

land resources biodiversity
water resources cultural heritage
waterways wetlands & floodplains
community capacity

Mallee Regional Catchment Strategy 2003 - 2008



Mallee Regional Catchment Strategy 2003 - 2008

Produced by the Mallee Catchment Management Authority

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A Steering Committee, involving key partners in the region, was set up by the Mallee CMA to oversee the Review and Renewal of the Mallee Regional Catchment Strategy. This Committee was chaired by Joan Burns, Chair of the Mallee CMA Board, and was responsible for providing high-level input into the project, and for ensuring that adequate community and stakeholder consultation occurred. The Committee was representative of local government, water authorities, partner agencies and the Mallee CMA. Final endorsement of the Strategy was the responsibility of the Mallee CMA Board.

The Mallee Regional Catchment Strategy has been prepared according to the National Criteria for the Accreditation of Natural Resource Management Plans, the Victorian Guidelines for the Review and Renewal of Regional Catchment Strategies, and the National Framework for NRM Standards and Targets.

The review and renewal of the Mallee Regional Catchment Strategy was undertaken by a consortium of specialist advisers led by Matthew Toulmin, Marsden Jacob Associates and Tim Cummins, Tim Cummins & Associates. The project manager was Jayne Sunbird, Jayne Sunbird Enterprises. The project was supported by the Chief Executive Officer, management team, and staff of the Mallee CMA with technical input from many partner agencies.

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Front Cover

Images represent the six goals of the Mallee Regional Catchment Strategy 2003 - 2008.

Preface



The Mallee Catchment Management Authority is proud to present the Mallee Regional Catchment Strategy as the principal planning tool and strategic focus for future natural resource management in the Mallee.

The Mallee region of Victoria is rich in natural resource assets, defined through this Strategy as biodiversity, waterways, floodplains and wetlands, water resources, land resources, cultural heritage, and community capacity. The communities of the Mallee have identified the priority issues for the region and the threats to the region's assets, and have also contributed to the development of the strategies, outcomes and targets for five years from 2003, as outlined in this Regional Catchment Strategy.

The Mallee Catchment Management Authority has consulted with and engaged key stakeholders, partner agencies and the wider community through an extensive consultative process to review the outcomes and successes of the previous Regional Catchment Strategy 1997, and to set the vision and goals for the future. 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 Regional Catchment Strategy provides an overarching strategic plan which enables all of the existing and developing Regional Action Plans to be implemented. It provides the basis for the outcomes and targets in the strategy to be translated into a coherent Investment Plan. The Investment Plan will detail the projects and actions to be implemented, and will be a detailed three-year rolling plan to be revised annually.

The Regional Catchment Strategy is supported 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 a Risk Assessment, a Research and Development Needs Analysis, a Communication Plan, and a Monitoring and Evaluation Framework. The base data is drawn from the Catchment Condition Report, while the extensive list of regional Action Plans provide the means to implement projects. These documents and their relationship are described herein.

The Mallee CMA acknowledges the input from the National Action Plan for Salinity and Water Quality, in funding the Review and Renewal of the Mallee Regional Catchment Strategy, and the valuable input of the Accreditation Coordinating Group in providing feedback through the extensive review process. 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 Regional Catchment Strategy in March 2003, and commended it to the relevant Commonwealth and State Ministers for accreditation. Accreditation was announced in July 2003 and confirmed in writing via letter dated 13 August 2003.

Joan Burns Board Chair

August 2003

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1 The Mallee Regional Catchment Strategy



6

Left - Right 1 The River Murray. 2 Dryland Farming.

1.1 Our Vision

The Mallee Regional Catchment Strategy is based upon a vision of:

"Informed Mallee communities protecting and improving our natural resources"

The Mallee is a richly varied and highly productive collection of human communities. It is also a valuable and diverse collection of ecological communities. The human communities rely on the continued health of the environment. Equally, the ecological communities depend on the strength and viability of the human communities to ensure effective natural resource management.

This Regional Catchment Strategy creates an opportunity, and a process, to promote the future success and health of these two communities. Their interdependence must be recognised if the region is to achieve ecologically sustainable development.

The Strategy is the principal planning tool and strategic focus for future natural resource management funding and action across the Mallee. It is the main framework

to integrate Federal and State-wide strategies with regional priorities and plans. It is also a process which brings together the key communities across the region.



Remnant Mallee vegetation.

1.2 Our Communities

The communities of the Mallee are at the centre of the future management of the region's natural resources. This is not a role solely for government agencies. The Mallee Regional Catchment Strategy must engage the energies and commitment of the full range of communities across the Mallee.

There is a long history of communities across the Mallee driving the development and introduction of major natural resource management plans, especially in salinity control on the River Murray. In order to continue that role fully, resources are needed, and the Mallee communities need to understand the issues and challenges where they can take the lead and make a difference.

Helping communities to develop and increase their ability to engage in the process of protecting and improving our natural resources is a priority for the Mallee Regional Catchment Strategy. Chapter 8 confirms the priority placed on this issue through its proposal for a Community Capacity Building Program.

1.3 Our Goals

The Mallee Regional Catchment Strategy sets a goal for each of six major assets across the Mallee. These remind us as a community of where we are going and what we want to achieve. They help us look beyond our immediate work programs and practical tasks to gain a sense of why we are engaged in the vision to protect and improve our natural resources.

- 1 **Biodiversity**
To maintain ecological processes and to protect and improve the extent and quality of biodiversity in the Mallee.
- 2 **Waterways**
To protect and improve waterway, wetland and floodplain health, taking account of the ecosystem and recreational services these provide to the people of the Mallee and other users down-stream.
- 3 **Water Resources**
To protect and improve the quality of water resources associated with people's entitlements to water, taking account of environmental constraints.
- 4 **Land Resources**
To protect and improve the capability of land resources in the Mallee to support ecological processes, primary production and built infrastructure.
- 5 **Cultural Heritage Sites**
To protect cultural heritage and significant landscape sites and to manage the risks to all sites.
- 6 **Community Capacity**
To promote self-reliant and informed communities able to identify, direct and implement change to protect and improve our natural resources.

1.4 Our Values

In realising this vision and goals, the Strategy is committed to the following values:

- Integrity in actions and behaviour;
- Community capacity building through communication, consultation, education and participation;
- Making sound decisions based on the best available and validated scientific information and economic and social evaluation;
- Promoting best practice and adaptive management - doing the right thing and learning from our actions;
- Recognising that our understanding will improve over time by ensuring that people who have acted in good faith in the past are not penalised; and
- Performance monitoring and continuous improvement in understanding and management.

1.5 The Mallee CMA

The Mallee Catchment Management Authority (Mallee CMA) is a government funded body whose primary role is to establish a framework and arrangements to ensure that natural resource management programs in the region reflect the expectations and priorities of the community and engage their commitment.¹

The Mallee CMA has a Board with members drawn from across the whole community. This ensures that the interests and concerns of different sectors are understood and reflected in the decisions of the Board. The Board is supported by two Implementation Committees that engage the skills, experience and commitment of members of the communities across the Mallee in developing and implementing natural resource management plans and projects.

In identifying priorities and programs, the Mallee CMA promotes an integrated catchment approach that seeks the development of research and solutions at a regional level across the three states that span the Mallee region of south-eastern Australia.

The Mallee CMA has the main responsibility for the preparation of this renewed Regional Catchment Strategy. It also takes the lead in prompting, co-ordinating and seeking funding for the programs and projects that will be promoted by the Regional Catchment Strategy, and monitors and reports on the success of those projects and programs. But the Mallee Regional Catchment Strategy belongs to the whole community, who have had a major role in the developing it, not just to the Mallee CMA.

¹ In this role, the Mallee CMA acts as a statutory body under the *Catchment and Land Protection Act 1994*. The Mallee CMA also plays a more direct role in the management of waterways and in advising on developments within floodplains, under the *Water Act 1989*.

2 The Victorian Mallee CMA Region

The area covered by the Victorian Mallee Catchment Management Authority (CMA) is a semi-arid region which is home to some 60,000 people. The largest centre is Mildura. Other significant centres include Robinvale, Ouyen, Hopetoun, Murrayville and Birchip. The area covered by Swan Hill Rural City Council is largely inside the Mallee CMA region, although the city of Swan Hill itself is outside the Mallee CMA boundary.

The region is noted for its agricultural production both from irrigated horticulture along the River Murray and from dryland production of wheat, barley and sheep. A series of major parks cover 1.2 million hectares, which is nearly forty per cent of the region's area.

The following map indicates the region covered by the Mallee CMA, the major centres of population, local government boundaries, Crown Land and Reserves (Figure 1, next page).

2.1 Population of the Mallee CMA Region

The census in 2001 recorded a total population for the Mallee CMA region of 61,095. The pattern of population varies greatly throughout the region, ranging from large areas where the population density is less than 0.2 people per square kilometre, across much of the dryland farming area and national parks, to parts of Mildura with a density over 2,000 people per square kilometre. The areas of highest population are located close to the towns of Mildura and Swan Hill, and the large percentage of the population is located along the River Murray.

The population falls into three broad categories (Table 1):

Table 1 Mallee CMA Population²

Area	Population
Rural	25,189
Urban - Mildura (built up area)	24,982
Urban other	10,924
Total	61,095

² The following data comes from a socio-economic database collated for the Mallee CMA from a number of sources, in particular the 2001 Census returns.

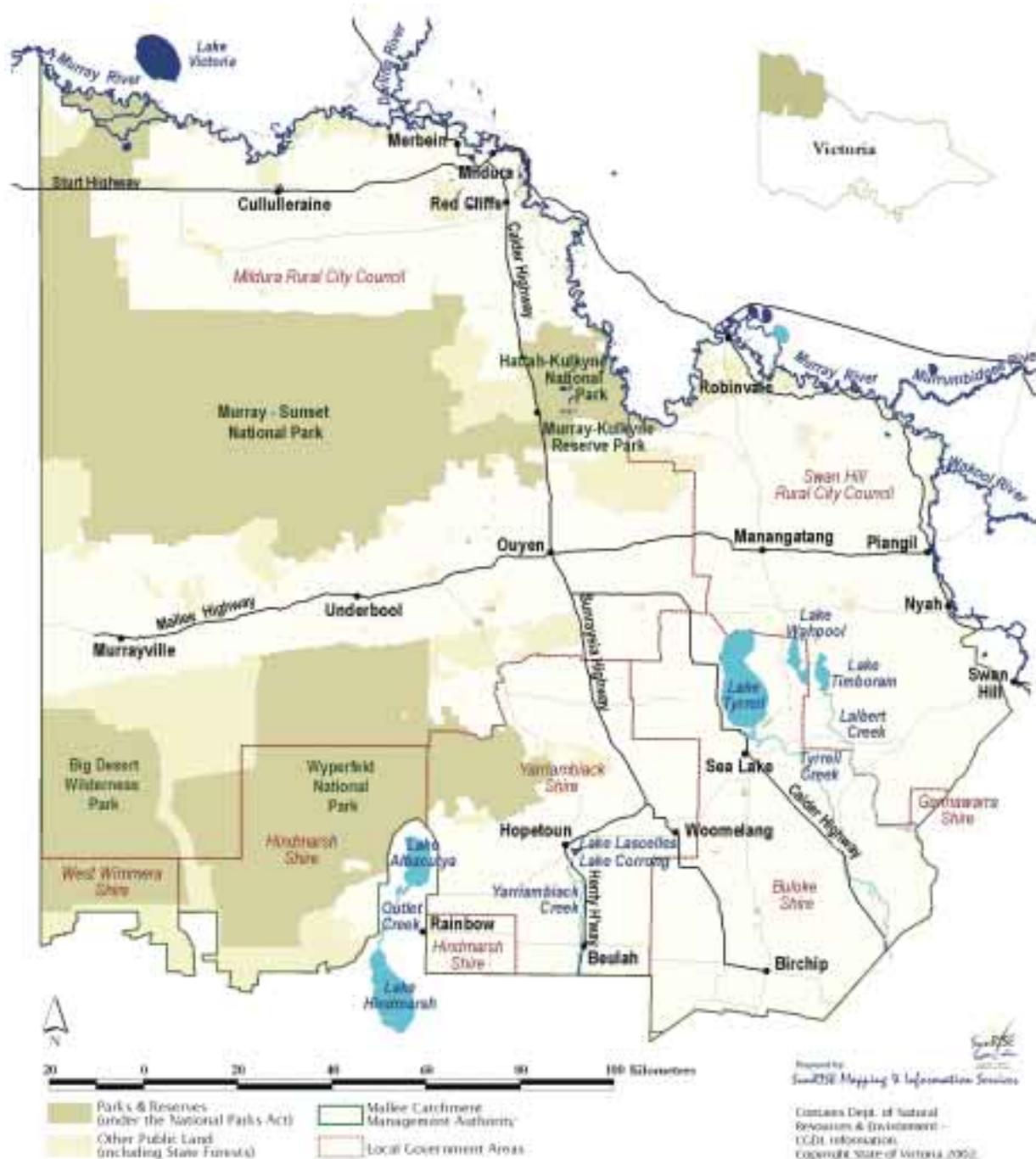


Figure 1 Map of Mallee CMA Region

Overall, the region's population grew by 0.3 per cent per year over the period from 1996 to 2001. However, this growth was very uneven across the region, with continuing growth in urban Mildura, matched by parallel losses in smaller communities. These growing regional locations have been dubbed 'sponge cities' and are particularly prevalent in the wheat and sheep belts across Australia.

So, while the population of urban Mildura increased by 1.8 per cent per year over the five years, and the position in Robinvale and the outer Swan Hill region was static, the population of all other parts of the region fell, by up to 2.0 per cent per year, over the same period. This disparity continues a longer-term trend evident since the 1980s and is projected to continue over the period to the year 2021, with continuing growth in Mildura and Swan Hill, but population decline in all other areas.

One of the drivers of this change is the increase in farm size in dryland areas and a move to greater capital investment, with a consequent reduction in labour. The average Mallee dryland farm increased in size from 1,000 hectares in 1990 to 1,500 hectares in 2000. This process has also seen families managing multiple properties in order to obtain the size of property that is economically viable. Equally, in the irrigation areas there is a steady increase in property size through amalgamation and increasing introduction of corporate management. This process may place at risk the effective social cohesion of some smaller country towns across the Mallee.

2.2 Ancestry of the Peoples of the Mallee CMA Region

The region has benefited from the contributions of peoples from a wide range of different ethnic backgrounds. In particular, the Mallee is the ancestral home for indigenous peoples of several different language groups (the next section provides more details).

At the latest census people were asked to record the ancestries they most closely identified with (see Figure 2). The largest grouping (28,998 people) is those who recorded themselves as from a North-West European background, who mainly come from the UK or Ireland. The next largest was those who reported themselves as of Australian ancestry (23,757 people), which includes both those with several generations in Australia and those from indigenous communities (1,830). Dryland farming appears to be almost entirely dominated by people from these two major categories.

English is the first language of more than 97 per cent of the population of the Mallee region and is normally the language of choice of other communities, such those from the Pacific Islands.

Minority ethnic groups in the horticultural sector were engaged in the consultative process for the drafting of this strategy, through representative groups such as trade associations and the water service committees of the regional water authority. In implementing the Mallee Regional Catchment Strategy account will be taken of the particular language needs of different groups with advice and support from the Sunraysia Ethnic Communities Council.

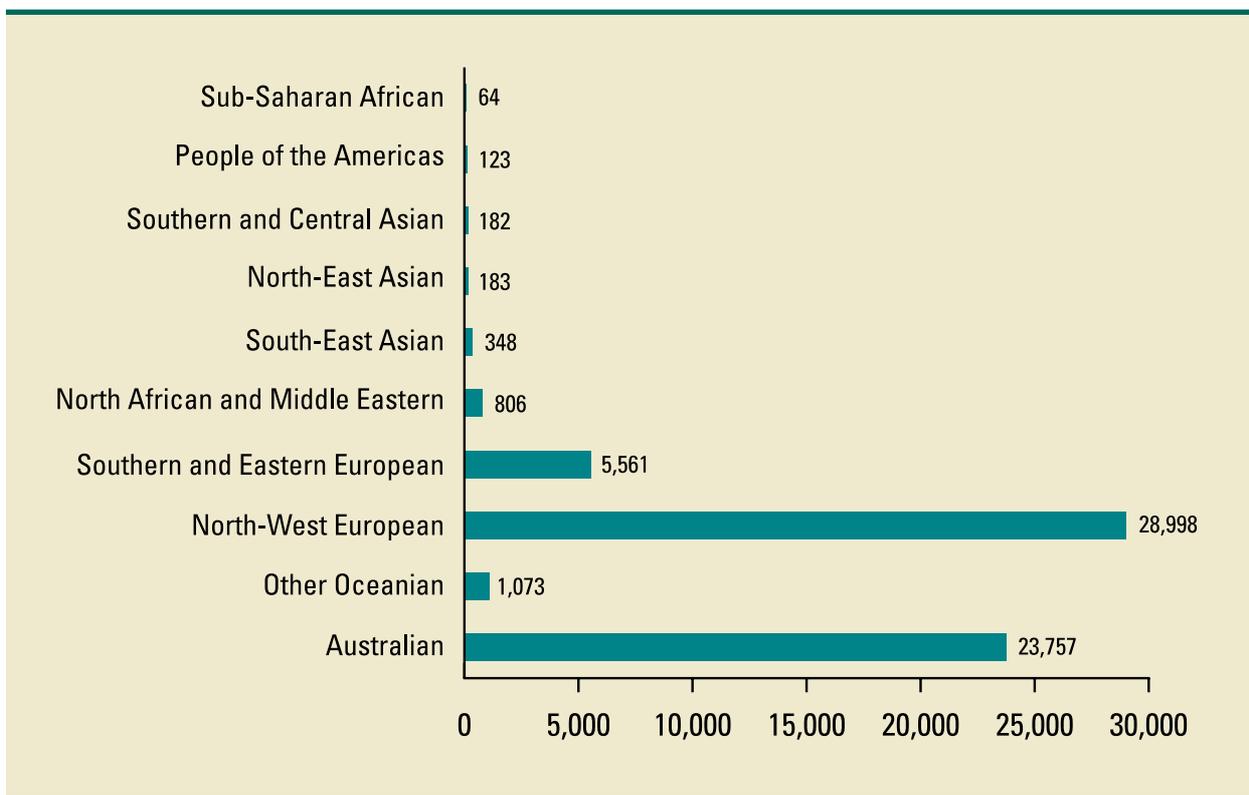


Figure 2 Ancestry of the Peoples of the Mallee CMA Region

The Mallee region is also significant for the percentage of the population from Southern and Eastern Europe, with nearly 10 per cent of the population recording this as their ancestry at the latest census (5,561 people). This includes Greeks and Italians, where there has been no significant migration for two generations, and Turkish immigrants who arrived mainly in the 1980s. More recent immigration has involved much smaller numbers from the Pacific islands, such as Tonga, and from South East Asia, in particular from Vietnam. Most of these other groups are concentrated in the horticultural sector in the Mildura and Robinvale districts.

2.3 Indigenous Peoples

The Mallee is the ancestral home for indigenous peoples with a long tradition of engagement with the land and the water of the Mallee. Across the region as a whole, approximately 3 per cent of the population is of indigenous origin, with several census districts recording figures greater than 10 per cent. This is considerably higher than the Victorian average of 0.5 per cent.

Aboriginal people of eight language groups have traditionally occupied the Victorian Mallee - the main ones being Latji Latji, Wergaia, Wadi Wadi, Wamba Wamba, Jari Jari and Dadi Dadi. The Latji Latji and Wadi Wadi and Wamba Wamba peoples

2.4 Productive Activity Across the Mallee

The census identified that 26,699 people were employed across the region in 2001. Figure 4 records the category of that employment. This confirms that agriculture is the dominant sector, covering nearly a quarter of all employed people. Much of the other employment, in say manufacturing, is in food processing which depends on farming. Health, education and government account for a further 18 per cent and retail trade for 14 per cent.

The census also records the businesses which were registered within the Mallee region. Individual farms represented some 4,701 (or 42 per cent) of the total of 10,956 business entities reported. However, these figures do not record those businesses which operate within the Mallee region but whose Head Office is located elsewhere.



Figure 4 Employment Across the Mallee



Left - Right 1 Wheat harvest. 2 Viticulture in the Mallee region.

Of the total area of the Victorian Mallee (3,925,584 ha), 62 per cent is private land. Individual landholders, therefore, carry the primary responsibility for the success of many of the targets and objectives of the Mallee Regional Catchment Strategy.

The large majority of farms are small business enterprise with multiple demands on their discretionary expenditure that may include landscape and habitat protection, as well as a host of production, managerial and family-related decisions. Any natural resource management initiatives which rely on the engagement of landholders needs to be realistic as to the drivers and constraints of that engagement.

In any given year, the private land supports some 1 million hectares of crops (90 per cent cereals and 10 per cent legumes and oilseeds). The cropped area produces 80 per cent of dryland farm income. Although irrigated horticulture occupies less than one per cent of the total Mallee area, it contributes up to 40 per cent of the Gross Value of Agricultural Production of the region.

The Mallee region produces up to 50 per cent of Victoria's cereals (covering both wheat and barley), close to 100 per cent of Victoria's dried vine fruits, 30 per cent of Australia's wine grapes, 70 per cent of Victoria's table grapes and significant proportions of the nation's citrus, avocados, olives, and vegetable crops. These supply both the domestic and export markets.

Unemployment is generally lower than the state average with a significant variation across the region. As expected, unemployment tends to be recorded at a higher level in urban areas (Table 2). For comparative purposes unemployment across Victoria, in 2001, was an average of 6 per cent, with the metropolitan rate marginally higher at 6.2 per cent.

Table 2 Unemployment Rate Across the Region

Local Government Area	%
Mildura Urban	8.6
Robinvale	7.9
Swan Hill other	5.9
Swan Hill Central	4.6
Gannawarra	4.0
Hindmarsh	3.3
Buloke	3.3
Mildura Rural	3.1
West Wimmera	2.6
Yarriambiack	2.0

2.5 State Parks and Public Land

Public land represents some 38 per cent of the total area covered by the Mallee CMA. The need to conserve and maintain the plants and animals of the Mallee was recognised as early as 1909 when land was set aside for the creation of the Wyperfeld National Park. Thirty six per cent of the public land across Victoria managed by Parks Victoria is located in the Mallee.

A series of major parks cover approximately 1.2 million hectares, including Murray-Sunset National Park, Big Desert Wilderness, Wyperfeld National Park, Hattah-Kulkyne National Park and Murray-Kulkyne Park (Figure 1). There are 500 small public land reserves covering 143,000 hectares, scattered through the agricultural area. A further 490,000 hectares of other public land in the Mallee are primarily reserved for recreation and conservation but also support various other uses including grazing, timber, stone and gravel extraction, salt and gypsum mining, and apiculture.

All public land is mapped and discussed in the Land Conservation Council's Final Recommendations Mallee Review, 1989. That report recommends specific land management arrangements for each parcel of public land and also nominates a specific (state or local) government agency as responsible for that management.

There has been a policy of no clearing of public land for agriculture since 1973. Nonetheless, vegetated public land continued to be converted to freehold title and then cleared for agriculture up until 1985. Since then, there has been no further transfer of vegetated public land into private ownership. Native vegetation retention controls were extended to private land in 1989.

Approximately three per cent of freehold land in the Mallee is covered by native vegetation. The road and rail reserves dissecting this land also act as important corridors of remnant vegetation in an otherwise cleared agricultural landscape. Vegetation in these corridors accounts for perhaps a further two per cent of the land surface of the Mallee.

The semi-arid nature of the region is evident from the high levels of evaporation (seven times the average rainfall), the highly variable rainfall and irregular significant events such as frost, bush fires and dust storms. All of these have shaped the landscape and both the human and environmental communities of the Mallee.



Mallee Wildflower (*Senecio Sp.*)

3 Scope and Context of the Regional Catchment Strategy

3.1 Scope

This renewed Regional Catchment Strategy has been kept brief and simple deliberately, to ensure that it is accessible to a wide audience and that it will become a working document for regular use rather than a reference volume of only historical interest.

The Regional Catchment Strategy addresses the priorities and issues of concern for the region at a high level to identify the key strategies and approaches for intervention. This ensures that people and communities know what is expected. However, it does not attempt to define the detail of the plans and projects required to achieve those ends. That would limit the flexibility of the revised Regional Catchment Strategy to respond to changing information and experience. That detail will be provided in the Investment Plan and in the specific projects and programs which it supports.

Our Regional Catchment Strategy covers the following issues:

- **Vision and Goals**
Chapters 1 to 3 set out the vision and goals for the Regional Catchment Strategy, introduce the Victorian Mallee and its communities, and outline the scope and context for the Regional Catchment Strategy;
- **Community Engagement**
Chapters 4 and 5 confirm the extensive engagement of communities in developing this Regional Catchment Strategy and the lessons from the earlier 1997 Regional Catchment Strategy;
- **Our Natural Resource Assets**
Chapters 6 and 7 identify the natural resource assets of the Mallee and the major threats to those assets;
- **Strategy, Targets and Outcomes**
Chapters 8 and 9 are the heart of the Regional Catchment Strategy. They set out the strategy and priorities for implementing the vision of the Regional Catchment Strategy when faced by those threats, and define the goals, outcomes and targets for implementing that strategy;
- **Roles and Partnerships**

Chapter 10 outlines the roles, and partnerships of the key stakeholders responsible for implementing the Regional Catchment Strategy;

• **Adaptive Management**

Chapters 11 and 12 confirm the commitment of the Regional Catchment Strategy to adaptive management and to a rigorous process of monitoring and evaluation; while

• **Driving Investment**

The final Chapter 13, demonstrates how the Regional Catchment Strategy will drive the development of a 3-year rolling investment plan and detailed project plans which will translate those strategies into action.

3.2 The Context of the Regional Catchment Strategy

The Regional Catchment Strategy is not a stand-alone document. It is built on work over the last fifteen years to develop a suite of controls to manage threats and establish a sustainable productive base across the Victorian Mallee.

The Regional Catchment Strategy sits within a complex web of influences and references that inform its judgments and give it purpose and effect. In turn, the Regional Catchment Strategy will trigger a cascade of further plans and programs (Figure 5). Annex A provides a more detailed record of the full listing of the plans and policies currently in place within the Mallee to deliver natural resource management outcomes.

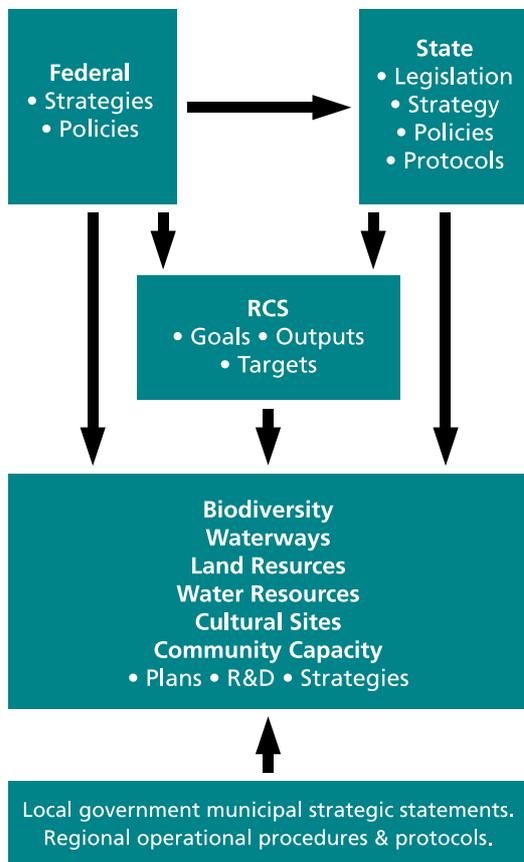


Figure 5 Policy Content of the Regional Catchment Strategy

The key elements of this interaction are:

- **the historical context:** this confirms the suite of interlocking legislation, strategies, plans and procedures already in place which provide the framework for the future management of natural resources across the Mallee;
- **the legislative context:** this creates the formal structure and framework for the Regional Catchment Strategy;
- **the funding context:** the development of the Regional Catchment Strategy was funded through the National Action Plan for Salinity and Water Quality (NAP). That process and the resultant strategy must meet certain criteria in order for the Regional Catchment Strategy to be accredited;
- **the policy context:** the Mallee Regional Catchment Strategy provides a process to translate Federal and State-wide strategies and policies into a local and regional context which takes account of perceived threats and priorities within the Mallee Community; and
- **the strategy framework:** the Mallee Regional Catchment Strategy is the public focus of a suite of reports, which start with a review of the assets of the region and will be implemented through individual detailed plans and sub-strategies.



Implementation Committee meeting.

3.3 The Strengths of the Current Controls

There is a strong, interlocking suite of existing legislation, strategies, plans and procedures that provide the framework for the management of natural resources across the Mallee. The following foundation stones have established the primary controls needed to provide for sustainable farming practice in the Mallee.

- Murray Darling Basin Salinity Management Strategy, 2001;
- Land Conservation Council, Mallee Area Review, Final Recommendations, 1989;
- *Water Act* 1989;
- Nyah to SA Border Salinity Management Plan;
- Council of Australian Governments (COAG) Strategic Framework for Water;
- Murray-Darling Basin Agreement and Ministerial Council Cap on Diversions;
- *Planning and Environment Act* 1987;
- *Flora and Fauna Guarantee Act* 1988;
- Victoria's Native Vegetation Management - a Framework for Action;
- National Strategy on Ecologically Sustainable Development;
- *Environment Protection and Biodiversity Conservation Act* 1999;
- Victoria's Biodiversity Strategy; and
- Bulk Water Entitlements on the Murray.

Because they have evolved separately and at different times, this suite of controls can appear poorly coordinated. However, closer observation reveals strong and consistent themes between them. Once they are taken together, it becomes clear that collectively they determine the limits, in the Victorian Mallee, to:

- how much land is available for development;
- how much water is available for development;
- how many EC Credits are available for development;
- how biodiversity must be conserved during development; and
- what is a nationally acceptable approach to dealing with these issues.

The Land Conservation Council Recommendations and the Salinity Impact Zones outlined in the Nyah to SA Border Salinity Management Plan effectively limited the area of land available for irrigation development and placed a cap on further clearing across the Mallee.

The Murray-Darling Basin Cap on Diversions effectively limits the volume of water available for development, and under the Bulk Entitlements agreement, the total volume of water entitlements in the Mallee is now clearly specified. So too is the security of those entitlements.

The Murray-Darling Basin Salinity Management Strategy, combined with the Victorian Government response to Salinity Management Plans in the Mallee, effectively limits the number of EC credits available for development. The Strategy permits further irrigation development only if there is no net impact on river salinity.

