



GOULBURN
BROKEN
CATCHMENT
MANAGEMENT
AUTHORITY

The Goulburn Broken Catchment Management Authority

CATCHMENT STRATEGY



Final

June 1997 - Reprinted May 1998

Goulburn Broken Catchment Management Authority

CATCHMENT STRATEGY FINAL

**This Strategy was prepared by the Goulburn Broken Catchment and
Land Protection Board and was adopted by the Goulburn Broken
Catchment Management Authority at its first meeting
held on 1st July 1997.**

PREFACE

The State Government of Victoria is committed to working in partnership with catchment communities to achieve sustainable development and conservation of our vital land and water resources.

We commend the Goulburn Broken Catchment and Land Protection Board for preparing this Regional Catchment Strategy. It is the culmination of two years effort by the Board, working with local communities to assess the needs of the region and to develop a vision and set of integrated programs for sustainable development in the Goulburn Broken Catchment.

We have approved the Strategy as the basis to guide future investment by Commonwealth and State governments and regional communities on land and water resource management in the Goulburn Broken Catchment.

The Victorian Government supports the actions in the Strategy as important for:

- ensuring the health of our land, water and vegetation resources;
- improving the long term productivity from these resources; and
- enabling regional communities to be resilient and prosperous.

On 1 July 1997, a new Goulburn Broken Catchment Management Authority with expanded roles will be appointed to replace the existing Catchment and Land Protection Board. The new Authority will use the Regional Catchment Strategy as the blueprint for achieving effective integration and delivery of the land and water management programs in the Goulburn Broken region into the next century.



HON. MARIE TEHAN, MP
Minister for Conservation and Land Management



HON. PATRICK McNAMARA, MP
Minister for Agriculture and Resources

FOREWORD

The Goulburn Broken Catchment & Land Protection Board was established in early 1995 under the Catchment & Land Protection Act 1994.

Section 13 (a) of the Act requires the Catchment Board to 'Prepare a Regional Catchment Strategy for the Region and to co-ordinate and monitor its implementation'.

The Goulburn Broken Catchment has established four broadly based committees to develop policy and plans for the Irrigation Dryland, Public Lands and River Environment and Water Quality. The Board has liaised extensively with the Catchment community both directly and through these committees. It has been the Board's stated objective to produce a Catchment Strategy that is environmentally sound, socially just, economically responsible and affordable.

This Strategy builds on the sound base that was established in the Catchment by the:

- Salinity Program
- Water Quality Working Group
- River Management Authorities
- Landcare

Its preparation has not been easy. The key to strategic planning is to keep many often different and sometimes conflicting elements in balance, with a keen eye on reducing any limiting factors likely to impede successful implementation.

In part the strategy stems from review of over fifty previous reports, most of which deal with physical issues (mainly geophysical and biological) with a few devoted to economic and financial matters. In the view of the Catchment Board, a strategy statement can not be restricted to these areas, important though they are, if it is to produce added value. It must go further to bind in programs of financial, social and institutional action needed to establish the most efficient context within which physical action can take place.

The Catchment Board believes this strategy has positioned the Catchment to take advantage of any increased investment in Natural Resource Management at the Commonwealth and State level. It also builds on the goodwill that already exists in the Catchment community.

The Catchment Board welcomed the findings of the Catchment Management Structures Review because it provided more appropriate institutional arrangements for the implementation of the Catchment Strategy.

The Catchment Board wishes the new Catchment Management Authority well on its charter to work with the community to achieve integrated Catchment Management through the implementation of the Catchment Strategy.

In concluding, I would like to acknowledge the work of the members of the Catchment Board and support staff in the preparation of this strategy and thank them for their dedication and support over the last two years.



JOHN DAINTON
Chairman
Goulburn-Broken C&LP Board

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1. THE FUTURE WE WANT

1.1 A picture of our future

The future that the Goulburn-Broken Catchment community wants to create is one where the catchment's land and water resources are protected and enhanced to improve the region's social well being, environmental quality and productive capacity in a sustainable manner.

This strategy provides a framework to work towards this future.

