- Plays an important part in assessing ecologically sustainable development.

What contributes to the Net Outcome?

With respect to the quality and quantity of native vegetation, a broad range of actions, both human-related and natural, contribute to the net outcome for Victoria.

Losses in extent include:

- Permanent clearing of native vegetation, both approved and illegal; and
- Incremental reduction of woodlands through tree decline.

Losses in quality include:

- On-going decline resulting from insufficient management of threatening processes;
- Impact of forest product harvesting and mining operations and
- Impact of wildfires and fuel-reduction burns.

Gains in extent include:

- New areas of revegetation primarily for biodiversity conservation; and
- New areas of revegetation for land protection, greenhouse or other purposes which have included sufficient locally indigenous species to be considered part of the native vegetation estate.

Gains in quality include:

- Improved management of threatening processes within existing native vegetation including both active improvement (e.g. control of weeds) and avoidance of further impacts by landholders agreeing to forego permitted uses (e.g. stock grazing, harvesting timber for on-farm use);
- Recovery from forest product harvesting and mining operations;
- Recovery from wildfires; and
- Supplementary plantings into depleted existing native vegetation.

3.2.3 *Land Protection and Conservation Significance in Net Gain*

To achieve the goals for native vegetation management application of the Net Gain approach needs to be linked to the land protection and conservation significance of the native vegetation in question.

For land protection, the significance of a patch of vegetation (from the point of view of both hazard avoidance and mitigation) is determined according to:

- Role of the site in surface and groundwater behaviour;
- Erosion hazard and soil structure characteristics of the site;
- Ability of the vegetation to provide an ongoing land protection role;
- Productive capability of the site; and
- Other recognised criteria (for example, whether climatic conditions favour rapid re-establishment of vegetation cover).

Appendix 4 sets out the factors considered when determining significance of native vegetation for land protection. Revegetation priorities for land protection outcomes are outlined in regional plans arising from other strategic documents such as *Victoria's Salinity Management Framework* and the *Victorian River Health Strategy*.

For biodiversity the conservation significance of a patch of vegetation (from Very High to Low) is determined according to:

- Conservation status of vegetation types present;
- Quality of the vegetation;
- Conservation status of species present (and the potential habitat value);
- Strategic location in the local landscape; and
- Other recognised criteria (for example, commitments under international conventions).

The approach to assessing bioregional conservation status of vegetation types (Ecological Vegetation Classes) is described in, Appendix 5. The criteria and approach for determining conservation significance for biodiversity is outlined in Appendix 6.

3.2.4 Ensuring Individual Protection and Clearance Decisions Contribute to Net Gain goals

To achieve this, government will require:

- Appropriate assessment of any potential impacts on native vegetation and management options that avoid clearing;
- Consideration of clearing in the context of sustainable land use change; and
- Any losses associated with clearing are to be mitigated by commensurate gains through appropriate offsets.

Appropriate offsets are outlined below, summarised as criteria in Appendix 7.

The three step approach to applying Net Gain

It is important to ensure the Net Gain approach is only applied in a way that supports the overall conservation of the great majority of existing native vegetation. In applying the Net Gain approach to protection and clearance decisions at the on-ground level the steps are:

1. Avoid adverse impacts, particularly through vegetation clearance;
2. If impacts cannot be avoided, to minimise impacts through appropriate consideration in planning processes and expert input to project design or management; and
3. Identify appropriate offset options.

Only after these steps have been taken should offsets (actions undertaken to achieve commensurate gains) be considered. To ensure the “commensurate” requirement of Net Gain is met, a clear link between gains and losses must, at a minimum, be achieved. These offset criteria in Appendix 7, represent the minimum requirement. To qualify as a Net Gain outcome all criteria must be met in each case. Calculation of the amount of gain associated with the offset actions will be based on an estimate of the improvements that will be realised within 10 years of the actions being initiated. The offset criteria and the rationales for their application are briefly outlined in the following section.

Response to proposal to clear and offset

To meet our goals for native vegetation in the most efficient and practical manner responses to planning applications to clear native vegetation will be graded according to conservation significance.

Net outcome of offset

The Net Gain offset criteria ensures that offsets reflect the conservation significance of the vegetation removed. For all native vegetation removal approved as part of a planning permit, the relative size and nature of offset will reflect the conservation significance and amount of the native vegetation removed.

Like-for-Like

Vegetation or Habitat Type of Offset

Offset responses are graded according to the conservation significance of the vegetation type removed. The offset response ranges from a direct link between loss and offset for higher conservation significance vegetation, down to greater flexibility for lower conservation significance vegetation. That is, for losses in very high conservation significance the offset must be of the same vegetation/habitat type as that being lost. While offsets for low or medium conservation significance must be in the same Bioregion, but can be in other vegetation/habitat types. Further details are in the *Victoria's Native Vegetation Management A Framework for Action*.

Landscape Role

To ensure important functional aspects of vegetation at the landscape scale (*e.g.* protection from erosion or salinisation; buffering of riparian or other significant areas; wildlife movement; large patch size) are adequately considered, there will be a graded response: from close consideration of both ecological and land protection function for higher significance, down to a focus on land protection function for lower significance vegetation, recognising this latter aspect will be determined on a case-by case basis by the planning authority.

Quality objectives for offset

To ensure the use of a measure (habitat hectares) that “blends” quality and quantity does not allow inappropriate trade-offs between high and low quality vegetation, quality thresholds have been set for offsets, graded according to conservation significance. This effectively means any loss of higher significance vegetation must be predominantly mitigated by improvement of other existing vegetation of comparable quality, and the contribution of revegetation of previously cleared areas will be limited according to conservation significance of the lost vegetation. Revegetation as the only means of offset will generally only be an option for mitigating lower quality or lower significance losses. On a site where the loss of vegetation is temporary (*e.g.* mining followed by rehabilitation) this criterion is applied according to the Low Conservation Significance. In addition, for any further gains required to reach the appropriate net outcome of offset (in number of habitat hectares) this quality criterion will be applied according to the conservation significance of the vegetation that was removed.

Large old tree objectives for offset

For remnant patches of native vegetation that contain large old trees

Large old trees are important environmental assets that are being progressively lost through clearing and declining health but are impossible to replace in the short term. Whilst recruiting new trees for the future is very important, replacement ratios cannot address the need to retain and improve the on-going survival of as many large old trees as possible in the current landscape.

Where large old trees are part of a vegetation remnant to be cleared, both protection of other large old trees and recruitment of new trees will be required as part of the offset, with graded ratios according to conservation significance. For the purpose of this plan, very large old trees (VLT), large old trees (LT) and medium old trees (MT) are defined as individuals of key long-lived dominant tree species (as specified in the relevant EVC benchmark) that are greater than a certain diameter at 1.3 m above ground level. A large tree is defined as a tree that has a diameter at breast height (DBH) as specified in the EVC benchmark for the corresponding EVC. A very large tree (VLT) is defined as a tree that is 1.5 x DHB or greater of the benchmark for a large tree DBH, and a medium old tree is defined as a tree that is 0.75 x DBH or greater of the benchmark of a large tree DBH. Where large old trees (*i.e.* VLT, LT or MT, as specified in the relevant EVC benchmark) are part of a vegetation remnant to be cleared, both protection of other large old trees and recruitment of new trees will be required as part of the offset, with graded ratios according to conservation significance. Protection will be according to standards specified in Appendix 7. The objective is to maximise the longevity of the large old trees that are being protected. Recruitment of new trees may be either through plantings to the prescribed standard (*e.g.* species composition, density, survival) and/or through regeneration associated with protection of other old trees, at the discretion of the planning authority. Any plantings which have been undertaken by the landholder since 1989, and which meet all the relevant offset criteria, can be used to meet this requirement. *Victoria's Native Vegetation Management A Framework for Action* and guidelines produced by DSE for achieving Net Gain in Planning Decisions provide further information on the requirements to use plantings and works undertaken post 1989 as potential offsets for Net Gain.

For stands of scattered old trees

Relatively dense stands of scattered old trees that occur within pasture or another altered environment, rather than in clearly defined vegetation remnants (*i.e.* where tree densities are not greatly reduced from benchmark densities, but the understorey is less than 10 per cent of the total cover specified for the benchmark), are also important environmental assets. This can be the most common way some vegetation types such as Plains Grassy Woodlands still occur and the best stands represent possible options for the recovery of these vegetation types. However, scattered old trees are often less consistently protected and their health may be more at risk. Using habitat hectare assessments to calculate offsets for scattered old trees is unnecessarily complex. Simple protection and replacement ratios will be adequate in this case.

Protection of existing trees will be required for offsets in parcels of land that are greater than 4 hectares in area and have eight or more large old trees per hectare. Recruitment of new trees will be required for offsets in parcels of land which are greater than 4 hectare in area but have less than eight large old trees per hectare. The offset ratios will be graded according to conservation significance. The offset ratios for very large, large and medium trees from these parcels of land are detailed in Appendix 7.

Stands of scattered old trees on parcels of land that are greater than 4 hectares and have 8 or more scattered old trees per hectare

For stands of scattered old trees on parcels of land that are greater than 4 hectares and have 8 or more scattered old trees per hectare, both protection of older trees and recruitment of new trees will be required as offsets. The prescribed offset ratios for very large, large and medium scattered trees lost from these parcels of land are set out in Appendix 7.

Stands of scattered old trees on parcels of land that are greater than 4 ha. but have less than 8 trees per ha., or parcels of land that are less than 4 ha. with any number of scattered old trees per ha.

The Framework does not specify offset ratios for old scattered trees on parcels of land that are greater than 4 hectare but have less than 8 trees per hectare, or parcels of land that are less than 4 hectare with any number of scattered old trees per hectare. The Mallee RNVP therefore has prescribed offset ratios for such parcels of land. The offsets provide for some flexibility in that they can be through recruitment only, or a combination of protection and recruitment. The decision as to whether the offset is via recruitment only, or recruitment and protection, is at the discretion of the planning authority and to be assessed on a case by case basis. However, where there is an opportunity to protect large old trees, protection of large old trees is the preferred offset.

The Mallee Plan recognises the importance of 'very large trees' (VLT), acknowledging that these trees have a substantial habitat provision potential, especially in severely degraded landscapes. To reflect this, the Plan allocates a separate VLT component in the offset requirements. A VLT is defined as any tree that is equal to or greater than 1.5 times the DBH of the large tree DBH as defined in the appropriate EVC benchmark (Guidelines produced by DSE for achieving Net Gain in Planning Decisions). Appendix 7 details the offset requirements for VLT, LT and MT in parcels of land greater than 4 hectare in area with less than 8 scattered trees per hectare or parcels of land less than 4 hectare with any number of scattered trees. The offset ratios are graded according to conservation significance.

Protection and recruitment standards

The protection component of any offset requirement will need to meet the objective of maximising the long term survival of trees being protected, and in turn contributing to the process of recruitment of juveniles. Protection standards include removal of grazing, or in specific cases, carefully controlled grazing may be permitted. Other protection measures include weed and vermin control. Guidelines produced by DSE for achieving Net Gain in Planning Decisions detail minimum standards and requirements necessary for the appropriate protection of trees in the landscape, and should be consulted for details on protection measures. Any regional standards for protection of trees should also be met.

Recruitment of new plants may be achieved through plantings of a prescribed standard (e.g. species composition, density, survivorship) and/or through regeneration associated with protection of other older trees, at the discretion of the planning authority. In the case where natural regeneration was the preferred

offset option, and regeneration does not occur, then follow up recruitment/plantings will need to take place to meet Net Gain.

For the purpose of this Plan, recruitment of new plants refers to planting, or regeneration, of a range of vegetation life forms (trees, shrubs, herbs, grasses) that are appropriate to and are planted/established in a manner that is appropriate to the particular EVC. Best practice guidelines and guidelines produced by DSE for achieving Net Gain in Planning Decisions are to be used to ensure habitat recreation and biodiversity aims are met.

Vicinity

There needs to be an adequate geographic link between losses and offsets if mitigation benefits are to generally accrue to the CMA region and plant / animal populations that have been impacted.

There will be a graded response: from as close as possible and/or effective for higher significance, down to more flexibility for lower significance (at the discretion of the planning authority) leading to opportunities to optimise outcomes.

Timing

To ensure delays between clearing and mitigation do not unnecessarily exacerbate the risk to environmental values during the “transition” to recovery through offsets, the timing of offsets needs to be appropriate. It is also important to properly manage risks of non-compliance, particularly for the most significant impacts.

There will be a graded response: from formally initiating offsets prior to clearing taking place, to initiating offsets as soon as possible after the clearance but within 1 year of the clearing taking place, taking seasonal conditions into consideration.

Formal Agreement to Achieve and Secure Offsets

To ensure the management actions required to achieve offsets are undertaken, and that permanent losses from clearing are mitigated by gains of an on-going and secure nature, offset arrangements will be formally established through the routine and streamlined use of management agreements or permit conditions. The planning authority will maintain adequate and readily accessible records of agreed offset arrangements.

In ensuring individual protection and clearing decisions effectively contribute to our overall goals, the achievements of the Net Gain approach will be formally reviewed four years after implementation of the approach commences. The review will assess how effective the Net Gain implementation has been in reducing land clearance and in achieving commensurate gains. There is a possible need to revise some aspects of particular offset provisions during the life of the RNVP as a result of new information becoming available and through experience gained in the application of the Net Gain policy.

Response to proposal to harvest timber from naturally established forest on private land

The harvesting of naturally established native forest has environmental consequences but is clearly a different level of impact to permanent clearing. In general terms, the approach to this activity on private land will reflect the approach on public land. However, an important difference with respect to environmental factors at the landscape scale, is that private land timber stands are often neither as large in area nor as surrounded by extensive areas of other forest as stands on public land, and so there are often more limited options for “buffering” the impacts of harvesting in time and in space.

The Net Gain approach will complement the framework for sustainable forest management on public land. Consistency with the Net Gain approach means utilisation of native vegetation for timber products (*e.g.* selective harvesting, harvest and regeneration) on private land must be part of a sustainable forest management approach and will only normally be permitted in Low and Medium conservation significance categories. In some cases there are combinations of conservation status and quality of vegetation that result in a Very High or High conservation significance rating, but harvesting is currently allowed on public land under certain conditions (*e.g.* silviculture prescriptions) within the same bioregion. In these circumstances harvesting, followed by regeneration, can be permitted on private land with similar conditions unless other criteria on the site warrants a Very High or High rating (*e.g.* threatened species). However, the amount of harvesting will need to be determined on a site by site basis taking into consideration the need to buffer the impact of harvesting in time and in space. Appendix 8 summarises the offset criteria for harvesting timber from naturally established native forest on private land.

Table 5 - Proposed Net Gain Reporting Sheet

	TOTAL NATURAL CHANGE	TOTAL INTENTIONAL CHANGE	LOW	MEDIUM	HIGH	VERY HIGH
GAINS IN QUALITY						
- Public land management - Private land management - including voluntary and Government assisted						
GAINS IN EXTENT						
- Public land management - Private land management - including voluntary and Government assisted						
LOSSES IN QUALITY						
- Public land management - including permitted use; wildfires - Private land management - including permitted use; wildfires						
LOSSES IN EXTENT						
- Public land management - including approved clearing - Private land management - including clearing by permit - Unrecorded changes - including tree decline, clearing by exemption, illegal clearing						
TOTAL						

4 TARGETS FOR NATIVE VEGETATION

The Mallee Regional Catchment Strategy (RCS) 2003-2008 is the principal planning tool and strategic focus for future natural resource management funding and action across the region (RCS, 2003). It is the main framework to integrate federal and state-wide strategies with regional priorities and plans. It is also a process that brings together the key communities across the region.

The Mallee Regional Catchment Strategy sets a goal for each of the six major asset classes across the region. The various processes enacted through the Mallee Native Vegetation Plan will make a significant contribution to the attainment of the following goals in the strategy:

Biodiversity

To maintain ecological processes and to protect and improve the extent and quality of biodiversity in the Mallee.

Community Capacity

To promote self-reliant and informed communities able to identify, direct and implement change to protect and improve our natural resources.

The Native Vegetation Plan has a distinct suite of desired outcomes (predominantly linked to the Regional Catchment Strategy) that over the five-year life of the plan will contribute significantly to the attainment of the relevant asset goals in the strategy.

4.1 Outcomes and Targets

Outcomes

The desired outcomes for the Mallee Native Vegetation Plan are:

1. Extent, diversity and condition of all Ecological Vegetation Classes maintained above self-sustaining thresholds;
2. Threatened ecological communities and threatened populations of flora recovered to self-sustaining levels and secured against further decline;
3. All ecologically invasive plant species controlled;
4. Ecological processes restored to meet ecological needs
5. Native vegetation on private land managed according to biodiversity outcomes;
6. Ecosystem services managed sustainably; and
7. Communities across the Mallee with the capacity to fully protect and improve our native vegetation.