While, finally, Victoria's Biodiversity Strategy, the *Planning and Environment Act 1987*, the *Flora and Fauna Guarantee Act 1988* and the *Environment Protection and Biodiversity Conservation Act 1999* determine acceptable environmental outcomes. The Native Vegetation Framework outlines the State Government's policy of Net Gain in the extent and quality of native vegetation and the accounting process for measuring Net Gain outcomes. And the Native Vegetation Retention Controls and the irrigation development guidelines provide mechanisms for achieving these outcomes.

There is also a suite of policies and processes which ensure that the objectives of the legislation and strategies are implemented in practice, through detailed operational management arrangements with clear accountability allocated to key agencies, with key roles played by DPI, the Rural Water Authorities and Parks Victoria.

The strategies and priorities of the renewed Regional Catchment Strategy recognises and respects the strength and effectiveness of these fundamental controls. This leaves the Mallee free to concentrate on sustainably managing the assets that we exploit in productive use. It also allows us actively to manage those assets that are now protected on private land in balance with the assets previously set aside on public land.



Hattah Lakes steering committee site visit 2002.

3.4 Legislative Context

Legislation provides a mechanism to implement Government policies in a consistent, transparent and structured way. For the Regional Catchment Strategy, legislation provides a process whereby the Mallee community can be seen to take responsibility for determining the priorities for future natural resource management initiatives in a practical and meaningful way.

Each of Victoria's Catchment Management Authorities is required to prepare a Regional Catchment Strategy for its region and to coordinate and monitor its implementation, under Section 3 of the *Catchment and Land Protection Act 1994*. The Mallee CMA also has responsibility to review the Regional Catchment Strategy within a five-year period from its publication, under Section 24(2)(g) of the Act. There is also a suite of relevant legislative controls that apply to the objectives and programs prompted by the Regional Catchment Strategy including State Environment Protection Policies under the *Environment Protection Act 1970*.

3.5 Funding Context

The Mallee Regional Catchment Strategy has been prepared in accordance with the National Criteria for the Accreditation of NRM Plans, the Victorian Guidelines for the Review and Renewal of Regional Catchment Strategies, and the National Framework for NRM Standards and Targets.

The Mallee Regional Catchment Strategy also establishes the framework for future funding of natural resource management programs by either the State or the Commonwealth Governments, through the National Action Plan for Salinity and Water Quality (NAP), the Natural Heritage Trust or other sources.

These funding sources have set a number of criteria that must be met if the revised Regional Catchment Strategy is to be accredited as the approved framework for future government funding:

- **Community ownership:** the revised Regional Catchment Strategy and the process for its development must have involved the full breadth of the community - so that its outcomes and priorities reflect and are owned by the community;

- **Evidence based:** the process to review the status quo and develop the priorities for future attention must be based
- **Integration:** the Regional Catchment Strategy must address all natural resource management issues and identify how proposed actions will achieve multiple benefits;
- **Investment focus:** future natural resource management programs must be considered as a business case seeking external funding. This means they must:
 - Outputs: focus on causes of problems rather than their symptoms, and on the natural resource management outputs to be achieved not solely on activities,
 - Governance: demonstrate robust governance to provide assurance to the funding body that the funds and programs will be delivered to timelines and within budget, and
 - Monitoring: include clear means to monitor and report on achievement against targets;
- **Adaptive Management:** the process must build in arrangements to ensure that the plans and priorities will change to reflect improved understanding and feedback from the projects adopted.

3.6 Policy Context

The Regional Catchment Strategy provides a strategic framework for future investment in natural resource management across the Mallee. It provides an over-arching set of priorities and targets which integrate the wide range of action plans, projects and programs currently in place. This ensures that these activities are focussed on consistent and appropriate goals and that the full range of natural resource management issues and actions are covered. However, that framework has to be developed in the context of wider and parallel policy and planning objectives and obligations.

Local Government

The Mallee Regional Catchment Strategy is closely aligned with Municipal Strategic Statements of local government. The planning policies triggered by these Strategic Statements provide a key mechanism through which the objectives of the Regional Catchment Strategy will be implemented. Other partners, such as water authorities and regional agencies, also have important links with local government as they provide significant input to implementation of local government planning schemes as referral authorities.

The Mallee CMA will work closely with its partners in local government and other agencies to establish consistent and integrated approaches between the Regional Catchment Strategy and planning policies to ensure robust and sustainable natural resource management outcomes.

Murray-Darling Basin Commission

The Murray-Darling Basin Commission, through its operating arm River Murray Water, has responsibility for managing the flows and quality of the River Murray. All actions and objectives in this Regional Catchment Strategy in relation to the River Murray will be framed within this context.

Basin-wide policies and programs are established by the Murray-Darling Basin Ministerial Council, which has representation from each of the jurisdictions within the Murray-Darling Basin, along with the Commonwealth Government. These policies and programs are given authority through the Murray-Darling Basin Agreement (1992). The most significant of these for this Regional Catchment Strategy are the Murray Darling Basin Integrated Catchment Management Policy, the Murray Darling Basin Salinity Management Strategy, and the commitment to a Cap on diversions as detailed in Schedule F to the above Agreement.

This Regional Catchment Strategy will seek to ensure that the interests of the Victorian Mallee are represented in the development of the policies of the Council.

Federal & State-wide Strategies and Policies

The Regional Catchment Strategy also helps translate and apply Federal and State-wide strategies and policies to the Mallee in the context of the threats and priorities as judged by the local community. Annex A details some of the primary references which are implemented in the Mallee through the Regional Catchment Strategy. The tables in Chapter 9, on the Goals and Targets for this Regional Catchment Strategy cross-refer to the most important of these Federal and State strategies and policies.

3.7 Strategy Framework

The Mallee Regional Catchment Strategy is the document which will be most widely accessed by stakeholders to identify the priorities and targets for natural resource management across the Mallee. However, it is only the most public focus of a suite of documents which provide a comprehensive framework and process for the natural resource management planning of the region.

This suite of reports is set out in Figure 6 overleaf, which shows the interaction between the different elements. The following section explains the purpose and role of each report and identifies where further information on each is available in this strategy. Copies of the full documents are available as stand-alone reports.



Threatened Belah woodland.

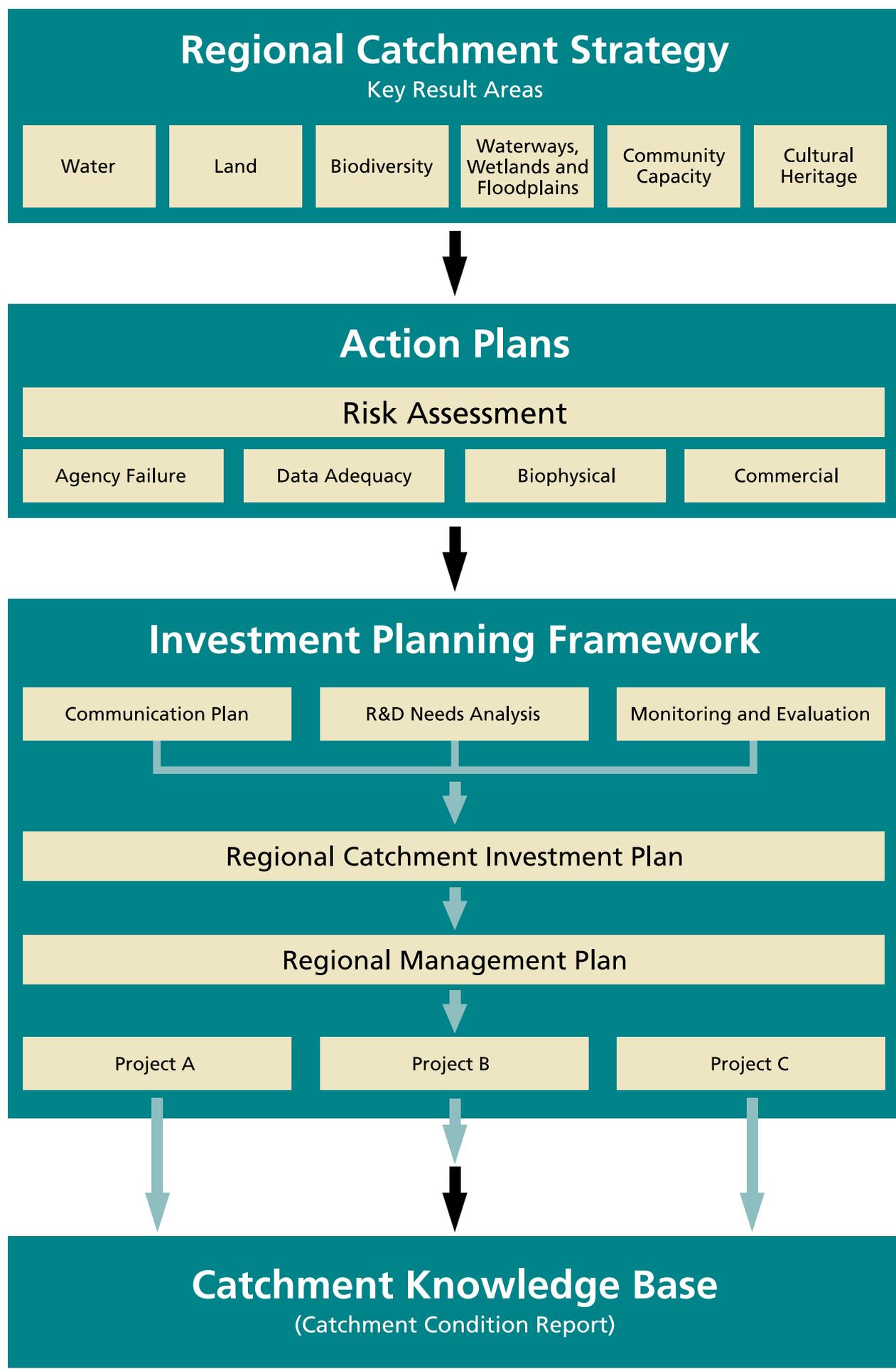


Figure 6 Strategic Framework

- **Catchment Knowledge Base:** all decisions are based on the information which we hold about the natural resource assets of the region, and the threats to their condition. This information is held in a single collated data-base called the Catchment Condition Report (see section 4.2 and 6.1);
- **Previous Strategy Review:** this is not the first Regional Catchment Strategy. In developing this strategy the Mallee CMA has learnt from the successes and constraints of the earlier strategy drafted in 1997 (see Chapter 5);
- **Regional Catchment Strategy:** this publication provides a strategic oversight of the region and identifies the key objectives and targets for the next five years;
- **Risk Assessment:** the Mallee CMA and partner agencies have made an assessment of the main risks which may limit our success in translating the targets in the Regional Catchment Strategy into action plans in practice. The four main risks are Agency Failure, Data Inadequacy, Biophysical Risks and Changes in the Commercial Environment (see Chapter 12);
- **Communication Plan:** the Mallee CMA has developed a Communications Strategy and Plan. This identifies the key stakeholders and the best routes to promote greater engagement with the objectives of the strategy (see Chapter 10);
- **Research and Development Needs Analysis:** the targets in the strategy were reviewed to identify those objectives where, given the current level of knowledge, the best course of action was not able to be adequately identified. In these areas the first priority will be to invest in further Research and Development (see Section 6.2);
- **Monitoring and Evaluation:** monitoring and evaluation of a suite of different activities and elements is needed for a range of different reasons. For example, this could provide data on key assets and changes in their condition, it can also monitor the effectiveness of a program and ensure accountability for project delivery. The Mallee CMA has developed a Monitoring and Evaluation Framework to ensure robust and effective arrangements are in place (see section 11.2);
- **Investment Plans:** the framework and priorities of the Regional Catchment Strategy need to be translated into action programs. The main mechanism for this is the Regional Catchment Investment Plan which will seek investment from external funding bodies for the priority natural resource management programs of the region set out in the strategy. This will establish an annual Regional Management Plan which will confirm the specific projects to be progressed in the following twelve month period (see section 13.2).



Mallee Landcare Conference, June 2002.

4 Regional Catchment Strategy Process

The Regional Catchment Strategy sets priorities for the region and identifies the Mallee communities which will be responsible for achieving them. These priorities and programs have been developed and endorsed by those communities, key stakeholders and players across the Mallee.

Developing the renewed Mallee Regional Catchment Strategy has involved a number of major stages:

- Reviewing the original Mallee Regional Catchment Strategy to identify successes and lessons;
- Assessing the current state of the assets across the region to help identify their values, and the threats to their condition, through a Catchment Condition Report. This provides the basis for identifying priorities and targets;
- Engaging and consulting with a wide range of communities, stakeholders and partners to confirm priority concerns and options for the future management of natural resources across the Mallee;
- Building a renewed Regional Catchment Strategy through a process which engages key partners and communities across the Mallee. This has built on the overall vision and goals for the renewed Mallee Regional Catchment Strategy which were developed through a workshop of the Mallee CMA Board, key partners and stakeholders, in June 2002;
- Consulting with the public on a draft of the renewed Mallee Regional Catchment Strategy, released in November 2002. The consultation period ran until 13 December 2002. The comments received have informed the production of this final document for submission to government for accreditation.

4.1 Review of the Regional Catchment Strategy 1997

The Regional Catchment Strategy 1997 consisted of a tiered set of goals, objectives, actions and targets. Each element was reviewed against two parameters:

- **Achievement:** *What was achieved in practice?*
- **Commentary:** *What factors affected the outcome?*

The change in catchment condition since 1997 has been significant with major successes achieved over the last five years. The review identified the following lessons:

- Where the initiative is off-farm, the Mallee CMA must ensure government and community endorsement occurs and that resources are in place;
- Where the initiative is on-farm, market forces are critical in determining the success of the project:
 - Where these forces are favourable then it is important that adoption meets approved environmental standards and landowners maintain these standards
 - Where market prices and on-farm costs do not encourage adoption, additional incentives, sanctions and research will be required.
- On-going monitoring is needed to understand the technological, market, and environmental changes that influence adoption and effectiveness of actions. Flexibility will be needed to re-align funding and deliver programs in response to these changes.

4.2 Assessment of Status Quo

The Regional Catchment Strategy needs to be underpinned by an assessment of the condition and threats to the natural resource assets of the Mallee. A robust and systematic assessment of these assets and issues was made through the development of the Catchment Condition Report.

The Catchment Condition Report is the central baseline reference document for the renewed Mallee Regional Catchment Strategy. It represents the Balance Sheet for the natural, economic and social assets of the Mallee region. The Catchment Condition Report will be revised and up-dated as new information is generated. To ensure this occurs a framework and methodology have been adopted which are sufficiently comprehensive and rigorous to provide not only for our current level of understanding but also for the knowledge base that we anticipate will be in place in five or ten years time. This will allow the succeeding reports to be compared to assess progress across the key assets and attributes of the region over time.

The Catchment Condition Report is a reference document confirming the current condition of the assets of the region with an informed understanding of the threats and trends related to those assets. It does not attempt to identify what actions are available to offset those threats and trends, or what priority should be allocated to such interventions. That is the role of this renewed Mallee Regional Catchment Strategy. However, the standardised, rigorous and consistent approach in the report creates a robust basis for taking those future decisions.

The key elements of the Catchment Condition Report are set out in the central Chapters of this renewed Mallee Regional Catchment Strategy - Chapter 6 confirms the assets and their values, while Chapter 7 identifies the primary threats to those assets. This leads into Chapter 8, which sets out the priorities, and Chapter 9, which reports the Goals, Outcomes and Targets.

4.3 Stakeholder Engagement and Market Research

A central element of the program has been to engage stakeholders, communities and partners from across the Mallee in the development of the renewed Mallee Regional Catchment Strategy (Figure 7). The approach has involved a program of meetings and contacts with:

- Implementation Committees of the Mallee CMA;
- Major partners;
- Industry bodies;
- Specialist interest groups;
- Indigenous communities and stakeholders;
- Research Agencies;
- Landcare groups and local landholders; and
- The wider community.

Annex B confirms the location, approach and coverage of those meetings and records the key issues and concerns identified for each group. These meetings and contacts covered the full Mallee region including, amongst others, the Millewa, Mildura, Robinvale, Piangil, Swan Hill, Murrayville, Ouyen, Walpeup, Hopetoun and Birchip.

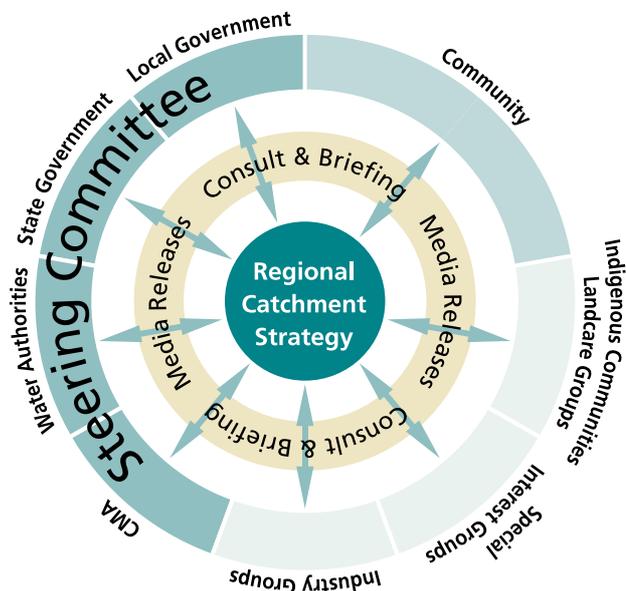


Figure 7 Stakeholders and Contributions to the Regional Catchment Strategy

Figure 7 illustrates the stakeholder contacts and contributions to the development of the Mallee Regional Catchment Strategy. A central role has been played by a Steering Committee of the key regional partners which has overseen the project, and ensures community and stakeholder input to the exercise.

A market research campaign was used to capture a picture of what the broader community of the Mallee considered to be the priority issues across the region. The key messages were:

- improving the health of the River Murray was identified as the most important action to be taken;
- salinity was identified as the most serious risk;
- these priorities were the same across the region, although irrigators also stressed issues to do with water availability and quality, while dryland farmers identified land degradation and soil erosion;
- many groups and agencies were considered to share responsibility for providing leadership including NRE, Government and landholders; and
- there was strong support for the Mallee CMA taking a leadership role in developing and over-seeing a revised Mallee Regional Catchment Strategy, to coordinate and direct future investment to priority natural resource issues.

The drafting of the Mallee Regional Catchment Strategy took explicit account of the issues raised through the initial round of consultation and from the market research, in establishing the priorities and the targets for future natural resource management in the Mallee.

The Mallee CMA promoted a further round of public consultation, in November 2002 on the draft Strategy. This covered the full range of stakeholders and communities engaged in earlier stages, to brief them on the draft and to seek feedback and comments, through a suite of measures:

- 150 copies of the draft Mallee Regional Catchment Strategy were sent to groups involved in the first round of consultation, inviting their comments and contributions. In all nearly 500 copies of the draft were distributed through a number of routes including regional offices of NRE, local council offices and libraries and water authority front counters;
- 2000 copies of a summary leaflet were distributed through the public meetings and via stakeholder and community groups. These set out the key elements of the draft Mallee Regional Catchment Strategy and invited members of the public to seven public meetings across the region;
- seven open-form, public meetings were organised across the Mallee, to provide an opportunity to brief interested parties on the draft Mallee Regional Catchment Strategy and for members of the public and community groups to come and have their say;
- further contacts were arranged with key partners and indigenous stakeholders;
- the draft RCS was posted on the Mallee CMA website; and
- a series of media briefings were released to notify members of the public of the exhibition period as required under the *Catchment and Land Protection Act 1994*, to prompt coverage in the local and regional media and so wider awareness and interest across the wider public.

The Mallee CMA received extensive comments and feedback on the draft, both at the public meetings and in subsequent telephone calls and written submissions. The final draft of the Mallee Regional Catchment Strategy has taken account of the comments received through this consultative program.



Community capacity building.

4.4 Building the Renewed Regional Catchment Strategy

The renewed Mallee Regional Catchment Strategy has been drafted as an inclusive and consultative process building on the earlier stages, described above.

The process included:

- Learning from the lessons identified from the review of the earlier Strategy;
- Listening to the views, concerns and priorities of a wide range of communities and stakeholders across the Mallee;
- Assessing the condition and value of the key assets across the Mallee and the threats which they face. This helped identify priorities;
- Engaging key stakeholders in reviewing these lessons and assessments to develop a Vision and Goals for the Mallee Regional Catchment Strategy;
- Involving key partners across the Mallee in drafting the text, developing the targets and assessing the risks that those targets would not be met;
- Engaging the wider scientific research community in identifying where further research is needed to support achievement of the targets;
- Responding to comments from across Government to facilitate the accreditation of the final Mallee Regional Catchment Strategy; and
- Consulting widely on the draft Mallee Regional Catchment Strategy, across stakeholders, communities and partners. This final publication has taken on board the comments and feedback received during this consultation.

5 Review of the Regional Catchment Strategy 1997



Left - Right 1 Northern Mallee pipeline under construction. 2 Stock & domestic water supply channels are now decommissioned in the Northern Mallee.

5.1 Objective

The first Mallee Regional Catchment Strategy was published by the then Mallee Catchment and Land Protection Board in June 1997. It has been managed and implemented since July 1997 by the Mallee Catchment Management Authority.

This first Regional Catchment Strategy consisted of a tiered set of goals, objectives, actions and targets. Each element was reviewed against two parameters:

- **Achievement:** *What was achieved in practice?*
- **Commentary:** *What factors affected the outcome?*

5.2 Success Stories

This section reflects on the significant successes that have been seen in our catchment condition since 1997. Many of the successes from the Mallee Regional Catchment Strategy 1997 could have been effective as stand-alone initiatives. However, it is only through the strategic approach of the Strategy with its emphasis on integrated catchment

management at a regional level, and the active engagement of a range of partners and the wider community that consistent longer-term progress will be made.

The major success stories identified in the review of the strategy are:

- **The completion of the Northern Mallee Pipeline:** this has provided major benefits for land management, small towns and stressed rivers. Ultimately 35 gigalitres³ of water per annum will be returned to the environment. Previously much of this water would have seeped to the ground water and hence led to increased risk of water logging and salinity. In addition, 15 gigalitres per annum will be available for security of supply and regional development.
- **Major reduction in rabbit population:** The advent of the rabbit haemorrhagic disease (calicivirus) in 1996 reduced rabbit populations to extremely low levels. Before this, rabbits were the main impediment to the regeneration of natural ecosystems and also had a major impact on primary production. A major benefit of the reduced rabbit population has been the opportunity to increase programs to improve biodiversity. It has also allowed local

³ A gigalitre (GL) is 1,000 megalitres. A megalitre is roughly the volume of an Olympic size swimming pool

communities to achieve more effective outcomes from integrated baiting, fumigating and warren ripping.

- **Increased focus on biodiversity:** resourcing of actions that improve biodiversity values has increased dramatically, particularly on private land and roadsides.
- **Sustainable expansion in irrigated horticulture:** The ability to trade water has provided a framework for a major expansion of irrigated horticulture in the Mallee. All new development has been managed via a framework for environmental protection established under the Nyah to SA Border Salinity Management Plan. This has promoted best practice in sustainable horticulture.
- **Reduction in irrigation drainage flows:** There has been a net reduction in Irrigation drainage volumes, and salt loads to the River Murray have dropped by four per cent each year. Consequently, the twenty-year target for existing irrigation has been met in five years. Moreover, drainage disposal is now much better coordinated and controlled.



Viticulture in the Mallee region.

5.3 Assessing and Understanding Success

To assess the effectiveness of the actions and targets in the Mallee Regional Catchment Strategy 1997 we need to acknowledge that some level of achievement would have occurred anyway. Ideally, we would like to know how much is attributable to the Strategy. Therefore, in this review we have attempted to identify the key characteristics of programs that led to a successful outcome. Future programs can then seek to repeat these characteristics.

Observations of this review are that:

- Where activities have been off-farm (including those on public land) they have been successfully completed provided that they have been endorsed by Government and the community and adequately resourced;
 - Examples include the Northern Mallee Pipeline, Nangiloc-Colignan drainage scheme, Psyche Bend lagoon drainage works, Nyah to Border drainage works, public land management
- Where one or more of these requirements (that is Government endorsement, community endorsement, or adequate resources) are absent the activity is not successful;
 - Examples include some of the environmental works on the floodplain proposed in the irrigation salinity plans, which were not completed due to uncertainty of benefits or lack of resources.

- Where activities have been on-farm they have had mixed success depending on the level of adoption. The level of adoption has been driven by farm economics (the market);
 - Where market circumstances are unfavourable, little change has occurred. (Examples include the adoption of lucerne on dryland farms)
 - Where the activity has been consistent with on-farm economics, changes have sometimes been dramatic. (A prime example is the more recent adoption of water-saving irrigation systems as a result of the winegrape boom and promotion of incentives by SunRISE 21 and the Sunraysia Salinity Management Plan).

5.4 Recommended Approach

A recommended approach for Mallee CMA activities is as follows:

- Where off-farm activity is concerned, the Mallee CMA must ensure government and community endorsement occurs and resources are in place;
- Where the market is driving investment and adoption, it is important that adoption meets approved environmental standards and landowners maintain these standards. Therefore, the focus for the Mallee CMA must be to provide an approval process that ensures standards are achieved and maintained, while not restricting adoption;
- Where market prices and on-farm costs do not encourage investment and adoption there are three options - singly, or in combination:
 - Provide other incentives that overcome market disincentives, commensurate with the public benefit ('carrots')
 - Provide sanctions that overcome market disincentives, commensurate with the public benefit ('sticks')
 - Target research to find market-driven profitable solutions, together with extension activities to provide farmers with knowledge of these innovations;
- On going monitoring is needed to understand the technological, market, and environmental changes that influence adoption and effectiveness of actions. In some circumstances, it will make sense to wait until economic conditions are more favourable for on-farm adoption; and
- Flexibility will be needed to re-align funding and deliver programs in response to change. A decision support system for setting priorities for programs against agreed criteria would be useful.

6 The Mallee's Natural Resource Assets

6.1 The Catchment Condition Report

A major stage in the review and renewal of the Mallee Regional Catchment Strategy was to complete a comprehensive assessment of the natural resource assets of the Mallee. The outcome is contained in the Catchment Condition Report.

The Catchment Condition Report establishes a systematic, rigorous and robust conceptual and practical framework to assess the assets of the Mallee Catchment, under six broad categories:

- Terrestrial Biodiversity;
- Waterways, Wetlands and Floodplains;
- Water Resources;
- Land Resources;
- Cultural Heritage and Landscape Sites; and
- Community Capacity.

The Catchment Condition Report assesses these assets through a five-stage process:

- the **assets** are identified and their location recorded within the five main bio-regions present across the Mallee region (see Section 6.3 below);
- the **value** of those assets is recorded against a range of different criteria. For example, the priority of biodiversity assets is determined by the Bioregional Network Analysis for species and conservation status for Ecological Vegetation Classes. The most important elements are reported in the remainder of this chapter;
- the **condition** of those assets is assessed and recorded against a range of criteria such as vegetation condition assessment using the Habitat Hectare methodology;
- the **threats** to that condition are identified and the trend line of their probable future impact assessed and reported (see Chapter 7 below); and
- these parameters are **integrated** in a summary sheet to provide an overview by asset class. This creates a consistent and independent methodology to identify priorities related both to inherent asset value and the extent of the threats identified.

This framework generates a single, integrated and consistent base-data set on the natural resource assets of the Mallee for use by all parties across the region. It collates diverse and complex data from a multitude of program-specific initiatives in a single, collated reference, and translates that base-data, through a robust methodology involving a series of measured judgments, into an agreed assessment of priorities across broad categories.

The Catchment Condition Report is a living process. The data and judgments in the spreadsheets represent an informed community consensus as to the value of the assets of the region and the extent of the threat to their condition. That consensus will be a developing and changing picture as new research is undertaken and the outcomes of projects are assessed. The Catchment Condition Report will be updated over time to capture that changing position. The Catchment Condition Report provides a powerful tool to direct our research and to capture, assess and prioritise our knowledge base.



Murray Darling Freshwater Research Centre undertaking electrofishing to gather data.

6.2 Research and Development Needs

One outcome from drafting the Catchment Condition Report has been to confirm the significant gaps which exist in the data which is available on the assets of the region. These gaps cover three categories:

- **base data:** on the assets and on their condition;
- **processes and threats:** information on the dynamics of the processes affecting those assets and their condition; and
- **management options:** understanding the options available to achieve effective interventions in those processes.

A priority for the Mallee Regional Catchment Strategy is, therefore, to improve our understanding of the condition of our natural resource assets and the changes to that

condition as they occur over time. A separate, stand-alone report has been developed setting out a proposed 'research and development needs analysis' to accompany the Strategy. This analysis was developed through a joint exercise involving members of the wider scientific research community.

Research and Development, therefore, becomes one of the key tools and opportunities for investment, particularly in the early stages of the implementation of the Mallee Regional Catchment Strategy. The improved understanding will be fed back into the Catchment Condition Report and so will inform the adaptive management of the region's natural resource assets. This process is explored further in Chapters 11 to 13.

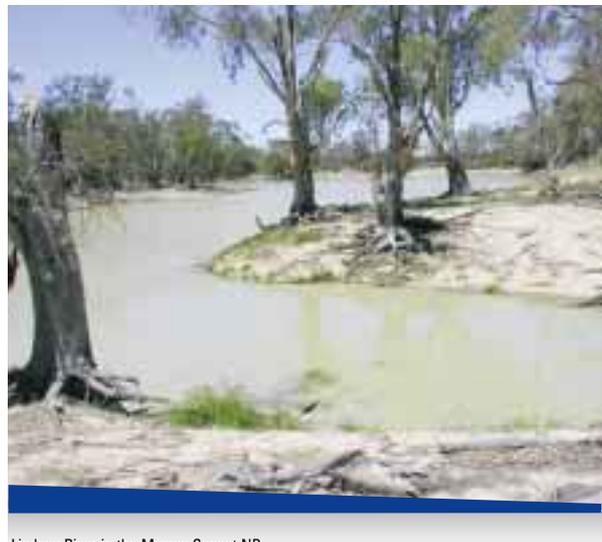
This process will be reinforced through the focus of the Monitoring and Evaluation Framework which also seeks to establish a robust basis for understanding the condition of the assets of the region.

6.3 Bioregions as an Asset Planning Base

Bio-geographic regions (bioregions) provide a framework to capture the patterns of ecological characteristics within the landscape. Because bioregions reflect underlying environmental features, they can also be related to patterns of land and water use. They can therefore be used to identify the relationships between natural resource based activities and biodiversity assets.

This bioregional planning base underpins the assessment of the value and condition of the natural resource assets of the Mallee, as outlined in the Catchment Condition Report. It will also inform the development of the Bioregional Action Plans forecast as part of the implementation of this Regional Catchment Strategy.