The Goulburn Broken Catchment and Land Protection Board was established in 1995 under the Catchment and Land Protection Act 1994, to provide a link between the community and ultimate decision makers. This strategy was prepared by the Catchment Board in consultation with, and on behalf, of the community.

1.2 What's important?

The following principles underpin this strategy:

- a realistic approach to catchment management
- equal access to decision making and resources
- the value of economic benefits should exceed the costs
- actions are equitable and affordable
- agricultural production is sustainable.

The objectives of the Strategy are to:

1. Consolidate existing Natural Resource Management (NRM) Strategies.
2. Broaden and develop existing strategies to cover identified gaps including weeds, biodiversity and catchment drainage.
3. Accelerate implementation through other funding sources.
4. Improve delivery of on-ground works through strategic planning, improved efficiency and ongoing landholder involvement.
5. Improve viability of catchment landholders by tackling social, economic and environmental constraints.

In addition, it will be important to promote co-operation, including community awareness and understanding, in implementing the strategy.

The Catchment Management Authority will be action-oriented. Although levels of community commitment are high and considerable progress has already been made, much remains to be done while maintaining the momentum. The implementation of works which need to be undertaken for natural resource management in this catchment will be over a long period and will need to be maintained.

1.3 Why bother?

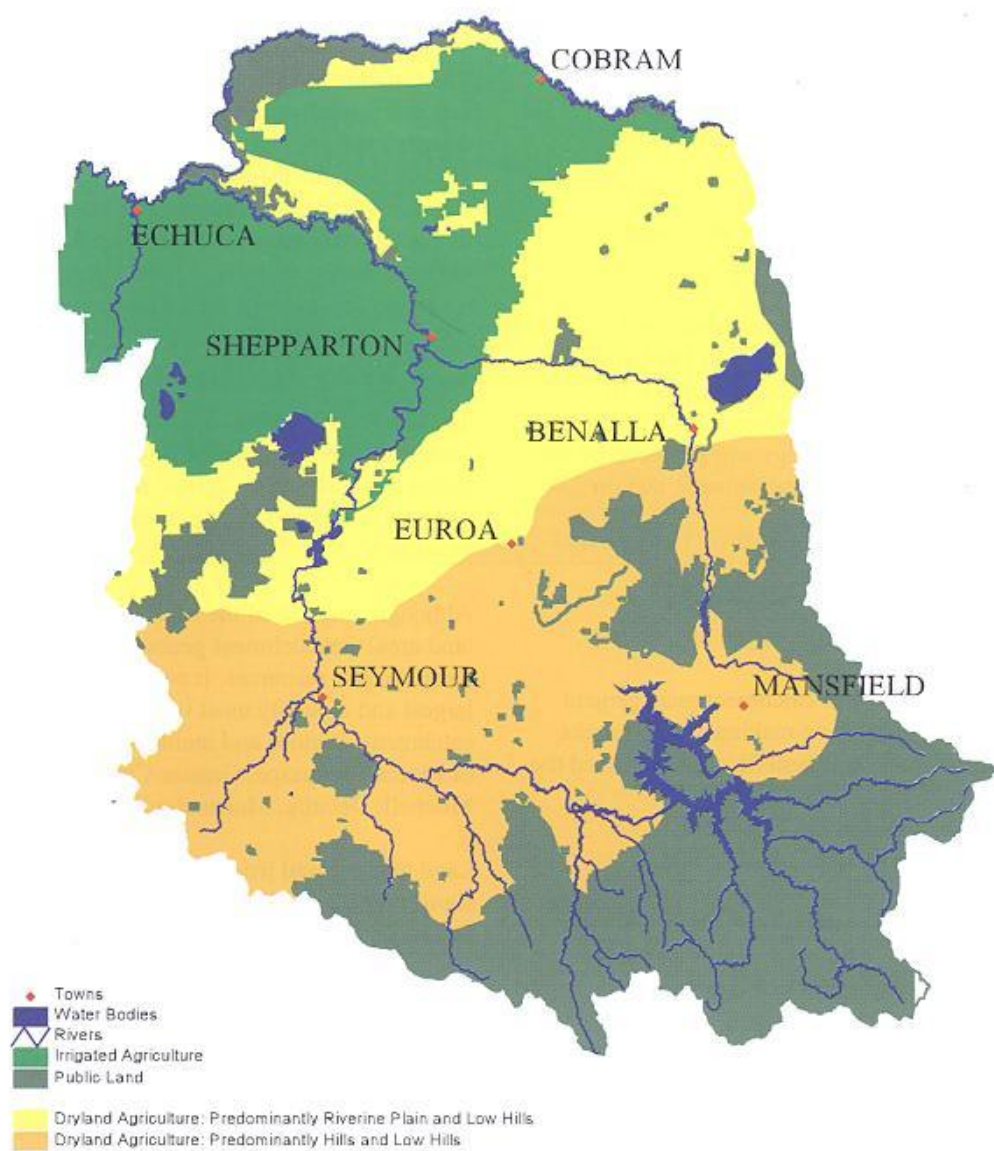
The Goulburn-Broken Catchment covers 17% of Victoria, and houses about 200,000 people. The region supports major agricultural (dryland and irrigated), food processing, forestry and tourism industries.