Further to the outcomes, the RCS defines a number of *Achievable Resource Condition Targets* that cover the relevant “matters for targets and indicators” outlined in the “National Framework for Natural Resource Management Standards and Targets”.

The following tables indicate the outcomes and targets for each of the asset classes to achieve the stated goals of the Mallee Regional Catchment Strategy (the desired outcomes of the Mallee Native Vegetation Plan appear within the tables in **bold**).

Following the development of the Mallee Ecological Vegetation Class maps and subsequent analysis, a number of these goals and targets will need reviewing and revising. *E.g. the target of a minimum of 30 per cent native vegetation across each bioregion (RCS 2003)* needs to be reviewed and revised to reflect the extent of remnant native vegetation given in Table 1.

This will be undertaken by the Mallee CMA using a multi-stage process as outlined below:

1. The first stage will be to establish the baseline conditions for each of the *Achievable Resource Condition Targets* described in the Regional Catchment Strategy. This will become the level against which the targets are determined and future change is measured.
2. The second stage will be to gather and analyse information about historic trends so that future trends may be predicted. In some cases, with a sharply worsening trend in the resource condition, the achievable target may be a lower level than the current condition.
3. The third stage will be to determine the potential improvement the Management Plan will have on the resource condition. This will be accomplished by using the science and assumptions included in the Mallee Native Vegetation Plan and State Framework, to forecast the impact the activities in the plan are expected to have on extent and condition of native vegetation.
4. In the final stage, a methodology will be developed to set the targets for each of the *Achievable Resource Condition Targets* based on current and historical data, and the expected changes to be produced by the management plan.

4.2 Monitoring and Evaluation

One of the main requirements of any management plan is that it should have a monitoring and evaluation plan that relates back to the purpose and goals of the plans. The Native Vegetation Plan will address this through a structured monitoring and evaluation programme.

The monitoring requirements are largely satisfied by existing monitoring programmes required to track Land Protection Information System (LPIS) grants and the environmental monitoring programmes used to report on catchment condition. Much of this data is captured through Catchment Activity Management System (CAMS) and Flora Information System (FIS). These monitoring programmes use indicators developed according to the National Framework for Natural Resource Management (NRM) Standards and Targets to monitor and measure change in the extent, distribution and condition of native vegetation.

The evaluation component will consist of two elements. The first will consist of routine analysis of collected data to assess catchment condition *i.e.* the extent, distribution and condition of native vegetation; the second will be a detailed review and evaluation of the data in relation to the goals and targets of the plan to determine if the policies and actions are appropriate. This review will be used to revise management actions and targets as necessary.

Whilst the monitoring programme will monitor the rate of improvements towards targets, the evaluation programme will provide a way of testing, reconfirming or refining the assumptions that link the activities delivered on the ground to the desired changes in native vegetation condition and land management practise targets.

The evaluation component of the monitoring and evaluation framework is particularly important, providing a powerful tool for driving adaptive management within the plan. It is to be designed to continuously test the programme logic of the plan by addressing:

1. Whether the processes being monitored are behaving consistently with the assumptions that underpin the plan,
2. Whether targets should be revised,
3. Whether the plans actions need modifying if targets are to be achieved.

Biodiversity Goal: To maintain ecological processes and to protect and improve the extent and quality of biodiversity in the Mallee.

Biodiversity Outcomes	Achievable Resource Condition Targets (10 to 20 years)	Management Action Targets (5 years)
1) The extent, diversity and condition of all Ecological Vegetation Classes maintained above self sustaining thresholds.	• Net gain in extent and condition of Ecological Vegetation Classes. • A minimum yet to be determined per cent native vegetation cover across each bioregion. • Increased extent of each Ecological Vegetation Class to at least 15 per cent of pre-1750 extent. • 20 per cent improvement in condition across all conservation significance levels using the ‘Habitat Quality Assessment’ method when fully developed and tested.	• Baseline conditions determined and target levels set and quantified; • Vegetation extent and quality assessments completed at 1,100 priority sites using the ‘Habitat Quality Assessment’ (as determined by the Vegetation Condition Mapping project); • 200 priority reserves covered by management documents. (These may include agreements with adjoining landholders or other parties); • Remnants of ecological vegetation classes less than 15 per cent pre 1750 coverage subject to management agreements with land managers (as determined in Biodiversity Action Plans); • Increase in extent of endangered Ecological Vegetation Classes (as determined in Biodiversity Action Plans); • A yet to be determined number of hectares restored to native vegetation as habitat for native species in priority areas (as determined in Biodiversity Action Plans); • Implement relevant regional strategies and plans.

Biodiversity Outcomes	Achievable Resource Condition Targets (10 to 20 years)	Management Action Targets (5 years)
2) Threatened ecological communities and threatened species populations recovered to self sustaining levels and secured against further decline (e.g. Threatened vegetation communities and threatened populations of flora).	• No decline in populations for a yet to be determined number of rare or threatened species. • Increase in size, range and number of populations for a yet to be determined number of rare or threatened species to (yet to be determined) stable levels.	• Recovery plans and Action Statements established and implementation to commence for nationally endangered species and threatened communities, with ten commenced; • Population monitoring of priority populations (as determined in Biodiversity Action Plans;) • Farming systems developed that minimise impact of soil erosion on native vegetation; • Extent of critical biodiversity assets impacted or potentially impacted by salting identified; • Farming systems that reduce recharge including strategic placement of native vegetation for multiple benefits; • Strategies developed to allow the movement of farm machinery while protecting the biodiversity on priority road reserves; • Stock movement regulated by local laws to protect identified priority roadsides.
3) All ecologically invasive species controlled.	• Priority invasive species controlled or contained at (yet to be determined) levels.	• Define impacts for all ecologically invasive species and control levels; • Regional Action Plans prepared for priority pest plant and animals and control initiated.

Biodiversity Outcomes	Achievable Resource Condition Targets (10 to 20 years)	Management Action Targets (5 years)
4) Ecological processes, restored to meet ecological needs.	• Appropriate ecological fire regimes in place. • Maintain and enhance natural regeneration processes for native vegetation.	• Priority ecological processes identified, and conditions maintained to enable regeneration during episodic events • Implement existing Action Statements for potentially Threatening Processes and prepare new Statements as required • Municipal Strategic Statements aligned with the Mallee Regional Catchment Strategy • Ecological fire regimes investigated and determined • Regional Greenhouse Strategy developed and priorities implemented • Wildfire suppression managed in ways that account for ecological needs • New irrigation developments setback from remnant vegetation, especially along roads and linear reserves, and buffer plantations of indigenous vegetation promoted around new irrigation developments
5) Native vegetation on private land managed according to biodiversity outcomes.	• A net gain in the extent and condition of native vegetation on private land. • Ecologically sustainable agricultural systems developed and operating.	• Market-based incentives established to maintain and rehabilitate biodiversity on private land; • Improved knowledge of ecosystem function to ensure management agreements enable least cost environmental outcomes; • A yet to be determined percentage of native vegetation on private land covered by cooperative management agreements; • A yet to be determined number of hectares of private land restored to native vegetation as habitat for native species in priority areas (as determined in Biodiversity Action Plans);

Biodiversity Outcomes	Achievable Resource Condition Targets (10 to 20 years)	Management Action Targets (5 years)
		• Whole farm plans encouraged and used to guide government investment at farm level • Undertake a review of the condition of sites with voluntary management agreements and permanent agreements.
6) Ecosystem services managed sustainably.	• Integration of native vegetation management into agricultural practises.	• Improve understanding of ecosystem services including definition of the value of, and principles for, managing ecosystem services; • Market based mechanisms to recover the full cost of using and exploiting ecosystem services developed and improved environmental outcomes delivered; • Determine value of ecosystem services of remnant vegetation in the Mallee; • Management plans agreed with relevant industries to address the maintenance of ecosystem services.

Community Capacity Goal: To promote self reliant and informed communities able to identify, direct and implement change to protect and improve our natural resources.

Community Capacity Outcomes	Achievable Resource Condition Targets (10 to 20 years)	Management Action Targets (5 years)
1 Communities across the Mallee with the capacity to fully protect and improve our native vegetation.	Informed and experienced groups across the Mallee with the capacity to understand issues and drive landscape change to a benchmark yet to be determined (For example, community and landholder groups with the capacity to conserve and enhance native vegetation).	• Collaborative reviews completed with major stakeholders to establish Action Plans for capacity building; • Establish agreed measures of community capacity in native vegetation management; • Establish and maintain a database on community capacity and extent of landholder engagement in the native vegetation programme; • Implement a community education programme for native vegetation management.
2 Healthy and active community groups promoting and directing joint native vegetation programmes at a local level.	• Communities and landholders active in native vegetation management across all areas of the Mallee.	• Develop and implement a five year Mallee Regional Community Action Plan.
3 Indigenous stakeholders actively engaged in directing programmes which protect and improve natural resources	• Indigenous engagement in native vegetation management.	• Engage local indigenous stakeholders to establish trust and confidence and share knowledge, involvement and resources; • Provide assistance to aboriginal people to implement the <i>Strategy for Aboriginal Managed Lands in Victoria 2003</i>.

***Note:** The four community areas in the Mallee are: Mildura Aboriginal Corporation; Murray Valley Aboriginal co-operative Ltd; Swan Hill and district Co-operative Ltd; Goolum Goolum Aboriginal Co-operative Ltd.

5 IMPLEMENTATION ARRANGEMENTS

Responsible Parties

The Mallee CMA will be responsible for overseeing implementation of the Mallee Native Vegetation Plan through the Technical Reference Committee for Biodiversity (TRC). The committee will be chaired by a Mallee CMA board member with additional community input from members drawn from the Mallee CMA Implementation Committees. The committee will have at least two members who derive their primary source of income from farming. The TRC will also have members from a range of other sources to provide a high level of technical expertise to the committee. It will guide development of the annual investment plan for biodiversity and oversee the funded projects that emanate from the investment plan. This Native Vegetation Plan will drive the direction of the projects each year.

Commitment of Stakeholders

The Mallee CMA recognises a number of organisations are involved in native vegetation management and need to be involved in implementing the Mallee Native Vegetation Plan. Several of these organisations have been involved in development of the plan, including Greening Australia Victoria, Parks Victoria, former Department of Natural Resources and Environment, Department of Sustainability and Environment, the Department of Primary Industries, Mildura Rural City Council, Swan Hill Rural City Council and Trust for Nature. Many more will be involved in its implementation.

The Mallee CMA recognises that individual land managers and users and the general community will play an important role in the ongoing management of native vegetation. Landcare groups and the Mallee Landcare network have a key role in promotion and implementation of the plan.

The Mallee CMA will seek to enter into agreements with organisations undertaking projects with funding through the Mallee CMA, outlining how the organisations will work together, who will be responsible, what will be achieved and how works will be implemented and reported. The Mallee CMA will liaise with local community and industry groups — for example Landcare groups, the Victorian Farmers Federation, Aboriginal groups and environmental groups and involve these stakeholders in further consultation or implementation.

The Swan Hill Seedbank is an important resource for the region as it supplies the vast majority of indigenous seed to the mallee for revegetation. The Swan Hill Seedbank relies on volunteers to function. Other organisations with potential to contribute to on-ground works include training providers and volunteer organisations. These include Conservation Volunteers Australia, Green Corps, MADEC, Sunraysia and Murray Group Training. Educational institutions including Sunraysia Institute of TAFE, Latrobe University, and schools throughout the region will have a role in education and training.

Where on-ground works are proposed the Mallee CMA will seek support and voluntary cooperation from the owners or managers of land on which those works are proposed. This may lead to entering into voluntary agreements between the Mallee CMA or other body and the landowner/occupier to:

- Define the exact nature of the works or other actions;
- Develop a site works plan;
- Specify the roles and responsibilities for undertaking those works and any ongoing maintenance or monitoring; and
- Outline the funding arrangements and cost sharing of those works, where relevant.

5.1 Stakeholders and Roles

For implementation of the plan to progress, a high level of technical advice and support to the land managers is needed for both planning and on-ground action. Financial incentives offered without this support rarely receive a community response in this region. Technical support will be provided to landowners by a range of providers through the co-ordination of the Mallee CMA. It is clear that with the number of service providers and staff across multiple centres, coordination of providers is paramount. The table below lists the roles/responsibility arrangements in the Mallee.

Organisation	Responsibility
Mallee Catchment Management Authority (CMA)	Provides the strategic direction and coordination for land, water and biodiversity management through a formal partnership between the Victorian government and a community-based board. The Mallee Regional Catchment Strategy sets out broad-based actions for sustainable management of natural resources in the region and incorporates at least 10 regional action plans. Together with input from Technical Reference Committees for the four natural resource asset classes in the Strategy and two Implementation committees, annual priorities and an annual regional investment plan is developed. Most State and Commonwealth funding enters the region through this investment plan, putting the CMA in a pivotal role to commission and oversee projects. The CMA is responsible for monitoring, evaluation and reporting for both resource condition and project implementation, and then reporting to government on the state of the whole of the catchment, including public and private land. The Mallee CMA will co-ordinate implementation of the Native Vegetation Plan, consult with landowners, engage partners in delivery and share the cost of works with landowners. It will also commission information projects relevant to this plan

Department of Sustainability & Environment (DSE)	DSE provides strategic direction and a policy framework for all aspects of natural resource management and planning in Victoria through the head office divisions. DSE regions deliver many of the programmes. Some of the roles are: • Manage the Crown land estate, leasing, purchase and sale of Crown land and coordinates native title issues and land use planning, provides state-wide geospatial information and land information, statutory planning. DSE in its statutory planning role as a referral agency provide the primary regulatory process for Native Vegetation retention. This is a critical in respect to implementation of this plan. • Management of State Forests and commercial forestry, fire prevention and fire suppression on all public land. • Manage and conserve the biodiversity of Victoria and implements the <i>Flora and Fauna Guarantee Act 1988</i>, management of the State's parks and reserve system through Parks Victoria. Provides the Land for Wildlife Scheme to private rural landowners. • State-wide policy setting and programme monitoring and coordination, for catchment management on public and private land including waterway management, water resource management, native vegetation management, and soil, salinity and pest management. • In the regions, DSE has Native Vegetation Management Officers, Wildlife Officers and Ecosystems Coordinators that will contribute to delivery of the plan, in particular in overseeing the Native Vegetation Framework and the protection of threatened species under the FFG
Department of Primary Industries	Agricultural policy, programme development, coordination and research. The regions deliver both the agricultural industries programmes and through Catchment Management Officers the soil, salinity and pest programmes, including technical advice and enforcement. DPI will play a part in delivery of this plan through development of farming systems to reduce erosion and reduce recharge. There is opportunity to use strategic placement of biodiversity revegetation to optimise water use in addressing dryland salinity. Also monitors and reports on the impact of wind erosion on farmland. Should include monitoring the impact of erosion on roadsides. DPI is custodian of a parcel of land at Walpeup (Mallee Research Station) containing high value native vegetation in good condition.
Parks Victoria	Parks Victoria manages Parks and Reserves in Victoria through a service agreement with DSE. Major Parks in the Mallee include Murray Sunset, Hattah Kulkyne and Wyperfeld National Parks. Parks Victoria also manages approximately 130,000ha of reserves in the Mallee, including the highly significant Murray River Reserve, including Kings Billabong Wildlife Reserve. These reserves vary from areas of 1-2ha to areas of 20,000+ha. Parks Victoria shares its conservation responsibilities with a range of other public and private land managers. It has developed an Environmental Management System (EMS) to enable the development of a proactive management programme to conserve and enhance the natural values and manage the current and potential future risks consistent with National and State legislation and Victorian government policy. Parks Victoria will play a role in the implementation of this plan, including delivery of programmes on the land it manages.
Private Landowners	Landowners of private land will play a major part in implementing this plan. The plan will rely on a great deal of voluntary and in kind input to proceed. It is acknowledged unequivocally that the owner and occupier have the final say on any proposals put forward for private land. There will also be a commitment sought to maintain certain works. The capital cost of works will be shared between government and landowner including in some cases the cost of initial knockdown of priority pests

Organisation	Responsibility
Victorian Farmers Federation	The Federation represents farmer members on many issues including native vegetation and other land management issues. The Mallee CMA will consult with the VFF during implementation of the plan.
Local Government	There are seven municipalities within the Mallee CMA region but only one (Mildura Rural City Council) wholly within the region. Councils are responsible for developing and implementing planning schemes. They are the responsible authorities for implementing the <i>Planning and Environment Act</i> 1987-including administering the Native Vegetation Retention controls and in some cases developing Section 173 agreements between a landowner DSE and Council. Councils also make local laws, maintain and construct roads other than highways and main roads. Councils own and manage land; some have environmental officers and deliver advice and or incentives to landowners and community groups. Councils should be encouraged to consider adopting rate rebate schemes for protected areas as done by the Buloke Shire Council, subject to reviewing the cost effectiveness of such a scheme. Most Councils have been involved in doing inventories of roadside vegetation and preparing a roadside management plan. It is envisaged that Councils will play a major role on the implementation of roadside plans and the Mallee CMA should support this role. Commitment and involvement of all Councils in implementation of the Mallee Native Vegetation Plan is essential.
Landcare Groups	There are 27 Landcare groups in the region with all the dryland covered by groups. It is expected that community grants programmes will be directed through Landcare groups. The Landcare co-ordinators will be one source of awareness and technical advice on native vegetation management available to the landowners. Each co-ordinator will be guided by a network steering committee and work across a network of groups. Landcare groups take carriage of weed and pest animal programmes, which link strongly to this plan. Landcare has a major role in carrying out the tasks required on the ground to protect existing remnants, revegetating degraded areas and integrating native vegetation into agricultural systems. The Buloke Biolink Programme is a community organisation in the southern mallee based in the Shire of Buloke and involving all Landcare groups within the three CMAs in the Shire. The programme delivers strategic incentive based works in the project area at landholder level and should be supported.
Aboriginal Groups	There are many sectors in the local aboriginal community with a strong interest in the land and the many cultural sites and places. A great deal of knowledge is held amongst aboriginal people on native vegetation and wildlife. There are some parcels of land where aborigines have direct input into land management. The Mallee CMA will engage with sectors of local communities to assist both parties in gaining mutual outcomes in helping to deliver the plan.
Water Authorities	Distribute water to urban or rural landholders. There are two combined urban/rural water authorities and two rural water authorities in the region. Water authorities manage groundwater, wastewater, administer water licences, participate in implementation of salinity plans, construct and manage infrastructure such as pipelines, pumps, <i>etc.</i> Water authorities own and/or manage land such as drainage basins, some of which have significant wetland values, channel reserves, and water storages. They are able to offer rate rebates for the area-based component of the cost of water as demonstrated by Wimmera Mallee Water. For the majority of the Mallee this rebate is available for approved areas of protected native vegetation. This facility provides a valuable incentive to landowners to fence off remnants. Water Authorities play a role in ensuring native vegetation is protected when greenfield irrigation development is initiated.