Five distinct bioregions are recognised within the Mallee CMA boundaries for the purposes of managing natural resource assets (see Figure 8). There are three bioregions along the floodplain of the River Murray and two more covering the large dryland areas away from the River.



Lindsay River in the Murray Sunset NP.

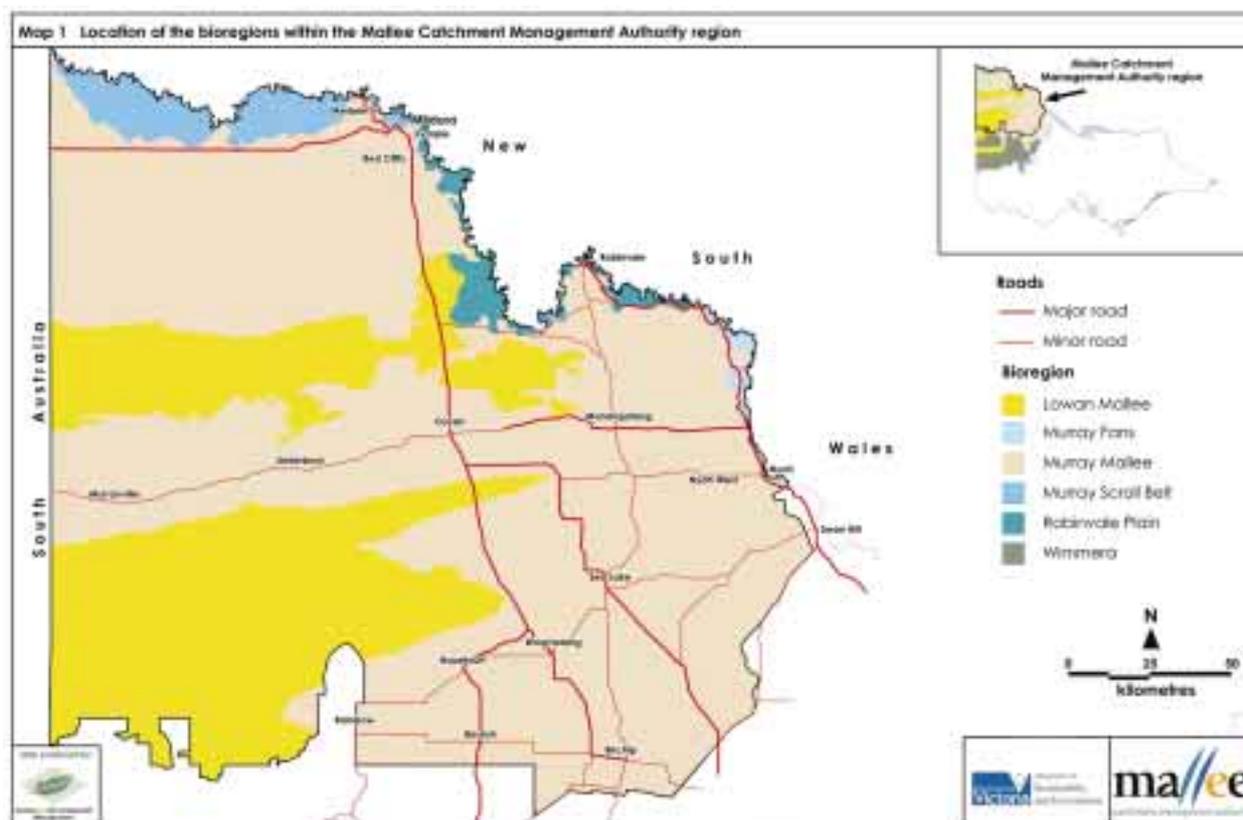


Figure 8 Bioregions of the Mallee Region

The eastern most floodplain bioregion - the Murray Fans bioregion - extends in a thin strip along the Murray from Nyah to the confluence with the Murrumbidgee River at Boundary Bend. The Robinvale Plains bioregion extends from here along the Murray to west of Mildura, taking in most of the Hattah-Kulkyne National Park. Downstream of Mildura, the Murray Scroll Belt bioregion continues in a broad strip to the border with South Australia. The Lowan Mallee bioregion extends through the Big Desert, the southern Sunset Country and the Annuello Block. The Murray Mallee bioregion covers the rest of the landmass of the Victorian Mallee.

The differences between the Lowan and Murray Mallee bioregions are largely a result of the different parent materials that formed the dominant soil types in each bioregion. The fine loose sands of the Lowan Mallee were formed by the wind eroding and reworking marine sediments. The red-brown clayey sands and sandy clays of the Murray Mallee were formed by the wind eroding and reworking freshwater sediments.

The remainder of this chapter confirms the key values of the asset classes in the Catchment Condition Report.

6.4 Biodiversity

The term "biodiversity" is used to describe the natural variety of all life forms. It is the keystone that underpins a range of vital ecological functions. It buffers against catastrophic events and is fundamental to maintaining regional productivity. Extreme climatic conditions interacting with the geology of the Mallee have resulted in unique communities of flora and fauna. Aboriginal use of fire was

also a strong influence in shaping native vegetation formation, distribution and ecological requirements.

The Victorian Mallee is significant for its unique animals, particularly its reptiles and birds. A significant number of the species of flora and fauna in the Mallee region are classified as threatened within Victoria (see Table 3).

Table 3 Number of Victorian Rare or Threatened Flora and Fauna, Mallee Region

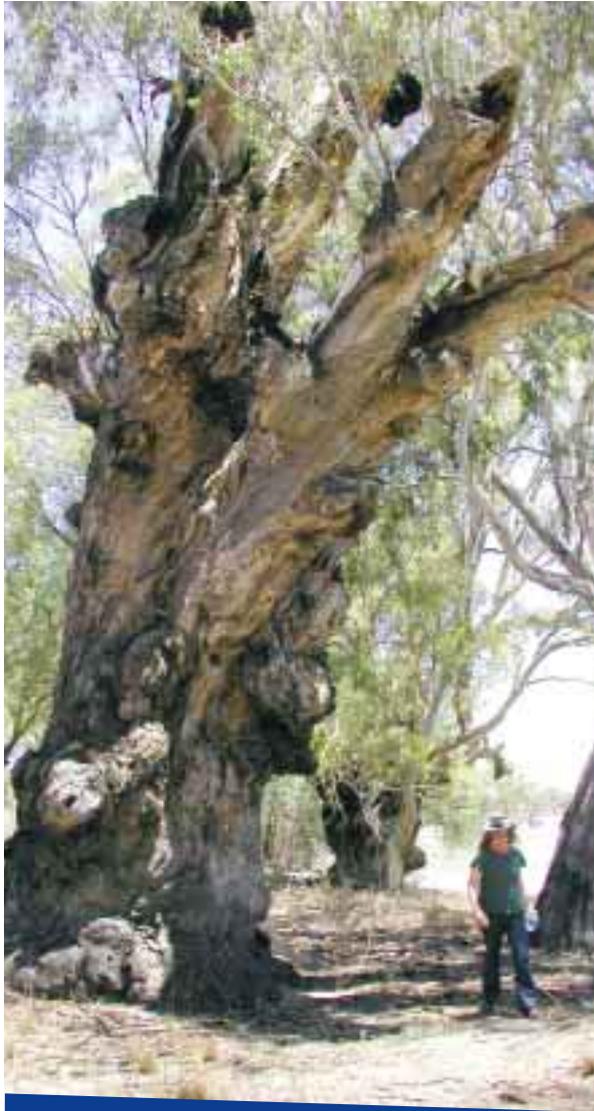
Status	Flora	Fauna
extinct	7	7
critically endangered	n/a	10
endangered	64	30
vulnerable	119	35
rare / other	142	30

Source NRE 2000

Three communities have been listed under the *Flora and Fauna Guarantee Act 1988* (Semi-arid Herbaceous Pine-Buloke Woodland, Semi-arid Shrubby Pine-Buloke Woodland and Semi-arid Herbaceous Pine Woodland). More detailed information regarding threatened species, including those Nationally threatened within the Mallee can be found in the Catchment Condition Report.

Many of the vegetation complexes that originally dominated the Mallee are now largely fragmented. Large blocks of public land remain but this vegetation does not represent the diversity that would have been present prior to European

settlement. The majority of vegetation classed as threatened, as defined by the Victorian conservation status, occurs on freehold land. Annex C provides a more detailed review of the key biodiversity assets of the Mallee CMA region. This section provides a summary assessment for each of the bioregions.



Habitat Tree

Lowan Mallee bioregion: The greater part of the traditional vegetation complexes are restricted to the Lowan Mallee bioregion. Land within this area is generally of poor agricultural quality due to the low fertility, low water storage capacity and high wind erosion potential of its sandy soils. Around 80 per cent of the bioregion remains public land, with the Murray-Sunset, Wyperfeld, Annuello and the Big Desert Wilderness Park, making up a major portion of the bioregion.

The management of our public land is vital for biodiversity conservation. There is a need to maintain the largest, best natural areas from the threats that are noticeably degrading their values, particularly pest plants and animals, altered fire regimes and grazing. There is a need for active management of these areas. It is a mistake to assume that wilderness areas can look after themselves.

Murray Mallee bioregion: There are also many smaller but significant areas found throughout the landscape of the Murray Mallee bioregion in the secondary reserve system, in linear strips on roadsides and streams and in often isolated patches on private land. The size, number, connectivity and quality of these areas is significant for preservation of much of the Mallee fauna.



Malleefowl mound.

The broadscale clearance of native vegetation in the Murray Mallee bioregion was primarily governed by the expansion of Victoria's wheat frontier from the Wimmera into the Mallee during the late 19th and early 20th Centuries. Unfortunately, the vegetation types that have suffered greatest loss - those occurring on areas with heavier, more fertile soils, i.e. woodland and grassland communities - are generally the communities that have also been impacted to the greatest extent by other threatening processes such as grazing, erosion, soil structure decline and salinisation.

Alteration of the types and numbers of grazing and browsing animals in the bioregion has resulted in major degradation of native vegetation communities, particularly those with an herbaceous ground layer. The combined impact of these changes in grazing regimes, has been the modification of vegetation communities through a general depletion of native perennial plant species (including canopy species such as Slender Cypress Pine and Buloke) and replacement by annuals (mostly introduced weeds). This has in turn increased the wind and water erosion of the soil surface due to lack of vegetation cover (LCC 1987) and increased recharge of ground water.

Murray Scroll Belt, Robinvale Plains and Murray Fans bioregions: The riverine bioregions comprise largely intact tracts of native vegetation that form part of a continuous corridor of native vegetation along the length of the River Murray with some links to dryland vegetation.

Land within these bioregions is primarily used for grazing, recreational, conservation and timber harvesting purposes. Floodplain areas are mostly public land of various land tenures due to the periodic flooding of much land within these bioregions and clearance for agriculture has been minimal. (water-based biodiversity is dealt in more detail under the heading Waterways, Wetlands and Floodplains). Differing processes have affected the floodplains and terraces, however. Altered hydrological regimes, timber harvesting and firewood collection have affected floodplain communities, while overgrazing and the resultant effects of wind erosion have degraded native vegetation on the alluvial terraces.



Redgum woodland on the River Murray floodplain.

Ecosystem Services: The biodiversity of the Mallee also provides 'ecosystem services'. These services include cleaner air and water, protection from land degradation, pest control, soil fertility, recreation, amenity and aesthetic values for local residents and tourists. They also include productive values from harvesting timber, firewood, honey and pollination services for orchards. The value of these services is fundamental to our existence.

The environment of the Mallee is fragile, and substantial changes to our biodiversity have already occurred which, in turn, have altered many of these ecosystem functions. A balanced approach to environmental, social and economic considerations is required in order to achieve sustainability. This can be achieved through a partnership approach. The Mallee will have to work with adjoining Catchment Management Authorities and States to achieve required outcomes.

A fundamental factor affecting the achievement of our Mallee Regional Catchment Strategy outcomes will be an improved understanding of interactions between management options and their effect on ecosystems. For example, it is recognised that salinity is having a direct impact on biodiversity, but our knowledge of the extent of that effect, is limited. Equally, little is known about the interventions that will need to take place to protect biodiversity assets from salinity. Best management practices need to be tested in terms of their regional applicability in order to improve confidence and increase our understanding of assumptions associated with them.

Improved understanding in these areas should help identify priorities for undertaking works to protect high priority environmental assets (as determined by the *Environment Protection and Biodiversity Conservation Act 1999*, *Flora and Fauna Guarantee Act 1988*, and the bioregional network analysis). It will provide information essential to the establishment of responsive management and planning protocols for responding to these threats. This research will ensure that investment will be guided to areas with maximum return/benefit for biodiversity.



Aerial photograph of Denning Channel linkages.

6.5 Waterways, Wetlands and Floodplains

The Mallee CMA region is bordered in the north by the River Murray, and includes the Mallee Basin and sections of the Wimmera, Avoca and Millicent Coast Basins in the south and east of the region (Figure 9).

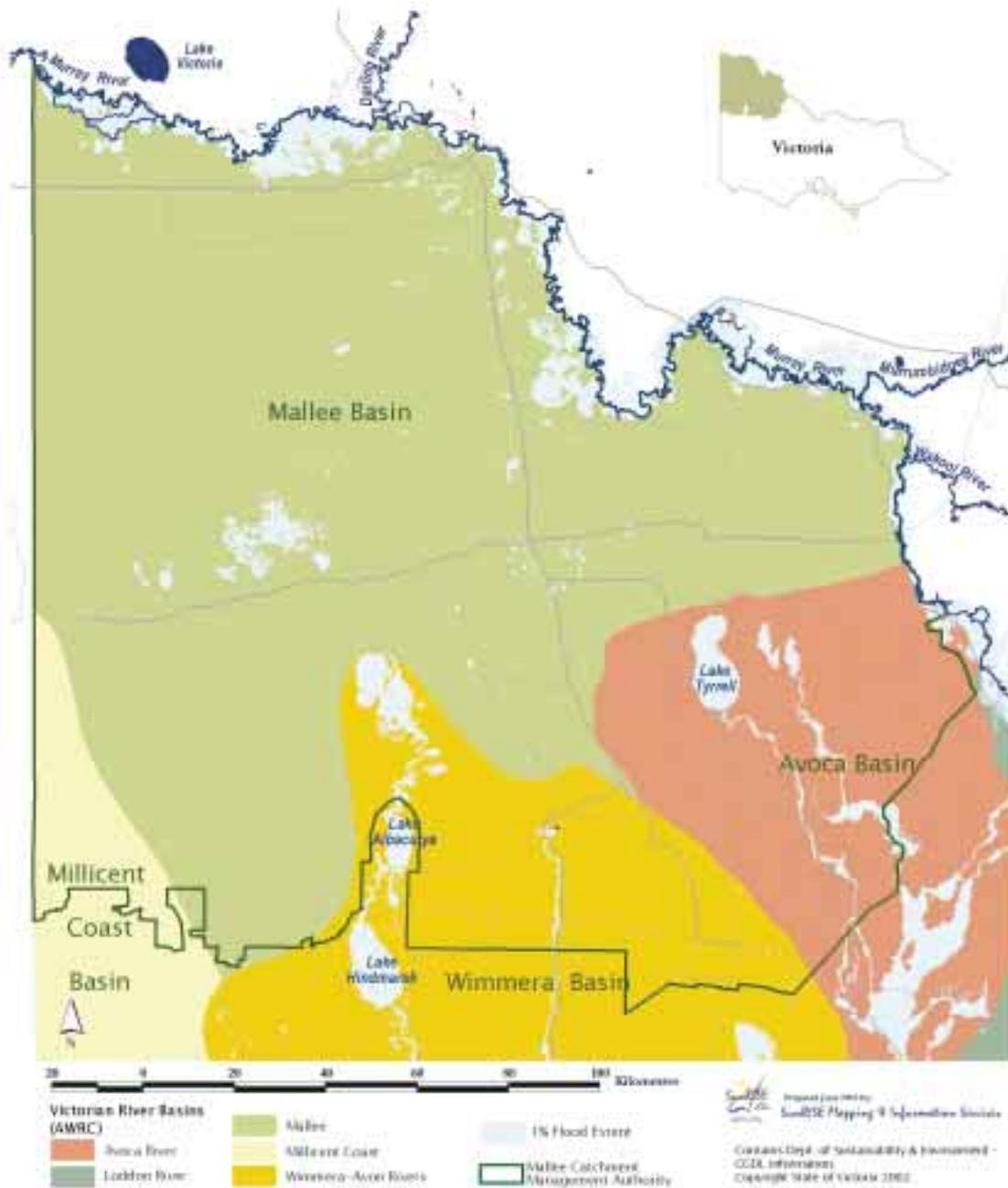


Figure 9 River Basins of the Mallee Region

In the northern area, the River Murray, its anabranches, distributary channels and associated wetland systems dominate the wetlands and waterways. These bioregions represent important and distinct floodplain ecosystems, providing critical interaction with the river environment. Flooding of these areas releases important nutrients and trace elements that drain back into the river to help maintain a complex and rich aquatic environment.

In the south, north-flowing effluent streams, including the Yarriambiack Creek, Outlet Creek and Dunmunkle Creek follow the direction of the dune systems that align the wetlands and waterways, terminating in a number of ephemeral wetland complexes including the Wirrengren Plain and Lakes Corrong and Lascelles. In the east, two effluent streams of the Avoca River system, Tyrrell Creek and Lalbert Creek, empty into a number of large terminal saline wetlands including Lakes Tyrrell, Wahpool and Timboram (see Figure 10).

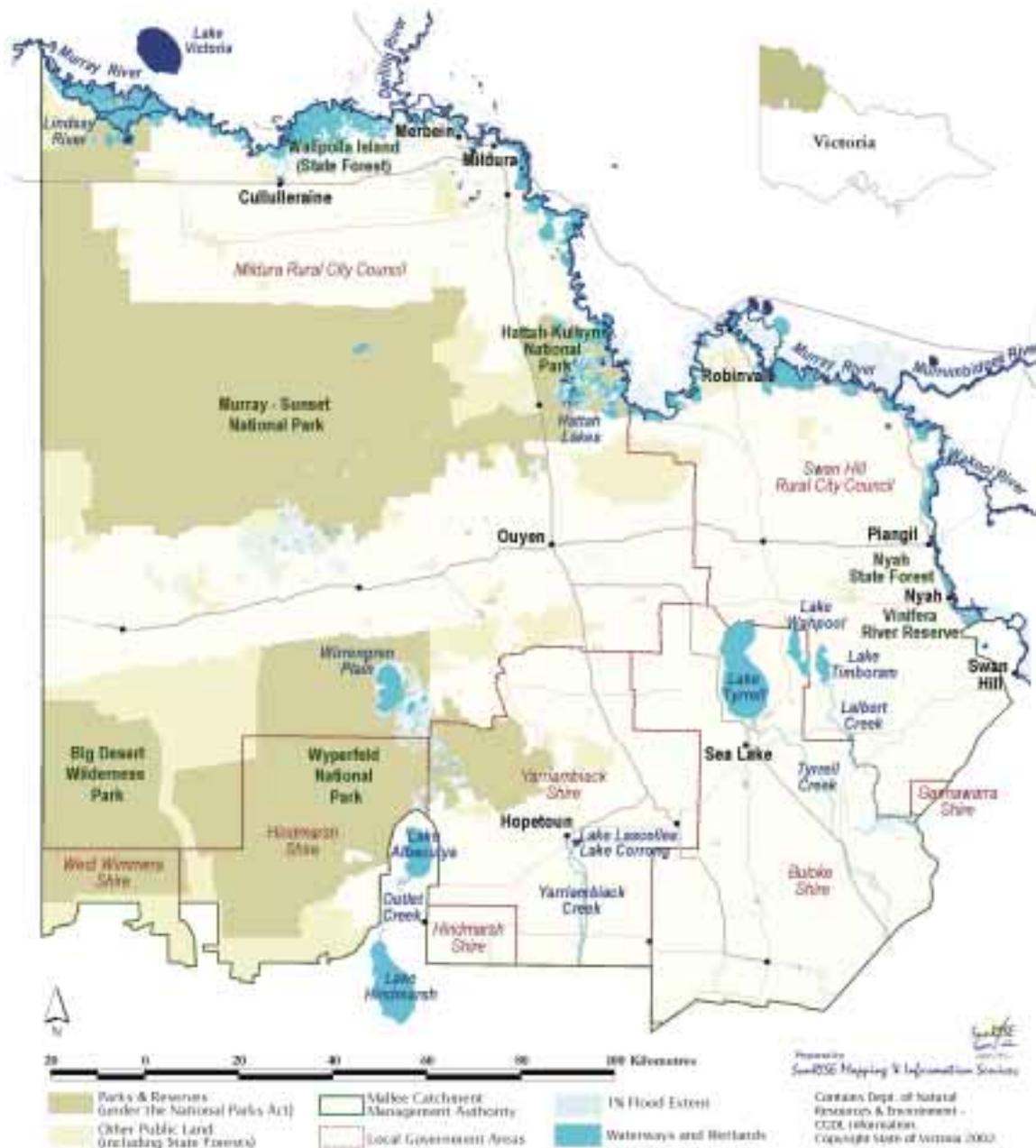


Figure 10 Waterways, Wetlands and Floodplains of the Mallee Region

There are more than 900 wetlands within the Mallee CMA boundaries. Some Mallee wetlands are recognised at the international level. For example, the Hattah Lakes are a declared wetland of international significance under the Ramsar convention (see Table 4 - overleaf).



Left - Right 1 Lake Corrong in the southern Mallee. 2 Hattah Lakes. 3 Lindsay River in the Murray Sunset National Park.

Table 4 Hattah Lakes - Key Attributes

- The Hattah Lakes system is a large floodplain, wetland complex consisting mainly of shallow lakes, anabranches and temporary swamps on the River Murray floodplain.
- Hattah Lakes was listed in 1982 as a Ramsar site, ie, a wetland of international importance under the Convention on Wetlands and is also listed on the Register of the National Estate.
- Hattah Lakes support a large abundance and diversity of waterbirds including many breeding species. The area supports several bird, mammal, reptile, fish and plant species that are endangered, rare or vulnerable in the State of Victoria.
- A number of species of waterbird found in the National Park are listed under the Japan-Australia Migratory Bird Agreement and/or the China-Australia Migratory Bird Agreement.
- The site is located within Hattah-Kulkyne National Park which is recognised as a Biosphere Reserve under the UNESCO Man and Biosphere program. Only the lakes are included in the Ramsar site.
- Current threats to the site include disturbance to natural flows in the River Murray and algal blooms.
- Priority actions and controls are being developed for the site as part of a CMA-wide audit and prioritisation program for wetlands across the region. Any actions will be consistent with the proposals in the Hattah-Kulkyne Lakes Ramsar Site: Draft Strategic Management Plan.

Some wetlands are also significant as important sites for migratory birds recognised under the Japan Australia or the China Australia Migratory Bird Agreements (JAMBA/CAMBA). Others are recognised at the national level, either by being listed in the Directory of Important Wetlands in Australia, or by being listed on the Register of the National Estate (Table 5).

Table 5 Nationally Significant Wetlands of the Mallee CMA Region

- Belsar Island
- Cardross Lake
- Hattah Lakes
- Heywoods Lake
- Kings Billabong Wetlands
- Lake Ranfurly
- Lake Tyrrell
- Lake Wallawalla
- Lindsay Island
- Major Mitchell Lagoon
- Pink Lakes
- Raak Plains
- Walpolla Island
- Wargan Basins

Source: A Directory of Important Wetlands in Australia (Environment Australia, 2001)



Left - Right 1 Cardross Lakes 2 Kings Billabong

The wetlands, river channels, and riparian vegetation of the region's waterways and floodplains provide diverse habitat for a variety of aquatic and terrestrial species. Wetlands, waterways and floodplains of the region also provide important ecological services. As detailed in the Victorian River Health Strategy (NRE, 2002), this includes energy and nutrient recycling, water purification, sediment control, the processes that maintain animal and plant production, and the interactions of species that affect community structure.

The waterbodies of the region also provide an important resource for human use (refer Section 6.6). The River Murray for example is used to provide water for irrigation, stock and domestic needs, and to meet the urban and industrial needs of major regional centres, such as Mildura and Robinvale. Waterbodies of the region are also used to store or convey irrigation or drainage water and may hold important aesthetic, amenity, cultural and recreational values.



Recreational use of the River Murray frontage at Mildura.

Apart from the River Murray, the value of most wetlands and streams in the Mallee has not been well recognised in the past. The Mallee Regional Catchment Strategy acknowledges the importance of these as key natural assets of the region, and the need to develop a strategic program for informing and prioritising their management. This will require careful consideration of their environmental requirements, and their economic, recreational, cultural and other values.

These waterway, wetland and floodplain assets have been subjected to a number of threatening processes outlined in Chapter 7 which have impacted on their condition and value. The major threats have been from altered flooding regimes, salinisation, recreation and grazing. The current condition of waterways and floodplains is being assessed under the State's Index of Stream Condition surveys, and other more detailed studies. A similar audit process is proposed for assessing the current condition of wetlands in the region. These processes will also ensure that the Mallee region is well placed to respond swiftly to any new or revised Ramsar or similar listings.

With regard to riverine wetlands in the Mallee region, the main challenge will be the restoration of natural flooding regimes and the extent to which this is practicable. It is widely accepted in the Mallee community that, given our management of water resources for consumptive use, it will

not be possible to fully restore natural flooding regimes. Rather, we need to understand how much potential there is to maintain specific ecological values by enhancing the seasonality and duration of wetting and drying cycles. Apart from maximising the environmental benefits of floods, it is also the intent of this strategy to minimise their risks to human life, safety and property.



Heywoods Lake is dry most of the time, a feature of Mallee Wetlands.

The Mallee CMA will work closely with the Wimmera CMA to ensure that restored flows along the Wimmera River System (resulting from the pipelining of water supply systems in the Mallee and Wimmera) are shared between its various effluent streams in accordance with natural trends and ecological requirements. Similarly, the Mallee CMA will work with the North Central CMA to ensure that flows along the Avoca River system are shared between its effluent streams in accordance with natural trends and ecological requirements. The Mallee CMA will also work with the Murray-Darling Basin Commission, DSE/DPI and other relevant agencies to protect and improve the health of wetlands along the Murray system.



Yarriambiack Creek in dry season.

6.6 Water Resources

The River Murray is the principal source of permanent fresh water in the Mallee Region. Potable drinking water is supplied to urban communities in the Mallee by either Lower Murray Water or Grampians Water. A number of small towns within the region do not receive supply of potable town water, but may have access to untreated water for household use and rainwater for potable use.



The River Murray.

Rural communities in the northern Mallee are supplied by four rural water authorities (Sunraysia Rural Water Authority, First Mildura Irrigation Trust, Goulburn Murray Water, and Wimmera Mallee Water) which pump River Murray water for irrigation, household use, livestock consumption, and industrial water use. Around a thousand irrigators are also licensed to pump their own water from the River Murray - they account for nearly half the total water use across the Mallee.

The southern Mallee rural users are supplied with water for stock and domestic use from the Wimmera and Glenelg River systems. This is harvested and stored in the Grampians

before being conveyed by Wimmera Mallee Water through open earthen channels to farms and communities.

In the Murrayville district of the western Mallee, the Duddo Limestone aquifer is the main source of freshwater for irrigation, domestic and stock use.

There is an estimated 485,000 megalitres of water entitlement held in the Mallee. The majority of which (74 per cent) is used for irrigation in the Murray Mallee bioregion. Taking account of the water allocated for irrigation, urban, domestic and stock purposes, water resources in the Mallee have an estimated market value of \$398 million.



Pump infrastructure on the River Murray at Nangiloc.

Despite its clear production value, water use can also harm the environment. Losses from irrigation and conveyance systems can cause localised effects such as water-logging and wider effects from increased salinity risks. Equally, over-extraction can damage the sustainability of the resource. Much of this Regional Catchment Strategy is directed towards managing our resources to maximise their productive values while minimising these potential externalities.

A modern irrigation delivery infrastructure is essential if the region is to reduce losses, with its associated recharge, and drive adoption of greater water use efficiency on-farm.



Stock and domestic water supply channel continues to bring water to Southern Mallee farms

One priority project relates to the Wimmera Mallee Pipeline, which, if implemented, would replace the Southern Mallee rural users' open earthen channel system with pipelines. This will generate major benefits by reducing water lost through bank wetting, evaporation and leakage, both within the channel system and from farm dams. Under the current proposals, any water savings would be used to increase environmental flows in river systems and promote high value horticulture (mainly within the Wimmera CMA Region), at the same time as reducing water-logging and increasing security of supply. There are some transition issues to resolve about how to retain recreational and environmental outcomes from the existing scheme and other benefits such as easy access to water for firefighting.

Other priorities arise out of Attachment 4 to the Bilateral Agreement between the Victorian and Commonwealth Governments on the implementation of the National Action Plan for Salinity and Water Quality. This requires Victoria to:

- complete its water allocation framework;
- improve water use efficiency and productivity; and
- develop and implement river health and stressed rivers strategies.



Furrow irrigation.

In the Mallee a groundwater management plan is in place for the Murrayville area and Bulk Water Entitlements have already been set for the Murray system, but the process has only just commenced in the Wimmera-Mallee. The Mallee CMA will contribute to that process. Victoria expects to complete the bulk entitlement conversion process for all NAP regions by 2003.

Water use efficiency is being improved rapidly through a combination of on farm incentives and market-based mechanisms. Moreover water markets, and linkages to salinity management plans, have accelerated this process.

'Stressed river strategies' for the Avoca River (including the Tyrrell and Lalbert Creeks) and the Wimmera River are due for completion in December 2003, with a similar deadline for completion of the wider Mallee Regional River Health Strategy.



Lalbert Creek in the eastern Mallee.

6.7 Land Resources

The area of agricultural private land is 2.3 million ha. The current market value of all agricultural land (including irrigation water) is approximately \$2,680 million.

Since the market value of the land resources of the Mallee is an embodiment of people's expectations about its future earning capacity, that value can be expected to fluctuate in line with the fluctuating fortunes of world commodity prices. The productive capacity of Mallee land rose steadily over the last half of the twentieth century due to increased mechanisation, improved management techniques and genetic improvement of crops.

Irrigated land makes up 1.4 per cent of the area but 36 per cent of the value of agricultural land. The area under irrigation has grown by around 1,000 hectares per year since 1994.

Productive land is the backbone of the economy of the Mallee. Chapter 2 confirms that the Mallee produces fifty per cent of Victoria's cereals, covering both wheat and barley, as well as a high percentage of Victoria's irrigated horticulture. Chapter 7 confirms that this capacity is threatened by a range of external factors including increased salinity, soil erosion, and pest plants and animals. Equally, the use of land as a productive resource also has the potential to harm the environment, whether from increased salinity or destruction of native vegetation.