Although only 2% of the Murray Darling Basin's land area, the catchment generates 11% of the basin's water resources. It contains Victoria's largest and arguably most important water supply catchment (Eildon) and includes the Municipalities of Moira, Campaspe, Greater City of Shepparton, Mitchell, Delatite, Murrundindi and Strathbogie.

Land clearing and irrigation have resulted in significant degradation of the catchment's land, water and biodiversity.

Production from the irrigation region supports a very large food processing industry, which has expanded dramatically in recent years. The Shepparton Irrigation Region (SIR) produces 25% of Victoria's export earnings and about \$4.5 billion in economic output each year and is regarded as the "foodbowl" of Australia. The Irrigation area is the driving force of the catchment's economy and a large contributor to State and national export earnings. Work to improve it cannot be allowed to slow.

Figure 1: Goulburn Broken Catchment - Regional Management Units



2. WHAT WE HAVE NOW

2.1 Part of a bigger picture

The agricultural and food processing strength of the Goulburn catchment needs to be maintained. This catchment strategy will ensure the sustainability of these industries.

There are a large number of existing organisations and Boards which are working towards common sustainability and development targets. Strong linkages between the Catchment Management Authority and these groups will be a priority.

2.2 Problems in the catchment

2.2.1 Salinity

Inappropriate clearing in the dryland and replacing deep rooted vegetation with annual pasture has increased agricultural production, but has also dramatically increased groundwater recharge.

The Dryland is a major source of salt entering the river system. The catchment currently contains about 4500 ha of salt discharge areas where saline groundwater has evaporated to leave heavily saline soils or salted ground. This area is growing at 5% per year, and will ultimately increase to 38,000 ha in 50 years if nothing is done.

The major impact of increased salinity on rivers and streams over the next 30 years will be increased saltloads (downstream) and the destabilisation of banks through saline seepage.

The catchment exports an average of 180,000 tonnes of salt from the Dryland catchment to either the irrigation region or the River Murray (approx. 45%). This will double in 50 years if remedial action is not taken.

In the Irrigation area the natural underground drainage system of aquifers has not coped with the introduction of intensive irrigation. Now 43% of the SIR is underlain by watertable within 2 metres of the surface. The rise has been so rapid that the watertable levels predicted in 1987 for the year 2000 have already been surpassed.

If nothing is done, some 65% of the SIR will have a high watertable by 2020, and severe land salinisation will occur. Most major wetlands will have suffered irreversible degradation and 1500 km of streams will see major rises in salinity to levels where aquatic life will be seriously affected.

The impacts of unchecked watertable rises and salinity (in both the Dryland and Irrigation areas) are of significant economic, environmental and social concern.

2.2.2 Soil acidity and sodicity

Soil acidity (both natural and induced) is a problem in many of the pastoral and cropping areas of the catchment and reduces the available options for salinity recharge control by restricting the range of useable pasture and cropping species.

Soil sodicity is a problem that often accompanies salinisation because of the domination of sodium chloride in our catchment subsoils and groundwater. It is also an important issue when using groundwater for irrigation. Sodicity leads to soil structure decline, especially when accompanied by the application of freshwater or rainfall on saline soils.