Organisation	Responsibility
VicRoads, and VicTrack	VicRoads is responsible for construction and maintenance of Highways and declared main roads. It is also responsible to manage all aspects of the road reserve, including weeds and pest animal control and vegetation. Many highways in the past have been subject of planting with either exotic trees or non-indigenous native trees. This policy has been reversed for a decade and may gradually be replaced with indigenous flora in line with this plan. VicTrack owns the land for the railway lines, which are managed by a private company. There is potential to collaborate better with both entities at least in meeting obligations to control pests and protect native vegetation as defined by law
Trust for Nature	Trust for Nature is a statutory non-profit organisation, which encourages permanent protection of bushland with high conservation value. The Trust seeks corporate sponsors, manages a revolving fund to buy and sell land, and protects land permanently by encouraging and arranging covenants. It also gives specialist advice on ecosystem management and runs field days and training. The Trust has a small number of regional staff to deliver rural based programmes including an officer in the Mallee. It has purchased a large parcel of land at Ned's Corner to the west of Mildura to manage for conservation. The Mallee CMA will support the activities of the Trust in securing voluntary permanent protection of significant native vegetation
Greening Australia	Greening Australia is a non-profit organisation that encourages revegetation projects and manages projects for the community. Administration is based in each state with a number of regional offices the closest currently at Bendigo and a local office in Mildura. Runs field days, loans equipment and gives on farm advice
Environmental, Recreation Groups, Service Clubs, Educational Institutions	Local environmental groups such as the Field Naturalist Trust and Bird Observers provide valuable knowledge and skills particularly with respect to the local flora and fauna and sites of significance. They also play an important role in ensuring significant areas are conserved. They monitor and survey fauna and there is potential to further build on this input. Friends Groups are important in raising awareness of local issues and protecting sites of significance particularly active near centres of high population. Their involvement should be supported. Sporting groups, such as the Victorian Field and Game Association, Sporting Shooters Association and fishing clubs, have contributed to protecting sites or species of high value and raising awareness of issues and threats. Their involvement should be encouraged. Schools, scouts/guides and service clubs are often looking for on ground involvement in revegetation works, and if possible should be guided to contribute to meeting the regional targets
Cropping Groups	Regionally based farmer driven organisations are very active in the Mallee. Both the Birchip Cropping Group in the south and the Mallee Sustainable Farming Group in the north deliver research and extension to a broad membership base. They link industry corporate sponsorship and government with local community projects to enhance sustainable agriculture. There is potential to increase the involvement of these groups with implementation of this plan.
Country Fire Authority	The Authority co-ordinates volunteer fire fighters in preventing and suppressing wildfire on private land. The CFA will play a part in developing fire management plans and adhering to standards during implementation. There will be a need from time to time for the CFA to provide advice in respect to fire risk and revegetation works, fuel reduction, and firebreaks on private land.

5.2 Cost Sharing Principles

Cost sharing is a process whereby the costs of implementing natural resource management works are shared between the various stakeholders with an interest in the outcome of those works. The Murray Darling Basin Commission (MDBC 1996) established a set of principles that underpin cost sharing.

The most common philosophy applied to cost sharing frameworks is known as ‘beneficiary pays’, which:

Involves distributing the costs between stakeholders - i.e. the people who benefit or are disadvantaged by the action plan. The stakeholders pay according to the portion of the benefits they receive from the works.

The beneficiary-pays principle recognises that on-ground works can provide benefits for the whole community as well as the individuals implementing those works.

The Mallee Native Vegetation Plan will involve substantial on-ground works as part of the implementation of the plan. Cost sharing principles, specifically beneficiary pays, will be used to determine how those works are funded. A key management action will be to undertake social and economic analysis to determine the shares of the costs that should be allocated between various stakeholders for the various components of the plan. Government should continue to fund provision of technical advice and community leadership and coordination because there is failure in the market place to provide this commercially. Government will also contribute to the cost of materials for on-ground works consistent with the priorities in the plan. The cost share arrangement of any approved on ground works, on average, will be 50 percent government contribution and 50 percent landholder contribution. High priority works may qualify for a higher cost share from government. Supplementary labour to assist landholders may be available for some projects. As a general rule, landholders will supply voluntary labour and machinery.

Landowners may accrue benefits from undertaking works apart from receipt of incentive payments. Benefits to farmers could include;

- the satisfaction of protecting natural assets on their property and leaving them in a better condition than when management commenced;
- the possibility of involving the whole of family in farm activities;
- potentially adding value to their property;
- social interaction with others undertaking similar works;
- an opportunity to reduce local recharge to groundwater by introduction of deep-rooted perennial vegetation located in the optimum point in the landscape;
- the possibility of new industries emerging in the Mallee e.g. fencing contracting, seed collection, weed and rabbit control;

- Learning new skills and increasing knowledge.
- Incorporating native vegetation management into Environmental Management Systems (EMS) to provide an opportunity for market drivers to be developed whereby native vegetation outcomes can be achieved.

The Mallee CMA has the role of allocating the funding from the large regional projects funded by the government investors (funders) through the annual regional catchment investment plan (RCIP). Successful projects in the regional investment plan will then be deployed to landowners, delivery agencies or consultants.

In the future preference for provision of incentives will be given to landowners that have completed an Environmental Management Plan for the farm. This will enable a holistic approach to land management issues to be used in the deployment of incentives. The project to develop and test a process to assist farmers prepare an EMP will commence in 2004.

Local government and water authorities will be encouraged to adjust rates and tariffs to provide added incentive to on-ground works where a cost effective broader community benefit is perceived.

Key contributors to the management priorities include:

5.2.1 The Commonwealth Government

The Commonwealth provides substantial resources to the state and regions mainly via investment from two fund sources. Each of these programmes has guidelines and broad priorities and seeks to progress towards targets identified in the Regional Catchment Strategy.

The National Action Plan for Salinity and Water Quality (NAP) is a joint programme in partnership with each state government. The Natural Heritage Trust provides funding either directly to community groups or via the state and regional process. These are described in more detail in 5.3.

5.2.2 State Government

The state government through the divisions in head office provides legislation and sets policy and broad priorities between programmes and the regions. It also manages the process to deploy Commonwealth funding through the regions through a competitive investment plan process. The state also contributes half of the funding for the National Action Plan. The state government provides state funding through the same process, for managing natural resources through a range of state programmes. Several state initiatives within the process may directly benefit on ground works by landholders including the Victorian Second Generation Landcare Grants, the Good Neighbour Programme and the Land Protection Incentive Scheme.

The Land Protection Incentive Scheme is a framework established under the *Conservation Forests and Lands Act 1987* to administer payment of incentives from government or its agent to private

landowners. The framework provided by the scheme is now used by Catchment Management Authorities to share the cost of works for a whole range of issues between government and landholders.

5.3 Links between Regional/Local Plans and National and State Plans

National Action Plan for Salinity and Water Quality

The National Action Plan for Salinity and Water Quality (NAP) has been developed as a joint initiative between the Commonwealth and State Governments. The objective is to motivate and enable regions via CMA's to use coordinated and targeted actions to:

- Prevent, stabilise and reverse trends in salinity, particularly dryland salinity, which is affecting the sustainability of production, conservation of biological diversity and the viability of our infrastructure; and
- Improve water quality and secure reliable water allocations for human uses, industry and the environment.

Funds will be invested in addressing salinity and water quality issues, including locations where specific threats to biodiversity exist. There will be additional benefits for the protection and enhancement of native vegetation particularly in relation to managing threats associated with salinity. The National Action Plan is available across Australia primarily to priority regions with salinity issues. The Victorian Mallee is part of one of the 21 priority regions known as the Lower Murray Region. Each of the four CMAs in the Lower Murray Region is central to procuring and deploying the funding through respective state-Commonwealth processes. There is opportunity through the Lower Murray Region to develop joint projects for native vegetation management with neighbouring areas.

Natural Heritage Trust

The Commonwealth government provides funding for vegetation protection and enhancement and for the protection of nationally listed rare or threatened species through the Natural Heritage Trust (NHT). Key programmes within NHT include Bushcare (National Vegetation Initiative), National Landcare Programme, and the Endangered Species Programme. These programmes are delivered through two main processes which include:

- Envirofunds stream of NHT is directly managed by the Commonwealth. It is run at least annually and enables community organisations to receive up to \$30,000 for one year projects; and
- Regionally managed process (via the state and Commonwealth) enables the Mallee CMA to access funding for projects through the annual regional catchment investment plan.

Areas identified as benefiting from revegetation, though not commercially viable or appropriate for commercial plantings, are revegetated with indigenous communities with high habitat hectare potential. Significant progress can be made in the Net Gain goal via revegetation under these programmes.

Victorian Second Generation Landcare

The Second Generation Landcare Grants programme makes available Victorian State Government funding through the Mallee CMA for projects conducted by community groups and occasionally by individuals. The programme aims to:

- Help community groups to operate at their optimum level;
- Provide support to community groups to participate in natural resource management projects;
- Provide a catalyst for changing land management practices; and
- Promote and protect biodiversity values, including the targeted control of priority weeds and rabbits.

Investment decisions for allocation of funds to on-ground projects (such as revegetation) are driven by the extent to which the project addresses the regional priorities identified in Action Plans (including the Native Vegetation Plan). This contributes to implementing the Mallee Regional Catchment Strategy. Local priorities have focused on rabbit control and weed management. For the Mallee Native Vegetation Plan there is a major opportunity to ensure that any rabbit control or environmental weed control is aligned to other works to improve native vegetation. The Second Generation Landcare Grants is the main fund source that specifically supports on ground works for pest management. It is usually targeted at Landcare groups that wish to undertake works on roadsides and neighbouring farmland in consultation with their members. The programme is advertised in spring annually by the Mallee CMA.

Land Protection Incentive Scheme

In the case of private landowners (generally farmers), the Mallee CMA uses the framework provided by the State, known as the Land Protection Incentive Scheme to administer incentives. Funding from several sources, both State and Commonwealth can be used through the Scheme. All projects outputs and transactions are recorded in a spatial State data-base known as the Catchment Activity Management System (CAMS). This is the process that has operated in the Mallee since 1987 and has been managed by the Mallee CMA with refinements since 2000.

The process for a typical incentive project on private land to proceed to completion is as follows:

- Project application will be prepared by the technical support agency after discussion and field inspection with the landowner, including taking co-ordinates of site. The project will need to be consistent with priorities in this plan;
- Application submitted to the Mallee CMA for approval before commencement of works;
- Subject to availability of funding a letter of offer, description of works, cost shares and a voluntary management agreement will be then sent to the landowner for acceptance, with a time limit specified for completion of works;
- Project commences when the signed acceptance is returned to the Mallee CMA.

- On completion of the agreed works and inspection by the relevant agency, a signed claim form will be sent to the Mallee CMA triggering payment of the Government contribution to the landowner by the Mallee CMA.
- Ongoing monitoring and site maintenance.

5.4 Relevant State and National Plans

Australia is signatory to several International conventions and meets its associated commitments through national and state agreements, strategies, policies and legislation. There is a requirement for local and state governments to consider these strategies and policies and for landholders and government to comply with legislation relating to native vegetation when involved in decision-making processes. Figure 8 illustrates the links between a number of National, State and Local legislation, policies and strategies.

5.5 Regional Strategies and Plans

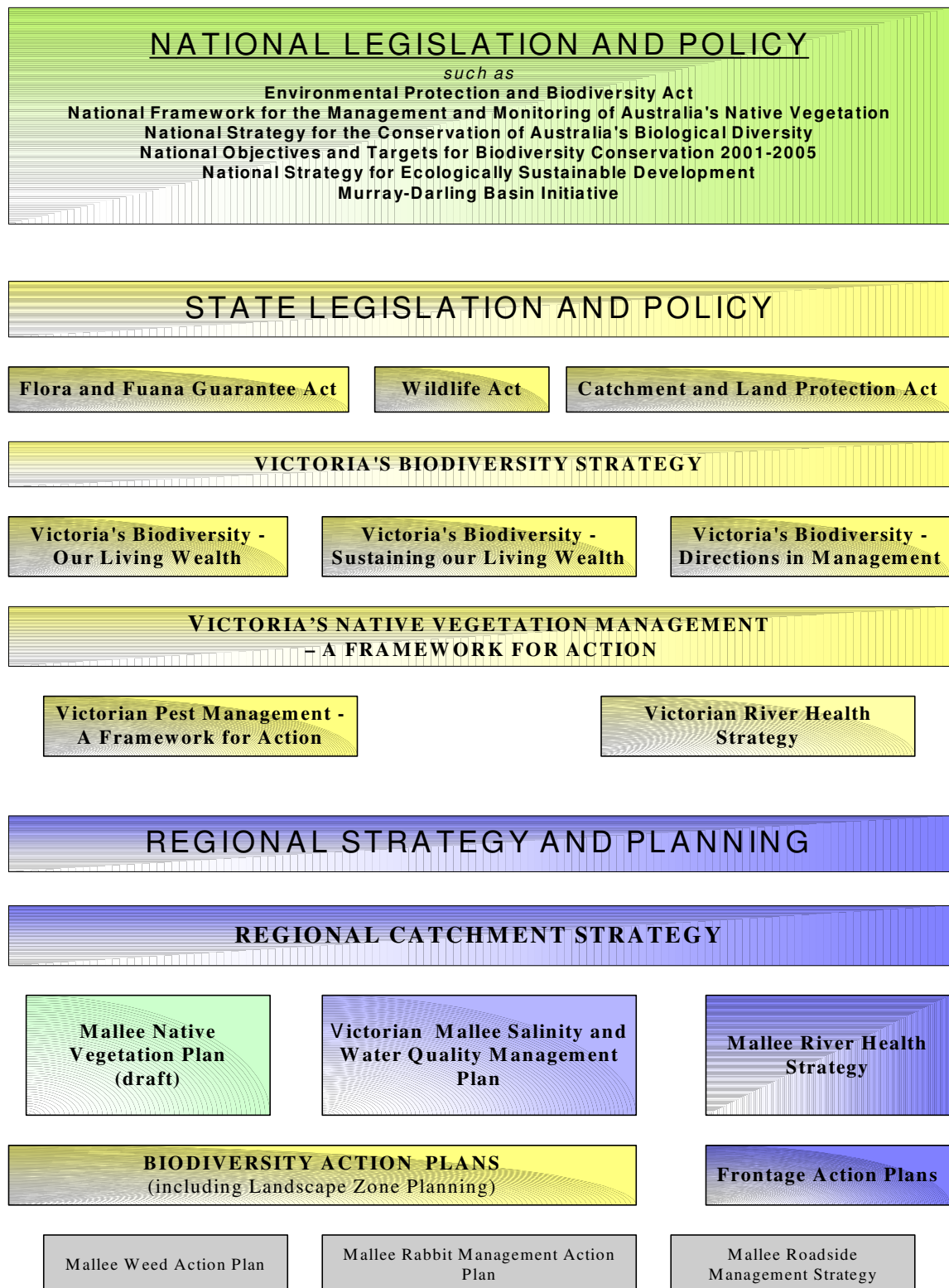
5.5.1 Regional Catchment Strategy

Regional Catchment Strategies constitute strategic regional blueprints at the uppermost policy level. The role of a Regional Catchment Strategy is to coordinate, in partnership with government, the processes of sustainable land and water management and biodiversity conservation within the region whilst ensuring a full opportunity for involvement of land managers, stakeholders and the wider community. As a key contributor to this goal the development of a Native Vegetation Plan for each CMA area provides a regional focus for protecting, enhancing and restoring native vegetation (NRE 1997).