Dryland farming.

This Regional Catchment Strategy is based on the judgment that agriculture in the Mallee is sustainable against triple bottom line criteria, given maintained investment in line with the targets in this Strategy. The Investment Plan will provide a process and forum through which those triple bottom line outcomes will be demonstrated. This is explored further in Chapter 13.

The Land Resources Asset also includes significant infrastructure assets such as roads, channels, pipelines, railway-lines and grain-storage. The Mallee Regional Catchment Strategy applies to these assets in a number of circumstances:

- where the assets are adversely affected by similar threats as impact on natural resource assets, eg wind-erosion effects on roads or channels, or
- to control risks to natural resource assets when those assets are created or during their operation; and

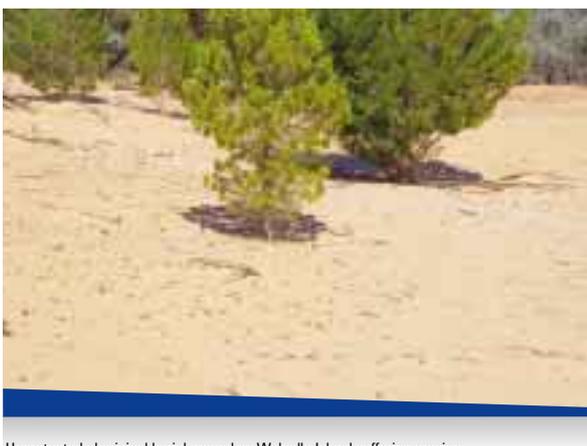
- when the assets reach the end of their useful-life, when they will require controlled decommissioning.



Grain harvest.

6.8 Cultural Heritage and Landscape Sites

The Victorian Mallee includes some very important cultural heritage sites, both Aboriginal and non-Aboriginal. It is important to preserve these significant sites. The Mallee communities need to understand them better if we are to meet this challenge. The Mallee also contains significant landscape and geological features.



Unprotected aboriginal burial ground on Walpolla Island suffering erosion.

More than 3,800 Aboriginal archaeological sites in the Mallee are recorded on the Aboriginal Affairs Victoria site register, but the non-Aboriginal community is still learning to understand where these are most likely to occur. Their location is strongly influenced by flooding regime and water availability. The boundary between non-alluvial areas and alluvial areas is particularly important. Aboriginal cultural heritage sites and places are protected under the *Archaeological and Aboriginal Relics Protection Act 1972* and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

Approximately 52 sites in the Mallee are recorded on the Register of the National Estate. Several more sites are recorded on the Victorian Heritage Register. This Strategy concentrates on cultural and heritage sites in the landscape that are potentially vulnerable to the threatening processes described in later sections.



Protection of a midden at Merbein Common with fencing and erosion control.



Aboriginal burial ground on Walpolla Island protected by fencing, erosion control in progress.

That capacity is still a vital resource for the region. The Mallee CMA has started a process to identify how best to ensure that this resource is harnessed to ensure the successful achievement of the outcomes and targets in the Mallee Regional Catchment Strategy. Landcare plays an important role in the dryland areas of the region, with twenty-nine separate groups. Waterwatch engages school groups and communities in looking after our waterways. There are also many other local and issue specific groups who take responsibility for progressing natural resource management initiatives (see Section 10.12 and Annex B).

Our current understanding of the community capacity is still only partial. What we do know is that many of those communities are under considerable pressure from a range of long term forces, including the amalgamation of farms and so a reduction in the local population, increasing mechanisation with its impact on employment, and continuing fluctuations in commodity prices and weather conditions.

A major commitment of the Mallee Regional Catchment Strategy will be to involve communities, partners and stakeholders through a collaborative exercise to:

- identify their existing resources, skills and capacity;
- confirm their strengths and achievements;
- explore the difficulties and constraints which they have experienced in engaging in effective ownership of the problems and their resolution;
- help them express their aspirations for their future roles and targets; and
- highlight the additional skills or resources required to enable those roles and targets to be achieved, and the processes required to allow full community engagement in the development and implementation of solutions.

6.9 Community Capacity

The Vision of the Mallee Regional Catchment Strategy has identified that the communities of the Mallee are at the heart of the future management of the region's natural resources. To achieve the goals of this Strategy we need well-informed communities with the skills and confidence to identify, direct and implement change.

The Mallee has a proud history of the community generating and implementing innovative and complex natural resource management projects and plans. The primary examples of this are the suite of Salinity Management Plans which created new and effective controls on irrigation from the River Murray to allow further sustainable development within Sunraysia, and established improved controls in dryland areas. These plans date from the early 1990s and involved large numbers of community representatives in significant contributions of their time and effort to develop, draft, consult on and revise the plans which have lasted for nearly a decade.

7 Threats to the Mallee's Natural Resource Assets

This section of the Mallee Regional Catchment Strategy identifies the primary threats to the natural resource, productive and cultural heritage assets of the Mallee. A detailed analysis is contained in the Catchment Condition Report. That report identifies nine major processes threatening natural resources and productive activities in the Mallee:

- Loss of ecological processes;
- Pest plants and animals;
- Altered flooding regimes;
- Land and water salinisation;
- Water pollution;
- Wind erosion;
- Changing Land Use;
- Recreational pressures; and
- Altered fire regimes.

These factors represent the primary threats to the condition and value of the resources of the Mallee region. The threats impact both on the ecosystem viability of our natural resource assets and on their productive capacity. The systematic approach set out in the Catchment Condition Report provides a mechanism to allow us to judge when a process has passed a materiality threshold to become a threat to our assets, and therefore triggers a suite of possible control measures.

There is a suite of additional pressures which can also harm the region's assets. This includes grazing pressures, rubbish dumping, firewood collection, loss of woody debris in streams, the impact of in-stream structures on aquatic biota and levees on floodplains. Climate change represents a major threat, but we have limited understanding of its implications. The major action here is to assess its probable impact and develop a strategy for responding to it.

Many of these threatening processes occur within a spatial dimension wider than the Mallee CMA region. That is, the Mallee is affected by actions and processes which occur up-stream, or outside the region, and, at the same time, generates outcomes which create adverse outcomes for users further downstream. These wider interactions highlight the importance of developing coordinated natural resource

management controls across catchments, as with the NAP funding approach to the development of strategies across all three states in the Lower Murray region.

7.1 Loss of Ecological Processes

Ecological processes include energy and nutrient dynamics - the way in which carbon and nitrogen and other chemical elements cycle through the plants, animals, soil, water and air of the landscape. They also include population maintenance processes such as reproduction, regeneration, dispersal, migration and predation. They include the conditions that trigger these processes - for example, the flooding needed to regenerate River Red Gums. And they include species interactions - such as predator-prey relationships; the competition within and between species for habitat and food; as well as symbiotic and commensal interactions.

Many things threaten ecological processes. 'Native Vegetation Retention Controls' were introduced in Victoria in 1989. Land clearing is therefore no longer a priority issue for the Victorian Mallee. Rather, the priority issues revolve around the need to protect and improve the condition of remnant vegetation. Clearance controls by themselves will not ensure that these assets survive into the future; but maintaining ecological processes will. Therefore this section concentrates on managing the threat of losing ecological processes.

In practice, the largest threat to native vegetation is overgrazing. All threatening processes discussed in this section interact with and further threaten ecological processes. Three threats to ecological processes merit particular attention. They are:

- Ecosystem fragmentation;
- Disturbed breeding and regeneration cycles; and
- Species population imbalances.

The Mallee faces serious threats to remaining flora and fauna. Habitat is the key to maintaining and enhancing biodiversity. The size, number, connectivity and quality of habitat patches, as well as the dispersal of events likely to cause extinctions, will determine how well ecological processes will continue to function.



Scalded land adjacent to River Murray caused by past overgrazing.

7.2 Pest Plants and Animals

Pest plants and animals threaten both the biodiversity of our natural resources and the productive capacity of our communities.

Once established, pest plants are superior competitors for both nutrients and water and may provide habitat for pest animals. Environmental weeds threaten native vegetation particularly on roadsides and are one of the most significant threats to the biodiversity of the region. Spined weeds in recreation areas are injurious to human health, they also degrade aesthetic values, and limit access. Spined weeds seeds are a significant food safety risk and cause consumer complaint problems in food products. Agricultural weeds compete with crops and affect the quality of produce. Their control increases the cost of production, and in extreme cases, they can diminish land capability. The distribution of pest plants varies throughout the region, according to soil type, rainfall, land use, availability of transport agents, and management practices.



Boxthorn control.

Rabbits are a significant pest animal in the Mallee. On public land, populations tend to be higher adjacent to the boundaries and in highly disturbed areas. Whilst rabbit numbers fluctuate between seasons and from year to year, there was a substantial reduction in numbers following the introduction of myxomatosis in the 1950s. Once resistance to myxomatosis set in, control depended on advances in technology (integrated use of 1080 baiting, ripping and pressure fumigation). Since 1996, rabbit populations have been historically low due to Rabbit Haemorrhagic Disease, but rabbits remain, and in some areas their numbers are rising again. Increased awareness and group action have also been a major factor in successful control programs. This emphasises the importance of engaging the community in developing effective solutions.



Rabbit warren ripping.

After rabbits, foxes are the most abundant pest animals across the region. Foxes prey on lambs and a wide range of native mammals, reptiles and birds. Rabbits are another food source for foxes and as this source is eliminated, fox control becomes a higher priority.

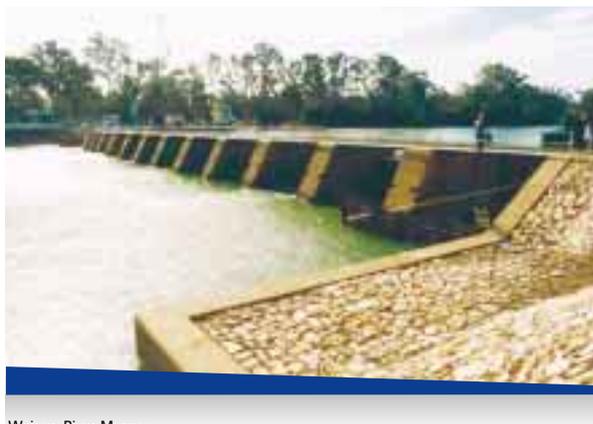
Wild dogs are also an occasional problem in some parts of the Mallee. Feral pigs are generally confined to the floodplains. Feral goats occur in the larger public land blocks such as Murray-Sunset and Hattah-Kulkyne National Parks. Feral cats, which prey on rabbits and native animals, also degrade the environment. Other pests include feral bees, hares, starlings, snails and rats. Mice and locusts threaten crops and pastures from time to time. Proliferation of mice is likely to be an ongoing issue and of particular economic significance particularly in the Southern Mallee where the use of legume crops and intensive rotations is increasing. The Mallee environment is such that these pests can have a sudden detrimental impact on the fragile soils and crops.

An important factor in the proliferation of pests and their control is the availability of harbour and food sources. There are often critical interactions between public land and neighbouring private property. This interaction is two-way. Public land is sometimes regarded as a haven for pest plants and animals that may adversely affect adjacent private land. Conversely, activities on private land may impact on the fragile eco-systems on neighbouring sites of high-conservation value.

European Carp, which is found in most of the region's waterways, is known to cause considerable damage to the bed and banks of water bodies. It is playing a major role in reducing native fish populations, as are other exotics such as the mosquitofish (*Gambusia*) which impacts adversely on smaller forage fish.

7.3 Altered Flooding Regimes

Changes to river flow pattern, along with the effects of weirs and dams, have harmed the full range of the original biodiversity of the river and associated wetlands and floodplains. Those changes relate to four aspects of those flows: their timing (when they occur), their frequency (how often they occur), their magnitude (how big they are) and their duration (how long they last). In many cases these threats result from actions and processes up-stream from the Mallee. For example, in the eastern Mallee, changes to natural flows in the Avoca River system have affected the health of the Tyrrell and Lalbert Creeks.



Weir on River Murray.

On the Murray, releasing water during the summer irrigation season reverses the natural flow pattern in the river. High summer flows keep the river full and permanently floods some wetlands and parts of the floodplain. This prevents the natural wetting-and-drying cycle their plants and animals depend on. Maintaining high water levels upstream of weirs and locks has a similar effect.

In the southern Mallee, storages and diversions for the Wimmera-Mallee domestic and stock water-supply system have reduced average annual flows in the lower parts of the Wimmera River and its effluent streams - the Yarriambiack, Dunmunkle and Outlet Creeks. They have also severely affected the natural flooding regimes for the wetlands along this system including Lakes Hindmarsh, Albacutya, and Corrong.

These changes have resulted in a range of adverse outcomes across the Mallee which vary by location:

- Death of River Red Gums and changes in riverine plant communities that are important habitat for native birds, animals and fish;
- Reduced ecosystem diversity;
- Increased river bank erosion; and
- Loss of the natural breeding cues for fish, birds, plants and aquatic insects.



Bank erosion at Murphy's Creek - Piangil.

Many wetlands rely on flooding and drying cycles. The flooding of wetlands promotes rapid growth of plants, fish, birds and animals, encouraging them to breed. As floodwaters fall, nutrients and insects in the wetlands drain into the river to provide nourishment for other animals.

Changed flow patterns mean that medium-sized spring floods occur less often, and fall more quickly than they did naturally. Shorter floods reduce the breeding of many native plants and animals. For instance, many waterbirds require relatively long floods (3–5 months) for the hatchlings to mature and leave the nest. When floods are shortened because water is being stored in dams, the birds abandon their nests and the chicks starve or are eaten by predators.



Regeneration of Red Gum occurred near the River Murray following flooding in 1992.

Many native fish use changes in water temperature and flow as cues to migrate and breed. Juvenile fish require warm temperatures and reliable food resources for survival. Native fish numbers across the wider Murray Darling Basin are also falling because of cold water releases from large dams upstream, their inability to migrate past dams and weirs, and the lack of flooding and food sources for baby fish.

Many native plants and animals of the river system depend on specific daily or seasonal flow patterns to breed, survive and grow. This means that to be effective, environmental flows must occur at the right season to trigger breeding of plants and animals. They must also last long enough to allow breeding to complete.

These issues confirm that the volume of the flows is not the sole measure. It is also critical to identify and meet ecological needs related to the timing, frequency, magnitude and duration of flooding events. Even in the absence of increased flows, water levels can be manipulated to provide wetlands with seasonal wetting and drying cycles.

The proposed pipelining of the Wimmera-Mallee domestic and stock water supply system will, over the long-term, provide opportunities for more natural flows to be returned to the Wimmera River and its effluent streams. The Mallee CMA will work closely with the Wimmera CMA to ensure these improvements are shared with the Yarriambiack, Outlet and Dunmunkle Creeks in accordance with natural trends and ecological requirements.

Equally, the initiative from the Murray Darling Basin Commission, entitled the Living Murray, is explicitly focussed on increased environmental flows for the River Murray. This will play a critical role in protecting the longer-term health of the Murray within the Mallee.

The Mallee CMA will contribute strongly to this process at the regional level. However, the exercise confirms the complexity of the decision making process involved in developing an optimal trade-off between productive use of the water and ecosystem benefits.

7.4 Land and Water Salinisation

Once watertables rise to within about two metres of the soil surface, groundwater is drawn to the surface by capillary action. At the surface, the water is evaporated, but salt contained in the groundwater is left behind to accumulate. As salt concentrations in the soil gradually increase, salt sensitive vegetation is replaced by progressively more salt tolerant vegetation.



Monitoring bore to measure rising saline ground water.

Some land salinisation in the Mallee is caused by highly localised groundwater systems, and some is caused by larger 'regional' groundwater systems. Managing the more localised 'perched' watertables relies on 'using-up rain' where it falls so that as little as possible ends up joining the watertable. Stopping the land salinisation caused by regional groundwater is more difficult. It requires an approach across regions to reduce groundwater levels, which otherwise induce more rapid lateral flows. In the Mallee, the regional groundwater system, the Parilla Sands, poses the greatest risks in terms of land and water salinisation.

Like all water in the landscape, the water in the regional groundwater system is trying to flow downhill. Its movement through the tiny pores between the grains of Parilla Sands is very slow, but eventually it does find an outlet in low-lying parts of the landscape or through the bed of the River Murray. And while the movement of each individual drop might be slow the pressure caused by the build-up of water in the system is transmitted very quickly to those parts of the groundwater system that are close to the outlets.

Salinisation can also degrade and kill the indigenous vegetation in low-lying ecosystems, of particular concern are rising saline groundwater levels under the floodplain wetlands. Saline groundwater mounds are also likely to compromise our ability to improve flood duration due to the risk of further raising the mounds to within the root zone.

Dryland salinity is one of the most significant of the threats faced by the Mallee region over the next twenty years. That threat is particularly problematic as we still have a poor understanding of the underlying dynamics of salinity in the Mallee and lack a clear program of interventions that can be promoted and adopted with confidence.

7.5 Water Quality Pollution

The quality of the water resources of the Mallee is subject to threat from a number of sources and processes. These could diminish both the ecological sustainability of the



Rising saline groundwater near the River Murray at Psyche Lagoon. Recent works have reduced the impact.

Once again, many of these processes occur within a spatial framework that is larger than the region of the Mallee CMA. For instance, land clearing in the Wimmera increases recharge in groundwater systems. This drives increasing dryland salinity within the Mallee. On the other hand, discharges from groundwater systems, within the Mallee, increase salinity within the River Murray which can adversely affect users down-stream.

Land and water salinisation harm the economic, social and environmental values of the Victorian Mallee. For example, salinisation degrades land resources and renders them less able to generate economic returns at the local, regional and national levels. It can also shorten the life of vital community assets such as roads and buildings. In these ways it threatens the viability of some small towns.

resource, and its capacity for productive use. Those threats, which may result from processes both within the Mallee and up-stream, include:

- increased salinity;
- nutrient pollution from point and non-point sources;
- temperature effects in weir pools;
- blue green algae; and
- other pollutants, such as heavy metals, hydrocarbons and pesticides.

Salinisation of the major watercourses, such as the River Murray, is a significant threat to the sustainability of the resource. At high levels, salt levels can reduce productive use of the resource and its potential as a drinking water source. At much lower levels, increased salt levels can have significant lethal and sub-lethal effects on a variety of life stages of water based plant and animal life, particularly for the lower end of the food chain. As noted, these effects may result from actions up-stream and outside the Mallee. A significant issue impacting on wetlands adjacent to the River Murray is increased groundwater pressures/intrusion associated with weir pools.

The major salt-interception schemes and salt disposal basins operated by Goulburn-Murray Water are an important feature to protect both River Murray water quality and provide habitat values for wildlife species.

Major point sources of nutrient pollution in the Mallee include irrigation drainage water, urban stormwater, intensive animal industries, houseboats, domestic and industrial wastewater. Nutrients from point sources tend to be the main nutrient loads in rivers during dry periods when overland run-off is limited and river flow is low.

Diffuse sources of nutrient pollution in the Mallee include urban stormwater, surface water contaminated by soil erosion, groundwater, agricultural fertilisers, grazing, and animal wastes. In-channel sediments provide a significant source of nutrients. Land clearing and agricultural development has contributed greatly to increasing diffuse nutrient inputs. Diffuse source nutrient inputs increase dramatically following heavy rain and are most significant during high river flows.



Outbreak of blue-green algae adjacent to River Murray near Mildura.

Algal blooms are not the result of any single variable. Rather they represent the coincidence of particular nutrient, light, temperature, water flow and weather conditions. The human health costs range from skin and eye irritations from primary contact through to toxicity from ingestion. Apart from their potential to produce toxins, the blooms' demands for oxygen, as they develop and as they decay, seriously threatens aquatic biota with oxygen depletion. Therefore the level of dissolved oxygen is an important indicator of water quality.

Additional forms of water pollution include heavy metals, hydrocarbons and pesticides. A key priority for the Mallee Regional Catchment Strategy is to establish a comprehensive monitoring program to develop an improved database covering the full range of water pollutants to allow an informed and cost effective control strategy.



Waste water plantation at Mildura.

Blue-green algae can present a threat when they form blooms. In Australian rivers, blue-green algae have come to be recognised as a symptom of degraded water quality and an unhealthy environment. They create adverse impacts on the environment, human health and productive uses. A major algal bloom in the Mildura Weir pool could have a catastrophic impact on the international sales and marketing of regional horticultural products because of the negative perceptions of key overseas markets and the loss of the region's clean green image.

7.6 Wind Erosion

Wind erosion threatens most agricultural land in the Mallee. In any one year, up to seven per cent of the dryland Mallee is at risk of erosion prior to sowing. The potential for erosion is highest in the low rainfall parts of the Murray Mallee Bioregion and in those parts of the Lowan Mallee that have been cleared for agriculture.



Erosion from adjoining cultivation threatening fenceline.

The potential for wind erosion is highest on coarse textured soils, especially when the surface cover is removed. The most effective method of control is to maintain vegetative cover. The potential for wind erosion is therefore increased where there is frequent cultivation (whether intended for water conservation, weed or disease control) overgrazing or crop failure. Strong winds convert that potential into erosion culminating in soil loss and dust storms. Low winter rainfall is also a predisposing factor as this reduces the potential for ground cover. Drought clearly exacerbates the risk. The optimal solutions to wind erosion rest primarily with cultivation and grazing management, rather than in external actions such as windbreaks.

Dust storms from wind erosion can cause off-site public costs through the smothering of remnant native vegetation, particularly on north-south road side reserves, and impact on public utilities such as roads and channels. Airborne dust impacts on human health and safety and may also reduce the quality of life in drought years both in the Mallee and areas to the east. The main economic impact is the gradual loss of the productive capacity of the soil. Newly emerging crops may suffer damage from sand-blasting which may be severe enough on occasions to require re-sowing. Wind erosion also threatens cultural sites, especially burial grounds which are often located on sandy rises on the Murray River floodplain.

Wind erosion threatens specific areas of public land such in the Hattah-Kulkyne National Park and Wyperfeld National Park where mobile dunes are the result. At these sites soil erosion (although a natural occurrence on Mallee soils) has been accelerated by previous clearing, fire and overgrazing. Wind and water erosion also occur on scalded land on the River Murray floodplain downstream of Merbein, which has suffered in the past from severe over-grazing. This can result in the remaining topsoil being blown or washed into the river.

7.7 Changing Land Use

Changes in land use, for example the change from dryland agriculture to irrigated horticulture, can also change the relative importance of different threatening processes on that parcel of land, for instance, it is likely to create additional pressure on native vegetation. It can also result in new threats to adjoining parcels of land. Equally, the greatest threat to native grass-lands is the increase in the extent of commercial cropping.

Ironically, threats can also be created by the adoption of improved irrigation techniques if they lead to a reduction

in channel outfalls and drainage flows. This is a key issue associated with Cardross Lakes. If our intervention in the landscape has created ecological communities, then we may need to maintain that intervention to ensure no net loss of biodiversity.

On the other hand, the approval processes associated with many changes in land use can provide institutional mechanisms to place controls on those threatening processes that landholders may otherwise have had no incentive to control.

7.8 Recreational Pressures

Human recreation, particularly along waterway frontages, on floodplains and around wetlands, is a source of great pleasure to individuals and community enrichment. However, it can also threaten natural resource assets and sites of cultural significance. Those threats are manifested in a number of ways. The natural semi-arid environment is very sensitive to disturbance.

For example, the uncontrolled use of four-wheel-drive vehicles and motorcycles results in the proliferation of unauthorised tracks. This diminishes the coverage of native vegetation, and the potential for regeneration is limited by soil compaction. The tracks also expose soil to erosion and encourage the spread of weeds. Moreover, the increased access they provide enhances opportunities for illegal firewood collection and hunting. It also means that camping is more dispersed and that rubbish dumping becomes more difficult to manage. Houseboats, water skiing, fishing and camping also place pressure on natural systems.

Legal collection of firewood for camp-fire use has severely depleted the amount of fallen timber on riparian land in many areas of high visitor use. This reduces available habitat for native animals.

Recreational pressure can degrade native vegetation and habitat, exert significant pressure on native fish species through over-fishing, increase bank erosion and increase nutrient loads to waterways. It can also degrade the landscape character of the frontage and the floodplain.

Recreation activities may threaten cultural heritage sites through the impact of vehicle and people access and occasionally more deliberate actions. This impact is particularly evident on the River Murray Floodplain where visitor use is high and there is a concentration of cultural heritage sites.

7.9 Altered Fire Regimes

Changing fire regimes in the Victorian Mallee has had a range of effects on natural resource assets. The impact of these changes depend on a number of variables including the season of the burn, its intensity, frequency and duration.

There is evidence that a suite of rare Mallee birds (Malleefowl, Red-lored Whistler, Black-eared Miner, Mallee Emu-wren, Striated Grasswren, Southern Scrub-robin) prefer 'old' Mallee. Changing fire regimes may be part of the reason for their rarity, but is probably less significant than other factors such as habitat loss from clearing. Equally, Smoky Mouse

has requirements for a much shorter fire frequency. There is also some information on the effect of altered fire regimes on Scrub Pine Woodlands and Heath in the Big Desert which suggests that the absence of fire results in progressively less complex heaths.

DSE/DPI has a legislative requirement to control wild-fire, and so, consequently, some fires started by natural causes, such as lightning strikes, would be likely to burn more country if left to their own devices.

managing the threatening processes discussed above, but the commitment to improvement implies something more. It implies concerted action to improve the extent and quality of those assets.

It is also acknowledged that removal of a threat may not result in an automatic improvement of an asset. Active management of that asset may also be required, eg control of total grazing pressure may not lead to regeneration of Slender Cypress Pine at Hattah-Kulkyne National Park if



Regeneration after wildfire.

This is an issue where further research will be required to establish a clearer understanding to enable the community to agree a balance between the benefits to ecosystems from allowing fire events and the need to protect those assets and wider property interests from risk. Indigenous communities in Victoria have a growing appreciation of traditional Aboriginal burning practices and their impact on the landscape. The Mallee CMA will draw on that understanding.

7.10 Interactions Between Threatening Processes and Assets

As previously discussed, the vision for this Regional Catchment Strategy is of:

"Informed Mallee communities protecting and improving our natural resources"

This vision sees human communities at the centre of natural resource management in the region. Moreover, it sees their role as both protecting and improving the natural resource assets of the Mallee. The protection role clearly involves

there is no seed source available at the site. In these circumstances an active re-vegetation program will be required with introduced seed.

The natural resource assets of the Mallee are inherently diverse, and they exist within complex systems. Human beings need frameworks to help simplify this complexity. They also need frameworks to help connect themselves to an understanding of the natural resource assets and challenges.

The interaction between threatening processes and assets is one aspect of the inherent complexity of natural resource management. As demonstrated by Table 6 most threatening process threaten more than one natural resource asset. As a result, it is important to be clear about the relative importance of managing threats versus managing assets. In this context, it is important to realise that it is not the absolute size of the asset or threat that is important. Marginal responses are important. The chance of reducing asset damage for each threat has to be considered, not the absolute size of the asset or threat.

As a rule, protection is better and cheaper than cure. Therefore, natural resource managers should generally

focus first on protection. Protection implies managing threats, but there are scale issues. For example if the focus is on a specific ecological vegetation class, then 'protection' might involve protecting remnant stands from pest plants and total grazing pressure rather than encouraging regeneration or re-vegetation.

By contrast, if the focus is on threatened bird species, the need may be for landscape-scale change. In that case, it might involve encouraging regeneration or re-vegetation of specific ecological vegetation classes in strategic locations.

Apart from these scale issues, there are risks in solely focusing on threat management. For example, Table 6 shows that biodiversity is potentially affected by most of the threatening processes. While it would be possible (and desirable) to develop threat management plans for each of those processes, in the absence of some overall asset improvement plan, it would be difficult to know whether resources were being allocated between those threats in the right proportions.

assets of the Mallee. Those threats will be managed more efficiently and effectively if they are managed in the broader context of expected outcomes and targets for the health and well-being of the unique resources of the Mallee.

Clearly, an early challenge will be to improve the quality of our understanding of those assets, their current condition and how that condition changes over time. Chapters 11 to 13 confirm the process which will drive development of the three year Investment Plans and ensure accountability and adaptive management.

Annex A demonstrates how the specific threat-based plans, policies and strategies which inform the work of the Mallee CMA will deliver against the assets-based goals, outcomes and targets in this Regional Catchment Strategy.

Table 6 Interactions Between Threatening Processes and Assets

Assets	Terrestrial Biodiversity	Waterways, Wetlands and Floodplains	Water Resources	Land Resources	Cultural Heritage and Landscape Sites
Threats					
Loss of Ecological Processes	3	3	1	1	
Pest Plants and Animals	3	1		2	1
Altered Flooding Regimes		3	1		1
Land and Water Salinisation	2	2	3	2	1
Water Pollution Effects		2	2		
Wind Erosion Effects	2			3	3
Changing Land Use	2	1		1	1
Recreational Pressures	1	2	1	1	2
Altered Fire Regimes	2				1

1 = significant effect; 2 = severe effect; 3 = critical effect

This Regional Catchment Strategy systematically and simultaneously deals with threat management and asset improvement. But in so doing it gives primacy to managing the processes that threaten natural resource assets. Giving primacy to threat management ensures that the primary focus is always on protection rather than cure.

The Regional Catchment Strategy also delivers economies of scale in the deployment of social capital. Most institutions and their workforces are geared towards problem solving. For example, if someone is engaged in the business of rabbit control, it does not make sense for them to concentrate only on controlling rabbits where biodiversity is at stake. Rabbits must be managed throughout the landscape if there is to be any chance of success.

The threat management plans and programs triggered by this Regional Catchment Strategy will address issues at a regional level and reflect the cross border nature of many of the natural resource management issues which face the Mallee. Primacy is being placed on threat management, but only as the most efficient way of moving towards a net improvement in the condition of the natural resource



Wildflowers of the Mallee (*Halganina Sp.*)

8 Priority Issues and Plans

8.1 Prioritisation Framework

The previous chapters have highlighted the wide range of assets and threats which the Mallee Regional Catchment Strategy needs to consider and address, in developing the strategy and framework for future investment in natural resource management across the region.

This chapter indicates how an assessment of those assets and threats has been translated, through a robust process, into the priorities for future natural resource management programs across the Mallee, as encapsulated in the outcomes and targets set out in the following chapter.

Establishing these priorities has involved a sequence of judgments:

- The Catchment Condition Report identified the key assets of the region, when ranked by reference to their value, condition and threat.
- The Research and Development Needs Analysis and the Monitoring and Evaluation Framework have both identified those areas where the region currently lacks sufficient knowledge to recommend an optimal approach. In these areas the priority will be to invest in better data to improve our decision making.
- This Regional Catchment Strategy provides a strategic approach to the identification and ranking of priorities for targets and programs to address the threats to the assets. The priority targets and judgments were set through an iterative process involving the full range of stakeholders across the region and taking account of market research and feedback during public consultation. The judgments were based on triple bottom line concerns.
- These priorities will be further confirmed through the Regional Catchment Investment Plan which will use a robust and consistent methodology to identify those projects which provide the best value for money, taking account of the benefits to be won, the threats to be met, the costs which will be incurred and the risks and timescales for their achievement.