2.2.3 Nutrients

Blue green algal blooms occur frequently in and downstream of our catchment. Reduction in nutrients, particularly phosphorous is the most effective way to reduce the likelihood of blue green algal blooms.

The catchment was nominated as Victoria's highest priority for nutrient reduction in the Murray Darling Basin Commission Algal Management Strategy (1994). Nutrient loads leaving the catchment vary markedly with time and conditions and have ranged from 615 tonnes of phosphorous (P) in 1993/94 to 256 tonnes in 1994/95. The range for Total Nitrogen (N) is equally dramatic, with a range of 5121 tonnes (1993/94) to 1613 tonnes in 1994/95.

Nutrients are generated from numerous sources in the catchment, some natural, many human-induced. Major sources include irrigation drainage, sewerage, sediment mobilisation (particularly in the mid-upper slopes) and intensive animal industries.

2.2.4 River Management

Catchment rivers and streams have undergone major changes since settlement. These changes and increased use of the streams and adjacent floodplains have resulted in many problems including stream instability, bank erosion, protection of public and private assets which are threatened by stream damage, flood protection and preparedness, stream frontage protection and habitat protection.

In general, flows in the Goulburn and Broken Rivers vary largely in response to irrigation needs downstream. Operation of Eildon has reduced the July to September flows passing Eildon to 33% of total annual flow, allowing an increase of the January to March to 23% of annual flow. Goulburn Weir has reduced the annual down river flow to less than 50% of the pre-regulated flow.

Principal Upper Goulburn and Broken River management issues are seen as:

- flooding prevention and management
- sand and gravel extraction
- willow invasion
- bank erosion (generally considered manageable with controlled flows)
- adjustment to flow regulation, impacting on the bank and river ecosystem.

The Lower Goulburn floodway has been extensively developed for irrigated agriculture. Controlled flows have meant bed and bank erosion is minimal, but rising saline watertables are a major concern and are expected to have an impact on bank stability should they continue to rise.

Degradation of rivers is often caused by land management practices further up the catchment, therefore more work needs to be done on the links between river management and catchment and land protection.

2.2.5 Pest plants and animals

The catchment contains a wide array of pest plants and animals. The catchment has 70 species of

proclaimed noxious weeds. Rabbits are the worst pest animals in the catchment, but other pests include wild dogs, horses, pigs, kangaroos, wallabies, cockatoos, galahs, foxes, feral cats, goats and wombats. In the waterways, carp are a major problem, causing turbidity and depletion of native fish stock.

2.2.6 Biodiversity

Biodiversity refers to the variety of lifeforms. This includes different plants, animals, insects and micro-organisms, the variation in genes they contain and therefore the ability to produce genetically different offspring. It also includes the ecosystems or associated habitat, for example, a riverine forest, a wetland, or a grassland, and variety among areas such as natural regions like floodplains or alpine areas.

Catchment habitats have been substantially modified since settlement through development of primary industries, including agriculture, mining and forestry.

Riverine grassy woodland, box ironbark forest and Montane grassy woodland are among the vegetation types most effected. Dry foothill forest on private land, river/riparian and wetland ecosystems are also subject to ongoing pressures. The public land domain (generally in the Upper Catchment) is in reasonable condition, although weeds and pests are an issue.

Broad Vegetation Types requiring sensitive planning and management include:

- grassy woodlands
- box-ironbark forests
- valley grassy forest
- dry foothill forest

There is a gradual degradation of roadside and stream vegetation in the mid-lower catchment and a fragmentation in habitat. Of major concern is a general lack of community understanding of the need to retain indigenous vegetation, and the value of diversity (especially understorey shrubs). Improved prioritisation and co-ordination of biodiversity projects is required to address these issues.