Beneath the overarching policy direction of the state-wide biodiversity plan and the Native Vegetation Management Framework, the *Mallee Regional Catchment Strategy 2003-2008* (MCMA 2003), *Wimmera Regional Catchment Strategy* (WCMA 2003) and *North Central Regional Catchment Strategy* (NCCMA 2003), provide the framework within which the recommendations in this report will ultimately be implemented. The strategies outline major natural resource management programmes relevant to landscapes in the Mallee, Wimmera and North Central Catchment Management Authority regions.

It is intended that as specific biodiversity objectives are identified, these become integrated under each relevant programme and receive appropriately high priority. The CMAs will have a critical coordinating and resourcing role over all of the recommended actions, as well as ensuring appropriate inventory, planning and monitoring activities are implemented and properly supported.

Figure 8 - Status Integrating Multiple Values into the Mallee Regional Catchment Strategy



5.5.2 Salinity Management Plans

Faced with the prospect that salinity poses the major threat to the terrestrial and aquatic ecosystems of Victoria in the late 20th Century (State Conservation Strategy 1987), the then state government embarked on a campaign to arrest, and where appropriate, reverse, the trend of increasing salinity across the state. A major step in this process was the formation of Community Implementation Working Groups that were faced with the task of formulating and subsequently implementing Salinity Management Plans (SMPs) within designated areas or sub-regions.

These are the *Nyah to the South Australian Border SMP* (NSABWG 1990), *Nangiloc-Colignan SMP* (NCCSWG 1991) and *Sunraysia SMP* (SCSWG 1993), which cover irrigated land in proximity to the Murray River, and the *Mallee Dryland SMP* (MDSWG 1992), which covers the dryland Mallee area, incorporating land from the southern boundary of the Big Desert to the Murray River across the eastern Mallee as far as Dumosa and Nyah West. Murray Mallee Bioregion extensions in the Nhill, Warracknabeal and Donald areas are covered by the *Wimmera Dryland SMP*, and in the Boort area by the *Boort West of Loddon SMP* (BWLSWG 1994).

Each salinity management plan typically consists of an Environment Report outlining the biological resources of the sub-region and the draft plan and Government Response that outline the management actions and targets involved in managing salinity within the sub-region.

The five salinity management plans for the Mallee are in the final stages of being revised and integrated, into one plan and combined with water quality. The new plan is expected to be released in late 2004 and will be titled the *Victorian Mallee Salinity and Water Quality Plan*.

5.5.3 Waterway and Floodplain Management Strategies

Water available for environmental purposes along the Murray River floodplain is derived from specific allocations, rain-rejection flows and unseasonable rain. Rights to water are defined within Bulk Water Entitlements and environmental allocations are managed and distributed in Victoria by DSE according to an annual works programme that outlines how and where this water is to be used. The Mallee CMA has prepared Waterway and Floodplain Management Strategies that covers all flood management activities over a five year planning horizon. The Mallee CMA is preparing a Regional River Health Strategy, which will replace these strategies. Murray River Frontage Action Plans for three stretches of the Murray River are being implemented. These plans outline priority onground actions and define the roles and responsibilities of management agencies for frontages.

DSE is developing Water Management Strategies for each forest area that will address appropriate watering regimes for floodplain communities and provide specific management options for individual wetlands and watercourses.

5.6 Knowledge Gaps

The following gaps in our knowledge of native vegetation in the Mallee are noted as they affect our ability to achieve the objectives of the plan. Knowledge gaps need to be addressed to take account of the triple bottom line of social economic and environmental impacts. The following research needs have been identified by the Steering Committee for the Mallee Native Vegetation Plan as being of high priority:

- Ecosystem services of remnant vegetation;
- Values of native vegetation remnants and planted vegetation;
- Specific role of strategic corridors, roadsides, fencelines and patchwork corridors in flora and fauna movement/ dispersal;
- Specific role of freehold remnants in biodiversity conservation;
- Correlation of corridor width and length to function;
- Relationship of floodplain landscape features (grassland/ shrubland/ woodlands) and their respective specific products (biomass, detritus, logs) to riverine biodiversity health;
- Factors inhibiting/promoting regeneration of species and reconstructing Ecological Vegetation Classes;
- Role of fire in maintaining and improving biodiversity;
- Role of native vegetation in ameliorating degraded land; and
- Improved knowledge of terrestrial ecology to enable better management of threatening processes.

5.7 Benchmarking, Monitoring, Evaluation and Reporting

The Monitoring and Evaluation Programme for the Mallee Native Vegetation Plan will consist of two elements. These are

- a. Resource Condition Monitoring Programme, which consists of collection and analysis of biophysical data related to *Achievable Resource Condition Target* indicators; and
- b. Monitoring and Evaluation Programme, which reviews and evaluates the data in relation to the goals and targets of the plan to determine if the policies and actions are appropriate.

Whilst the Resource Condition Monitoring Programme will monitor the rate of progress towards targets, the Monitoring and Evaluation Programme will provide a way of testing, reconfirming or refining the assumptions that link the activities delivered on the ground to the desired changes in native vegetation extent and condition. The Monitoring and Evaluation Programme will be used to revise management actions and targets as deemed necessary.

The Monitoring and Evaluation Programme for the Mallee Native Vegetation Plan is outlined in Table 7.

5.8 Resource Condition Monitoring

The Natural Resource Management Ministerial Council has developed the *National Framework for Natural Resource Management Standards and Targets* to provide a uniform basis for selecting indicators and quantifying targets. Within this framework, a minimum set of issues for which all regions must set regional targets (minimum *Matters for Targets*) has been developed. Those relevant to the Native Vegetation Plan are shown in Table 6.

Table 6 - Minimum Matters for Targets

Matter for Target	Indicator Heading
Integrity of Native Vegetation	Native vegetation extent and distribution
Communities	Native vegetation condition
Significant native species and ecological communities	Selected significant native species and ecological communities extent and conservation status
Ecologically significant invasive species	Selected ecologically significant invasive vegetation species extent and impact

These will form the basis of the Resource Condition Monitoring and catchment condition reporting. The Catchment Condition Report “Report Cards” will be a progressive process based on annual updating of the report card with the outputs or findings of projects. The Catchment Condition Report is a legislative requirement under the *Catchment and Land protection Act* 1994, and must be done by catchment management authorities every five years.

Resource condition monitoring will be a combination of Bioregional monitoring conducted by the Department of Sustainability and Environment, Mallee CMA programmes and other regional monitoring programmes.

The benchmark for the Resource Condition targets will be;

- Mallee Ecological Vegetation Class mapping 2004;
- Mallee Vegetation Condition Report 2004, and
- Mallee Depletion Analysis 2004.

5.9 Monitoring and Evaluation Programme

As discussed, the evaluation component of the monitoring and evaluation programme will address:

1. Whether the processes being monitored are behaving consistently with the assumptions that underpin the plan;
2. Whether targets should be revised; and
3. Whether the management actions need modifying if targets are to be achieved.

Key aspects of the Monitoring and Evaluation Programme are:

A Technical Reference Committee for Biodiversity has been appointed by the Board of the Mallee CMA to oversee implementation of the Biodiversity goal of the Mallee Regional Catchment Strategy. The Technical Reference Committee has representatives including farmers drawn from a wide range of expertise and organisations. This committee will take a primary role in the planning, coordinating, monitoring and evaluating delivery of the Native Vegetation Plan.

An evaluation programme for the plan intended to address activities that aim to influence changes in native vegetation management by:

- i) Providing knowledge and skills (these activities mainly focus on training, therefore the evaluation component will need to provide data on the extent to which these activities actually provide land managers with the knowledge and skills necessary to make changes in land management);
- ii) Influencing drivers for change (these activities include financial incentives, market-based incentives and regulation);
- iii) Developing environmental management systems for agriculture.

The evaluation component of the Monitoring and Evaluation Programme will draw together all aspects of the plan into a report on the performance of the region linked directly to the Catchment Condition Report. The Evaluation Programme will lead to a review of the Native Vegetation Plan in three years from release, with monitoring and evaluation of the success of the plan and its activities and projects.

This programme will ensure plan activities and projects are implemented efficiently and effectively with wide consultation and collaboration to achieve the objectives of the Mallee Native Vegetation Plan.

It is proposed to review the Mallee Native Vegetation Plan in three years from release. However, prior to the proposed three year review there may be a possible need to revise some aspects of particular offset provisions during the life of the regional native vegetation plan as a result of new information becoming available and through experience gained in the application of the Net Gain policy.

Table 7 - Monitoring and Evaluation Actions

Code	Description	Responsibility	Partners	NVP Priority	Timeframe	Performance Indicator
RESOURCE CONDITION MONITORING						
ME1	Prepare Catchment Condition Report Card which will initially benchmark resource condition for key indicators	MCMA		High	July 2004, and annually	Report card endorsed by board
ME2	Integrate Native Vegetation Plan monitoring with CMA and DSE Bioregional Network monitoring programmes	MCMA	DSE	High	June 2005 and annually	Links developed and programmes integrated.
ME3	Monitor all Native Vegetation Plan activities and projects and inspect 10 per cent of all projects annually	MCMA	DSE	Med	Annually	Monitoring undertaken
ME4	Develop consistent guidelines for project monitoring and ensure relevant stakeholders are involved in the monitoring process	MCMA		Med	June 2005 and annually	Guidelines developed
ME5	Use maps and GIS data to record and monitor all Native Vegetation Plan activities and projects as required	MCMA	DSE	Med	June 2005 and annually	Appropriate data utilised

MONITORING AND EVALUATION PROGRAMME						
ME6	Continuously test the programme logic by addressing whether the processes being monitored are behaving consistently with the assumptions that underpin the plan.	MCMA	DSE	High	June 2005 and continuously thereafter	Assumptions confirmed, Or assumptions revised and targets reset
ME7	Prepare annual report on progress of Native Vegetation Plan implementation	MCMA		High	June 2005 and annually	Report prepared
ME8	Review Mallee Native Vegetation Plan in three years	MCMA		High	June 2007	Review undertaken Outcomes incorporated as appropriate
ME9	Incorporate outcomes of review, monitoring and evaluation into future planning for the Native Vegetation Plan	MCMA		High	June 2005 and annually	Outcomes incorporated as appropriate

APPENDICES

Appendix 1 - Policy and Legislation

Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act* 1988 (FFG) provides a legal and administrative structure to promote flora and fauna conservation. The objectives of the Act are:

‘To provide a programme:

- Involving community education in the conservation of flora and fauna
- To encourage co-operative management of flora and fauna through amongst other things, the entering into of co-operative agreements under the *Conservation Forests and Lands Act* 1987
- Assisting and providing incentives to people, including landholders, to enable flora and fauna to be conserved’.

Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act* 1994 has the objective of establishing a framework for the integrated and co-ordinated management of catchments which will;

- Maintain and enhance long-term land productivity while also conserving the environment, and
- Aim to ensure that the quality of the State’s land and water resources and their associated plant and animal life are maintained and enhanced.

The legislation established ten (10) Catchment and Land Protection Boards, which have since had expanded roles to become Catchment Management Authorities in 1997. The *Catchment and Land Protection Act* 1994 provides for the development of Regional Catchment Strategies which, among other things, must assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention. Local Planning schemes must have regard for the Regional Catchment Strategies.

Victorian Conservation Trust Act 1972

The Trust for Nature is a statutory authority that was established under the *Victorian Conservation Trust Act* 1972. The Trust has the power to hold, buy and sell real property and the power to enter a binding covenant with a landholder. The Trust uses this power to operate a revolving fund in which areas of high conservation significance are purchased then resold following the placement on the title of a covenant to protect the conservation values.

Planning and Environment Act 1987

The Victorian Planning Provisions the State Planning Policy Framework (SPPF) sets out principles for land use and development planning and policies for settlement, environment, and management of resources, infrastructure, economic well-being, social needs and regional co-operation. Specific policies encompass objectives, generic implementation techniques applying across Victoria. The objective of the conservation of native flora and fauna policy is:

‘To assist the protection and conservation of biodiversity, including native vegetation retention and provision of habitats for native plants and animals and control of pest plants and animals.’

The general implementation instructs that the responsible authority maintain a regard for a range of National, State and regional strategies particularly regional vegetation plans and roadside management strategies.

The objective of the policy on protection of catchments, waterways and groundwater is:

‘To assist the protection and, where possible, restoration of catchments, waterways, water bodies groundwater, and the marine environment.’

Again planning authorities must have regard to relevant aspects of the regional vegetation plans.

Planning and responsible authorities must take account of and give effect to both the general principles and specific policies applicable to issues before them. The State Planning Policy Framework seeks to ensure the objectives of planning, as described in s4 of the *Planning and Environment Act 1987* in Victoria, are fostered. One of these objectives is

‘To provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity’

The Local Planning Policy Framework contains the Municipal Strategic Statement and Local Policies. The Municipal Strategic Statement contains the strategic planning, land use and development objectives of the Council and emphasises:

- Strategies for achieving objectives;
- Opportunities and constraints which provide a context for local planning decisions; and
- Demonstrated links between the municipality’s strategic planning, the regional context and the State Planning Policy Framework; and
- An explanation of the relationship between the objectives, strategies and controls on use and developments.

Local Policies provide detailed directions regarding land use but not development. They either relate to specific areas or to local issues and should have their origins in the Municipal Strategic Statement. The Victoria Planning Provisions has also introduced a standard set of Zones that control the use of land and Overlays that control development of land.

There is no provision for landholders to receive compensation for retaining native vegetation on private land under the *Planning and Environment Act 1987*.

Native Vegetation Retention Controls

The Native Vegetation Retention (NVR) controls were established under the provisions of the *Planning and Environment Act 1987* and introduced into the State Section of all Victorian-planning schemes in 1989. The NVR controls require a planning permit to remove, destroy or lop native vegetation (subject to a range of exemptions designed to facilitate normal domestic and rural practices).

In the Victoria Planning Provisions the Native Vegetation Retention controls are located in the particular Provisions under Clause 52.17 and have the stated purpose;

‘To protect and conserve native vegetation to reduce the impact of land and water degradation and provide habitat for plants and animals.

The decision guidelines for permits required under Clause 52.17 require the responsible authority to consider, among a range of other things, the approved Regional Native Vegetation Plan. Guidelines for achieving Net Gain in Planning Decisions are expected to be released by DSE in the near future that will clarify the process.

Appendix 2 - Glossary of Terms and Abbreviations

ACF - Australian Conservation Foundation

Agroforestry – the use of trees for commercial purposes integrated into a cropping, grazing or horticulture enterprise.

AAV – Aboriginal Affairs, Victoria.

AFFA – Agriculture Fisheries and Forestry Australia, the Commonwealth department that is responsible for national land and water policy

AROTS – Australian Rare or Threatened Species.

BMP or Best Management Practice – a philosophy of management whereby the only actions employed are those that, on balance, are based on the best available management information.

Biodiversity – The variety of all life-forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part.

Biodiversity Action Plans - summarise the key biodiversity assets of the bioregion, and the actions and tools required to achieve state-wide biodiversity goals. They will form a subset under each of the regional native vegetation plans

Bioregions – biogeographic areas that capture the patterns of ecological characteristics in the landscape or seascape, providing a natural framework for recognising and responding to biodiversity values

Broad Vegetation Type (BVT) – a classification that provides a simplified view of vegetation based on land system or biophysical attributes (such as geology, rainfall, elevation, soil type and landform). Each broad vegetation type will contain a mixture of EVCs often in a recognisable pattern; however any one EVC can occur in more than one BVT

Bushcare - a funding programme of the Natural Heritage Trust.