The renewed Mallee Regional Catchment Strategy represents an explicit change in emphasis and priority from the previous Regional Catchment Strategy 1997. There is now a much stronger focus on biodiversity, both terrestrial and aquatic, and a recognition that these objectives are also essential to ensure sustainable production systems.

8.2 Biodiversity

The prioritisation of future programs to progress biodiversity outcomes in the Mallee CMA region is based on a series of sequential arguments.

8.2.1 Concentrate on High Value Assets

The Catchment Condition Report has helped us identify those assets which have the greatest value for the region. Those assets represent the highest priority for the Regional Catchment Strategy. The Report allocated priority to native vegetation and species by reference to the listed communities in the *Environment Protection and Biodiversity Conservation Act 1999* and the *Flora and Fauna Guarantee Act 1988*, the bioregional conservation status for native vegetation (from ecological vegetation class mapping), and from the Victorian Bioregional Network Analysis for species.

Mallee stakeholders are aware that base-data for the Mallee is fragmentary and so a priority for this asset class is to invest in generating better quality data in targeted areas. This priority has been confirmed through the research and development needs analysis. Good progress is being made through, for example, the mapping of Ecological Vegetation Classes. This work needs to be supplemented with other information projects such as vegetation condition mapping.

8.2.2 Retain and Protect

Within the assets identified as of the greatest value, the priority should be to retain and protect existing biodiversity assets before investing in regeneration or re-establishment. This is because there is strong evidence that investment in retention and protection of existing assets yields a far greater return.



Fencing to exclude grazing.

The Mallee landscape is now so highly modified that it is not sufficient merely to protect remnants from clearing. Most are subject to continuing threats that warrant active management if the optimal benefits are to be achieved and maintained. While native vegetation cover provides us with a useful surrogate measure for fauna coverage as well, this approach has limitations that require explicit attention.

8.2.3 Maintain or Rehabilitate Ecological Processes

Victoria's native vegetation retention controls mean that land clearing is no longer a major threat in the Mallee. Nonetheless, the long-term retention of native vegetation will depend on ecological processes being maintained.

If ecological processes are to be maintained then we will need to intervene to take account of scale issues related to time and location. In short time scales, the main priority is to ensure natural regeneration processes are disturbed as little as possible. In the Mallee this means managing grazing pressures from pest animals, native animals (where there are population imbalances), and domestic animals (where the remnant vegetation is on private land or public land leased for grazing).

In longer time scales, the main priorities are to maintain genetic diversity by ensuring connectivity within fragmented ecosystems, and to maintain resilience within fragmented ecosystems by managing edge effects. At sub-regional spatial scales, the priorities will vary from location to location depending on the relative importance of different threatening processes. Finally, in managing the existing sites we need to control pressures from active harvesting of the resource.



Revegetation using indigenous species.

8.2.4 On Ground Implementation

In parallel with the above program will be a commitment to effective implementation of plans and strategies that have already been developed. These identify mechanisms for more efficiently conserving the bioregion's key biodiversity assets, assist communication and integration of conservation activities and provide incentives for the protection and enhancement of biodiversity by private land managers.

8.3 Waterways, Wetlands and Floodplains

The prioritisation of future programs to progress outcomes in the Mallee CMA region related to waterways, wetlands and floodplains is based on a three main elements.

8.3.1 Improve the Quality of Data to Improve Prioritisation and Regional Decision Making

The quality of the data available to make decisions on priorities is limited. An early priority for the Regional Catchment Strategy is, therefore, to improve this data base. There are a number of elements to that exercise:

- to undertake an audit and prioritisation study of the wetlands of the region to establish the condition, values and threats of each and the available management options;
- to undertake further river and riparian condition surveys to complement existing Index of Stream Condition (ISC) baseline information;
- to develop a Regional River Health Strategy and further develop integrated decision support systems, such as the State's RIVERS database, to improve riparian and waterway management priority setting;
- to establish an integrated water quality monitoring program and database for major waterways; and
- to improve an understanding of natural flooding regimes and ecological flooding requirements and how to maximise benefits from available flows.

8.3.2 Prioritise Actions and Strategies

Given an improvement of our knowledge base, priorities will be established, through the Regional Catchment Investment Planning process on the basis of:

- first, protecting existing high value waterways, floodplains and wetlands;
- then, maintaining the condition of ecologically healthy systems;
- finally, restoring those assets where there is:
 - the highest environmental and community gain for the resource invested, and
 - real community commitment towards long-term improvements in river health.
- while ensuring prevention of damage from our management activities.

8.3.3 Implement Plans and Strategies

To implement existing priorities established under current programs, strategies and plans, such as the Mallee Waterway and Floodplain Management Strategies, the Mallee Salinity and Water Quality Management Plan and the Murray River Frontage Action Plans.

8.4 Land and Water Resources

Landholders should take responsibility for actions on private land. The first priority for the Regional Catchment Strategy is to control the risks of adverse externalities from our use of resources, whether land or water. The most effective element of this approach is to ensure that new irrigation developments are subject to adequate controls to minimise any additional impacts.

The second priority for the resources assets is to ensure a well-judged balance between the benefits from use of those resources for production, against the values and outcomes from their ecosystem or environmental uses.

The Regional Catchment Strategy also has a role to play where there is evident market failure. These occur when the decisions and actions of individual landholders do not generate optimal outcomes. Examples include:

- the significant public benefits which can arise from actions taken on private land, eg from native vegetation management controls which support wider objectives; or
- where coordinated actions between landholders and/or public agencies can promote greater benefits. Examples include dryland salinity control and rabbit warren-ripping.



Mallee vegetation.

Particular priorities for irrigation and dryland programs are:

Irrigation Environment

The Salinity and Water Quality Management Plan will drive investment in priorities for water and land use and biodiversity conservation in the irrigation sector:

- **New Developments:** to direct new developments in the irrigation sector to locations which will create the least adverse effects from salinity, and minimise damage to native vegetation or cultural heritage sites;
- **Water Use Efficiency:** to create incentives for greater water use efficiency in irrigation to reduce groundwater accessions and saline discharges to the river; and
- **Drainage Schemes:** to promote more effective coordinated, regional drainage schemes to prevent saline flows to the river and minimise localised adverse effects from water logging or salinity.

Dryland Environment

Dryland productive priorities focus on three key areas:

- **Dryland Salinity:** gaining a better understanding of the dynamics which drive dryland salinity. This basic science should be the priority over the next five years rather than investment in potential control strategies which may be misplaced until our understanding of the underlying hydrogeology is improved. The Salinity and Water Quality Management Plan provides the main focus for this program;
- **Wind Erosion:** developing practical solutions to minimise wind erosion. Our current approaches, which include trash retention and minimal mechanical fallowing, are not yet proven to be practical or economically competitive with traditional approaches; and
- **Whole Farm Plans:** promoting the development and adoption of whole farm planning as a framework to drive the full suite of natural resource management and production outcomes. The reconfiguration of farms following the introduction of the Wimmera Mallee Pipeline will provide a valuable opportunity to promote this approach.



Trash retention farming.

8.5 Cultural Heritage Sites

The Mallee CMA has commenced a process of engagement and consultation with indigenous communities and stakeholders in the Mallee. A major concern for these groups is the proper protection of sites with cultural heritage significance. The Mallee Regional Catchment Strategy promotes a staged approach to progress in this area as a priority, through:

- an assessment of the Catchment undertaken by a heritage consultant including:
 - detailed surveys of all priority areas,
 - sites prioritised by type, for condition assessment, and
 - developing an agreed process to record impact assessment and measurement of actions;
- this will provide the base data to develop a Cultural Heritage Action Plan covering:
 - procedures for identifying sites and engaging traditional owners and other stakeholders,
 - a reassessment schedule for surveyed sites outlined, and
 - "Best Practice" guidelines for managing sites.



Fenced aboriginal burial ground on Walpolia Island suffering damage by feral pigs.

8.6 Capacity Building and Education

The vision of the Mallee Regional Catchment Strategy has identified 'Informed Mallee Communities' at the centre of the process of 'protecting and improving our natural resources'. The natural resource management challenges that we face require investment in people as much as in on-ground action. Major long-term changes in natural resource management will only occur when individuals and communities believe that they have control over the programs that shape their landscapes.

A key priority for the Mallee Regional Catchment Strategy is, therefore, to work with the full range of communities, partners and stakeholders across the Mallee to establish a coherent and systematic capacity-building program with at least the same rigour and emphasis as is in place for on-ground works.

This capacity-building will include improving awareness, provision of training and education, technical advice, planning support at a property level and sharing of the cost of works between the community and the landholder. Support for community groups will include coordination and facilitation of projects, and sharing the costs of works. Leadership and monitoring and evaluation also contribute to community capacity along with partnerships and clarity on roles and responsibilities.



Carpet Python field day with Tyrrell College.

A primary focus will be to assess the existing levels of participation by landholders in current programs and the extent to which these programs have been effective in driving adoption of changed practice.

Many elements of the capacity building program are already understood, but they need to be collated and addressed in a more systematic and strategic way. They need to be integrated with the goals and targets for the other assets in this Regional Catchment Strategy. That will ensure that the potential for the human and social capital of the Mallee region to resolve problems is considered alongside the natural resource management issues.

Key commitments include:

- Collaborative reviews completed with all major stakeholder to establish Action Plans for capacity building;
- Database established on community capacity;
- Develop and implement a five year Mallee Regional Community Action Plan;
- Develop and maintain a Community Action Group Steering Committee to guide and develop the direction of community action in the region;
- Develop and maintain the Mallee Regional Landcare Network; and
- Maintain existing programs such as Waterwatch.

8.7 Key Action Plans

The Outcomes and Targets in the next Chapter list the range of Action Plans, strategies and policies relevant to each goal. Annex A provides a full listing of these plans and demonstrates how they apply to each goal.

Nine such plans stand out as representing the major building blocks for current and future natural resource management projects across the region. These are:

- Mallee Biodiversity Action Plans;
- Mallee Floodplain and Waterway Management Strategy;
- Mallee Parks Management Plan;
- Murray River Frontage Action Plans;
- Mallee Native Vegetation Plan;
- Mallee Rabbit Management Action Plan;
- Regional River Health Strategy (to be developed);
- Mallee Salinity and Water Quality Management Plan; and
- Mallee Weed Action Plan.

The following section highlights the main activities from these priority plans, which will drive achievement of the targets and outcomes identified in the Mallee Regional Catchment Strategy.



Regent Parrot needs tree hollows for nesting. Photograph: Peter Menkhorst.

Mallee Biodiversity Action Plans (five overviews and seven zone plans across the region)

- Plan and implement detailed on-ground actions by land managers to improve habitat.
- Provide a regional overview of the planning and management of biodiversity.
- Summarise remaining biodiversity assets in the bioregion.
- Identify priorities for conservation and restoration of biodiversity.
- Identify mechanisms for more efficiently conserving the bioregion's key biodiversity assets, including threatened vegetation communities, threatened species and important remnant habitats.
- Provide the basis for further biodiversity planning at increasingly finer scales.
- Assist communication and integration of conservation activities by private landholders, community groups, corporations and all levels of Government



Surveying for index of stream condition, 2002.

Mallee Floodplain and Waterway Management Strategy

- Provides a framework of actions for the management of waterway and water quality issues that affect the health of the River Murray and its anabranches and other waterways in the region.
- Provides specific actions for implementing effective floodplain management measures to reduce the adverse effects of flooding to life, safety and property and to protect and enhance the environmental values of floodplains.



Pink Lakes is a feature of the Murray Sunset National Park.

Mallee Parks Management Plan

This plan sets out management actions and priorities for programs to be progressed by Parks Victoria in conjunction with local and regional partners. It is supported by more location specific plans.



Competing uses of River Murray frontage at Nangiloc, showing unrestricted access to pumps.

Frontage Action Plans (three plans for stretches of the River Murray)

- Provide a framework of actions to protect and restore areas of riparian land along the River Murray. This includes actions:
 - to reduce recreation pressures, total grazing pressures and the impacts of water diversion works,
 - to contain and reduce the impact of pest plants and animals,
 - to retain and protect riparian vegetation and flora and fauna habitat,
 - to restore degraded areas,
 - to increase community awareness of waterway and riparian issues;
 - to protect cultural heritage sites, and
 - to reduce sedimentation and nutrient inputs to the River Murray.
- Develop co-operative/voluntary partnership arrangements with key stakeholders, community groups, licensees and land managers.

Mallee Native Vegetation Plan

- Increase awareness and appreciation of the value of Native Vegetation.
- Manage remnant native vegetation on private land, particularly the grassy woodlands, woodlands and grasslands, for example Pine-Buloke woodlands and protect from threatening processes.
- Restore linkages between priority remnants that are locally or regionally significant where corridors have been fragmented or removed.
- Actively improve quality of degraded priority areas, by addition of appropriate understorey and overstorey species that are absent or depleted.



Planting of corridor to link remnant vegetation.

Mallee Rabbit Management Action Plan

- Reduce impact of rabbits on biodiversity and agricultural production.
- Co-ordinate rabbit control programs.

Regional River Health Strategy (to be developed)

- Will identify key assets and threats, set broad priorities for protection and restoration using a risk based approach and will provide implementation and resource condition targets based on river health objectives set for major river management units.

Mallee Salinity and Water Quality Management Plan

- Reduce drainage volumes from irrigated horticulture through improved on-farm irrigation management through grower training and adoption of improved water management technology.
- Design and construct co-ordinated drainage infrastructure for irrigated land where salting threatens adjoining wetlands or river.
- Guide new irrigation development to minimise and offset its impact on the environment.
- Investigate groundwater processes and trends, for informed decision making.

- Improve water use in dryland farming systems.
- Manage dryland discharge sites according to capability.
- Protect environmental assets from salinity.
- Reduce sedimentation and nutrient inputs to the River Murray and other waterways and waterbodies.
- Protect and enhance the quality of the River Murray and other water bodies.



Viticulture drip irrigation.

Mallee Weed Action Plan

- Identify and plan for control of new and emerging weeds that threaten assets.
- Control or contain priority weeds that threaten agricultural land use, for example Silver-leaf nightshade.
- Control of weeds that threaten biodiversity, for example, Boxthorn.



Left - Right 1 Weed control in action. 2 An infestation of Prickly Pear after treatment

9 Goals, Outcomes and Targets

The Regional Catchment Strategy needs to have goals and targets to focus our energies and prioritise our investments.

9.1 Goals

The Regional Catchment Strategy sets a goal for each of the six major assets across the Mallee. These remind us of where we are going and what we want to achieve in the broadest sense. They help us look beyond our immediate work programs and practical tasks to gain a sense of why we are engaged in our vision to protect and improve our natural resources.

- 1 **Biodiversity:**⁴ *To maintain ecological processes and to protect and improve the extent and quality of biodiversity in the Mallee.*
- 2 **Waterways:**⁵ *To protect and improve waterway, wetland and floodplain health, taking account of the ecosystem and recreational services these provide to the people of the Mallee and other users downstream.*
- 3 **Water Resources:** *To protect and improve the quality of water resources associated with people's entitlements to water, taking account of environmental constraints.*
- 4 **Land Resources:** *To protect and improve the capability of land resources in the Mallee to support ecological processes, primary production and built infrastructure.*
- 5 **Cultural Heritage Sites:** *To protect cultural heritage and significant landscape sites and to manage the risks to all sites.*
- 6 **Community Capacity:** *To promote self-reliant and informed communities able to identify, direct and implement change to protect and improve our natural resources.*

⁴ This goal covers terrestrial native biodiversity. Aquatic biodiversity is covered in the following goal for waterways. Targets for the use of water and land as resources are covered in later goals.
⁵ This goal covers biodiversity of aquatic systems. The following goal on water resources covers the use of water as a productive resource.

9.2 Outcomes and Targets

Goals inspire us but they cannot direct our actions. The following sections, therefore, identify the outcomes and targets for each of the asset classes to achieve those goals. The following tables are in a standard format, e.g.

Goal: To...

Outcomes	Achievable Resource Condition Targets	Management Action Targets
1	•	•
2	•	•
3	•	•

Key Strategies, Policies and Plans
Federal and State-based Strategies and Policies •
Mallee Regional Plans and Policies •

This format differentiates between the different elements of those Outputs and Targets,

- **Goals:** the table re-states the goal for each asset class.
- **Aspirational Outcomes:** that overall goal is better defined through a series of Outcomes in the first column of the table. These provide an indication of the endpoints and objectives that we seek to achieve.
- **Achievable Resource Condition Targets:** these cover all relevant 'matters for targets and indicators' outlined in the 'National Framework for Natural Resource Management Standards and Targets'. These are generally 10 to 20 year targets, however in some cases it is not yet possible to describe the baseline conditions or to quantify the specific targets. In keeping with the National Action Plan for Salinity and Water Quality Bilateral Agreements, this Regional Catchment Strategy includes a commitment to quantify all these targets by the end of 2004.
- **Management Action Targets:** the table then identifies broad actions to meet the Resource Condition Targets. More specific 'time-bound' actions are set out in the detailed Action Plans and programs to be promoted through the Investment Plan.
- **Key Strategies and Plans:** each table is supported by a chart listing relevant Federal, State and Regional strategies that will help with the successful achievement of the outcomes and targets.

The outcomes and targets were set by a series of workshops of regional partners who brought considerable personal and professional expertise to the trade-offs between the standards to be met and the costs and practical implications of achieving them.

9.3 Biodiversity Outcomes and Targets

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	Management Action Targets
<p>1 The extent, diversity and condition of all Ecological Vegetation Classes maintained above self sustaining thresholds.</p>	<ul style="list-style-type: none"> • Net gain in extent and condition of Ecological Vegetation Classes. • 30% native vegetation cover across each bioregion. • Increased extent of each Ecological Vegetation Class to at least 15% of pre-1750 extent. • 20% improvement in condition across all conservation significance levels using the 'Habitat Quality Assessment' method. 	<ul style="list-style-type: none"> • Baseline conditions determined and target levels set and quantified. • Improved knowledge of terrestrial ecology to enable better management of threatening processes. • Vegetation extent and quality assessments completed at priority sites using the 'Habitat Quality Assessment' method (as determined by 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% 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). • Mallee drought management strategy developed and implemented. • Implement relevant regional strategies and plans
<p>2 Threatened ecological communities and threatened species populations recovered to self-sustaining levels and secured against further decline.</p>	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Recovery plans established and implementation to commence for nationally endangered species, with ten completed in 5 years. • Management plans (including Action Statements) established and implementation commenced for 'response-level-4' species (as determined by Bioregional Network Analysis), with 10 completed in 5 years. • Priority remnants linked by corridors (as determined in Biodiversity Action Plans), with 10% completed in 5 years. • Population monitoring of priority populations (as determined in Biodiversity Action Plans). • Management plans (including Action Statements) for threatened ecological communities developed and implemented. • Reintroduction of regionally extinct species
<p>3 All ecologically invasive species controlled</p>	<ul style="list-style-type: none"> • Rabbits controlled at less than one rabbit per spotlight kilometre and less than one active entrance per hectare of rabbit habitat. • Other priority invasive species controlled, or contained, at (yet to be determined) levels. 	<ul style="list-style-type: none"> • Define impact for all ecologically invasive species and control levels. • Regional Action Plans prepared for priority pest plants and animals and control initiated
<p>4 Ecological processes, restored to meet ecological needs.</p>	<ul style="list-style-type: none"> • A net reduction in the impact of salinity, groundwater and nutrients on ecological processes. • Appropriate ecological fire regimes in place. • Maintain and enhance natural regeneration processes for native vegetation. 	<ul style="list-style-type: none"> • Priority ecological processes identified, maintained and enhanced. • Implement existing statements for potentially threatening processes and establish new statements as required. • Municipal Strategic Statements and Outline Development Plans aligned with the 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 property boundaries, especially along roads and linear reserves, and buffer plantations of indigenous vegetation promoted around new irrigation developments.

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Biodiversity Outcomes	Achievable Resource Condition Targets	Management Action Targets
5 Native vegetation on private land managed according to biodiversity outcomes.	<ul style="list-style-type: none"> A net gain in the extent and condition of native vegetation on private land. 	<ul style="list-style-type: none"> 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. Ecologically sustainable agricultural systems developed and operating. Strategies developed to allow the movement of farm machinery while protecting biodiversity on priority road reserves. 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).
6 Ecosystem services managed sustainably.	<ul style="list-style-type: none"> Ecosystem services maintained at levels that avoid or minimise further loss in extent or quality of biodiversity. 	<ul style="list-style-type: none"> Improved 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. Management plans agreed with relevant industries to address the maintenance of ecosystem services.

Biodiversity: Key Strategies, Policies and Plans

Federal & State-based Strategies and Policies

- *Environment Protection and Biodiversity Conservation Act 1999*
- National Strategy for the Conservation of Biological Diversity 1996
- Action Statements under State and Federal Protected Species Legislation
- The National Reserve System
- Victoria's Biodiversity Strategy 1997
- Victoria's Native Vegetation Management-A Framework for Action 2002
- Land Conservation Council Review, Final Recommendations 1989
- Victorian Pest Management-A Framework for Action 2002

Mallee Regional Plans and Policies

- Mallee Parks Management Plan 1996
- Mallee Native Vegetation Plan (draft)
- Biodiversity Action Plans (draft)
- Mallee Weed Action Plan 2001-2005
- Mallee Rabbit Management Action Plan 2000-2005
- Mallee Roadside Management Strategy 1998
- Mallee Regional Greenhouse Strategy (to be developed)
- Management plans to be developed that address sustainability for harvesting of natural resources (hardwood, firewood, minerals, pollen)
- 'Outline Development Plans' for irrigation development in line with Municipal Strategic Statements
- Mallee Salinity and Water Quality Management Plan (draft) 2003
- Fox, Feral Cat, Feral Pig, Wild Dog and Feral Goat Action Plans (to be prepared)
- Feral Bee Management Strategy (to be prepared)



Left - Right 1 Tyrrell Creek fencing project undertaken by landholders. 2 Direct seeding of indigenous vegetation. 3 Emubush in flower.

9.4 Waterway, Wetland and Floodplain Outcomes and Targets

Waterway, Wetland and Floodplain Goal: To protect and improve waterway, wetland and floodplain health, taking account of the ecosystem and recreational services these systems provide to the people of the Mallee and other users downstream.

Waterway, Wetland and Floodplain Outcomes	Achievable Resource Condition Targets	Management Action Targets
<p>1 The extent, diversity and condition of aquatic, riparian and floodplain ecosystems, and associated ecological processes, are protected and improved.</p>	<ul style="list-style-type: none"> • A yet to be determined increase in the length of waterways and riparian areas in excellent or good condition as defined in the Regional River Health Strategy. • A yet to be determined increase in the number of wetlands in excellent or good condition as defined by international, national and state criteria. • All waterways improved in at least one rating in the measurement of riparian condition. • A net reduction in damage to ecological processes caused by salinity, groundwater, nutrients and altered flooding regimes. • A yet to be determined increase in the length of riparian areas subject to cooperative management agreements. • A yet to be determined increase in the length of waterways and area of wetlands, where in-stream habitat has been reinstated. • A medium term (20 year) nutrient reduction achieved of 40-50% of Total Nitrogen (TN) and Total Phosphorus (TP) input from the Victorian Mallee into the Murray River and other regional waterways and wetlands. • A yet to be determined increase in the number of monitoring sites meeting SEPP and MDBC environmental quality objectives. 	<ul style="list-style-type: none"> • Information on baseline conditions improved and target levels set and quantified. • Improved knowledge of aquatic ecology and ecological processes developed to guide better regional decision-making. • Priority actions implemented to improve riparian, floodplain, wetland and waterway health in accordance with the Mallee Waterway and Floodplain Management Strategies, the Victorian Mallee Salinity and Water Quality Management Plan and other existing regional action plans and strategies (refer list below). • Regional River Health Strategy developed and further priority actions identified. • Regional Wetland Audit and Prioritisation Framework developed to guide future investment and to identify further sites for national or international recognition. • Riparian, waterway and wetland action plans completed and implemented for all remaining priority waterways and wetlands. • Plans developed and implemented to protect and meet obligations for nationally and internationally recognised wetland sites. • Cooperative management agreements developed for the protection and restoration of riparian land. • Increased community awareness and involvement developed through programs such as the Murray River Frontage Action Plan project, Waterwatch and Riverwatch.
<p>2 Environmental benefits of floods maximised, while risks to human life and property minimised.</p>	<ul style="list-style-type: none"> • A yet to be determined improvement in the ecological health of floodplain and wetland ecosystems through improved water management and floodplain linkages. • A net decrease in flood risk and the magnitude and cost of damage from floods. 	<ul style="list-style-type: none"> • Appropriate monitoring and research undertaken to better understand natural flooding processes and ecological flooding requirements. • Regional investigations undertaken and measures implemented to support MDBC and state environmental flow programs for priority areas. • Flood studies and floodplain management plans developed to assess and treat flood risks. • Priority actions implemented to reduce the risk and damage of floods in accordance with the Mallee Waterway and Floodplain Management Strategies.

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Waterway, Wetland and Floodplain Outcomes	Achievable Resource Condition Targets	Management Action Targets
<p>3 Threatened species populations recovered to self-sustaining levels and secured against further decline.</p>	<ul style="list-style-type: none"> • No decline in populations for a yet to be determined % of rare or threatened species. • A yet to be determined improvement in the status of designated freshwater dependent focal species. • Increase in size, range and number of populations of rare or threatened species to (yet to be determined) stable levels. • A yet to be determined increase in length of waterways accessible to native fish. 	<ul style="list-style-type: none"> • Recovery plans established and implemented for priority species. • Population monitoring of priority populations. • Plans developed for the protection and repair of key components of aquatic and riparian habitat. • Plans developed for the adequate passage and migration of fish and other aquatic fauna. • Reintroduction of regionally extinct species.
<p>4 All ecologically invasive species controlled</p>	<ul style="list-style-type: none"> • Priority invasive species controlled or contained to (yet to be determined) levels. 	<ul style="list-style-type: none"> • Appropriate research undertaken to better understand the cause, spread and impacts of invasive species. • Control levels defined for all ecologically invasive species. • Regional Action Plans completed and implemented for priority pest plants and animals.
<p>5 Use, development and harvesting of waterways, wetlands and floodplains managed on a sustainable basis.</p>	<ul style="list-style-type: none"> • Ecosystem services 'harvested' at levels that do not incur further loss in extent or quality of biodiversity. • New development and use within or adjacent to floodplain, wetlands and waterways areas compatible with environmental, cultural and scenic values. 	<ul style="list-style-type: none"> • Development of State and regional Management plans supported for relevant industries (for example firewood, irrigation drainage management and recreation). • Review existing guidelines and support the development of new Best Management Practice and/or Development guidelines. • Local municipal strategic statements, local planning policies and controls aligned with outcomes, targets and actions of the Regional Catchment Strategy.

Waterways, Wetlands and Floodplains: Key Strategies, Policies and Plans

Federal and State-based Strategies and Policies

- Draft Forest Management Strategy – Mildura Floodplain State Forests
- Land Conservation Council Mallee Area Review, Final Recommendations 1989
- Management of Victoria's Ramsar Wetlands Strategic Directions Statement
- MDBC Floodplain Wetlands Management Strategy for the Murray-Darling Basin
- MDBC Algal Management Strategy
- A Directory of Important Wetlands in Australia
- National Management Strategy For Carp Control 2000-2005
- MDBC Daughterless Carp Program
- MDBC Draft Native Fish Strategy 2002-2012
- 'The Living Murray' MDBC Discussion Paper & related reports
- State Environment Protection Policies (SEPP)
- Victorian River Health Strategy 2002
- Victoria's Biodiversity Strategy 1997
- Victoria's Planning Provisions (VPP)
- Victorian Pest Management Framework - A Framework for Action 2002
- Victorian Flood Management Strategy 1998
- Floodplain Management in Australia - Best Practice Principles and Guidelines

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Waterways, Wetlands and Floodplains: Key Strategies, Policies and Plans

Mallee based Strategies and Plans

- Avoca River Health Strategy
- Biodiversity Action Plans (Draft)
- Municipal Planning Schemes
- Murray River Frontage Action Plans 2002
- Other river health action or management plans (as developed)
- Regional River Health Strategy (to be developed)
- Stormwater Management Plans
- Sunraysia Drainage Strategy 2002
- Water Management Plans (ie Hattah Lakes, Lindsay & Walpolla Islands - under development)
- Mallee Salinity and Water Quality Management Plan Draft 2003
- Waterway and Floodplain Management Strategies 2001
- Mallee Rabbit Management Action Plan 2000-2005
- Mallee Weed Action Plan 2001-2005
- Wetland Operation Plans
- Wetland Audit and Prioritisation Framework (to be developed)
- Wimmera Regional Floodplain Strategy
- Yarriambiack Creek Management Plan (to be revised in 2003)

9.5 Water Resource Outcomes and Targets

Water Resource Goal: To protect and improve the quality of water resources associated with people's entitlements to water, taking account of environmental constraints.



Left - Right 1 Undervine drip irrigation. 2 Overhead sprinklers on citrus.

Water Resource Outcomes	Achievable Resource Condition Targets	Management Action Targets
<p>1 The quality of surface water and groundwater is maintained and enhanced</p>	<ul style="list-style-type: none"> • Regional contributions to nitrogen loads in aquatic environments reduced by a percentage to be determined. • Regional contributions to phosphorus loads in aquatic environments reduced by a percentage to be determined. • Regional contributions to oxidised nitrogen loads in the River Murray reduced to a yet to be determined level. • Algal counts maintained below alert levels in the Regional Weir Pools. 	<ul style="list-style-type: none"> • Information on baseline conditions improved and target levels set and quantified. • Coordinated water resources monitoring program implemented. • Federal, State and MDB Ministerial Council objectives for nutrients, salt and other pollutants fulfilled. • Information on threats to water quality improved to enable the development of cost-effective management strategies. • A robust and comprehensive database on water quality developed. • The need for regional turbidity targets assessed.