Figure 2. Broad Vegetation Types pre 1750

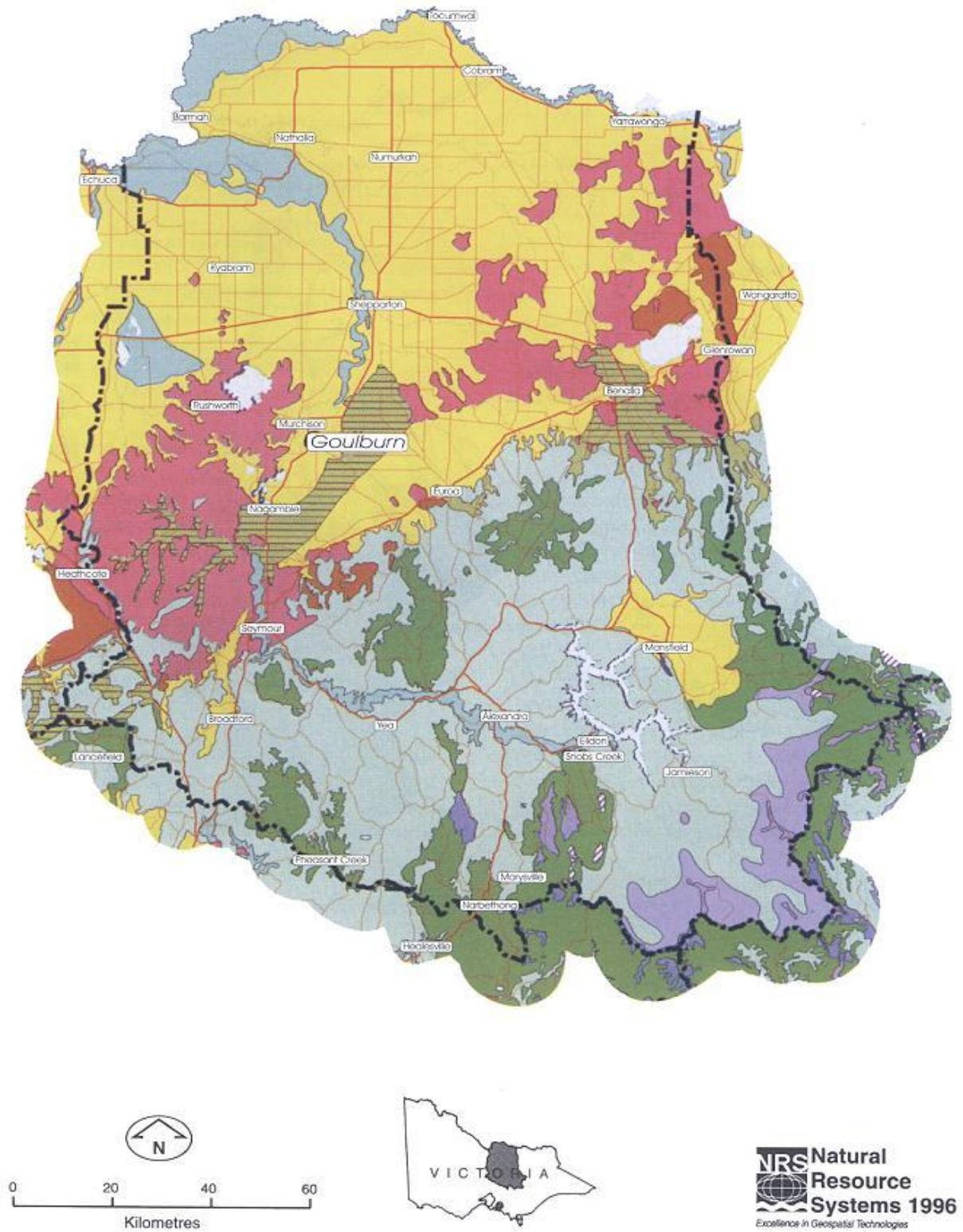