CAMBA – Chinese- Australian Migratory Bird Agreement.

Categories of threat to vascular plants in Victoria (Source Gullan *et al.*, 1990).

Endangered – In Victoria: rare and at risk of disappearing from the wild state if present land use and other causes continue.

Vulnerable – In Australia: not presently Endangered but at risk of disappearing from the wild over a longer period (20 to 50 years) through continued depletion.

Rare – In Australia: rare but overall not currently considered Endangered or Vulnerable.

Depleted – Not rare in Victoria in the wild state, but considered threatened: regeneration is problematic or less than necessary to replace losses, and the populations are continuing to decrease. This category is used for those plants that may occur over their former range but are markedly less common and continuing to decline, and also for those plants whose range is now substantially reduced with satisfactory regeneration only in a very small proportion of that range.

Conservation Covenant – A voluntary agreement between a landowner and Trust for Nature to safeguard bushland, plants and animals. The covenant is registered on the title and binds future owners of the land.

Convention on Biological Diversity (1993) - The Convention is an international partnership developed for the Earth Summit in Rio de Janeiro (1992) in recognition of the environmental, social, cultural and economic value of biodiversity and it's significant on going reduction around the world. Signatories are required to implement the Convention's objectives through national strategies, plans and programmes, which include the integration of conservation and sustainable management of biodiversity in sectors such as agriculture.

Core Vegetation Cover – Refers to the cover of permanent vegetation that's similar in terms of species composition and structure to pre-European settlement vegetation types and excludes farm forestry, agro forestry and woodlots planted for production purposes.

Corridor – A linear habitat that may link patches of habitat in the landscape and be a pathway for movement of wildlife.

Cost Benefit Analysis - a technique used to financially compare alternative courses of action by assigning dollar values to all outlays and outcomes of the actions.

Cost Sharing - where a number of parties involved in a project share the financial or other burden of the project.

Discharge – Area where groundwater reaches the soil surface.

DPI – Department of Primary Industries (Victoria).

DSE - Department of Sustainability and Environment (Victoria).

EA – Environment Australia, a Commonwealth Department

ECC – Environment Conservation Council, replaced the Land Conservation Council in the role of determining the use and management of public land in Victoria.

Ecological Processes – fundamental processes that underpin the structure and function of a defined ecosystem.

Ecologically Sustainable Management – a descriptive phrase indicating that the action being considered does not bring about a deterioration in either the biodiversity or the ecological processes of land, water or air is essentially about long term viability of the land and its associated natural resources. This includes both economic viability and maintenance of the environment.

Ecosystem – collection of communities of organisms and their abiotic features interacting as a unit in some manifestly obvious manner, but usually having no defined boundary.

Ecosystem Services - are the essential ecological processes and life support systems that local ecosystems (thus biodiversity) provide. They include;

- clean air and water;
- regeneration processes (nutrient cycling, filtration, seed dispersal, pollination);
- production of goods (food, pharmaceutical's, genetic resources);
- stabilising processes (soil and climate stability, pest control, regulation of hydrology, detoxification);
- life fulfilling functions (aesthetics, cultural, spiritual inspiration); and
- options for the future

EVC - Ecological Vegetation Class. A type of native vegetation classification system that is described through a combination of its floristic, life form, and ecological characteristics, and through a detailed classification through inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities (*i.e.* a lower level in the classification that is based solely on groups of the same species) that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.

Farm Forestry – the intensive use of trees for regional development (other than horticulture) in particular focusing on wood or plant products. Secondary benefits could include water reuse or recharge control.

FFG – *Flora and Fauna Guarantee Act* 1988 lists and provides for protection of rare and threatened species.

FIS – Flora Information System, a spatial database of Victoria's flora.

FS – Forest Services, a division of Department of Sustainability and Environment.

GAV – Greening Australia Victoria is an organisation that encourages and supports revegetation projects and manages other projects for the community.

Geographic Information System (GIS) - a computer information system that stores, analyses and displays spatial and geographic data.

Grassy Ecosystem Reference Group (GERG) is a combined government/non-government body established to address the problem of grassy ecosystem conservation on a state-wide basis. Sectors of the community actively involved in the conservation and management of native grasslands and grassy woodlands are represented with two Project Officers being employed in Victoria.

Habitat - the living space of a species or community providing a particular set of environmental conditions.

Habitat Hectare - a site-based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type.

HV – Heritage Victoria.

IBRA – Interim Bioregionalisation of Australia.

Indigenous – Native to a particular area; not introduced.

Intergenerational Equity – an assessment criterion whereby the present generation provides for needs and aspirations in an ecologically sustainable way and without compromising the ability of future generations to do likewise.

The Inter-Governmental Agreement on the Environment (1992)

An agreement signed by the Commonwealth, State and Territory Governments in May 1992 to facilitate: A co-operative national approach to the environment

Integrated Catchment Management (ICM) – a process whereby the various parties and interests in a catchment are brought together through regional land and water management plans to achieve whole catchment improvements.

JAMBA – Japanese- Australian Migratory Bird Agreement.

Key Feature – a component of the native vegetation resource of the Mallee which has a particular issue, threat or management requirements. Seven key features have been defined.

Land and Water Resources Research and Development Corporation (LWRRDC) – A Commonwealth government research corporation that allocates industry and government funds.

Landcare - voluntary community land conservation groups and associated land, water and nature conservation activities.

Land for Wildlife – is a DSE programme in Victoria to encourage protection of habitat on private land. Eligible properties can be registered and supported by the programme.

Land degradation - undesirable changes in plant or animal composition or abundance or soil and land surface characteristics. It may be irreversible within the bounds of economic management.

LCC - Land Conservation Council. A now defunct statutory body established by the Victorian State government to provide advice on public land use and management.

LCG – Landcare Group.

LG – Local Government.

LPIS – Land Protection Incentive Scheme. A state-wide framework now managed by catchment management authorities in each region. The scheme uses project funding to provide a range of incentives to share the cost of on ground works with landowners or licensees of public land.

MADEC – Mildura and District Education Centre.

Mallee CALP – Mallee Catchment and Land Protection Board. A regional body appointed by the Minister in December 1994 to advise the Minister on land and water management and develop the first Regional Catchment Strategy. It was replaced by the Mallee Catchment Management Authority in 1997.

Mallee CMA - Mallee Catchment Management Authority. Established by the Victorian state government in 1997 to advise the Minister on catchment condition, land and water management activities and develop and implement regional plans. One of ten such authorities operating in Victoria.

Mallee - the term is used in this document to mean the area of northwest Victoria defined under the *Catchment and Land Protection Act 1994* as the Mallee CMA catchment or Mallee CMA region, and a

waterway management district under the *Water Act* 1989. These are referred to throughout the plan as the “Mallee”, although areas containing Mallee characteristics lie outside this administrative boundary

Mallee NVP – Mallee Native Vegetation Plan.

Management Agreement – A written agreement signed by a landholder in respect to implementing specified works then maintaining and managing an area of land and associated natural resources to agreed standards and monitoring results.

MDBC - Murray Darling Basin Commission, the operational arm of the Murray Darling Ministerial Council which represents four relevant state governments, the ACT and the Commonwealth.

National Forest Policy Statement – A New Focus for Australia’s Forests - Following the United Nations Conference on the Environment and Development in Rio de Janeiro in 1992 the commonwealth, state and territory governments developed the National Forest Policy Statement. The statement identified eleven broad national goals. The conservation goal is to maintain an extensive and permanent native forest estate in Australia and to manage that estate in an ecologically sustainable manner so as to conserve the full suite of values that forests can provide for current and future generations. The private native forests goal is to ensure private native forests are maintained and managed in an ecologically sustainable manner, as part of the estate, as a resource in their own right, and to complement the commercial and conservation values of public forest. One of the goals relating to plantations is to increase plantings to rehabilitate cleared agricultural land, to improve water quality and to meet other environmental, economic or aesthetic objectives.

National Landcare Programme – A component of the Natural Heritage Trust that supports innovative projects to improve land and water management and community capacity.

National Reserve System – nationally recognised conservation reserves such as Biosphere Reserves

The National Strategy for the Conservation of Australia’s Biological Diversity (1996) - Australia’s principle means for coordinated implementation of The Convention on Biological Diversity is The National Strategy for the Conservation of Australia’s Biological Diversity. The strategy aims to bridge the gap between current activities and those measures necessary to ensure the effective identification, conservation and ecologically sustainable use of Australia’s biodiversity.

National Strategy for Ecologically Sustainable Development (1992) - The goal of the strategy is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The core objectives in achieving this goal are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

Native Vegetation – All plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses.

Net Gain – is where, over a specified area or period time, losses native vegetation and habitat, as measured by a combined quality – quantity measure (habitat hectare), are reduced, minimises and more than offset by commensurate gains.

NHT - Natural Heritage Trust – a federal trust established to administer funds for natural resource protection and community capacity building.

No Net Loss – a concept whereby conservation losses in one geographically or otherwise defined area are balanced by a gain elsewhere.

NRE – Department of Natural Resources & Environment, Victoria, now replaced by two new departments.

NVR - Native Vegetation Retention controls.

Perennial – Living for at least several years, and usually flowering each year.

Permanent Protection – protection of a natural asset on private land through a legal agreement attached to the title; or land management by the Crown or statutory authority for conservation.

Pests – pest plants or pest animals declared in accordance with the *Catchment Land Protection Act* 1994.

Plantations for Australia – The 2020 Vision - This document provides a framework for action for the National Forest Policy Statement (1992) and the Wood and Paper Industry Strategy (1995). It identifies the target of trebling the effective area of Australia's plantations between 1996 and 2020.

Precautionary principle – To avoid wherever practicable serious or irreversible damage to the environment and an assessment of the risk weighted consequences of various options. When dealing with threats of serious or irreversible environmental damage lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Private Forestry in Victoria: Strategy towards 2020 - The vision articulated in this strategy is that by 2020, Victoria will have developed a major market-driven commercially and environmentally sustainable private forestry sector with strategically placed concentrations of plantations comprising suitable species. The target is to treble the effective area of private forestry in Victoria between 1998 and 2020.

Provenance – the place of origin of a species, subspecies or variety.

PV – Parks Victoria.

RCS – Regional Catchment Strategy.

Reference area – Tracts of public land containing viable samples of one or more land types that are relatively undisturbed and that are reserved in perpetuity.

RFA – Regional Forestry Agreements

Recharge – Area in which surface water enters the soil to become groundwater.

Recruitment – Natural regeneration, assisted regeneration, planting or direct seeding to propagate new individuals of flora taxa.

Regeneration – The natural regeneration of vegetation. Natural regeneration contributes to the vegetation cover when the dominant species of the pre-existing vegetation types re-establish, but is less than 10 years of age.

Remnant Vegetation – Native vegetation remaining after an area has otherwise been cleared.

Revegetation - The deliberate planting of vegetation. Revegetation contributes to vegetation cover when the species composition and structure (that is, all vegetation strata) is similar to pre-existing vegetation types for that area.

Riparian Vegetation – native vegetation growing on a riverbank or stream bank.

RMU – Resource Management Unit.

Scale management for native vegetation – there are four levels of scale

- **Regional (or Catchment)** scale management refers to areas ranging from tens to hundreds of kilometres across, and involves the co-ordination of processes to engage the broad range landholders, organised interest groups and government agencies. A perspective at this level facilitates medium to long term strategic planning for sustainable land and water management and for the conservation reserve systems.
- **Landscape** scale management refers to areas from several kilometres to tens of kilometres across, usually involving a number of properties and individual land managers. At this level, consideration can be given effectively to differences in native vegetation type, coverage and quality, including spatial configuration and connectivity of habitats, and other factors influencing biodiversity and land protection in the local landscape.
- **Patch (or Block)** scale management relates to a discrete stand of native vegetation usually within a single rural property, and focuses on size, shape and location of the patch and on the type(s) of vegetation. This level permits useful insight into how to best protect or enhance the value of patches as habitat and /or are for land protection.
- **Site** scale management refers to highly localised activities that may influence the characteristics of vegetation occurring within or adjacent to a patch. Such activities include

planting, direct seeding or regeneration of vegetation, as well as weed control or thinning in established vegetation.

Species - a group of organisms which are biologically similar and capable of breeding and producing fertile offspring with each other but usually not with members of other species.

SPPF – State Planning Policy Framework. This sits in the front of the planning scheme of each Council.

Stakeholder - any person, or collection of persons, institution, organisation, agency, department, authority, club, association or the like which has an interest in, or association with a physical area or issue.

Total Vegetation Cover – The total number of hectares of native vegetation, including remnant, regeneration, revegetation, farm forestry, agro forestry and woodlots.

Trust for Nature (TFN) - independent body established under the *Victorian Conservation Trust Act* 1972 to enable people to bequeath land or money to purchase/conservate Victoria's most threatened habitats.

Trust for Nature Covenants: voluntary permanent agreement on the title of a parcel of land of significant natural habitat value, subscribing permanent protection to that land. These covenants come under an amendment to the above act made in 1978.

Threatening processes – actions, either human induced or otherwise biotically or abiotically induced such as habitat disturbance or destruction or pollution that threaten the survival, abundance or evolutionary development of a species, population or ecological community.

Total Grazing Pressure – the total impact of all grazing animals on a particular area, including the impact of domestic stock, feral animals and native grazers.

Understorey – A general term for plants (usually shrubs) of a community occurring at levels lower than the top stratum (usually trees).

United Nations Framework Convention on Climate Change (1994) - the ultimate objective of the Convention is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The key commitment of promoting sustainable development and promoting and cooperating in the conservation and enhancement of sinks and reservoirs of all greenhouse gases including biomass, forests and oceans relates directly to the development of the Regional Vegetation Plan.

VFF – Victorian Farmers Federation. The Federation represents farmer members through a branch structure and commodity groups.

Victoria's Biodiversity Strategy (1997) - The goals for biodiversity management are to ensure that within Victoria:

- There is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation leading to a net gain with the first target being no net loss by the year 2001;
- The ecological processes and biodiversity dependant upon terrestrial, freshwater and marine environments are maintained and, where necessary, restored;
- The present diversity of species and ecological communities and their viability is maintained or improved across each Bioregion;
- There is no further preventable decline in the viability of any rare species or of any rare ecological community; and
- There is an increase in the viability of threatened species and in the extent and quality of threatened ecological communities.

The strategy aims to:

- Increase awareness of the need to conserve biodiversity;
- Enable continued development of partnerships between community, industry and government in the custodianship of our biodiversity;

- Indicate the mechanisms, existing and proposed, for achieving the objectives of flora and fauna conservation and management in the context of ecological sustainability;
- Provide perspectives on advances in flora and fauna conservations and directions for future management of exiting habitats and the continuation of natural ecological processes;
- Highlight the need for protection and replenishment of the total area of native vegetation, with particular emphasis on threatened or depleted types such as grasslands and riparian environments;
- Highlight the major threatening processes in each bioregion that must be ameliorated to conserve; and
- Highlight the habitats and environments that require urgent attention.

‘Victoria’s Greenhouse Action: Responding to a global warming’ (1998) - This action strategy commits the Victorian Government to investing \$15 million/year over the next three years in initiatives, which “reduce greenhouse gas emissions, enhance greenhouse sinks and manage the risks of climate change”. The government is investing \$9 million over the next three years into ‘Replanting Victoria 2020’ to better understand and extend Victoria’s greenhouse sink capacity. Approximately half of this funding will be committed to funding revegetation programmes across the state.

VPP – Victoria Planning Provisions, sit at the front of each planning scheme.

VROTS - Victorian Rare or Threatened Species.