Water Resource Outcomes	Achievable Resource Condition Targets	Management Action Targets
<p>2 The 'legacy of clearing' impacts on River Murray salinity minimised and a net reduction in other regional contributions to River Murray salinity.</p>	<ul style="list-style-type: none"> Regional contributions to river salinity at Morgan reduced by a yet to be determined number of EC units. 	<ul style="list-style-type: none"> No net increase in river salinity arising from water trade. Improvements in irrigation management to reduce river salinity by a yet to be determined number of EC units. Regional salt interception works to reduce river salinity by a yet to be determined number of EC units. End-of-valley targets under the Basin Salinity Management Strategy achieved.
<p>3 Surface water and groundwater securely allocated for consumptive use within the sustainable capacity of the water resource</p>	<ul style="list-style-type: none"> Secure, sustainable water allocations in place for all users Environmental water entitlements increased by a yet to be determined level. 	<ul style="list-style-type: none"> Contribute to the completion and implementation of the Wimmera-Mallee Bulk Water Entitlements as a significant stakeholder to ensure appropriate environmental outcomes. Helping to ensure the environmental outcomes embodied in the Murray Bulk Water Entitlements are met. Helping to ensure the environmental outcomes embodied in the Murrayville Water Supply Protection Plan met Regional contribution to the 'Living Murray' environmental flows process. Region recognised as an active contributor to the development of state, federal and Murray-Darling Basin policy formulation. Regional contribution to development and implementation of Wimmera Mallee Pipeline to ensure inclusion of Mallee concerns and priorities. Sunraysia Infrastructure Refurbishment study progressed. Total environmental entitlements increased by a yet to be determined level by pipelining the Wimmera-Mallee domestic and stock system. Total environmental entitlements increased by a yet to be determined level by refurbishing irrigation district infrastructure. Total environmental entitlements increased by a yet to be determined level by implementing a voluntary scheme for permanent and annual transfers from consumptive use.
<p>4 Production systems developed that maintain or enhance water quality and prevent and manage salinity.</p>	<ul style="list-style-type: none"> Average irrigation drainage volumes at annual maximum of 1 megalitre per hectare. 	<ul style="list-style-type: none"> Regional irrigation, nutrient and biodiversity management to exceed national best practice. Local government planning policies in place to support regional goals. Continuous upgrade of irrigation systems and water use efficiency.

Water Resources: Key Strategies, Policies and Plans

Federal and State-based Strategies and Policies

- Bulk Water Entitlements under the *Water Act* 1989
- Murray Darling Basin Ministerial Council Water Quality Objectives
- Murray Darling Basin Salinity Management Strategy 2001-2015
- 'The Living Murray' MDBC Discussion Paper and related reports
- State Environment Protection Policies for surface and groundwater
- Victorian Salinity Management Framework 2000

Mallee Regional Plans and Policies

- Municipal Stormwater Management Plans
- Municipal Strategic Statements
- Murrayville Groundwater Supply Protection Area Management Plan 2001
- Mallee Salinity and Water Quality Management Plan Draft 2003
- Sunraysia Drainage Strategy
- Sunraysia Infrastructure Refurbishment Study
- Wimmera Mallee Pipeline Feasibility Study

9.6 Land Resource Outcomes and Targets

Land Resource Goal: To protect and improve the capability of land resources in the Mallee to support ecological processes, primary production and built infrastructure



Salt affected land requiring treatment.

Land Resource Outcomes	Achievable Resource Condition Targets	Management Action Targets
<p>1 The impact of salinity on locations and systems that are critical for conservation of biodiversity, agricultural production and community infrastructure is avoided or minimised.</p>	<ul style="list-style-type: none"> • Total groundwater recharge reduced by 20%. • Land threatened by salinisation reduced from 10% to 8% of total land surface. 	<ul style="list-style-type: none"> • Information on baseline conditions improved and target levels set and quantified. • Extent of critical assets identified to enable better planning. • Information on salt mobilisation trends improved to enable better investment planning. • Land capability mapped and land use monitored to enable continuous improvement in land management and continuous reduction in groundwater recharge. • Farming systems that reduce groundwater recharge adopted. • Management actions in place to protect infrastructure and built assets affected by rising saline groundwater. • All land affected by rising saline groundwater covered by appropriate management action plans. • Regional Salinity and Water Quality Management Plan approved and implemented.
<p>2 Improved soil health</p>	<ul style="list-style-type: none"> • Soil health maintained at yet to be determined benchmark levels. • Negligible erosion throughout the Mallee in 6 out of 10 years. • The extent of actively eroding land in dry years confined to 3%. 	<ul style="list-style-type: none"> • Regional Soil Conservation Plan developed and implemented. • Farming systems that minimise wind erosion adopted. (For example, stock containment practised in 80% of dryland properties in drought years.) • Improved understanding of the relationship between land management practices and soil organisms in order to minimise damage to soil invertebrates and micro-organisms.

Land Resource Outcomes	Achievable Resource Condition Targets	Management Action Targets
3 Pest plants and animals controlled.	<ul style="list-style-type: none"> Comprehensive containment of non-endemic priority pest plants. Rabbits controlled at less than one rabbit per spotlight kilometre and less than one active entrance per hectare of rabbit habitat. Other economically important pest animals requiring joint action for control (such as foxes and wild dogs) controlled at yet to be determined levels. 	<ul style="list-style-type: none"> 'Best practice' - most ecologically sustainable - control measures defined for pest plants and animals. Control levels defined for all economically important species of pest animals requiring joint action for control. Regional Action Plans for priority pest plants and animals developed and implemented. All land infested with non-endemic priority pest plants covered by containment program. Rabbits in priority areas managed and assessed for potential long-term control. Foxes in priority areas managed and assessed for potential long-term control.
4 An integrated approach to land management practices in place to prevent and manage land degradation.	<ul style="list-style-type: none"> Whole Farm Plans implemented by all land managers with a reticulated stock water supply system. Environmental Management Systems identified and developed for each farm business in the dryland Mallee 	<ul style="list-style-type: none"> Whole Farm Planning support provided to all dryland farms in particular those serviced by the Wimmera-Mallee pipeline to build on the opportunities presented as it is rolled-out. Whole Farm Plans used to guide government investment at the farm level.

Land Resource: Key Strategies, Policies and Plans

State-based Policies and Strategies

- Victorian Pest Management Framework 2002
- Victorian Salinity Management Framework 2000

Mallee Regional Strategies and Plans

- Mallee Fox Action Plan (to be completed)
- Mallee Salinity and Water Quality Management Plan Draft 2003
- Mallee Rabbit Management Action Plan 2000-2005
- Mallee Soil Conservation Plan (to be prepared)
- Mallee Weed Action Plan 2001-2005
- Mallee Wild Dog Action Plan (to be prepared)
- Wimmera Mallee Pipeline Feasibility Study



Wheat field.

9.7 Cultural Heritage Sites Outcomes and Targets

Cultural Heritage Sites Goal: To protect cultural heritage and significant landscape sites and to manage the risks to all sites.



Errection of fencing to protect cultural heritage values.

Cultural Heritage Sites Outcomes	Achievable Resource Condition Targets	Management Action Targets
<p>1 Cultural heritage and significant landscape sites respected and actively protected.</p>	<ul style="list-style-type: none"> • All sites respected and valued by the Mallee community and tourists • Significant geological features identified and effective controls in place • The condition of all known Aboriginal cultural heritage sites protected in partnership with Aboriginal stakeholders. 	<ul style="list-style-type: none"> • Heritage assessment of Catchment undertaken by heritage consultant • Protocols developed to ensure heritage values are considered in all works undertaken • Cultural Heritage Action Plan developed • All sites at high risk protected from threatening processes, and reinstatement activities undertaken for damaged sites • Vehicle tracks rationalised to reduce access to known sites decommissioning of tracks given priority to high value / high risk sites. • Resource Protection Guidelines developed for cultural heritage sites • Priority sites monitored by Aboriginal representatives • Continue process of identification of cultural sites especially in priority areas • Investigate options for facilitating access to site information for planning and land management. • Education programs on cultural heritage sites and placenames undertaken for the wider community, landholders, and in schools
<p>2 Risks to cultural heritage and significant landscape sites managed.</p>	<ul style="list-style-type: none"> • Recreation pressures and land use change managed in ways that reduce the risk to sites 	<ul style="list-style-type: none"> • Best Practice guidelines developed for managing sites • Interpretative materials developed to explain the significance and likely occurrence of sites in high recreation areas, and made widely available to the general public • Aboriginal advice and guidance on risk management sought whenever works are to be carried out on public land • All Councils to introduce planning policies which address risks to sites • Education programs on cultural heritage sites and placenames undertaken for the wider community, landholders, and in schools • Information shelters include detail and interpretive material about local sites

Cultural Heritage Sites: Key Resources, Strategies and Plans

State-based Strategies and Guidelines

- Draft Forest Management Strategy - Mildura Floodplain State Forests 2000
- Land Conservation Council Review, Final Recommendations 1989
- NRE Resource Protection Guidelines for Rabbit Control 2000
- NRE Indigenous Partnership Strategy
- Strategy for Aboriginal Managed Land in Victoria (SAMLIV) 2003

Regional Resources, Plans and Protocols

- Indigenous intellectual knowledge
- Local government planning policies
- Mallee CMA Heritage Assessment and Impact reports (to be developed)
- Mallee Native Vegetation Plan (Draft)
- Murray River Frontage Action Plans 2002
- Protocols for:
 - Irrigation development
 - Works on Crown Land
- Mallee Salinity and Water Quality Management Plan Draft 2003
- Yarriambiack Creek Aboriginal Heritage Study

9.8 Community Capacity Outcomes and Targets

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



Cardross Primary School undertakes Waterwatch at Cardross Lakes.

Community Capacity Outcomes	Achievable Resource Condition Targets	Management Action Targets
1 Communities across the Mallee with the capacity to fully protect and improve our natural resources	<ul style="list-style-type: none"> • Informed and experienced groups across the Mallee with the capacity to understand issues and drive landscape change to a benchmark yet to be determined 	<ul style="list-style-type: none"> • Collaborative reviews completed with all major stakeholder to establish Action Plans for capacity building • Establish agreed measures of community capacity • Establish and maintain database on community capacity and extent of landholder engagement in current programs • Implement a community education program including a focus on schools
2 Healthy and active community groups promoting and directing joint natural resource management programs at a local level	<ul style="list-style-type: none"> • Communities and landholders active in natural resource management across all areas of the Mallee. 	<ul style="list-style-type: none"> • Develop and implement a five year Mallee Regional Community Action Plan • Develop and maintain Mallee Regional Landcare Network • Develop and implement a five year Mallee Regional Landcare Action Plan • Maintain and develop Waterwatch program
3 Indigenous stakeholders actively engaged in directing programs which protect and improve natural resources	<ul style="list-style-type: none"> • Indigenous engagement in natural resource management. 	<ul style="list-style-type: none"> • Continue process of engagement to establish trust and confidence between the Mallee CMA and local indigenous stakeholders • Action Plans for engaging indigenous stakeholders in natural resource management and cultural heritage projects, developed through engagement with traditional owners, the four regional community areas* and other regional indigenous stakeholders

* 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.

Community Capacity: Key Planning Tools

- Mallee Socio-economic database and Catchment Condition Report established to provide valid data on key issues 2003.
- Victorian Action Plan for Second Generation Landcare - healthy landscapes sustainable communities 2002.

10 Roles, Responsibilities and Partnerships

Many groups, agencies and communities play an important role in managing our natural resources and will be responsible for implementing the priorities and programs agreed in the Mallee Regional Catchment Strategy. This section helps identify some of the core roles and responsibilities of those groups.

It is not always possible to detail the exact responsibility for delivery of individual Management Action Targets in the Regional Catchment Strategy, as allocation of responsibility for delivery may require formal procurement through a public tender process, with contracts let to regional agencies or private consultants on a value for money basis. A robust process will be followed to allocate clear accountability for individual projects as part of the Regional Catchment Investment Planning process (see Chapter 13).

10.1 Mallee Catchment Management Authority

The Mallee CMA acts as a broker to establish a framework and arrangements to ensure that natural resource management programs in the region reflect the expectations and priorities of the community and engage their commitment. In this

role, the Mallee CMA acts as a statutory body under the *Catchment and Land Protection Act 1994*.

The Mallee CMA has a Board with members drawn from across the community. This ensures that the interests and concerns of different sectors are understood and reflected in the decisions of the Board.

Two Implementation Committees support the Board. They bring the experience and commitment of members of the community to the work of the CMA. The Mallee Lands Committee carries a leadership role in dryland issues, while the Mallee Irrigation and Environment Implementation Committee takes the lead in issues related to irrigation. Both have played key roles in the development and implementation of major natural resource management initiatives such as the Salinity and Water Quality Management Plan. They will act as a major link between the board and the community.

The Mallee CMA has the main responsibility for the preparation of the Regional Catchment Strategy. It will play a leadership role in the region in prompting, coordinating and seeking funding for the programs and projects that will instrument the targets in the Mallee Regional Catchment Strategy. The Mallee CMA will monitor and report on the

success of those projects and programs. The Mallee CMA will also manage waterways and advise on developments within floodplains, under the *Water Act 1989*.

The function of the Mallee CMA is described in Section 13 of the *Catchment and Land Protection Act 1994* which defines its statutory responsibilities and obligations.

In keeping with these responsibilities the Mallee CMA will:

- Promote performance partnerships with a range of key agencies in the region, as the basis for a collaborative approach to the achievement of regionally focussed priorities and strategies;
- Share the cost of natural resource management according to cost sharing arrangements outlined in Regional Action Plans;
- Continue to engage the community on annual priorities and investment;
- Inform the community on emerging issues and trends;
- Promote achievements in the region;
- Consult with the community on projects and seek involvement from stakeholders; and
- Coordinate implementation of the Regional Catchment Strategy ensuring an integrated approach where necessary.

It will liaise with local councils to promote consistency between the Mallee Regional Catchment Strategy and the Municipal Strategic Statements which are an important mechanism to implement the targets in the Strategy.

10.2 Department of Primary Industries and Department of Sustainability and Environment

The former Department of Natural Resources and Environment (NRE) was restructured late in 2002 and its previous roles allocated to two newly formed departments, the Department of Primary Industries (DPI) and the Department of Sustainability and Environment (DSE).

These two Departments are key players in natural resource management in the region through a number of roles:

- as a centre of specialist understanding of natural resource management issues related to the Mallee. This is held in a number of locations, including DPI/DSE offices in Irymple and Swan Hill, Primary Industries Research Victoria at Irymple, and the Mallee Research Station at Walpeup;

DPI/DSE therefore plays a vital role in helping identify and develop projects and initiatives related to natural resource management issues across the Mallee and is the principal agency for researching and developing new information in situations where deficiency of information is hampering natural resource management;

- DPI acts as a primary agency to implement projects in the region through its field workforce. These are based in

offices in the major centres and small country towns across the Mallee. This work involves extension to raise awareness and provide technical advice, coordination and access to incentives and enforcement. It has traditionally covered the full breadth of natural resource management issues including dryland salinity, control of pest plants and animals, native vegetation management, support to Landcare etc;

- DSE has regional roles in public land management, fire prevention and control and flora and fauna protection; and
- at a State level, DSE has the primary role in setting policies for natural resource management in Victoria. This includes the policy development, support and implementation of the Victorian Catchment Management Framework and the implementation of natural resource management policies through Government investment in Regional Catchment Strategies.

10.3 Local Government

Local government is a key stakeholder and partner in the Regional Catchment Strategy and in natural resource management more widely across the region. This engagement involves a series of different roles:

- Councils help achieve natural resource management aims and outcomes through the implementation of planning controls. Councils will liaise with the Mallee CMA to ensure consistency between the Municipal Strategic Statements which set the Council's planning framework and policies and the Mallee Regional Catchment Strategy and the plans which it supports. For example, Councils will develop revised planning controls for new irrigation developments to support the implementation of the new Salinity and Water Quality Management Plan for the Mallee.
- Councils are major natural resource managers in their own right as the owner and manager of large areas of land and are responsible for significant infrastructure that can affect the environment such as storm-water systems. The Sunraysia Drainage Strategy is a good example of a Council-led initiative in conjunction with the local water authorities.
- Councils are an important conduit for the concerns and priorities of individuals and communities to be represented in wider government processes.

Councils have been actively engaged in the development of the renewed Regional Catchment Strategy through direct meetings and through their membership of the Steering Committee that oversees the review and renewal of the Mallee Regional Catchment Strategy. The Mallee CMA has established strategic alliances with the main Councils in the region to reflect the partnership needed to resolve issues of joint concern.

Councils in the Mallee region include:

- Two Rural City Councils, Mildura and Swan Hill Rural City Councils,⁶ which together cover 90 per cent of the population and 70 per cent of the area; and
- Five Shire Councils including parts of Buloke, Yarriambiack, Hindmarsh, West Wimmera and Gannawarra Shires.

6 although Swan Hill City itself is outside the Mallee CMA region.

10.4 Water Authorities

Water Authorities are another key partner in the renewed Regional Catchment Strategy. There are both Rural and Urban Water Authorities in the region:

Four **Rural Water Authorities** provide water for irrigators:

- First Mildura Irrigation Trust (FMIT), supplies the Mildura Irrigation District,
- Sunraysia Rural Water Authority (SRWA), supplies the Red Cliffs, Merbein and Robinvale Irrigation Districts, licences private diverters and the Millewa and Carwarp-Yelta Waterworks Districts,
- Goulburn-Murray Water (GMW), provides bulk water supplies to both FMIT and SRWA, and manages the weirs on the River Murray and the major salt interception schemes on behalf of the Murray Darling Basin Commission, and
- Wimmera-Mallee Water (WMW), provides water for stock and domestic use to landholders across the southern and western areas of the region.

Rural Water Authorities play a central role in the natural resource management of the region and will be key players in ensuring effective implementation of the Regional Catchment Strategy.

Rural Water Authorities are responsible for managing the central infrastructure for capturing and delivering water for irrigation and stock and domestic purposes. They also provide water to dryland farms and bulk water to dryland towns, manage groundwater resources and dispose of irrigation drainage flows. The way that these functions are carried out has a significant impact on water-logging and salinity in the irrigation districts.

Water Authorities play a major role in promoting the adoption of greater water use efficiency by irrigators. This has an impact on local adverse effects and should allow the aggregate diversions from the river to be reduced.

Rural Water Authorities also license and enforce water rights and diversion licences, authorise all water trades, and collect salinity levies. As a result they will play a critical role in the effective implementation of the Mallee Salinity and Water Quality Management Plan.

Rural water authorities also administer the allocation and use of groundwater in the region for domestic, stock, agricultural and urban uses. The only significant relatively non-saline, groundwater resource is in the vicinity of Murrayville. Wimmera Mallee Water manages this resource and monitors its use and the impact on the relevant aquifer in terms of quantity and quality.

There are also two **Urban Water Authorities** which are responsible for the treatment and delivery of potable water to urban users and for the collection, transfer and treatment of municipal sewage and trade waste in the larger towns:

- Lower Murray Water, is responsible for the delivery of services along the River Murray and across the northern part of the region, and
- Grampians Water, services most of the dryland towns of the Mallee, south from Ouyen and Sea Lake.

The Water Authorities were involved in the development of the renewed Mallee Regional Catchment Strategy through membership of the Steering Committee. Water Authorities also contribute to the development of policies within the region through direct input to the Mallee CMA Implementation Committees.

10.5 Landholders

Individual landholders carry the primary responsibility for implementing natural resource management programs on private land. The success of many of the targets and objectives of the Mallee Regional Catchment Strategy will depend on the engagement and commitment of landholders.

The large majority of farms are small business enterprises with multiple demands on their discretionary expenditure, that may include landscape and habitat protection, as well as a host of production, managerial and family-related decisions. Any natural resource management initiatives which rely on the engagement of landholders needs to be realistic as to the drivers and constraints of that engagement.



Landholder improving remnant of Murray Pine.

The number of farms, farmers and farm employees is falling steadily across the Mallee. There is the prospect of more corporate-style farms in irrigated areas and more large owner-operated farms in dryland areas. In the future, product QA accreditation will be a driving force for natural resource management by both family and corporate farms

While declining farm numbers is a handicap to certain classes of natural resource management - voluntary activity is encouraged by the low opportunity cost of labour on cropping farms at some times in the cycle of farm operations - concentration of ownership has favourable implications in other dimensions. Corporate managed farms are more likely to treat natural resource management requirements as part of the cost of doing business. Regulatory approaches to natural resource management may become more appropriate as the agricultural sector becomes more concentrated.

There are a number of agencies and groups in the Mallee region which exist to help develop and promote improved outcomes from farming practice, such as the Birchip Cropping Group and Mallee Sustainable Farming Inc. These groups play a key role in enabling farmers, researchers and extension specialists learn and adapt their management to achieve improved land resource outcomes. These initiatives will help ensure the achievement of the outcomes and targets in the Mallee Regional Catchment Strategy.

10.6 Indigenous Communities and Stakeholders

Input from local indigenous stakeholders is vital for the development of the Mallee Regional Catchment Strategy and for the management of the land and water of the Mallee in the future.

The Mallee CMA has made a commitment to engage indigenous communities and stakeholders in the future management of natural resources across the Mallee and to involve these contacts in the process of developing and implementing programs. Advice was sought from the local indigenous community, stakeholders and relevant organisations on the best way to approach the engagement process.⁷

The Mallee Regional Catchment Strategy seeks to engage indigenous stakeholders and communities in the future management of natural resources through a number of different avenues:

- The Mallee Regional Catchment Strategy has a goal to protect and improve cultural and heritage sites and to manage the risks to all sites. Clearly local indigenous communities and stakeholders will take the lead in developing programs and projects to implement this goal;
- Where new development occurs in areas along the River where there are likely to be significant sites then local indigenous contacts are engaged to assess and advise on the location of those developments;
- Joint Action Plans will be developed with communities and stakeholders at a local level to identify capacity building needs and opportunities (see section 8.3 above); and
- Local indigenous communities and stakeholders also have their own priorities and concerns regarding the focus of the Mallee Regional Catchment Strategy. Those concerns will be included in the priority programs progressed through the initial investment plans.

10.7 Landcare Groups and Waterwatch

Landcare Groups play a major role in harnessing and promoting the interests of local communities in natural resource management issues. Landholders have the primary responsibility for managing their own land. Landcare provides a connection between the individual managers of separate private properties and wider community and public benefits. Landcare groups contribute through a number of important roles:

- they increase awareness of conservation issues;
- they promote and encourage coordinated community participation in land management; and
- they develop expertise and provide access to shared resources.

Experience of Landcare groups has shown that people are more likely to change attitudes and behaviour when involved in groups where leadership has been demonstrated, and successful outcomes achieved.

There are almost 30 Landcare groups across the Mallee region, mainly in the dryland areas. The level of membership

varies from thirty per cent of local landowners to seventy-five per cent. There is a regional Landcare network led by the Mallee CMA and supported by DPI.

Landcare can play a vital role in promoting the adoption of improved ways of doing things that should benefit the environment. But it is important to recognise the boundary of what it is reasonable to expect Landcare to achieve.



Community involvement.

These groups are often small and vulnerable to wider changes affecting the Mallee. As a recent review identifies:

*Issues facing rural communities such as decreasing farm viability, population decline and ageing of landholders are impacting on Landcare's capacity to address natural resource issues.*⁸

A critical factor in determining the success of local Landcare Groups in supporting the implementation of the Regional Catchment Strategy will be the on-going provision of support through the provision of coordinators and facilitators, and local technical advice.



Waterwatch with Koori school students.

The Mallee Waterwatch program plays a major role in educating and involving the community in a wide range of water related natural resource management issues and activities across the region. It engages more than 4,000 school children and community members each year on water quality, conservation, biodiversity, salinity and recreation issues. This involvement plays a valuable role in community capacity building. Waterwatch also generates a valuable source of data on water quality for our waterways.

⁷ Details of this process and the meetings held are provided in Annex B.
⁸ NRE (2002), "healthy landscapes - sustainable communities" - Victorian Action Plan for Second Generation Landcare.

10.8 Parks Victoria

Parks Victoria has the primary responsibility for implementing natural resource management programs on reserved public land. As noted in Chapter 2, this land covers nearly forty per cent of the area of the Victorian Mallee, and includes parks of national significance.

Parks Victoria will therefore carry a major responsibility for the implementation of the targets and outcomes for overall catchment health and maintenance of biodiversity across the Mallee.

The focus of Parks Victoria in the Mallee region is to establish sound management of reserved land based upon, and integrated with, a good understanding of the ecology of the region and associated ecosystems. This will lead to management actions that conserve and protect the estate while facilitating visitor access and use. Fire prevention and suppression is a key focus.

Parks Victoria also works actively to establish effective integration between the management of public and adjacent private land. These interactions managed to achieve optimal outcomes through partnerships such as the Good Neighbour Program to control pest plants and animals in areas adjoining private land boundaries.

10.9 Environment Protection Authority

The Environment Protection Authority (EPA) has the primary responsibility for setting policies for certain specified pollutants at a state wide level. This responsibility covers air, land and groundwater, litter, noise, waste and water. The most significant for this Regional Catchment Strategy is the State Environment Protection Policy "*Waters of Victoria*" where the Regional Catchment Strategy is seen as a key implementation route to achieve the identified policies and objectives.

The EPA also has roles in providing guidance and tools to reduce impacts to the environment and to progress towards sustainable land-management practices. Finally, it plays an enforcement role to ensure adequate compliance with these policies at a local level.

10.10 Murray-Darling Basin Commission

The Murray-Darling Basin Commission (MDBC) is a statutory body with responsibility for operating and managing the River Murray system, with reference to flow control and quality, through its operational arm "River Murray Water".

Basin-wide policies and programs are established by the Murray-Darling Basin Ministerial Council. These are given authority through the Murray-Darling Basin Agreement (1992).

10.11 Country Fire Authority

The Country Fire Authority (CFA) is responsible for fire prevention and suppression within rural Victoria, on land

outside Metropolitan Fire Districts and reserves managed by Parks Victoria or DSE. The CFA is supportive of the Mallee Regional Catchment Strategy as a means of setting goals and targets for the protection of natural resources and productive landscapes at a catchment level. CFA will work with stakeholders across the region to ensure that planning for safety from fire is integrated with the Regional Catchment Strategy.

10.12 Industry Associations

Many landholders, producers and processors are members of industry or trade associations. These bodies play an important role to develop and promote best practice in natural resource management. Increasingly market forces will be an important incentive to drive improved practice as industries seek to win market share through branding with conservation values.

10.13 Educational and Research Agencies

The Mallee region is fortunate to be the location for a series of leading educational and research agencies, with a particular interest and commitment to natural resource management issues. These bodies include:

- CRC for Freshwater Ecology: Lower Basin Laboratory, Mildura;
- CSIRO Plant Industry, Horticulture Unit, Merbein South;
- Primary Industries Research Victoria, Irymple;
- Mallee Research Station, Walpeup;
- Sunraysia Institute of TAFE, Mildura;
- National Centre for Sustainability, Mildura;
- MADEC, Mildura; and
- La Trobe University, Mildura Campus.

These organisations and other research agencies outside the region have a valuable role to play to promote, support and enhance natural resource management understanding and application, through research, development and training. They made a major contribution to the renewal of the Mallee Regional Catchment Strategy through a workshop in October 2002 to develop a research and development needs analysis to support the Regional Catchment Strategy.

10.14 Special Interest Groups

Awareness, concern and engagement of individuals in natural resource management issues across the Mallee is promoted and advanced by a wide range of special interest groups. These groups are listed in Annex B.

These groups have an important role to play as a means for individuals to become engaged in activities and programs that reflect their particular concerns. The groups are also a vital source of understanding related to specific issues and

ensure that those issues are recognised and included in the wider investment strategies of the region. The Mallee CMA welcomes contacts from emerging groups to ensure their engagement in the process.

10.15 Communication Plan

It is essential that this full range of agencies, groups and communities is effectively engaged in understanding, owning and implementing the renewed Strategy. In order to achieve this objective a comprehensive Communication Plan has been developed. This identifies the best way to ensure commitment to the implementation of the agreed strategy. The key elements of that plan are confirmed in Table 7 below.



Remnant Mallee vegetation.

Table 7 Communications Plan Outline

Agency	Roles	Communication Strategy
DSE/DPI	<ul style="list-style-type: none"> • Policy formation • Technical/scientific advice • Program delivery • Monitoring / enforcement • Management of Public Land 	<ul style="list-style-type: none"> • Membership of Mallee CMA Board • Advice to ICs • Regular meetings with CMA CEO
Councils	<ul style="list-style-type: none"> • Planning controls • Infrastructure management 	<ul style="list-style-type: none"> • Formal agreements with each Council on working arrangements • Liaise over reviews of the Regional Catchment Strategy and MSS. • Develop support for joint resourcing of eg native veg database
Water Authorities	<ul style="list-style-type: none"> • Infrastructure management • Licensing of private diverters • Authorising water trades 	<ul style="list-style-type: none"> • Membership of Irrigation Implementation Committee • Regular meetings with CMA CEO • Membership of Steering Committee
Indigenous Communities	<ul style="list-style-type: none"> • Land stewardship • Advice • Involvement in NRM projects 	<ul style="list-style-type: none"> • Building an enduring engagement process through the CMA • Implementing DPI's indigenous engagement strategy
Landholders	<ul style="list-style-type: none"> • Direct accountability for on-farm works 	<ul style="list-style-type: none"> • Landcare Groups • Extension work through DPI • R&D liaison with research bodies
Landcare Groups	<ul style="list-style-type: none"> • Community awareness • Program coordination 	<ul style="list-style-type: none"> • CMA regional Landcare Co-ordinator • Landcare Regional Newsletter
Mallee Waterwatch	<ul style="list-style-type: none"> • Community awareness • Water quality data collection 	<ul style="list-style-type: none"> • Regional Waterwatch Co-ordinator • Quarterly Waterwatch Newsletter
Parks Victoria	<ul style="list-style-type: none"> • Management of public land 	<ul style="list-style-type: none"> • Regular meetings with CMA CEO • Routine liaison with CMA
Environment Protection Authority	<ul style="list-style-type: none"> • Setting State-wide policies • Enforcement of local compliance 	<ul style="list-style-type: none"> • Regular professional exchange and engagement
MDBC	<ul style="list-style-type: none"> • Operation/management of River Murray System • Basin-wide policies and strategies 	<ul style="list-style-type: none"> • Liaison through DSE
CFA	<ul style="list-style-type: none"> • Fire prevention and suppression 	<ul style="list-style-type: none"> • Regular liaison with CMA and key stakeholders
Industry Groups	<ul style="list-style-type: none"> • Promote good practice • Market forces 	<ul style="list-style-type: none"> • Regular briefing • Engagement in consultation exercises
Research & Education Agencies	<ul style="list-style-type: none"> • Develop, extend and promote NRM understanding and practice 	<ul style="list-style-type: none"> • Representation on CMA Board & ICs • Professional links through CMA staff
Special Interest Groups	<ul style="list-style-type: none"> • Raise awareness • Engage individuals 	<ul style="list-style-type: none"> • Engagement through project planning groups
Wider Community	<ul style="list-style-type: none"> • Awareness • Engagement 	<ul style="list-style-type: none"> • Displays, signs & brochures • Media releases & public meetings

11 Managing Our Programs and Plans

11.1 Adaptive Management

Natural resource management programs operate in an ever-changing environment. There is considerable natural variability in all of the elements of the Mallee region that we seek to protect and improve.