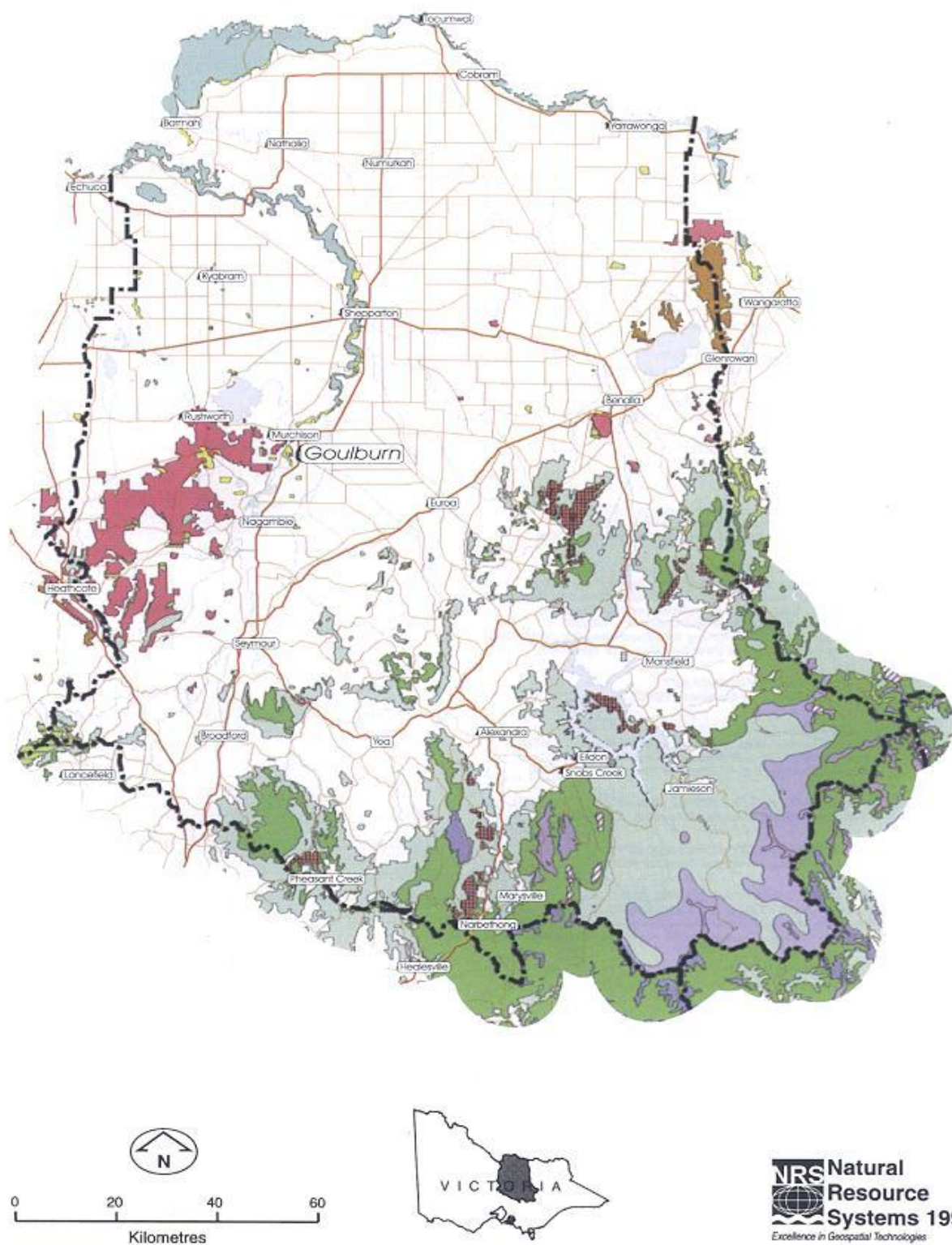