Appendix 3 - Further Reading

- ANCA (1996). *A Directory of Important Wetlands in Australia*—Second Edition, Australian Nature Conservation Agency, Canberra.
- ANCA (1996). *National Strategy for Conservation of Australia's Biodiversity*, Australian Nature Conservation Agency, Canberra
- Beovich E (1993). *Mallee Dryland Salinity Management Plan, -Environment Report*, Department of Conservation and Natural Resources, Victoria.
- Bluml M (1993). *Sunraysia Salinity Management Plan, - Environment Report*, Department of Conservation and Natural Resources, Victoria.
- CNR (1996). *Planning Guidelines for Native Vegetation Retention Controls*. Department of Conservation and Natural Resources, Catchment and Land Management Division, Victoria.
- CNR (1993). *Land Protection Incentive Scheme*. Department of Conservation and Natural Resources, Victoria.
- CNR (1994). *Big Desert Wilderness Park Management Plan*, National Parks Service—North West Area, Department of Conservation and Natural Resources, Victoria.
- CNR (1995). *Threatened Fauna in Victoria*. Department of Conservation and Natural Resources, Victoria.
- CNR (not dated) *Vegetation of the Mallee*, Department of Conservation and Natural Resources, Victoria.
- Commonwealth of Australia (1992). *National Strategy for Ecologically Sustainable Development*. Commonwealth of Australia, Canberra
- Cowling S (1993). *Mallee Country Wildlife*, Gould League of Victoria Inc., Melbourne.
- Crosthwaite J (1998). Consultancy Report to Goulburn Broken Vegetation Management Plan Steering Committee.
- Department of Premier and Cabinet (2001). *Growing Victoria Together. Innovative State. Caring Communities*. The State of Victoria
- Diez S, Foreman P (1996). *The management of natural grasslands on the Riverine Plain of South Eastern Australia*, Department of Conservation and Natural Resources, Victoria.
- DCE (1990). *Restoring the Balance*. Department of Conservation and Environment, Victoria.
- DSE (2003). *The Vegetation of North West Victoria*. Department of Sustainability and Environment, Victoria.
- DSE (2004). *Forest Management Plan for the Floodplain State forest of the Mildura Forest Management Area*. Department of Sustainability and Environment, Victoria

Flora and Fauna Branch, NRE (not dated) *Broad Vegetation Types of Victoria*, *Unpublished report*, Department of Natural Resources and Environment, Victoria.

Foreman DB, and Walsh NG (1993) *Flora of Victoria Volume 1*, Royal Botanic Gardens Melbourne.

Hogan E (1997) *A Vegetation Conservation Strategy for the North Central CMA Region*, Department of Natural Resources & Environment, Victoria.

LCC (1987) *Mallee Area Review*, Land Conservation Council, Victoria.

LCC (1989) *Mallee Area Review, Final Recommendations*, Land Conservation Council, Victoria.

LCC (1991) *Rivers and Streams: Special Investigations, Final Report*, Land Conservation Council, Victoria.

McCann I (1989) *The Mallee in Flower*, Victorian National Parks Association, Melbourne, Victoria

Mallee CALP Board (1996). *Mallee Catchment Condition Report*, Mallee Catchment & Land Protection Board, Victoria.

Mallee CALP Board (1997). *Mallee Regional Catchment Strategy*, Mallee Catchment and Land Protection Board, Victoria.

Mallee CMA (2002). *Mallee Catchment Condition Report*, Mallee Catchment Management Authority, Victoria.

Mallee CMA (2003). *Mallee Regional Catchment Strategy 2003-2008*, Mallee Catchment Management Authority, Victoria.

Mallee CMA (1998). *Mallee Roadside Management Strategy*, Mallee Catchment Management Authority, Victoria.

Mallee CMA (2001). *Mallee Waterway and Floodplain Management Strategy*, Mallee Catchment Management Authority, Victoria.

Mallee CMA (2003). *Murray River Frontage Action Plan, Nyah to Robinvale*, Mallee Catchment Management Authority, Victoria.

Mallee CMA (2003). *Murray River Frontage Action Plan, Robinvale to Merbein*, Mallee Catchment Management Authority, Victoria.

Mallee CMA (2003). *Murray River Frontage Action Plan, Merbein to South Australian Border*, Mallee Catchment Management Authority, Victoria.

Mallee Dryland Community Salinity Working Group (1992). *Mallee Dryland Draft Salinity Management Plan*, Salt Action, Victoria.

Mansergh I, and J Seebeck (1992). *Extinct Mammals 2 – Species Presumed Extinct Throughout Victoria. Action Statement No, 14*, Department of Conservation and Environment, Victoria.

Margules and Partners, P and J Smith Ecological Consultants (1990). *River Murray Riparian Vegetation Study*, Murray Darling Basin Commission, Canberra.

McKane B (1992). *Nyah—South Australian Border Salinity Management Plan—Environment Report*, Department of Conservation and Natural Resources, Victoria,

McLennan R (1991). *Native Vegetation Conservation Strategy: Mildura Region*, Department of Conservation and Environment, Victoria

Mock I, and Grinter V (2004). *Relative Wateruse of Mallee Farming Systems and Constituent Components*. Primary Industries Research Victoria, Department of Primary Industries, Victoria

MDBC (1996). *Cost Sharing for Dryland Works: A discussion paper*. Murray-Darling Basin Commission.

Muir A, and Collinson M (1996). *Assessment of the Conservation Values of Lalbert & Tyrrell Creeks, North-West Victoria*, Ecology Australia, Consultancy Report for Department of Natural Resources and Environment, Victoria.

Murray Water Entitlement Committee (1997). *Sharing the Murray: Proposal for Defining People's Entitlements to Victoria's Water from the Murray*. Victorian Government.

MVMWG (1991). *Mallee Vegetation Management in the Murray Hydrogeological Basin*, Mallee Vegetation Management Working Group, Murray Darling Basin Commission, Canberra.

NPS (1996). *Mallee Parks Management Plan*. National Parks Services – North West Area, Department of Natural Resources and Environment, Victoria.

NRE (1997A). *Victoria's Biodiversity: Sustaining Our Living Wealth*, Department of Natural Resources and Environment, Victoria.

NRE (1997B). *Victoria's Biodiversity: Sustaining Our Living Wealth*, Department of Natural Resources and Environment, Victoria.

NRE (1997C) *Victoria's Biodiversity: Directions in Management*, Department of Natural Resources and Environment, Victoria.

NRE (1997). *Heritage Rivers and Natural Catchment Areas: Draft Management Plans Western Victoria*, Department of Natural Resources and Environment, Victoria.

NRE (1998). *Assessing the Implications of RCD for the Management of Large Conservation Reserves, Grazing leasehold and Dryland Agriculture in North-west Victoria*. Report No. 6, Department of Natural Resources and Environment, Victoria.

NRE (1998). *'Victoria's Greenhouse Action: Responding to a global warming'* Department of Natural Resources and Environment, Victoria.

NRE (2000). *Mallee Rabbit Management Action Plan*, Department of Natural Resources and Environment, Victoria.

NRE (2000). *Mallee Weed Action Plan*, Department of Natural Resources and Environment, Victoria.

NRE (2000). *Resources Protection Guidelines for Rabbit Management—Mallee*, Department of Natural Resources and Environment, Victoria.

- NRE (2000). *Victoria's Salinity Management Framework- Restoring Our Catchments*, Department of Natural Resources and Environment, Victoria.
- NRE (2002). *Victoria's Native Vegetation Management, A Framework for Action*, Department of Natural Resources and Environment, Victoria.
- NRE (2002). *Victorian River Health Strategy*, Department of Natural Resources and Environment, Victoria.
- NRE (2002). *Victoria's Pest Management-A Framework for Action, Weed Management Strategy*, Department of Natural Resources and Environment, Victoria
- NRE (2002). *Victoria's Pest Management-A Framework for Action, Public Land Management Strategy*, Department of Natural Resources and Environment, Victoria
- NRE (2002). *Victoria's Pest Management-A Framework for Action, Rabbit Management Strategy*, Department of Natural Resources and Environment, Victoria
- NRE (2002). *Victoria's Pest Management-A Framework for Action, Wild Dog Management Strategy*, Department of Natural Resources and Environment, Victoria
- NRE (2002). *Victoria's Pest Management-A Framework for Action, Fox Management Strategy*, Department of Natural Resources and Environment, Victoria
- NRE (2002). *Victoria's Pest Management-A Framework for Action, Feral Pig and Feral Goat Management Strategy*, Department of Natural Resources and Environment, Victoria
- NRE (2002). *Victorian Action Plan for Second Generation Landcare*, Department of Natural Resources and Environment, Victoria
- Platt, S.J and Lowe, K.W. (2002) *Biodiversity Action Planning: action planning for native biodiversity at multiple scales – catchment, bioregional, landscape, local*. Department of Natural Resources and Environment, Victoria.
- Predebon S (1990). *Nangiloc Colignan Salinity Management Plan: The Environment*, Department of Conservation Forest and Lands, Victoria.
- Pressey RL (1986). *Wetlands of the River Murray, River Murray Commission Environmental Report 86/1*. River Murray Commission, Canberra.
- Rowan JN and Downes RG (1963). *A Study of Land in North-Western Victoria*, Soil Conservation Authority, Victoria.
- Seebeck J, I Mansergh (1992). *Extinct Mammals 1 – Species Presumed Extinct throughout Their Range. Action Statement No, 13*, Department of Conservation and Environment, Victoria.
- Sluiter IRK, Allen GG, Morgan DG and Walker IS (1997). *Vegetation Responses to Stratified Kangaroo Grazing Pressure at Hattah-Kulkyne National Park 1992-96*. Department of Natural Resources and Environment and Parks Victoria, Victoria.

Sluiter IRK, Minchin PR & Jaensch (1997). *The Buloke and Pine Woodlands of Semi-Arid and Dry Sub-Humid Victoria and Nearby Areas*, Unpublished Report by the Victorian Department of Natural Resources and Environment to Environment Australia.

Stephens S (1992). *Endangered Species and Communities and Threatening Processes in the Murray Mallee*, Endangered Species Unit, Australian NPWS, Canberra.

Stokes A.L. (1996). *A Biological Survey of Box and Buloke Grassy Woodland in the Upper Southeast of South Australia*, Department of Environment and Natural Resources, South Australia.

Sunraysia Community Salinity Working Group (1991). *Sunraysia Draft Salinity Management Plan*, Salt Action, Victoria.

Victorian Government (2002) *Our Forests Our Future, Balancing Communities, Jobs and the Environment*, Statement by the Premier of Victoria and the Minister for Environment and Conservation, Victoria

Yarriambiack Creek Advisory Committee (2004). *Yarriambiack Creek Management Plan*, Mallee Catchment Management Authority and Wimmera Catchment Management Authority, Victoria.

Appendix 4 - Land Protection Hazard for Net Gain Outcome

IDENTIFYING LAND PROTECTION HAZARD FOR NET GAIN OUTCOMES

HAZARD RATING	WATERWAY PROTECTION	SALINITY CONTROL	SOIL CONSERVATION	SOIL/LAND QUALITY	PRODUCTIVE CAPABILITY OF SITE
Very High	Riparian zone vegetation (ie adjacent to or within waterway, wetland or significant drainage line).	Vegetation on an area identified as having a high groundwater recharge potential OR Salinity discharge site and its immediately adjacent area	Very high erosion hazard associated with the proposed use and the activities needed to bring about the change in use (defined as land with >20% slope) OR Salinity discharge site	Land highly susceptible to soil structure decline, water logging or landslips.	Land with restricted vegetative growth potential because of either moisture availability or the occurrence of low temperatures
High	Vegetation immediately adjacent to riparian zone	Vegetation on an area with moderately high groundwater recharge potential OR Vegetation slightly uphill of discharge site	High erosion hazard associated with the proposed use or the activities needed to bring about the change OR Potential salinity discharge site	Land moderately susceptible to either soil structure decline, water logging or landslips	Land with low potential for reliable vegetative growth
Medium	Vegetation away from riparian zone	Vegetation on an area identified as having a moderate groundwater recharge potential	Moderate erosion hazard with proposed alternative use	Land of low susceptibility to either soil structure decline, water logging or landslips	Land with adequate potential for vegetative growth
Low	Vegetation not adjacent to or within riparian zone	Vegetation on an area identified as having a low groundwater recharge potential	Low erosion hazard associated with proposed alternative use	Well structured soil of depth greater than 150 mm	Land of high potential for vegetative growth

Appendix 5 - Assessing Bioregional Conservation Status of Ecological Vegetation Classes

ASSESSING BIOREGIONAL CONSERVATION STATUS OF ECOLOGICAL VEGETATION CLASSES

Assessment of the conservation status of vegetation types is traditionally based on the broad concepts of inherent rarity, degree of threat (including consideration of historic and on-going impacts) and importance for supporting other significant features (for example, as a drought refuge for native fauna). These concepts have been expressed as more specific criteria in a number of processes at State and National levels. The Regional Forest Agreement (RFA) process undertaken in partnership by Commonwealth and State agencies used National Forest Reserve Criteria which included a number of biodiversity criteria for establishing a Comprehensive Adequate and Representative reserve system (outlined in JANIS 1997). Many of these criteria have been used as the basis for assessing conservation status of vegetation types in the Net Gain approach. However, there are inherent differences between the processes - RFAs focus primarily on establishing a reserve system for forests in largely natural landscapes across public land, while NVPs focus primarily on prioritising protection of all types of remnant vegetation in rural landscapes across private land. These differences necessitate a refinement of the criteria. The key refinements are as follows:

- depletion and rarity of occurrence assessments are made within a Victorian bioregional framework which is more informative than the RFA study area framework;
- combinations of depletion-degradation-rarity which give equivalent conservation status to depletion-only thresholds are more explicitly defined;
- a “depleted” category is added to allow identification of vegetation types which may become threatened if broad-scale depletion or degradation activities are not managed appropriately;

The criteria are detailed in Table 4 and have been used to assign a conservation status for each combination of EVC and bioregion. The status of each combination may be amended with time as more complete or better scale mapping of vegetation type and condition becomes available. Where an EVC is only a minor occurrence in a bioregion it is assigned the conservation status from an appropriate neighbouring bioregion, unless the occurrence is considered to represent a threatened floristic community.

Complexes/mosaics are assigned the conservation status of the most threatened component EVC. Similarly, where threatened EVCs/floristic communities are known to exist but mapping is not available at this level of discrimination, decision-making processes based on more generalised datasets (for example, Broad Vegetation Types at 1:250 000) should be driven by the conservation status of the most threatened component likely to be present in a mapped polygon.

Bioregional Conservation Status of Ecological Vegetation Classes

STATUS		CRITERIA
Presumed Extinct	X	Probably no longer present in the bioregion (the accuracy of this presumption is limited by the use of remotely-sensed 1:100 000 scale woody vegetation cover mapping to determine depletion - grassland, open woodland and wetland types are particularly affected)
Endangered	E1	Contracted to less than 10% of former range; or Less than 10% pre-European extent remains;
	E2	Combination of depletion, degradation, current threats and rarity is comparable overall to E1: • 10 to 30% pre-European extent remains and severely degraded over a majority of this area; or • naturally restricted EVC reduced to 30% or less of former range and moderately degraded over a majority of this area; or • rare EVC cleared and/or moderately degraded over a majority of former area.
Vulnerable	V1	10 to 30% pre-European extent remains;
	V2	Combination of depletion, degradation, current threats and rarity is comparable overall to V1: • greater than 30% and up to 50% pre-European extent remains and moderately degraded over a majority of this area; or • greater than 50% pre-European extent remains and severely degraded over a majority of this area; or • naturally restricted EVC where greater than 30% pre-European extent remains and moderately degraded over a majority of this area; or • rare EVC cleared and/or moderately degraded over a minority of former area.
Depleted	D1	Greater than 30% and up to 50% pre-European extent remains;
	D2	Combination of depletion, degradation and current threats is comparable overall to D1 and: • greater than 50% pre-European extent remains and moderately degraded over a majority of this area;
Rare	R	Rare EVC (as defined by geographic occurrence) but neither depleted, degraded nor currently threatened to an extent that would qualify as Endangered, Vulnerable or Depleted
Least Concern	LC	Greater than 50% pre-European extent remains and subject to little to no degradation over a majority of this area

Geographic Occurrence of Ecological Vegetation Classes within Bioregions

GEOGRAPHIC OCCURENCE		CRITERIA
Rare	R1	total range generally less than 10 000 ha; or
	R2	pre-European extent in Victorian bioregion less than 1000 ha; or
	R3	patch size generally less than 100 ha
Naturally Restricted	NR	pre-European extent in Victorian bioregion less than 10 000 ha.
Common	C	pre-European extent in Victorian bioregion greater than 10 000 ha.
Minor	M	pre-European extent in Victorian bioregion less than approximately 1% of Statewide extent

EXPLANATION OF TERMS	
subject to a threatening process	includes currently acting threats that will lead to degradation (moderate or severe) OR risk of significant rapid change (e.g. rising groundwater; change of land use)
majority	greater than 50% of area
minority	greater than 10% and up to 50% of area
severely degraded	floristic and/or structural diversity is greatly reduced (and/or subject to a threatening process which will lead to an equivalent reduction) and unlikely to recover naturally in medium to long-term
moderately degraded	floristic and/or structural diversity is significantly reduced (and/or subject to a threatening process which will lead to an equivalent reduction) but may recover naturally with removal of threatening processes
little to no degradation	floristic and/or structural diversity is largely intact
range	area of smallest concave polygon which includes all occurrences

Appendix 6 - Determining Conservation Significance

DETERMINING CONSERVATION SIGNIFICANCE

DETERMINING CONSERVATION SIGNIFICANCE

CONSERVATION SIGNIFICANCE	BIODIVERSITY ATTRIBUTES		OR OTHER ATTRIBUTES
	VEGETATION TYPES	SPECIES	
	Conservation Status ¹	Habitat Score ²	
VERY HIGH	Endangered Vulnerable Rare	0.4 - 1 0.5 - 1 0.6 - 1	• sites with unique National Estate values • sites identified as being of national significance as a relic, endemic, edge of range or other non-species values • Ramsar Sites • East Asian-Australasian Shorebird Site Network sites • Other wetlands of international significance for migratory waterbirds • areas identified as providing refuges (e.g. during drought) for threatened species
HIGH	Endangered Vulnerable Rare Depleted	• the remaining 50% of habitat for threatened species² in a Victorian bioregion • best 50% of habitat for rare species² in a Victorian bioregion	• sites with rare National Estate values • sites identified as being of state significance for relic, endemic, edge of range or other non-species values • Wetlands listed in 'A Directory of Important Wetlands in Australia' • Wetlands of national significance for migratory waterbirds • areas identified as providing refuges (e.g. during drought) for rare species • priority areas for the re-establishment of habitat for a threatened species (eg. as determined in a Biodiversity Action Plan)
MEDIUM	Vulnerable Rare Depleted Least Concern	• the remaining 50% of habitat for rare species² in a Victorian bioregion • best 50% of habitat for regionally significant species²	• sites with uncommon National Estate values • sites identified as being of regional significance for edge of range or other non-species values • Wetlands of bioregional significance (based on application of National Land and Water Resources Audit criteria).
LOW	Depleted Least Concern	• the remaining 50% of habitat for rare species² in a Victorian bioregion • best 50% of habitat for regionally significant species²	

1. see Appendix 2

2. conservation status of species determined with reference to NRE Victorian Rare or Threatened Flora and Fauna lists, as supplemented by the relevant Native Vegetation Plan. The relative quality and suitability of habitat for threatened species depends on particular requirements and therefore must be estimated on a species-by-species and location-by-location basis by the relevant planning authority using the best available information.