Equally, our understanding of those assets, and the processes that drive them, grows as we gather better data and analyse the underlying drivers of that change. It is essential that the Mallee Regional Catchment Strategy, and the programs that it generates, are designed to respond and adjust to meet this changing environment. This will be achieved through a number of mechanisms:

- The Catchment Condition Report has been created as a living, growing base-reference for all future natural resource management programs across the Mallee. As new data and evidence is acquired the Catchment Condition Report will grow to accommodate it. Where this new evidence is at variance with the current data or assumptions then that will flag the need for revision of current priorities;
- The Mallee Regional Catchment Strategy sets goals and targets with a focus five to twenty years from now. That makes sure that they are driven by outcomes not by actions. Those outcome focused goals leave greater flexibility as to the exact approach or activity best suited to achieve that objective;
- The detail of what we are going to do in the immediate future will be reviewed and revised every year as we renew our three-year rolling investment plans. That means that every year we have to start again with the base reference Catchment Condition Report and reinterpret the strategic directions and targets of the Mallee Regional Catchment Strategy in validating the programs for which we will seek investment;
- The Mallee Regional Catchment Strategy sets clear targets for each of the assets of the region, defined by the resource condition outcomes that we seek to achieve. All plans will have effective monitoring programs, focused on these outcomes, to ensure that we measure how the programs are meeting their objectives. Regular monitoring and reporting to the Board and its Implementation Committees ensures that those programs, their deadlines and objectives will be subject to close scrutiny. Where they prove to have been unrealistic then the programs will be changed; and

- Equally, where the research and development, or the feedback from the monitoring of programs, identifies new data or issues which challenge the assumptions behind this Regional Catchment Strategy or the goals, targets or outcomes which it sets, then those goals, targets and outcomes will be changed. This process will form part of the annual exercise to renew the Catchment Condition Report and the three year investment plan.

11.2 Monitoring, Evaluation and Reporting Framework

The Mallee Regional Catchment Strategy provides the over-arching framework for future investment in natural resource management across the Mallee for the next five years. A robust monitoring and evaluation program will help ensure that the Regional Catchment Strategy is a 'living document' throughout that five-year period. A separate, stand alone report on a Monitoring and Evaluation Framework has been developed to direct policy and practice in this important area.

The Monitoring and Evaluation Framework

The Framework helps serve three important and related objectives:

- **Monitoring:** to help identify those areas where monitoring will provide a primary mechanism to help increase our understanding of the assets of the region. The report highlights opportunities to build on the various monitoring programs already being conducted by the Mallee CMA and its partner organisations in the Mallee;
- **Risk Control:** to help minimise risks of investing in threat management activities that might yield a poor return on investment; and
- **Governance:** to ensure that each program and project which is implemented to deliver the outcomes in the Mallee Regional Catchment Strategy, is subject to a disciplined protocol to require appropriate monitoring and reporting against identified outcomes and milestones. The framework builds on the commitment by the Mallee CMA to excellence in governance and information management, and its existing monitoring, evaluation and reporting arrangements.

Monitoring

A primary objective of the Monitoring and Evaluation Framework is to establish a robust base data-set on the characteristics of the assets of the Mallee CMA region. This will cover both inherent asset condition and the dynamic processes related to the threats to that condition. In this way, the framework will help off-set some of the potential risks identified in the Risk Assessment (see Chapter 12) as it will ensure that decisions are informed by robust data.

There is a suite of existing monitoring programs already in place across the Mallee. However, these are not well co-ordinated or integrated and do not cover the full set of parameters and issues needed to support delivery of the targets in the renewed Regional Catchment Strategy.

An early priority for the Investment Plan will be to review the coverage and effectiveness of the existing monitoring programs and to define the specification for an optimal integrated monitoring program. The aims of a coordinated monitoring program would be to:

- Centrally coordinate all Mallee monitoring programs, between Agencies and Programs, to enable integrated data collection and storage.
- Develop data into a source of information for on ground and management based decision support.
- Upgrade monitoring programs to better assess high-risk assets and key performance indicators and targets in the Mallee Regional Catchment Strategy. and
- Strengthen the 'Tri-State Information Management System' currently being developed.

It is envisaged that development of a coordinated monitoring program will require significant investment, particularly in the first years of the implementation of the Mallee Regional Catchment Strategy.

It will start with an assessment of the monitoring and evaluation required to complete and then update the Catchment Condition Report on a regular basis, which provides a consensus judgment on the condition of the assets of the Mallee region. It will then build on this by defining the range of monitoring and evaluation activities necessary to judge whether or not the goals of the Regional Catchment Strategy have been fulfilled.

Risk Control

An effective monitoring and evaluation strategy can also help to manage the risk of investing in threat management activities that might yield a poor return on investment.

The Risk Assessment Report identifies four major risk categories which may threaten successful achievement of the outcomes and targets in the Regional Catchment Strategy. Those risk categories are:

- Institutional or Agency risk;
- Data adequacy;
- Bio-physical risk; and
- Commercial risk.

The monitoring and evaluation framework will help us minimise those risks as we develop the Investment Plan which translates the objectives of the Regional Catchment Strategy into practical programs.

Governance

Individual Projects will be required to meet certain standards and protocols. These include:

- Accountability for project delivery;
- Agreed targets set in terms of natural resource management outcomes;

- Clarity as to the availability of data on the status quo and the risks around that data;
- Indicators clearly defined to allow monitoring of progress towards achievement of those targets;
- Milestones established to record when that monitoring will take place and how the data will be assessed; and
- Governance arrangements in place to demonstrate how the agency will respond to the outcome of that monitoring.

Government funding sources and other investors need confidence that their funds are being used to achieve the maximum impact and outcomes. The same rigorous framework of controls will be applied to the wider program management promoted by the Mallee Regional Catchment Strategy as to these individual projects.

The full detail of the approach and protocols which will be applied to individual projects and plans supported through the Regional Catchment Investment Plan are set out in the supporting Monitoring and Evaluation Framework.

12 Risk Analysis

The renewed Mallee Regional Catchment Strategy will provide the over-arching framework for future investment in natural resource management across the Mallee for the next five years and beyond. In assessing the renewed Strategy, the Mallee CMA Board and wider stakeholders need to consider the risks inherent in the proposed approach and priorities. A stand-alone report has been drafted which provides the detailed analysis to enable this considered assessment to be made.

This risk assessment is based on the Australian and New Zealand Standard on Risk Management (AS/NZS 4360) and involves a structured 6 step process (Figure 11, right).

This Risk Assessment provides a framework to help guide the strategy for the completion of the Investment Plan. This chapter provides a summary of the key risks identified and an assessment of their significance for the renewed Regional Catchment Strategy.

- **Data Adequacy:** decisions on natural resource management issues are normally taken in a situation of partial data. Data adequacy relates to a number of different elements:
 - Source Data: in many areas we have limited data on the base asset and its condition,

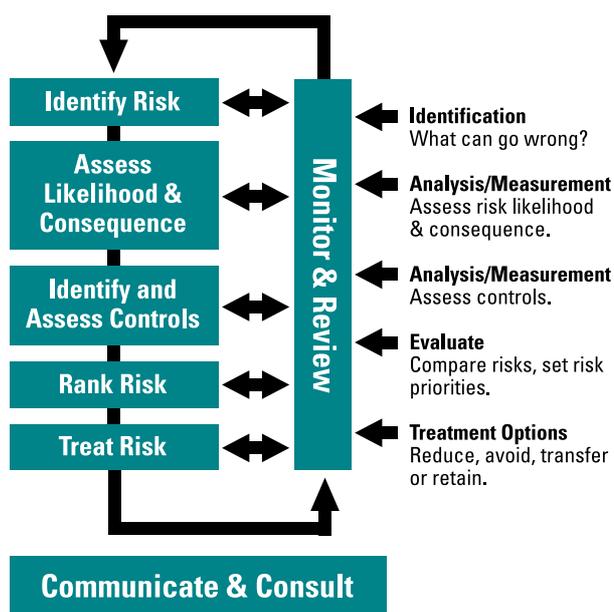


Figure 11 Risk Management Framework

- Processes and threats: in many areas we may have data on assets but poor understanding of the processes involved, including the drivers and the rate of change,
- Interventions: in many areas we have a limited understanding of the opportunities available to intervene in those processes,
- **Agencies for Change:** where we have reasonable data on issues and options for change there are still risks related to the agencies selected to implement that change:
 - Those agencies may have different agendas and commitments from the Mallee CMA,
 - They may face conflicting demands on their resources,
 - They may not have the resilience or capacity to deliver,
 - The renewed Mallee Regional Catchment Strategy may not win the endorsement of the broader community and so undermine its ability to drive a consensus in natural resource management,
 - The Mallee CMA itself is potentially vulnerable to loss of key staff and the intellectual capital held by those individuals. The Mallee CMA is also dependent on a small number of consultants,



Mallee vineyard.

- **Commercial Factors:** The review of the Regional Catchment Strategy 1997 identified that natural resource management projects are dependent on the commercial viability and prosperity of the relevant enterprises. The success of irrigation-based initiatives has been greatly assisted by the growth in the wine-grape sector over the last five years. The continued success of projects in this area could be undermined by a reduction in the profitability of this sector with a shift in the relative returns earned by the growers as against the processors.
- **Causality:** there is normally a complex series of steps in the chain-of-events between actions and ultimate outcomes in natural resource management projects, with implicit assumptions as to the strength of the causality between each element in the chain. There is considerable uncertainty in the chain-of-events between these Inputs and the ultimate outcomes as:
 - Systems demonstrate significant natural variability, reflecting climatic and other factors. This baseline is often poorly understood or monitored,
 - The assumptions as to the links between the elements are poorly understood,

- The effectiveness of any program will depend on a range of different factors many of them specific to the particular location and outside the control of the Mallee Regional Catchment Strategy,

Projects may fail because we over-estimated the strength of the links between different elements in that causation or under-estimated the relative importance of external factors in determining ultimate outcomes.

In assessing the risks inherent in the proposed Mallee Regional Catchment Strategy it is helpful to distinguish between three different categories:

- **Risk**, where we have some degree of knowledge of the variables which will determine the likelihood of the occurrence and the severity of the event. For this category, the challenge to the Mallee Regional Catchment Strategy will be to make a balanced judgment as to whether a course of action is prudent or desirable given our understanding of the risks involved;
- **Uncertainty**, where we are not able adequately to determine either the probability of an event occurring or the nature of the outcome. In this case the judgment for the Mallee Regional Catchment Strategy is:
 - Whether it is possible to make decisions, given the quality of the data available,
 - The provisos which are required to accompany any decision,
 - The actions required to promote a more informed basis for the decision;
- **Knowledge Gaps** involves a further step away from this position of uncertainty and involves situations where we are not aware either that we do not understand the issue or, in some cases, even that there is an issue that we do not appreciate.

These different categories involve different characteristics and expose the Mallee Regional Catchment Strategy and the Mallee community to different challenges. In developing a robust strategy they call for different responses.

Full details of the assessment of the risks inherent in the achievement of outcomes and delivery of the targets in the Mallee Regional Catchment Strategy are contained in the supporting Mallee Risk Assessment Report. The supporting frameworks, such as the Communications Plan, Research and Development Needs Analysis and Monitoring and Evaluation Framework provide a rigorous process to ensure that those risks are minimised as the targets in the Mallee Regional Catchment Strategy are translated into programs through the Investment Plan.

13 Translating the Regional Catchment Strategy Into Action

13.1 Translating Evidence Into Action Plans

The Mallee Regional Catchment Strategy and its supporting documents provide a robust and adaptable framework to identify and direct investment in natural resource management across the Mallee.

The process starts with a rigorous, systematic and comprehensive identification and assessment of all the natural resource assets of the region through the **Catchment Condition Report**. This reports on the current condition of those assets, assesses the trend line for that condition, and identifies relevant threats, and, through a robust and consistent methodology highlights priority areas for attention.

The Catchment Condition Report also provides the starting point for the **Research and Development Needs Analysis** as it confirms those areas where there is a deficiency in our current knowledge base on the condition, processes or threats related to the relevant assets.

This research and the feedback from the monitoring of plans will ensure that the Catchment Condition Report grows in breadth and authority over the life of the Mallee Regional Catchment Strategy as new and additional data and understanding is added to the analysis.

The **Mallee Regional Catchment Strategy** then provides the vision and purpose for the future direction and priorities of the communities of the Mallee region when faced with the evidence from the Catchment Condition Report. The Strategy sets out the longer-term aspirational aims for each of the key assets and defines the medium term targets that it is expected will be achieved within the life of the Mallee Regional Catchment Strategy.

The evidence from the Catchment Condition Report is focused through the Mallee Regional Catchment Strategy to shape and validate a three-year rolling **Investment Plan**. It is this Investment Plan that will translate the priorities and strategy of the Mallee Regional Catchment Strategy into an active program that will seek investment from funding sources.

That Investment Plan, in turn, is expressed through a series of detailed **projects and plans** which direct investment to specified actions and outcomes through the engagement of nominated groups and communities. Chapter 8 identifies seven priority plans which will represent the major building blocks for current and future natural resource management projects across the region. Chapter 9 details a wider listing both of relevant Federal and State Strategies and Policies and also of regional Mallee plans, policies and procedures

which will translate the objectives of the Mallee Regional Catchment Strategy into activities on the ground.

This interaction between the different elements of the process is illustrated in the diagram below (Figure 12).

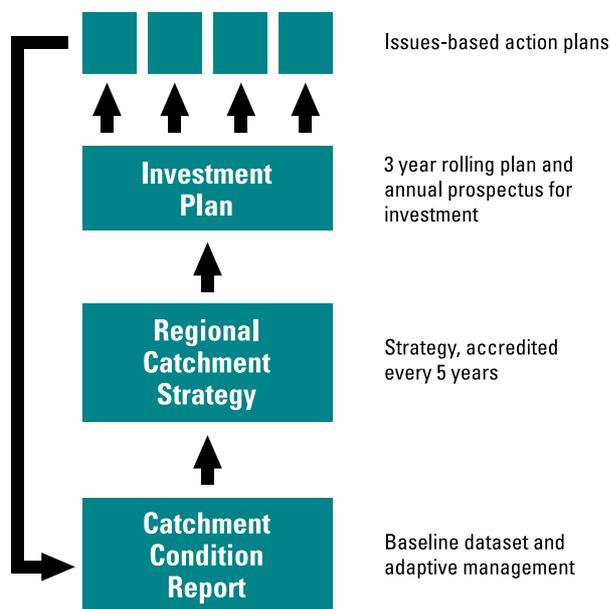


Figure 12 Integration of Regional Catchment Strategy Planning Process

13.2 Building the Investment Plan

The Investment Plan is the structure and process which translates the Goals, Outcomes and Targets in the Mallee Regional Catchment Strategy into funded programs as active plans and projects.

An Investment Plan is a prospectus or business case through which the region seeks investment from external funding bodies for the future management of the natural resources of the Mallee. That Investment Plan must, therefore, provide adequate information to allow potential investors to make informed decisions about the particular natural resource management outcomes they wish to support.

Those funding investors will need confidence that:

- the programs represent the real priorities for the region;
- the projects are clearly linked to the Goals, Outputs and Targets in the Mallee Regional Catchment Strategy;
- the projects will deliver demonstrable and measurable benefits; and
- the programs have clear accountabilities and reporting frameworks to ensure delivery of agreed outcomes.

The Mallee CMA is developing an approach to deliver these outcomes, based on a process which will engage its regional partners. The proposed approach will involve a staged series of steps:

- it will be structured around the asset classes in the Catchment Condition Report. That will integrate the Investment Plan with the Vision of the Regional Catchment Strategy to "protect and improve our natural resources";
- it will start with the clearly stated Goals, Outputs and Targets in the Regional Catchment Strategy for each asset class. That will tie the Investment Plan strongly to the Mallee Regional Catchment Strategy;
- it will assess the adequacy of the existing suite of threat-based plans, strategies, Research and Development, protocols and related instruments to deliver against those specified targets. This process will highlight those areas where the aggregate impact of those existing arrangements will not be sufficient to achieve the required outcomes and targets;
- Annex A indicates how that suite of existing plans, policies and strategies promotes achievement of the outcomes and targets for each of the six goals in the Catchment Condition Report and this Strategy;
- where gaps are identified in the tools available to deliver those outcomes and targets, then a process will be triggered to generate proposals for new and additional activities/plans/projects/Research and Development/protocols etc. That process will involve the full range of partners;
- those proposals will be assessed and collated in the first instance at an Asset Class level. That keeps the focus on the assets which the Mallee Regional Catchment Strategy intends to protect and improve. That program will include a clear assessment of the relative balance of private and public benefits from the specific plans and so the appropriate cost sharing approach;
- all proposals will be subject to assessment against triple bottom line criteria to ensure there is a balanced judgment of the relative impact of any initiative against all possible impacts;
- an initial program by asset class will be subject to community input through the Implementation Committee structure. This will ensure that the approaches are aligned with community expectations;
- those asset-based proposals will be collated and critiqued at a CMA regional level. In many cases the proposed threat-based plans will be effective in delivering against multiple goals, outputs and targets. This coordinated plan will also develop tests to allow optimal trade-offs between proposals to ensure that the final Investment Plan is focussed on priorities and delivers the most cost effective and efficient package of measures. It will also provide a clear assessment and validation for each project against triple bottom line outcomes; and
- finalising the Investment Plan will involve an iterative process engaging funding bodies, the Mallee CMA Board and delivery partners in the region.

This process of translating the goals and targets in the Regional Catchment Strategy into a robust Investment Plan will be supported by the policy approaches set out in the plans which accompany the Regional Catchment Strategy.

First the **Risk Assessment** identifies the risks to the successful achievements of those targets. It identifies four main areas of risk. The other supporting plans will help minimise those risks.

- **Agency Failure:** the Mallee Regional Catchment Strategy is dependent on a wide range of external agencies and organisations for its success. The Communications Plan establishes an approach to minimise these risks and promote effective engagement of those agencies in implementation of the goals of the Mallee Regional Catchment Strategy, while the Monitoring and Evaluation Framework creates a structure to ensure robust accountability for program delivery;
- **Data Adequacy:** in many areas the targets in the Mallee Regional Catchment Strategy are based on limited data. The Research and Development Needs Analysis, and the Monitoring and Evaluation Framework identify optimal approaches to generate the data to reduce that uncertainty and so support delivery of the targets;
- **Bio-physical:** the Goals and outcomes of the Mallee Regional Catchment Strategy may be threatened by the emergence of biophysical agents or events such as drought, new pest plants etc. The Monitoring and Evaluation Plan will create a framework to ensure adaptive management in response to such threats;
- **Commercial Factors:** the ability of the region to invest in natural resource management programs depends on its commercial viability. The Communications Plan anticipates such threats and the Monitoring and Evaluation Plan will create a framework to ensure adaptive management in response to such developments.

The outcome will be a robust process which will engage partners and communities across the Mallee in the development and delivery of cost effective, prioritised programs which will ensure successful achievement of the targets in the Mallee Regional Catchment Strategy to realise the vision of:

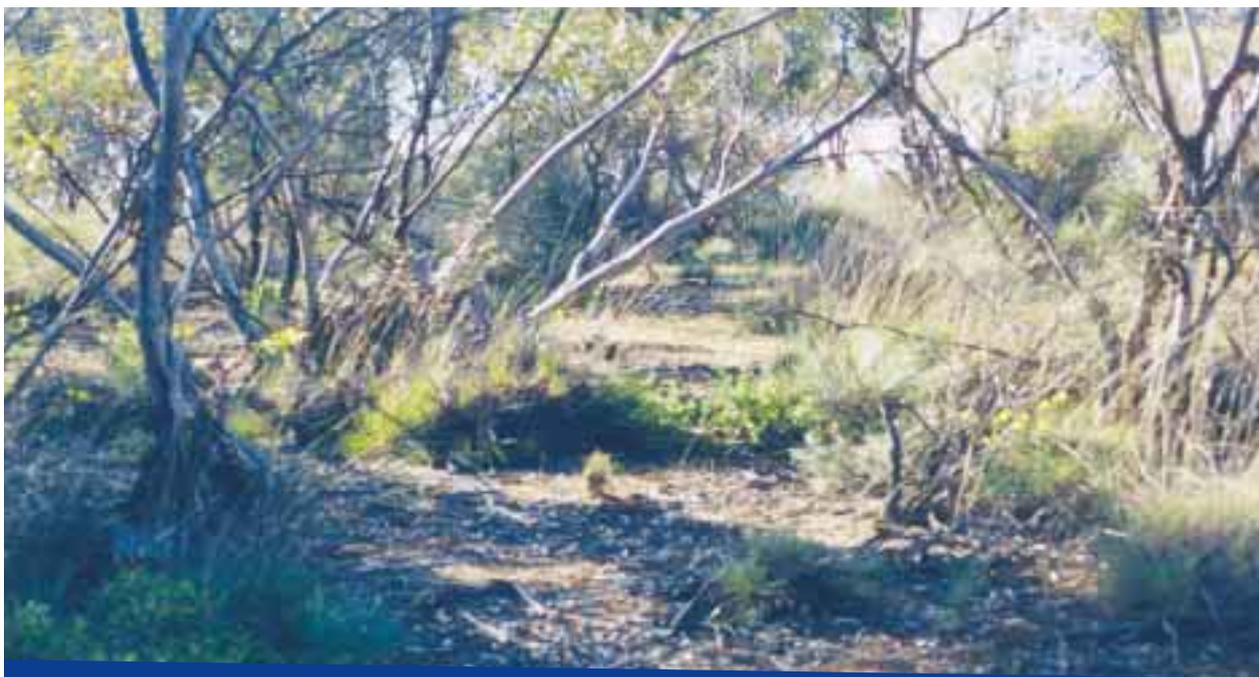
"Informed Mallee communities protecting and improving our natural resources."

Annex A Integration Between the Regional Catchment Strategy and Detailed Plans

The following tables (Tables 8, 9, 10, 11 and 12) confirm the detailed plans, projects, strategies, protocols and procedures that will deliver the outcomes and targets of the Mallee Regional Catchment Strategy.

Table 8 Mallee Regional Catchment Strategy - Relationship to Plans and Strategies

Commonwealth Strategies	State Strategies and Frameworks
Murray-Darling Basin Salinity and Drainage Strategy 1988	Entitlements to the Murray 1999
Council of Australian Governments Agreement (COAG) 1995	Victoria Flood Management Strategy 1998
Murray Darling Basin Ministerial Council Cap on Diversions 1995	Victorian River Health Strategy 2002
National Strategy for the Conservation of Australia's Biological Diversity 1996	Nutrient Management Strategy for Victorian Inland Waters 1995
National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance 1997	Victoria's Salinity Management Framework 2000
Floodplain Wetlands Management Strategy for the Murray Darling Basin 1998	Victoria's Biodiversity - Sustaining Our Living Wealth Strategy 1997
Salinity Audit of the Murray Darling Basin: A Hundred Year Perspective 1999	Victoria's Native Vegetation Management - A Framework For Action 2002
National Action Plan for Salinity and Water Quality 2000	Victorian Action Plan for Second Generation Landcare 2002
Integrated Catchment Management in the Murray Darling Basin 2001 - 2010	Victoria's Planning Provisions (VPP)
Basin Salinity Management Strategy 2001 - 2015	State Environment Protection Policies (SEPP)
National Strategy for Ecologically Sustainable Development 1992	Indigenous Partnership Strategy 2001
Recovery Plans under Federal Protected Species Legislation	Action Statements under State Protected Species Legislation
The National Reserve System	Management of Victoria's Ramsar Wetlands Strategic Directions Statement
'The Living Murray' MDBC Discussion Paper 2002, and related reports	Strategy for Aboriginal Managed Land in Victoria (SAMLIV)
MDBC Daughterless Carp Program	Victorian Pest Management - A Framework For Action <ul style="list-style-type: none"> - Weed Management Strategy 2002 - Public Land Management Strategy 2002 - Rabbit Management Strategy 2002 - Wild Dog Management Strategy 2002 - Fox Management Strategy 2002 - Feral Pig and Feral Goat Management Strategy 2002
MDBC Draft Native Fish Strategy 2002-2012	



Remnant Mallee vegetation.

Table 9 Mallee Regional Catchment Strategy - Relationship to Plans and Strategies (**Approved Regional Action Plans**)

Mallee Regional Catchment Strategy	Biodiversity Goal 1	Waterways, Wetlands & Floodplains Goal 2	Water Resources Goal 3	Land Resources Goal 4	Cultural Heritage Goal 5	Community Capacity Goal 6	State Of Approval R = Regional S = State D = Draft	RCS Timelines RCS Review Due RCS Renewal	2003- 2008 August 2008 2008	
									Approval Date	Review Date
Approved Regional Action Plans										
Nangiloc-Colignan Salinity Management Plan	•		•			•	R, S	1991 to current		Reviewed 1999
Sunraysia Salinity Management Plan	•		•			•	R, S	1993 to current		Reviewed 1999
Nyah To SA Border Salinity Management Plan	•		•			•	R, S	1993 to current		Reviewed 1999
Mallee Dryland Salinity Management Plan	•		•			•	R, S	1993 to current		Reviewed 1999
Waterway & Floodplain Management Strategy	•	•	•		•	•	R, S	2001 to		2004
Weed Action Plan	•			•		•	R, S	2001		2004
Rabbit Action Plan	•			•		•	R, S	2001		2004
Roadside Management Strategy	•			•		•	R	1998 to current		Not specified
Land Conservation Council Mallee Area Review - Final Recommendations (LCC)	•	•	•	•	•		S	1989, including addition of Recommendations in respect to Wimmera River.		Not specified
Mallee Parks Management Plan	•				•		S	1996		Not specified
Proposed Management Strategy for the Floodplain State Forests of the Mildura Forest Management Area	•	•			•		S	2000		Not specified
Mallee Tourism and Recreation Strategy					•	•		1993		
Yarriambiack Creek Management Plan	•	•			•	•	R	1998		2003
Murrayville Groundwater Supply Protection Area Management Plan			•			•	S	2001		2006

• Indicates strong link to Goal in Mallee Regional Catchment Strategy

Table 10 Mallee Regional Catchment Strategy - Relationship to Plans and Strategies (**Draft Regional Action Plans**)

Mallee Regional Catchment Strategy	Biodiversity Goal 1	Waterways, Wetlands & Floodplains Goal 2	Water Resources Goal 3	Land Resources Goal 4	Cultural Heritage Goal 5	Community Capacity Goal 6	State Of Approval R = Regional S = State D = Draft	RCS Timelines RCS Review Due RCS Renewal	2003- 2008 August 2008 2008
Draft Regional Action Plans	Approval Timelines								
Native Vegetation Plan	•			•		•	D	Public Consultation 2000	Expect S by mid 2003 Expect R by end 2002
Frontage Action Plan - Nyah to Robinvale	•	•			•	•	D	Public Consultation 2002	Expect R by March 2003
Frontage Action Plan - Robinvale to Merbein	•	•			•	•	D	Public Consultation 2002	Expect R by March 2003
Frontage Action Plan - Merbein to South Australian Border	•	•			•	•	D	Public Consultation 2002	Expect R by March 2003
Salinity & Water Quality Management Plan	•	•	•	•		•	D	Public Consultation 2002 - 2003	Expect R by March 2003 Expect S by June 2003
Bioregional Biodiversity Action Plans x 5	•	•				•	D	First draft in 2003	Expect R by 2003
Fox Action Plan	•			•		•	D	First draft in preparation	Expect R by March 2003
Wild Dog Action Plan	•			•		•	-	Planning in 2003	
Feral Pig Action Plan	•					•	-	No progress, unfunded	
Feral Goat Action Plan	•					•	-	No progress, unfunded	
Soil Conservation Action Plan				•	•	•	-	No progress, unfunded	
Regional River Health Strategy	•	•	•		•	•	-	Planning in 2003	Public cons. Late 2003
Regional Landcare Support Action Plan						•	-	Planning in 2003	Public cons. Late 2003
Murray River Reserve Environmental Action Plan	•	•			•		-	Planning underway	
Murray River Parkland Strategic Recreation Plan						•		Planning underway	
Avoca River Health Strategy	•	•	•		•	•			

• Indicates strong link to Goal in Mallee Regional Catchment Strategy

Table 11 Mallee Regional Catchment Strategy - Relationship to Plans and Strategies (**Regional Implementation Plans**)

Mallee Regional Catchment Strategy	Biodiversity Goal 1	Waterways, Wetlands & Floodplains Goal 2	Water Resources Goal 3	Land Resources Goal 4	Cultural Heritage Goal 5	Community Capacity Goal 6	State Of Approval R = Regional S = State D = Draft	RCS Timelines	2003 - 2008
								RCS Review Due RCS Renewal	August 2008 2008
Regional Implementation Plans									
Wetland Operational Plans	•	•	•				D	2003	R to be completed March 2003
Sunraysia Drainage Strategy		•	•				R, S	2002	R completed in 2002
Stormwater Management Plan, Mildura		•	•				D	2001	
Stormwater Management Plan, Robinvale		•	•				D	2001	
Hattah Lakes Water Management Plan	•	•	•				-	Planning underway	R to be completed in 2003
Lindsay/Walpolea Environmental Flows Project	•	•	•				-	Planning underway	
Potterwalkagee Creek Water Management Plan	•	•	•				-	Planning underway	
Hattah-Kulkynne Lakes Ramsar Site-Strategic Management Plan	•	•			•		D		
Wimmera Regional Floodplain Strategy		•							
Outline Development Plans	•	•	•	•	•	•	D	Planning underway	
Sunraysia Infrastructure Refurbishment Study			•	•					
Wimmera Mallee Pipeline Feasibility Study		•	•	•					
Yarriambiack Creek Aboriginal Heritage Study		•			•	•	-	AAV 2000	
Wetland Audit & Prioritisation	•	•	•		•			2003	

• Indicates strong link to Goal in Mallee Regional Catchment Strategy

Table 12 Mallee Regional Catchment Strategy - Relationship to Plans and Strategies (Protocols, Procedures and Planning Policies / Regional Investment Plans)

Mallee Regional Catchment Strategy	Biodiversity Goal 1	Waterways, Wetlands & Floodplains Goal 2	Water Resources Goal 3	Land Resources Goal 4	Cultural Heritage Goal 5	Community Capacity Goal 6	State Of Approval R = Regional S = State D = Draft	RCS Timelines RCS Review Due RCS Renewal	2003- 2008 August 2008 2008
Protocols, Procedures & Planning Policies									
Municipal Planning Schemes	•	•	•	•	•	•		2000/2001	2002/2003
Planning Guidelines for Native Vegetation Retention Controls	•				•	•		1996	
Draft Mallee Roadside Code of Practice	•			•	•	•	D	1999	
Draft Mallee Salinity Register			•				D		
Action Statements under <i>Flora & Fauna Guarantee Act 1988</i>	•	•						On-going	
Resource Protection Guidelines - Rabbit Control	•	•		•	•	•		2000	
Siting and Design Guidelines for Water Diversion Works on or across Crown Land	•	•	•		•				
Irrigation Development Guidelines	•		•	•	•	•			
(NSW) Murray Regional Environmental Plan No. 2 - Riverine	•	•						1994	
Murray River Landscape Guidelines	•	•							
Murray River Floodplain Planning Guidelines		•							
Guidelines for Environmental Impact Assessment, <i>Environmental Effects Act 1978</i>	•	•	•	•	•			1995	
Regional Investment Plans									
Regional Business Case (3 Year Rolling Investment Plan)	•	•	•	•	•	•		Done annually	
Regional Management Plan	•	•	•	•	•	•		Done annually	

• Indicates strong link to Goal in Mallee Regional Catchment Strategy

Annex B Consultation Program

Over one hundred separate agencies, organisations, groups and individuals were notified of the proposed review and renewal process and invited to a series of meetings held across the Mallee. A listing is provided at the end of this Annex.