Figure 3. Broad Vegetation Types - 1987





2.2.7 Farm viability

The Goulburn Broken Catchment is renowned as one of the most productive regions of Australia, with the SIR supporting a major food processing industry.

From the earliest times, governments of the day promoted land settlement schemes based on broadacre and irrigation development. Rural and soldier settlement policies reinforced the growth of strong economic activity in the region. These policies along with the need for landholders to provide for retirement security have resulted in the over-subdivision of rural properties in many areas.

Most properties in the catchment are smaller holdings; the farming population is ageing and the characteristics, farming practices, lifestyle preferences and capacity for contributing to natural resource management activities varies.

Farm size is a major issue for sustainable resource management in the catchment (approx 80% could be considered to be sub-economic). Restructuring of farm enterprises, land use and farm size is continuing and is inevitable, but the process is generally emotionally painful for those involved.

However, the true farm *household* financial picture is much better than this in many cases, as off-farm employment is available across most of the catchment at the major population centres where processing occurs. Many farm households are better able to service farm loans than may be apparent. Consequently, special programs will need to be designed to meet the needs of the catchment.

2.2.8 Land use changes

Farm viability is also affected when land use changes are caused by environmental damage or changes in land management for environmental protection (eg recharge control through high density tree planting). Land rendered unproductive is retired from agricultural production within the catchment and this needs to be acknowledged by rating authorities.

There are areas in both the irrigation and dryland parts of the catchment where protection from salinity/erosion is uneconomic. Landholders managing these areas require assistance in best management practice. Agroforestry is seen as a major option for recharge control areas, whilst saline discharge and erosion sites would require a different approach.

2.2.9 Bulk water entitlements

The Murray Darling Basin Commission has placed a 'cap' on water use within the basin. As part of this initiative, which has been strongly supported by the Catchment Board, existing water entitlements have been adopted for the 1993/94 level of development and form bulk water entitlements (BWE) for the basin. All water users within the catchment participate in the entitlements (including urban, irrigation and environmental authorities).

TABLE 1 : DISTRIBUTION OF PROPERTY SIZES & ECONOMIC VIABILITY 1995/96.

FORM OF ENTERPRISE	TOTAL NUMBER PROPERTIES	NUMBER OF OF SUB-ECONOMIC PROPERTIES	% OF SUB-ECONOMIC PROPERTIES
Irrigated dairy	2206	1192 (<50Ha, 246MI)	54
Horticulture	437	298 (<20 Ha, 77 MI)	68
Irrigated other	2975	2724 (<150 Ha, 277 MI)	91
Dryland	7286	6113 (<250 Ha)	84
TOTAL	12904	10327	80

Table 2 is an analysis of farm size based on a judgement of economic farm size and does not include issues like debt load or specific culture type.

Bulk Water Entitlements for the Goulburn system have been completed on the 1990/91 level of development and apply to both regulated and unregulated streams and rivers. Bulk entitlements for the Murray River are currently being prepared. The Broken River has not yet begun because it is not clear what Lake Mokoan's contribution to the resource will be in the long term.

Bulk Water Entitlements and Transferable Water Entitlements free up the water market and trade between users of water without placing extra pressure on the resource.

Environmental flows have been specified and improvements made in the operating rules associated with its usage. However this only applies to the regulated streams. Environmental flows in unregulated streams will need to be addressed through the development and implementation of Stream Management Plans.

The MDBC has recently finalised a 'water audit' of the basin. This audit will be a powerful tool in optimising environmental flows in the Murray.

Bulk Water Entitlements and Transferable Water Entitlements provide the most effective means of capping water use and increasing productivity within the catchment.

The new Catchment Management Authority will work with the appropriate agencies to ensure the most efficient and effective use is made of the catchment's environmental entitlement and to develop Stream Management Plans for unregulated streams.

2.2.10 Urban fringe issues

The urban fringe can create several difficulties for Local Government and industries. A significant portion of the Goulburn Broken Catchment can be categorised as urban fringe.

Effective links with local Government planning are important for natural resource management.

Issues of particular importance include:

- agricultural restructuring (eg land use changes)
- loss in regional economic activity resulting from agricultural land retirement
- compatible farm practices in 'urban fringe' eg noise, smell, chemicals and aesthetics
- environmental enhancement including buffer strips, wildlife corridors
- management of pests/weeds
- irrigation/salinity mitigation infrastructure (and cost sharing)
- extractive industries.

2.3 What's already being done

2.3.1 Taking care of downstream communities

The Goulburn-Broken Catchment community has always been mindful of the impact that land and water management decisions and practices in the catchment can have on downstream communities.

The catchment has been the focus of many "pilot" studies into land and water management, the major focus being the enormous concern for the spread of salinity. It has been at the forefront of development of the "catchment" approach to natural resource management.

This attention has produced a burst of community and governmental energies over the past seven years. In particular, the community has mobilised itself in a remarkable way to deal with the danger. Extensive detailed mapping of elements critical to the problem and its solution has been completed. Now, over 80% of the catchment in private ownership is covered by Landcare groups.