Appendix 7 – Summary of Responses and Offset Criteria

SUMMARY OF RESPONSES AND OFFSET CRITERIA GRADED ACCORDING TO CONSERVATION SIGNIFICANCE

CONSERVATION SIGNIFICANCE	VERY HIGH	HIGH	MEDIUM	LOW
Response to proposal to clear & offset	In keeping with the principles in Section 4 and in the context of the Net Gain approach which has, as a priority, the avoidance of further permanent losses of native vegetation through clearing (page 19):			
	Clearing not permitted unless exceptional circumstances apply (i.e. impacts are an unavoidable part of a development project, with approval of the Minister for Environment and Conservation (or delegate) based on considerations of environmental, social and economic values from a statewide perspective)	clearing generally not permitted	clearing generally not permitted	clearing may be permitted but only as part of an appropriate sustainable use response as determined by the responsible planning authority
If some clearing is to be permitted, the following offset requirements must be met				
Net outcome	substantial net gain i.e. at least 2 X the calculated loss in habitat hectares ¹	net gain i.e. at least 1.5 X the calculated loss in habitat hectares ¹	equivalent gain i.e. at least 1 X the calculated loss in habitat hectares ^{1, 2}	equivalent gain i.e. at least 1 X the calculated loss in habitat hectares ^{1, 2}
Formal agreement to achieve and secure offset	Requirements to achieve offsets must be identified in the associated management agreements &/or the permit conditions. Gains must be of an on-going and secure nature. Once achieved the offset must be maintained and the relevant planning authorities must maintain adequate and readily accessible records of agreed offset arrangements (ultimately on the Native Vegetation Permit Tracking system)			
Like-for-Like				
vegetation or habitat type of offset	the same vegetation/habitat type	the same vegetation/habitat type OR a Very High significance vegetation/habitat in the same Bioregion	Any EVC in the Bioregion OR a Very High or High significance vegetation/habitat in an adjacent Bioregion	
landscape role	Similar or more effective ecological function AND land protection function as impacted by the loss	Similar or more effective ecological function OR land protection function as impacted by the loss	Similar or more effective land protection function as impacted by the loss	
quality objectives for offset	The existing vegetation proposed as the basis of an offset must be at least			
	90% of the quality in the area being lost.	75% of the quality in the area being lost	50% of the quality in the area being lost	
	The proportion of revegetation included in the offset (in habitat hectares) is limited to			
	10%	25%	50%	100%

¹ Gains can include active improvements of quality and/or avoiding potential losses of quality by agreement to forego permitted uses. Note that applying all of the following offset criteria (where relevant) may require more than the minimum habitat hectares specified by these multipliers

² Where gains are achieved in vegetation/habitat of a higher significance than the vegetation lost, then the amount of the offset will be proportionally reduced (eg. offsetting losses in medium conservation significance with very high conservation significance gains will reduce the amount of the offsets required by half, i.e. the medium multiplier divided by the very high multiplier)

LARGE OLD TREE OBJECTIVE

For parcels of land greater than 4 ha with less than 8 scattered old trees/ha; or for parcels of land less than 4 ha with any number of scattered old trees/ha.

CONSERVATION SIGNIFICANCE	BENCHMARK	VERY HIGH	HIGH	MEDIUM	LOW
Protect and Recruit Option Land > 4ha + < 8 scattered/ha or Land < 4ha + any number of scattered old trees ¹					
VLT offset	≥ 1.5 benchmark	6 + 30	4 + 20	2 + 10	1 + 5
LT offset	≥ 1 benchmark	4 + 20	2 + 10	1 + 5	0 + 10 ²
MT offset	≥ 0.75 benchmark	2 + 10	1 + 5	1 + 5	0 + 5 ²
Recruit² Only Option Land > 4 ha + < 8 scattered/ha or Land < 4 ha + any number of scattered old trees ¹					
VLT offset	≥ 1.5 benchmark	400	200	100	50
LT offset	≥ 1 benchmark	200	100	50	10
MT offset	≥ 0.75 benchmark	100	50	10	5
Vicinity		Gains must be in the same bioregion and within the same priority landscape ³ zone as the loss where considered appropriate by the planning authority.	Gains must be within the same bioregion as the loss.	Gains must be in the same bioregion as the loss OR an adjacent bioregion if the offsets are in the Very High or High conservation significance vegetation.	
Timing		Offsets to be initiated prior to the loss	Offsets to be initiated as soon as possible after loss occurs but no more than 1 year (seasonal requirements to be considered)		

¹- old trees, Very Large, Large or Medium (VLT, LT AND MT), are defined as key long lived dominant tree species (as defined in the relevant EVC benchmark) greater than diameters relative to the benchmarks, at 1.3m above ground level.

²- on a case by case basis at the discretion of the planning authority, the requirement to recruit new trees may be either through plantings (trees or more diverse revegetation) to a prescribed standard (eg. species composition, density, survival) and/or through regeneration associated with protection of other old trees. Recruitment should meet the timing criterion specified in the *Victoria's Native Framework* (Table 6) NRE 2002. Any plantings that have been undertaken by the landholder since 1989 and that meet all the relevant offset criteria can be used to meet this requirement. Recruit means to regenerate or plant additional native vegetation. Protect means to conserve existing native vegetation, usually by removing threatening processes.

³- Identified in local landscape-scale biodiversity action plans

Note: where offsets for trees less than 0.75 the Large Tree Benchmark (LTB) are considered appropriate, these should be no more than the equivalent medium tree offset

Appendix 8 - Timber Harvesting Offset Criteria

CONSERVATION SIGNIFICANCE	VERY HIGH	HIGH	MEDIUM	LOW
Response to proposal	Harvesting generally not permitted ¹		Harvest and regeneration may be permitted as part of sustainable use option	
Net outcome of offset			Regeneration undertaken according to the following criteria will be considered to have achieved sufficient offset	
Vegetation or Habitat Type of offset			same as harvested	
Landscape role			same as harvested	
Quality objectives for offset			For clearfell harvest & regeneration Regeneration to be managed so that it has the best opportunity to reach a target of 50% of the vegetation that was harvested within 10 years and ultimately the same quality (minus large tree component) as required by permit condition. Where large old trees are included in the harvest area, mitigation will be determined on a case-by-case basis ensuring sufficient seed and habitat trees for regeneration of the forest values. Where private land forest is not substantially contiguous with the public forest estate, a higher level of mitigation will be required. For selective harvesting The reduction in quality in a site due to selective harvesting must not be greater than the % specified in the Regional Native Vegetation Plans.	
Vicinity			same as harvested	
Timing			Regeneration to be initiated as soon as possible after harvesting but no more than one year (seasonal requirements to be considered by planning authority)	
Security of offset			Planning permit conditions to apply until the regeneration achieves the equivalent quality of the vegetation that was harvested (excluding the large old tree component)	

¹ unless harvesting is currently allowed on public land within the same bioregion for areas of vegetation which have equivalent conservation values.

Appendix 9 – Bioregional Conservation Status of Ecological Vegetation Classes

Wimmera -
Robinvale Plains -
Murray Fans -
Lowan Mallee -
Murray Scroll Belt -
Murray Mallee -

Wimmera

Map Unit No.	Map Unit Name	Conservation Status	Map Unit Type	Pre1750 Area (a)	Conservation Reserve (C)	State Forest SPZ (S)	Other Public land (O)	Private (P)	Unknown (U)	Total Extant Area (b)	Extant/Pre 1750 (b/a)	Conservation Reserve/Extant (C+S)/b	Depletion a-b
				ha	ha	ha	ha	ha	ha	ha	%	%	ha
66	Low Rises Woodland	E	EVC	4,219	13	0	2	248	0	263	6%	5%	3,956
96	Ridged Plains Mallee	E	EVC	16,425	132	0	13	1,146	0	1,291	8%	10%	15,134
103	Riverine Chenopod Woodland	E	EVC	306	0	0	0	8	0	8	3%	0%	299
132	Plains Grassland	E	EVC	2,342	0	0	0	95	0	95	4%	0%	2,247
803	Plains Woodland	E	EVC	8,196	6	0	0	513	0	519	6%	1%	7,678
826	Plains Savannah	E	EVC	46,510	290	0	51	3,641	16	3,998	9%	7%	42,513
93	Sandstone Ridge Shrubland	V	EVC	5	0	0	3	0	0	3	59%	0%	2
97	Semi-arid Woodland	V	EVC	13	0	0	0	1	0	1	8%	0%	12
291	Cane Grass Wetland	V	EVC	242	0	0	2	25	0	27	11%	0%	215
823	Lignum Swampy Woodland	V	EVC	1,699	5	0	0	136	0	141	8%	4%	1,558
824	Woorinen Mallee	V	EVC	968	1	0	8	109	1	119	12%	1%	849
102	Low Chenopod Shrubland	D	EVC	5	0	0	0	0	0	0	4%	0%	5
88	Heathy Mallee	LC	EVC	3	1	0	0	0	0	1	52%	100%	1
89	Dunefield Heathland	LC	EVC	1	0	0	0	0	0	0	3%	100%	1
95	Red Swale Mallee	LC	EVC	9	1	0	1	0	0	1	14%	56%	8
969	Exotic Non-native vegetation *	na	no nat TC	0	1	0	0	59	1	61	na	2%	-61
990	Non Vegetation *	na	no veg	0	105	0	90	74,214	7	74,416	na	0%	-74,416
TOTALS				80,943	449	0	79	5,921	16	6,466	8%	7%	74,477
Note:	* Not included in totals												

Robinvale Plain

Map Unit No.	Map Unit Name	Conservation Status	Map Unit Type	Pre1750 Area (a)	Conservation Reserve (C)	State Forest SPZ (S)	Other Public land (O)	Private (P)	Unknown (U)	Total Extant Area (b)	Extant/Pre 1750 (b/a)	Conservation Reserve/Extant (C+S)/b	Depletion a-b
				ha	ha	ha	ha	ha	ha	ha	%	%	ha
96	Ridged Plains Mallee	E	EVC	0	0	0	0	0	0	0	100%	100%	0
132	Plains Grassland	E	EVC	5	1	0	0	0	0	1	19%	86%	4
803	Plains Woodland	E	EVC	2	0	0	2	0	0	2	88%	0%	0
809	Floodplain Grassy Wetland	E	EVC	17	0	0	17	0	0	17	100%	0%	0
97	Semi-arid Woodland	V	EVC	7,345	6,363	0	98	186	1	6,648	91%	96%	697
98	Semi-arid Chenopod Woodland	V	EVC	1,638	177	0	200	215	5	596	36%	30%	1042
104	Lignum Swamp	V	EVC	1,744	204	2	387	952	0	1,544	89%	13%	200
158	Chenopod Mallee	V	EVC	1,261	176	0	15	215	0	406	32%	43%	855
200	Shallow Freshwater Marsh	V	generic wetland	443	265	0	172	6	0	443	100%	60%	0
806	Alluvial Plains Semi-arid Grassland	V	EVC	79	54	0	18	2	0	74	93%	74%	6
819	Spike-sedge Wetland	V	EVC	99	86	0	13	0	0	99	100%	87%	0
824	Woorinen Mallee	V	EVC	788	646	0	2	18	0	666	85%	97%	122
828	Semi-arid Parilla Woodland	V	EVC	516	38	0	56	63	0	158	31%	24%	359
86	Woorinen Sands Mallee	D	EVC	2,308	2,167	0	6	17	0	2,189	95%	99%	119
102	Low Chenopod Shrubland	D	EVC	67	45	0	6	11	0	62	92%	74%	5
103	Riverine Chenopod Woodland	D	EVC	16,141	9,644	0	1,732	2,238	5	13,619	84%	71%	2522
106	Grassy Riverine Forest	D	EVC	1,894	1,641	0	148	86	17	1,892	100%	87%	3
107	Lake Bed Herbland	D	EVC	1,700	1,621	0	73	4	0	1,698	100%	95%	1
295	Riverine Grassy Woodland	D	EVC	4,347	3,661	0	459	105	0	4,224	97%	87%	123
810	Floodway Pond Herbland	D	EVC	488	273	0	185	29	0	487	100%	56%	1
811	Grassy Riverine Forest/Floodway Pond Herbland Complex	D	complex	727	541	0	183	1	0	726	100%	75%	1
813	Intermittent Swampy Woodland	D	EVC	5,149	4,100	0	697	290	4	5,091	99%	81%	58
816	Sedgy Riverine Forest	D	EVC	5	5	0	0	0	0	5	100%	100%	0
820	Sub-saline Depression Shrubland	D	EVC	84	84	0	0	0	0	84	100%	100%	0
821	Tall Marsh	D	EVC	99	64	0	18	13	0	96	96%	67%	4
823	Lignum Swampy Woodland	D	EVC	7,754	2,430	1	1,970	2,431	8	6,840	88%	36%	915
91	Loamy Sands Mallee	LC	EVC	1,261	1,235	0	0	4	0	1,239	98%	100%	22
808	Lignum Shrubland	LC	EVC	4,717	1,274	0	1,762	1,162	0	4,199	89%	30%	519
818	Shrubby Riverine Woodland	LC	EVC	2,642	1,553	0	1,045	37	2	2,637	100%	59%	5
969	Exotic Non-native vegetation *	na	no nat TC	0	1	0	2	17	0	19	na	5%	-19
990	Non Vegetation *	na	no veg	0	206	0	269	7,069	19	7,562	na	3%	-7562
992	Water Body - Fresh *	na	no veg	93	10	0	36	47	0	92	na	11%	0
993	Bare Rock/Ground *	na	no veg	426	308	0	104	7	8	425	na	72%	1
996	Not assessed to date *	na	unknown	237	180	0	50	6	3	239	na	75%	-2
TOTALS				63,323	38,349	3	9,262	8,086	42	55,741	88%	69%	7,582
Note:	* Not included in totals												