The following table records the program of meetings held in May and June 2002 with stakeholders across the Mallee to engage communities and groups in the process of developing the Regional Catchment Strategy (Table 13).

Table 13 Initial Consultation Program: May - June 2002

Location	Date	Audience
Buronga	13 May	Mallee Sustainable Farming Group
Ouyen	14 May	Mallee Lands Committee
Birchip	14 May	Birchip Cropping Group
Birchip	14 May	Shire Councils
Walpeup	15 May	Landcare Groups
Mildura	15 May	Mildura Rural City Council
Mildura	16 May	Mallee Irrigation Environment IC
Mildura	16 May	Water Authorities
Mildura	17 May	Industry Bodies
Mildura	17 May	Special Interest Groups
Tooleybuc	20 May	Landcare and Special Interest Groups
Swan Hill	20 May	Swan Hill Rural City Council
Melbourne	20 May	Friends of Wyperfeld
Robinvale	4 June	Robinvale indigenous community representatives
Mildura	5 June	Mildura indigenous community representatives
Red Cliffs	13 June	Regional Landcare Conference

This table records the extent of stakeholders reached through this consultative program. It confirms that meetings were held across the region to ensure a breadth of input to the process. Extensive meetings and discussions were also held with staff from the central agencies such as NRE and Parks Victoria.

A further round of meetings was held in November after the first full version of the renewed Regional Catchment Strategy had been drafted (Table 14). These meetings were advertised in the local press and through direct invitations to key regional stakeholders and groups. Copies of the draft renewed Mallee Regional Catchment Strategy were made available at a wide range of outlets including all twelve local offices of NRE and the front counters of local government and water authorities and in regional public libraries.

Table 14 Further Consultation Program: November 2002

Location	Date
Mildura: public meeting	14 November
Mildura: regional agencies	14 November
Robinvale: public meeting	20 November
Robinvale: meeting with the Murray Valley Aboriginal Cooperative	20 November
Piangil: public meeting	20 November
Birchip: public meeting	21 November
Hopetoun: public meeting	21 November
Murrayville: public meeting	21 November
Ouyen: public meeting	22 November

The Key Mallee Communities

The key issues and concerns identified by each group in the initial meetings are recorded below:

- **The Mallee CMA Implementation Committees** bring the experience and insights of the community to the work of the Mallee CMA. These groups have been briefed on the process, contributed to the direction of the project and have generated many of the programs and projects that form the central building blocks of the revised Mallee Regional Catchment Strategy. The two Implementation Committees were also represented on the project Steering Committee.
- **Major Partners:** such as government agencies, councils and water authorities carry much of the responsibility for implementing the major programs in the Mallee Regional Catchment Strategy. The Mallee CMA has formal agreements with these bodies to clarify and agree the relative roles and responsibilities of the different bodies (see Chapter 14 below). Meetings were held with

individual agencies on a one-to-one basis and through group sessions to explore common issues. Individuals from these agencies were also represented on the project Steering Committee. Priority issues identified included:

- For councils, how to use planning processes to support natural resource management objectives, and how the Mallee CMA and DPI can support initiatives on say protection of native vegetation,
- For water authorities, how to promote greater water use efficiency by landholders and reduce losses in delivering water to farms;

- **Indigenous Communities:** are reclaiming their native title rights to all public land in the Mallee. They have a continuing engagement in the management of land and water in the Mallee landscape.

The Mallee CMA is committed to developing and maintaining strong links with local indigenous communities in the Mallee, but recognises that it will take time and dedication from both sides to forge effective relationships. In establishing these links, the Mallee CMA sought advice from the local indigenous community and relevant indigenous organisations such as the Mirimbiak Nations Aboriginal Corporation, Cultural Heritage groups, and NRE indigenous facilitators.

An initial outcome of these contacts was a set of meetings in early June to provide a forum where the voices of the community could be heard and initial relationships established with the relevant elders and traditional owners. The Mallee CMA employed local indigenous coordinators to invite relevant people to the meetings, to provide a link between the elders, traditional owners and other key members of the community and the CMA.

The meetings were held at the Mildura Aboriginal Co-op and the Murray Valley Aboriginal Co-op in Robinvale, with invitations extended to representatives of relevant tribal groups such as the Latje Latje and Wadi Wadi peoples. The southern Mallee community was engaged through the Wotjobaluk Lands Council. Individuals from those meetings also made an important contribution to a workshop of the Mallee CMA Board at the end of June. Particular priorities raised at the meetings included:

- Protection of significant cultural sites,
- Protection of billabongs and river frontage sites that are important for cultural and recreational use, and
- Involvement of the community in developing and delivering solutions;

- **Industry Bodies:** such as the Victorian Farmers Federation (VFF) and regional trade associations represent the interests of important sectors across the Mallee. Members from these groups were invited to meetings at a number of locations across the region. Critical issues raised included:
 - Coordination of plans and programs across different agencies and areas to ensure clarity and continuity in action programs,
 - The specific concerns of beekeepers who provide critical pollination services but face declining areas to feed their bees;
- **Specialist Interest Groups:** such as Greening Australia, Environment Victoria and local voluntary conservation groups, such as Friends of Wyperfeld, speak for individuals who have particular interests and concerns regarding the environment. Members of these groups were invited to

open meetings across the region and also met members of the Regional Catchment Strategy team in other locations. Key issues raised included:

- Attention needs to be paid to the ongoing maintenance of existing schemes as well as major new capital expenditure and large projects,
- The roles of service provision, extension and enforcement should be separated,
- Looking for a vision for the region and leadership from the Mallee CMA,
- A particular concern related to how valuable environmental benefits will be retained once the Wimmera-Mallee pipeline is established;

- Market Research was completed to identify the priorities and concerns of the wider community across the region, looking at the different opinions held in different areas,
- Media releases were issued throughout the process to inform and prompt interest in the exercise, and
- Individual's comments and contributions were welcomed through freestanding comment sheets available through the Mallee CMA and Landcare Groups.



Frontage Action Plan Information Day at Piangil Demonstration site.

- **Landcare** groups and local landholders carry the front line responsibility for taking action on individual properties. Landcare Groups provide a vital energy to enthuse a local community, to raise awareness and harness available resources to coordinate work to improve our natural resources. A series of regional meetings were arranged to engage these groups. Particular issues included:

- The level of incentives needed to be raised if they were to encourage adoption of changed practice,
- Increased support is required to ensure continuity and engagement of Landcare coordinators and groups and reduce risks of burn-out,
- Capacity building is an essential attribute if local communities are to take responsibility for natural resource management issues,
- Wind erosion is a forgotten issue. It needs more resourcing to identify practical solutions, develop pilot schemes on demonstration farms and extension and other initiatives to provide constant encouragement;

- **The wider community** must be engaged and support the renewed Mallee Regional Catchment Strategy. The priorities and approach in the Mallee Regional Catchment Strategy must take account of the priorities and concerns of different communities across the Mallee. A structured approach was followed to achieve this engagement, with a range of different elements:



Landcare group discussing weed management.

Organisations Notified of Process/Invited to Meetings

Catchment Boards

- Lower Murray Darling Catchment Management Board
- Murray Catchment Management Board
- North Central Catchment Management Authority
- River Murray Catchment Water Management Board
- Wimmera Catchment Management Authority

Councils

- Buloke Shire Council
- Gannawarra Shire Council
- Hindmarsh Shire Council
- Mildura Rural City Council
- Swan Hill Rural City Council
- West Wimmera Shire Council
- Yarriambiack Shire Council

Education & Research Bodies

- La Trobe University
- MADEC
- Sunraysia Institute of TAFE
- CSIRO Plant Industry, Horticulture Unit, Merbein South
- Murray Darling Cooperative Research Centre for Freshwater Ecology
- Victorian Institute for Dryland Agriculture: Walpeup
- Riverlink

Indigenous Community Representatives

- Mirimbiak Nations Aboriginal Corporation
- North West Region Aboriginal Cultural Heritage
- Murray Valley Aboriginal Co-op Ltd
- Mildura Aboriginal Corporation
- Robinvale Murray River CDEP
- Wotjobaluk Lands Council
- Elders of local communities
- Traditional landowners and representatives of relevant tribal groups
- Local community members
- Natural Resources and Environment Indigenous Facilitators

Industry & Trade Associations

- Asparagus Growers of Sunraysia
- Australian Almond Growers Association
- Australian Dried Fruits Association
- Birchip Cropping Group
- Irrigation Association of Australia Ltd
- Mallee Sustainable Farming Project
- Murray Valley Citrus Marketing Board
- Murray Valley Wine Grape Industry Development Committee
- Nyah District Action Group
- Pistachio Growers Association
- Sunraysia Citrus Growers Incorporated
- Sunraysia Table Grape Growers' Association
- Sunraysia Rural Water Authority Customer Advisory Committee
- Victorian and Murray Valley Winegrape Growers Council
- Victorian Apiarists Association
- Victorian Farmers Federation: 5 District Councils (dryland) and 1 Irrigation Branch

Landcare Groups

- 29 Landcare groups across the Mallee

Regional Agencies & Bodies

- Deakin Irrigation Project
- Mallee Water for Growth Committee
- Mildura Chamber of Commerce
- Mildura Murray Outback Tourism
- Sunraysia Area Consultative Committee
- Sunraysia Drainage Task Force
- Sunraysia Rural Counselling Service
- Sunraysia/Mallee Economic Development Board
- SunRISE 21 Inc
- Yarriambiack Creek Advisory Committee

Special Interest Groups

- Australian Conservation Foundation
- Environment Victoria
- Friends of Hattah-Kulkyne National Park
- Friends of Kings Billabong
- Friends of Nyah Vinifera Forest
- Friends of Wyperfeld
- Greening Australia Victoria Inc
- Mallee Parks Consultative Group
- Mid Murray Field Naturalists
- Murray-Darling Association Inc
- Sunraysia Bird Observers Club
- Sunraysia Field Naturalists
- Trust For Nature
- Far West Anglers Association
- Mildura Four Wheel Drive Club
- Sporting Shooters Association
- Sunraysia Bushwalkers Inc
- Victorian Field and Game Association, Swan Hill and Mildura Branches

Local Members of Parliament

- Federal Member for Mallee
- Member for Mildura
- Member for North Western Province
- Member for Swan Hill

State Government Departments

- Country Fire Authority
- Department of Land and Water Conservation (NSW)
- Department of Infrastructure
- Department of Innovation, Industry & Regional Development
- Department of Natural Resources & Environment
- Environment Protection Authority
- Parks Victoria
- Vic Roads
- Victorian State Emergency Service

Water Authorities

- First Mildura Irrigation Trust
- Goulburn Murray Water
- Grampians Water
- Lower Murray Water
- South Australia Water
- Sunraysia Rural Water Authority
- Wimmera Mallee Water

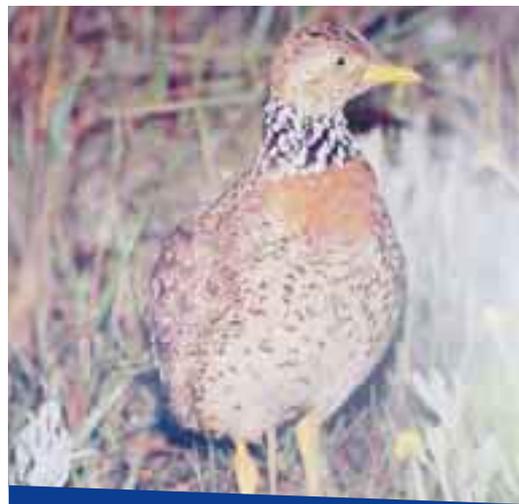
Annex C Biodiversity Assessment

This Annex expands on the assessment presented in Section 6.4.

The word biodiversity is used to describe the natural variety of all life forms. The term encompasses composition (species), structure (how it is arranged) and function (what it does). Biodiversity is the keystone that underpins a range of vital ecological functions. It buffers against catastrophic events and is fundamental to maintaining regional productivity. Extreme climatic conditions interacting with the geology of the Mallee have resulted in unique communities of flora and fauna. Aboriginal use of fire was also a strong influence in shaping native vegetation formation, distribution and ecological requirements.

The Victorian Mallee is significant for its unique faunal assemblages, particularly reptiles and birds. Approximately 52 species of flora and 62 species of fauna in the Mallee region are threatened. Many of the vegetation complexes that originally dominated the Mallee are now largely fragmented. Significantly, large blocks of public land remain but this vegetation does not represent the diversity that would have been present prior to European settlement.

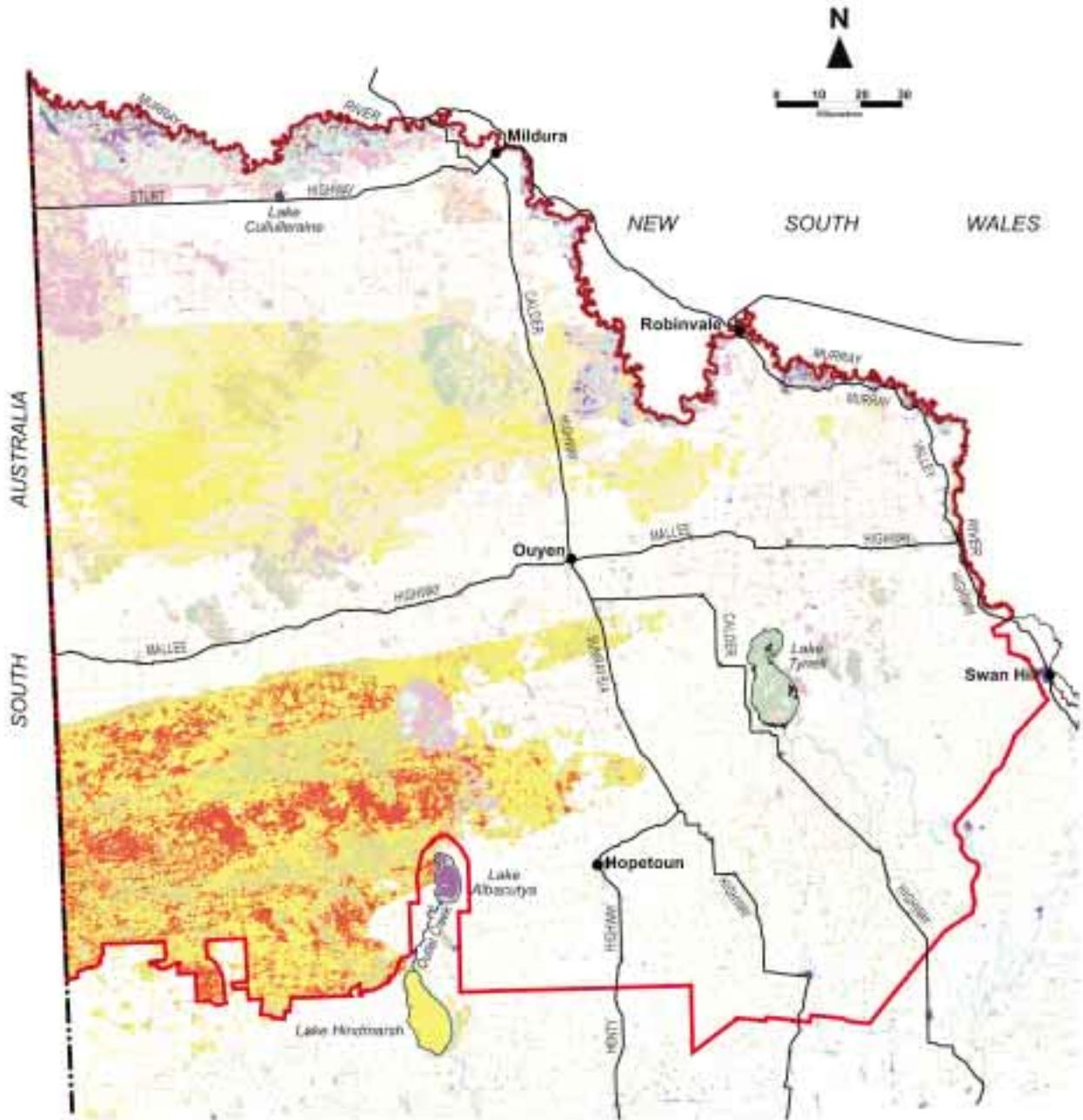
The vegetation of the Mallee region has been classified into thirty separate Ecological Vegetation Classes (EVC). The following maps (Figures 13 & 14) provide the location and extent of amalgamated EVC's prior to European settlement and of the areas now remaining.



Plains Wanderer requires native grassland for survival. *Photograph: Tom Whellan.*

Simplified Current 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 (non-Eucalypt) |  | Not vegetated - dunes and rock outcrops |
|  | 14.1 Riverine Grassy Woodlands or Forests - broader plain |  | Non-indigenous vegetation |
|  | 14.2 Riverine Grassy Woodlands or Forests - creekline and/or swampy |  | Cleared land |
| | |  | Mallee CMA boundary |



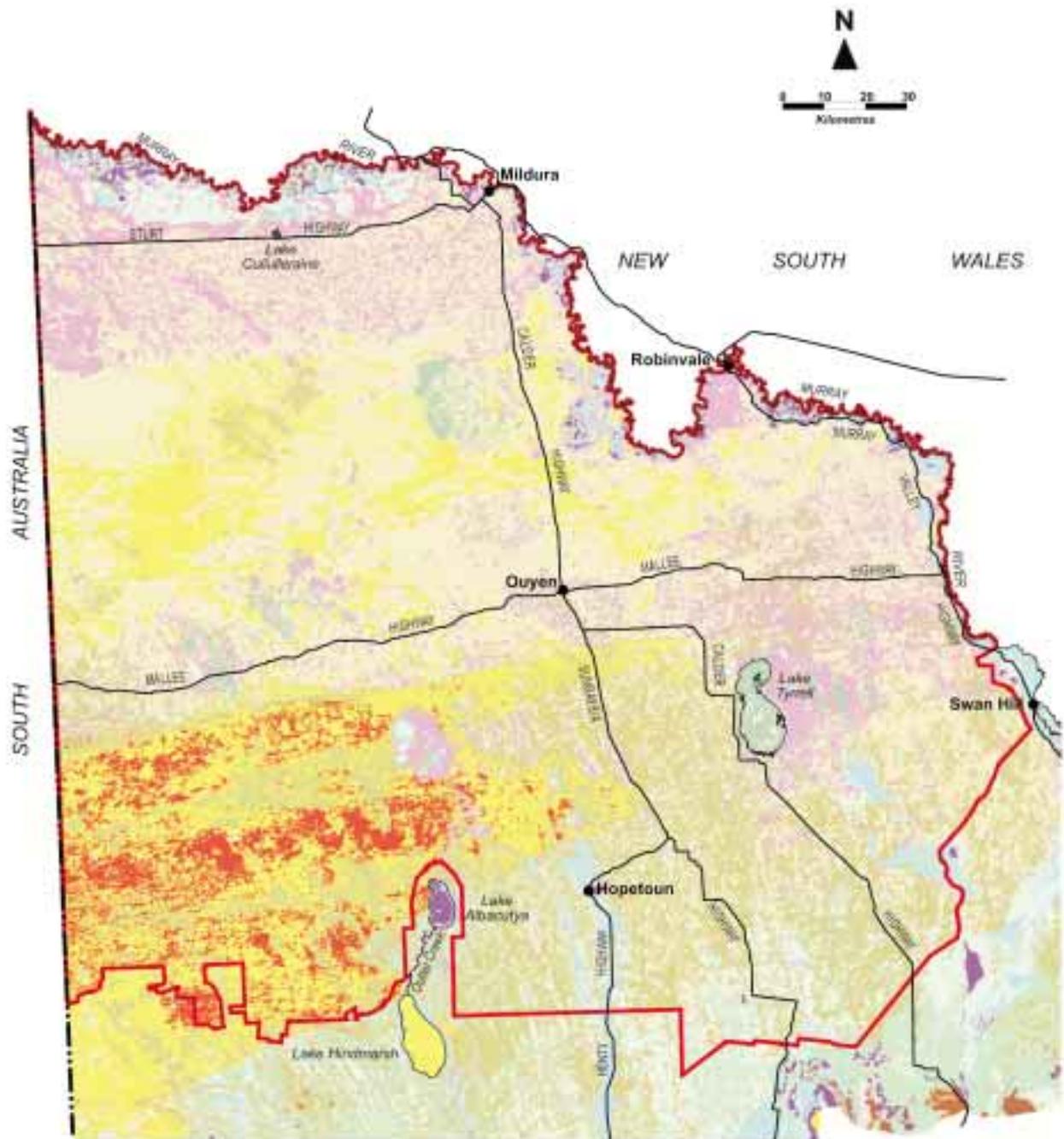
Source: North West EVC Mapping Study, funded by Mallee, Wimmera and North Central CMAs
Cartography by Spatial Vision, 2003

Figure 13 Simplified Current Native Vegetation

This map indicates the extent of the losses which have occurred.

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

- | | | | |
|---|---|---|---|
|  | 5.2 Lower Slopes or Hills Woodlands - grassy |  | 15.1 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 14 Simplified Pre-1750 Native Vegetation

Lowan Mallee Bioregion

Land within the Lowan Mallee Bioregion is generally of poor agricultural quality due to the low fertility, low water storage capacity and high wind erosion potential of the sandy soils (Rowan and Downes 1963). Hence, land clearance is mainly restricted to the margins of the bioregion blocks, where the Lowan Sands grade into heavier and more fertile soils. Around 80 per cent of the bioregion remains public land (66 per cent conservation reserves/14 per cent other public land). The Murray-Sunset, Wyperfeld, Annuello and the Big Desert Wilderness Park, comprise a major portion of the bioregion.

The majority of native vegetation within the bioregion is not depleted. Nearly two thirds of all the native vegetation occurs within conservation reserves, including most of the small proportion of vegetation that is considered Highly Threatened. However, the majority of vegetation classed as Threatened occurs on freehold land. Three listed communities from Schedule 2 of the *Flora and Fauna Guarantee Act 1988* have been recorded in the study area - Semi-arid Herbaceous Pine - Buloke Woodland, Semi-arid Shrubby Pine - Buloke Woodland, Semi-arid Herbaceous Pine Woodland (Sluiter et al. 1997). High priority species in the bioregion include Black-eared Miner, Greater Long-eared Bat, Rosenberg's Goanna and Azure Sun-orchid.

Aside from the clearance of native vegetation from areas around the margins of the bioregion, relatively minor modification of natural environments has occurred in the Lowan Mallee Bioregion in comparison with other Victorian bioregions. This is due to the general lack of exploitable resources (e.g. good soils, herbaceous ground cover, large timber). Woodlands of Scrub Cypress Pine appear to have suffered the greatest decline in historical times. Altered fire frequency is likely to have been a key factor contributing to this change (LCC 1985; LCC 1987). This species, as well as other community dominants such as Buloke and Desert Banksia, are killed by fire. Grazing licences also covered almost all areas of the bioregion in the past and may have resulted in modification of the composition of some woodland communities. Introduced weeds and feral animals, particularly rabbits and foxes, have also had an impact on native plant communities and native fauna.

The management of our public land is vital for biodiversity conservation. There is a need to maintain the largest, best natural areas (NPs and wilderness areas) from the threats that are noticeably degrading their values, particularly pest plants and animals, although there is often an assumption that the wilderness areas look after themselves.

Murray Mallee Bioregion

There are many small but significant areas found throughout the landscape of the Murray Mallee bioregion in the secondary reserve system, in linear strips on roadsides and streams and in often isolated patches on private land. The size, number, connectivity and quality of these areas is significant for preservation of much of the Mallee fauna.

Mallee vegetation, including Woorinen Sands Mallee, Chenopod Mallee, Broombush Mallee and Big Mallee, dominates the landscape of the Murray Mallee bioregion. In the far north of the bioregion and in the southern half

of the bioregion, where dunes are more weakly developed, a diverse mix of mallee, grassland, Pine-Buloke Woodland and Savannah Woodland occurs. A contrasting geomorphic component of the Murray Mallee Bioregion are the groundwater discharge landscapes.

Approximately 83 per cent of the Murray Mallee bioregion is freehold land that is mostly cleared of native vegetation cover. These areas are predominantly utilised for agricultural production. A large portion of the northwest arm of the bioregion, however, comprises the northern half of Murray-Sunset National Park. Most native vegetation within the bioregion is Threatened with a significant amount of native vegetation on freehold land.



Remnant Mallee vegetation.

One listed community from Schedule 2 of the *Flora and Fauna Guarantee Act 1988* has been recorded in the study area - Semi-arid Herbaceous Pine Woodland (Sluiter et al. 1997). High priority species in the bioregion are Major Mitchell's Cockatoo, White-browed Treecreeper, Carpet Python, Lined Earless Dragon, Mallee Golden Wattle and Northern Sandalwood.

The broad-scale clearance of native vegetation in the Murray Mallee bioregion was primarily governed by the expansion of Victoria's wheat frontier from the Wimmera into the Mallee during the late 19th and early 20th Centuries (LCC 1987). Unfortunately, the vegetation types that have suffered greatest loss - those occurring on areas with heavier, more fertile soils, i.e. woodland and grassland communities - are generally also the communities that have also been impacted to the greatest extent by other threatening processes such as grazing, erosion, soil structure decline and salinisation.

Alteration of the types and numbers of grazing and browsing animals in the bioregion has resulted in major degradation of native vegetation communities, particularly those with an herbaceous ground layer. Indigenous small to medium sized mammalian browsers and grazers are now extinct in the bioregion, and have been replaced by a variety of introduced taxa including domestic stock, rabbits, feral goats and hares as well as increased numbers of large kangaroos. The combined impact of these changes in

grazing regimes, has been the modification of vegetation communities through a general depletion of native perennial plant species (including canopy species such as Slender Cypress Pine and Buloke) and replacement by annuals (mostly introduced weeds). This has in turn increased the wind and water erosion of the soil surface due to lack of vegetation cover (LCC 1987) and increased recharge of ground water. Vegetation clearance, timber harvesting (particularly of Slender Cypress Pine) and the impacts of fires have also resulted in major loss of old growth vegetation, and its associated characteristics such as hollow-bearing trees, across the bioregion. Ongoing incremental loss of scattered trees, along with a lack of regeneration is also decreasing the condition of woodland vegetation. This is likely to have adversely affected the abundance of some groups of fauna, such as parrots, small mammals and reptiles that are dependant upon the features of old growth habitats (Burbidge 1985; MCMA 2000).

Riverine Bioregions

The riverine bioregions of the Murray Scroll Belt, Robinvale Plains and Murray Fans bioregions comprise largely intact tracts of native vegetation that forms part of a continuous corridor of native vegetation along the length of the Murray River with some links with dryland vegetation.

Land within these bioregions is primarily used for grazing, recreational, conservation and timber harvesting purposes. Floodplain areas are mostly public land of various land tenures due to the periodic flooding of much land within these bioregions and clearance for agriculture has been minimal. (Water-based biodiversity is dealt with in more detail under the heading Waterways, Wetlands and Floodplains).



Black Box on River Murray Floodplain at Ned's Corner, needs occasional flooding to regenerate.

Three listed communities have been recorded in these bioregions - Semi-arid Herbaceous Pine-Buloke Woodland, Semi-arid Shrubby Pine-Buloke Woodland and Semi-arid Herbaceous Pine Woodland (Sluiter et al. 1997). High priority species in the Murray Scroll Belt bioregion are Spotted Bowerbird, Paucident Planigale, Red-naped Snake, Murray Lily, Twiggy Emu-bush, Narrow-leaf Emu-bush. High priority species in the Robinvale Plains bioregion, are Mueller's Skink, Straggly Lantern-bush, Silver Saltbush, Spiny-fruit Saltbush, Billabong Daisy, Grey Scurf-pea, Flaccid Flat-sedge, Annual Flat-sedge, Pygmy Flat-sedge, Indian Sundew, Low Hibiscus, Pale Plover-daisy, Yellow Tails, Long Tails.

Differing processes have affected the floodplains and terraces, however. Altered hydrological regimes, timber harvesting and firewood collection have affected floodplain communities, while overgrazing and the resultant effects of wind erosion have degraded native vegetation on the alluvial terraces (LCC 1987).

Significant modification of native vegetation communities has occurred since European settlers first arrived in the region during the mid 19th Century. By the 1870s, heavy stock grazing and the spread of rabbits had contributed to major denudation of the land surface across the Mallee region (LCC 1987). Continued grazing pressure from rabbits and kangaroos, combined with the widespread removal of Slender Cypress Pine during early years for paddle-steamer and railway transport systems, has resulted in major degradation of Pine-Buloke Woodlands in particular (LCC 1987). The understorey of other vegetation types within the bioregion have also been modified to some extent by the impacts of grazing.

Ongoing silvicultural management of these forests due to continuing demand for River Red Gum timber, has resulted in significant structural change, most notably, the loss of large veteran trees. The associated decline in the availability of tree hollows and production of woody debris, in conjunction with the collection of wood for domestic firewood, is likely to have adversely affected the abundance of some groups of fauna, such as parrots, small mammals and reptiles (including threatened taxa such as Regent Parrot and Carpet Python), that are dependant upon these habitat features (Burbidge 1985; Mallee CMA 2000).

River regulation, initiated during the 1920s due to demand for a reliable water supply to meet irrigation needs during summer months, has resulted in major alterations to floodplain hydrology. Increased salinity levels and declines in water quality also pose major threats to floodplain vegetation.

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