Murray Fans

Map Unit No.	Map Unit Name	Conservation Status	Map Unit Type	Pre1750 Area (a)	Conservation Reserve (C)	State Forest SPZ (S)	Other Public land (O)	Private (P)	Unknown (U)	Total Extant Area (b)	Extant/Pre 1750 (b/a)	Conservation Reserve/Extant (C+S)/b	Depletion a-b
				ha	ha	ha	ha	ha	ha	ha	%	%	ha
66	Low Rises Woodland	E	EVC	7	0	0	2	1	0	3	39%	0%	4
96	Ridged Plains Mallee	E	EVC	103	7	0	8	13	0	28	27%	24%	76
98	Semi-arid Chenopod Woodland	E	EVC	517	2	0	4	100	0	106	20%	2%	411
103	Riverine Chenopod Woodland	E	EVC	6,649	399	2	482	2,312	18	3,213	48%	12%	3,435
803	Plains Woodland	E	EVC	2	0	0	0	1	0	1	46%	36%	1
809	Floodplain Grassy Wetland	E	EVC	51	8	0	39	4	0	51	100%	15%	0
826	Plains Savannah	E	EVC	2	0	0	0	1	0	1	41%	3%	1
829	Chenopod Grassland	E	EVC	0	0	0	0	0	0	0	38%	0%	0
97	Semi-arid Woodland	V	EVC	906	13	0	9	121	0	142	16%	9%	764
104	Lignum Swamp	V	EVC	298	30	0	33	181	0	245	82%	12%	53
158	Chenopod Mallee	V	EVC	865	3	0	0	140	1	144	17%	2%	721
200	Shallow Freshwater Marsh	V	generic wetland	106	1	0	105	0	0	106	100%	1%	0
295	Riverine Grassy Woodland	V	EVC	310	91	2	135	22	0	251	81%	37%	60
808	Lignum Shrubland	V	EVC	999	158	0	224	171	0	552	55%	29%	447
819	Spike-sedge Wetland	V	EVC	94	50	0	28	4	0	82	87%	61%	12
823	Lignum Swampy Woodland	V	EVC	7,080	695	0	469	2,253	2	3,419	48%	20%	3,661
824	Woorinen Mallee	V	EVC	99	0	0	1	16	0	17	17%	0%	82
86	Woorinen Sands Mallee	D	EVC	74	2	0	0	26	0	28	38%	7%	46
102	Low Chenopod Shrubland	D	EVC	1	0	0	0	0	0	0	40%	23%	1
106	Grassy Riverine Forest	D	EVC	589	326	1	208	44	0	579	98%	56%	10
810	Floodway Pond Herbland	D	EVC	182	57	0	95	22	4	178	98%	32%	4
811	Grassy Riverine Forest/Floodway Pond Herbland Complex	D	complex	138	76	1	45	10	0	132	96%	58%	6
812	Grassy Riverine Forest/Riverine Swamp Forest Complex	D	complex	236	0	70	166	0	0	236	100%	30%	0
813	Intermittent Swampy Woodland	D	EVC	251	84	0	130	28	4	246	98%	34%	4
814	Riverine Swamp Forest	D	EVC	520	235	11	160	53	0	458	88%	54%	62
816	Sedgy Riverine Forest	D	EVC	580	240	12	107	83	0	442	76%	57%	138
817	Sedgy Riverine Forest/Riverine Swamp Forest Complex	D	complex	135	25	31	79	0	0	135	100%	41%	0
91	Loamy Sands Mallee	LC	EVC	13	0	0	0	7	0	8	58%	1%	6
101	Samphire Shrubland	LC	EVC	246	0	0	218	12	0	230	94%	0%	16
818	Shrubby Riverine Woodland	LC	EVC	715	202	3	463	40	0	709	99%	29%	6
821	Tall Marsh	LC	EVC	20	18	0	0	0	0	18	86%	100%	3
969	Exotic Non-native vegetation	na	no nat TC	0	1	0	0	13	2	16	na	3%	-16
990	Non Vegetation	na	no veg	0	237	0	326	9,456	4	10,023	na	2%	-10,023
992	Water Body - Fresh	na	no veg	266	76	0	160	22	0	258	na	29%	8
993	Bare Rock/Ground	na	no veg	189	125	0	31	16	16	188	na	67%	0
996	Not assessed to date	na	unknown	62	62	0	0	0	0	62	na	100%	0
TOTALS				21,789	2,721	134	3,211	5,664	30	11,759	54%	24%	10,031
Note:	* Not included in totals												

Lowan Mallee

Map Unit No.	Map Unit Name	Conservation Status	Map Unit Type	Pre1750 Area (a)	Conservation Reserve (C)	State Forest SPZ (S)	Other Public land (O)	Private (P)	Unknown (U)	Total Extant Area (b)	Extant/Pre 1750 (b/a)	Conservation Reserve/Extant (C+S/b)	Depletion a-b
				ha	ha	ha	ha	ha	ha	ha	%	%	ha
66	Low Rises Woodland	E	EVC	43	1	0	1	0	0	2	6%	42%	41
96	Ridged Plains Mallee	E	EVC	892	499	0	17	37	0	554	62%	90%	338
132	Plains Grassland	E	EVC	41	36	0	5	0	0	41	100%	87%	0
803	Plains Woodland	E	EVC	114	6	0	0	1	0	7	7%	85%	106
826	Plains Savannah	E	EVC	147	56	0	1	7	0	64	43%	88%	83
981	Parilla Mallee	E	EVC	2,424	460	0	133	239	7	839	35%	55%	1,585
98	Semi-arid Chenopod Woodland	V	EVC	24	12	0	0	0	0	12	51%	100%	12
741	Salt Paperbark Woodland/ Samphire Shrubland Mosaic	V	mosaic	485	479	0	0	6	0	485	100%	99%	0
822	Intermittent Swampy Woodland/ Riverine Grassy Woodland Complex	V	complex	712	709	0	2	0	0	711	100%	100%	1
97	Semi-arid Woodland	D	EVC	23,718	19,239	0	1,170	394	0	20,803	88%	92%	2,915
103	Riverine Chenopod Woodland	D	EVC	4,249	3,161	0	55	90	0	3,306	78%	96%	944
107	Lake Bed Herbland	D	EVC	7	7	0	0	0	0	7	100%	100%	0
295	Riverine Grassy Woodland	D	EVC	12	12	0	0	0	0	12	100%	100%	0
829	Chenopod Grassland	D	EVC	4,594	4,366	0	38	2	0	4,405	96%	99%	189
882	Shallow Sands Woodland	D	EVC	1,524	1,358	0	129	3	0	1,490	98%	91%	34
86	Woorinen Sands Mallee	LC	EVC	79,124	62,467	0	4,599	1,536	0	68,601	87%	91%	10,523
87	Lowan Sands Mallee	LC	EVC	21,927	19,595	0	2,264	5	0	21,864	100%	90%	63
88	Heathy Mallee	LC	EVC	302,149	208,242	0	91,499	746	0	300,488	99%	69%	1,661
89	Dunefield Heathland	LC	EVC	138,357	109,912	0	28,229	33	2	138,176	100%	80%	180
90	Tea-tree Scrub	LC	EVC	3,187	3,153	0	10	8	0	3,171	100%	99%	16
91	Loamy Sands Mallee	LC	EVC	312,914	245,462	0	26,195	7,908	9	279,574	89%	88%	33,340
93	Sandstone Ridge Shrubland	LC	EVC	76,336	54,648	0	17,819	1,151	7	73,626	96%	74%	2,710
95	Red Swale Mallee	LC	EVC	56,800	28,800	0	11,065	1,913	0	41,777	74%	69%	15,023
101	Samphire Shrubland	LC	EVC	98	42	0	36	7	0	85	87%	49%	13
158	Chenopod Mallee	LC	EVC	18,255	17,943	0	139	43	0	18,125	99%	99%	130
824	Woorinen Mallee	LC	EVC	29,051	19,690	0	2,607	629	0	22,926	79%	86%	6,126
969	Exotic Non-native vegetation *	na	no nat TC	0	5	0	0	0	0	5	na	99%	-5
990	Non Vegetation *	na	no veg	0	1,502	0	12,324	62,200	0	76,026	na	2%	-76,026
991	Water body - salt *	na	no veg	11	11	0	0	0	0	11	na	100%	0
996	Not assessed to date *	na	unknown	0	0	0	0	0	0	0	na	20%	0
TOTALS				1,077,185	800,357	0	186,012	14,758	25	1,001,153	93%	80%	76,032
Note:	* Not included in totals												

Murray Scroll Belt

Map Unit No.	Map Unit Name	Conservation Status	Map Unit Type	Pre1750 Area (a)	Conservation Reserve (C)	State Forest SPZ (S)	Other Public land (O)	Private (P)	Unknown (U)	Total Extant Area (b)	Extant/Pre 1750 (b/a)	Conservation Reserve/Extant (C+S)/b	Depletion a-b
				ha	ha	ha	ha	ha	ha	ha	%	%	ha
807	Disused Floodway Shrubby Herbland	E	EVC	23	13	0	10	0	0	23	100%	56%	0
809	Floodplain Grassy Wetland	E	EVC	21	8	0	9	4	0	21	100%	39%	0
97	Semi-arid Woodland	V	EVC	1,097	338	0	261	194	3	795	73%	42%	302
104	Lignum Swamp	V	EVC	1,107	609	0	331	142	0	1,082	98%	56%	25
107	Lake Bed Herbland	V	EVC	716	198	0	46	58	403	704	98%	28%	12
158	Chenopod Mallee	V	EVC	197	2	0	77	35	4	117	59%	2%	80
200	Shallow Freshwater Marsh	V	generic wetland	69	47	0	22	0	0	69	100%	69%	0
806	Alluvial Plains Semi-arid Grassland	V	EVC	3,431	1,714	0	1,323	383	11	3,429	100%	50%	2
819	Spike-sedge Wetland	V	EVC	56	8	0	34	13	0	56	100%	14%	0
820	Sub-saline Depression Shrubland	V	EVC	924	124	0	365	422	0	910	98%	14%	14
86	Woorinen Sands Mallee	D	EVC	15	0	0	1	1	0	2	16%	0%	12
98	Semi-arid Chenopod Woodland	D	EVC	22,685	1,975	0	5,391	8,475	37	15,879	70%	12%	6806
102	Low Chenopod Shrubland	D	EVC	40,656	6,074	0	5,306	26,568	92	38,040	94%	16%	2615
103	Riverine Chenopod Woodland	D	EVC	17,849	5,270	0	4,666	7,374	87	17,397	97%	30%	452
106	Grassy Riverine Forest	D	EVC	1,011	810	0	105	73	22	1,010	100%	80%	1
810	Floodway Pond Herbland	D	EVC	340	183	0	125	20	12	340	100%	54%	0
811	Grassy Riverine Forest/Floodway Pond Herbland Complex	D	complex	284	152	0	95	36	0	284	100%	54%	0
813	Intermittent Swampy Woodland	D	EVC	3,462	2,380	2	656	381	42	3,459	100%	69%	2
823	Lignum Swampy Woodland	D	EVC	5,066	1,467	0	2,087	1,371	92	5,017	99%	29%	49
808	Lignum Shrubland	LC	EVC	10,917	5,231	0	3,250	2,352	57	10,889	100%	48%	28
818	Shrubby Riverine Woodland	LC	EVC	4,567	2,610	1	1,430	454	68	4,564	100%	57%	3
969	Exotic Non-native vegetation *	na	no nat TC	0	2	0	1	24	0	27	na	6%	-27
990	Non Vegetation *	na	no veg	0	31	0	709	9,333	304	10,378	na	0%	-10378
992	Water Body - Fresh *	na	no veg	584	290	0	212	81	0	583	na	50%	0
993	Bare Rock/Ground *	na	no veg	521	349	0	74	36	62	521	na	67%	1
996	Not assessed to date *	na	unknown	221	209	0	4	5	3	221	na	95%	0
TOTALS				114,490	29,213	3	25,587	48,356	927	104,087	91%	28%	10,404

Murray Mallee

Map Unit No.	Map Unit Name	Conservation Status	Map Unit Type	Pre1750 Area (a)	Conservation Reserve (C)	State Forest SPZ (S)	Other Public land (O)	Private (P)	Unknown (U)	Total Extant Area (b)	Extant/Pre 1750 (b/a)	Conservation Reserve/Extant (C+S)/b	Depletion a-b
				ha	ha	ha	ha	ha	ha	ha	%	%	ha
66	Low Rises Woodland	E	EVC	22,805	43	0	5	1,102	3	1,153	5%	4%	21,652
96	Ridged Plains Mallee	E	EVC	325,822	1,003	0	752	19,603	49	21,408	7%	5%	304,414
132	Plains Grassland	E	EVC	2,208	13	0	27	150	0	191	9%	7%	2,017
803	Plains Woodland	E	EVC	7,550	61	0	29	367	1	458	6%	13%	7,092
809	Floodplain Grassy Wetland	E	EVC	1	1	0	0	0	0	1	100%	94%	0
826	Plains Savannah	E	EVC	68,361	108	0	230	3,879	14	4,231	6%	3%	64,130
829	Chenopod Grassland	E	EVC	1,803	330	0	91	89	12	521	29%	63%	1,281
882	Shallow Sands Woodland	E	EVC	71	0	0	1	11	0	12	16%	0%	60
981	Parilla Mallee	E	EVC	159,230	7,198	0	1,213	6,227	47	14,684	9%	49%	144,546
97	Semi-arid Woodland	V	EVC	352,041	53,697	0	16,588	20,753	317	91,355	26%	59%	260,686
98	Semi-arid Chenopod Woodland	V	EVC	44,767	5,747	0	2,298	2,937	71	11,053	25%	52%	33,714
104	Lignum Swamp	V	EVC	28	10	0	15	2	0	27	96%	39%	1
158	Chenopod Mallee	V	EVC	228,652	21,936	0	21,072	17,622	177	60,807	27%	36%	167,845
200	Shallow Freshwater Marsh	V	generic wetland	0	0	0	0	0	0	0	100%	100%	0
810	Floodway Pond Herbland	V	EVC	9	2	0	0	2	4	8	90%	30%	1
813	Intermittent Swampy Woodland	V	EVC	106	37	0	6	33	0	76	72%	48%	30
816	Sedgy Riverine Forest	V	EVC	23	5	0	0	5	0	10	42%	53%	14
823	Lignum Swampy Woodland	V	EVC	6,276	453	0	1,451	1,598	40	3,542	56%	13%	2,733
824	Woorinen Mallee	V	EVC	643,306	99,975	0	7,282	37,285	317	144,859	23%	69%	498,447
828	Semi-arid Parilla Woodland	V	EVC	23,086	3,816	0	543	1,336	19	5,714	25%	67%	17,372
86	Woorinen Sands Mallee	D	EVC	390,445	120,826	0	14,825	18,301	303	154,455	40%	78%	235,990
102	Low Chenopod Shrubland	D	EVC	8,080	3,493	0	1,148	438	1	5,079	63%	69%	3,001
103	Riverine Chenopod Woodland	D	EVC	39,432	1,331	0	658	4,318	46	6,352	16%	21%	33,080
106	Grassy Riverine Forest	D	EVC	3	2	0	0	1	0	3	86%	52%	0
107	Lake Bed Herbland	D	EVC	619	467	0	26	2	0	495	80%	94%	124
295	Riverine Grassy Woodland	D	EVC	32	17	0	4	11	0	31	98%	54%	1
811	Grassy Riverine Forest/Floodway Pond Herbland Complex	D	complex	6	5	0	1	0	0	6	100%	82%	0
88	Heathy Mallee	LC	EVC	775	51	0	105	58	0	214	28%	24%	562
89	Dunefield Heathland	LC	EVC	432	9	0	31	35	0	75	17%	11%	357
91	Loamy Sands Mallee	LC	EVC	156,920	89,551	0	5,479	3,525	105	98,659	63%	91%	58,261
93	Sandstone Ridge Shrubland	LC	EVC	13,162	9,317	0	1,344	240	40	10,940	83%	85%	2,222
95	Red Swale Mallee	LC	EVC	301	6	0	8	14	0	28	9%	21%	272
101	Samphire Shrubland	LC	EVC	46,711	14,268	0	16,250	6,979	45	37,542	80%	38%	9,169
717	Saline Lake Aggregate	LC	aggregate	16,877	12,322	0	4,395	16	106	16,840	100%	73%	37
808	Lignum Shrubland	LC	EVC	22	0	0	0	20	0	20	92%	0%	2
818	Shrubby Riverine Woodland	LC	EVC	25	15	0	0	1	5	21	83%	71%	4
821	Tall Marsh	LC	EVC	1	0	0	1	0	0	1	100%	0%	0
940	Samphire Shrubland/Saline Lake Mosaic	LC	mosaic	2,171	2,101	0	10	26	21	2,157	99%	97%	14
969	Exotic Non-native vegetation *	na	no nat TC	0	37	0	23	1,111	22	1,192	na	3%	-1,192
990	Non Vegetation *	na	no veg	0	5,831	0	19,556	1,837,400	5,161	1,867,948	na	0%	-1,867,948
991	Water body - salt *	na	no veg	3,137	1,374	0	1,280	472	0	3,127	na	44%	10
993	Bare Rock/Ground *	na	no veg	22	19	0	3	0	0	22	na	85%	0
996	Not assessed to date *	na	unknown	8	6	0	0	3	0	9	na	68%	0
TOTALS				2,562,157	448,215	0	95,886	147,184	1,742	693,027	27%	64.67%	1,869,130
Note	* Not included in totals												