2.3.2 Existing catchment management activities

River Management Authorities

There are three River Management Authorities in the catchment who are responsible for the implementation of river management in about two thirds of the privately owned parts of the catchment. There are processes underway to expand the WMA boundaries to cover the entire catchment.

Municipalities

The original 22 municipalities serving the catchment have been reduced to 7 through amalgamation. Many of these municipalities actively assist and encourage natural resource management within their area and have contributed funding for works. They have extensive planning powers which have been used in the past to achieve positive natural resource management outcomes.

The recent amalgamation of municipalities and the State Government's Draft Rural Zones Proposal has provided a window of opportunity for the catchment to integrate natural resource management and land use planning.

Community / Landcare Groups

Over 100 community groups are operating within the catchment. These groups have formed generally around single issues, eg. soilcare, drainage, tree groups, environmental interest. Many have broadened their focus through becoming Landcare groups.

LandCare networks are being encouraged to provide strategic support leaving the LandCare Groups to focus on works on the ground.

Goulburn Murray Water

Goulburn Murray Water is the Water Authority responsible for the wholesaling of all water in the catchments regulated streams and for retailing water to agricultural users. Under the Water Act, Goulburn Murray Water has licensing responsibilities for surface water and groundwater. It is also responsible for the operation, maintenance and replacement of the publicly owned salinity assets.

Farmers Industrial Organisations

Numerous branches of the Victorian Farmers Federation (VFF) (grazing, cropping) and United Dairyfarmers of Victoria (UDV) are located in the catchment, each having representation back to their state bodies via central councillors. District councils amalgamate on particular issues (eg. Irrigation committee comprises UDV and VFF members).

Action

The community and government have been active in tackling resource management (particularly regarding salinity) within the catchment.

In the Irrigation region for the 6 years, up to June 1996 the following milestones have been achieved:

- management plans implemented for the wetlands, protecting almost 2000 ha of wetland
- detailed environmental assessment conducted on 13,000 ha of the region.
- landholders spent \$162 million and governments \$60.7 million
- 866 whole farm plans covering 80,000 ha completed, raising the total since 1987 to 1411
- plans now cover 94,400 ha (33% of the irrigated area)
- over 94,400 ha of farm area laser graded (60 % of the irrigated area)
- over 78,000 km of improved farm drains and 1400 km of farm channels completed
- over 2,000,000 trees planted;
- over 1400 ha of micro irrigation installed
- over 1250 reuse systems built. Reuse systems now trap water from over 50 % of the irrigated area
- 59 km of arterial drains and 279 km of community drains built
- 91 new private groundwater pumps installed and thirty upgraded
- habitat protection works completed for 163 ha.

Similar achievements have been made in the dryland and implementation of the Water Quality Strategy has begun.

The catchment has two Government endorsed Salinity Management Plans and a Water Quality Strategy. DNRE is responsible for providing a number of natural resource management services outside the Government endorsed management plans.

3. HOW WE WILL GET THERE

The Catchment Management Authority will embark on a multi stage process to achieve the future described in Section 1:

- pursuing and accelerating the existing Natural Resource Management programs
- knowing and involving the catchment community
- finding the necessary money; and
- resourcing and organising the Catchment Management Authority.

In the past a group approach has been taken to awareness raising and planning, but implementation has mostly been targeted at individual landholders. A local area planning approach is being developed to take into consideration the opportunity for “cumulative benefits” rather than dealing with natural resource management from a single issue approach. This approach will provide a mechanism to integrate programs at the sub catchment level.

3.1 Priorities

The Catchment and Land Protection Board identified four physical issues as absolutely central:

- salinity, mainly a private land issue in the Irrigation and Dryland areas
- weeds, predominantly in the Dryland and Public Land areas
- nutrient inflows to streams, for their effects both outside and inside the catchment on algal growth, town water supplies and stream health generally
- declining biodiversity. For the most part, this problem is located within Private Lands where the majority of threatened habitat occurs.

It also identified three key non-physical issues:

- the need to know and involve the catchment community in detail at the local level, in ways not always achievable through committee structures
- the desirability of accelerating the physical programs
- a corresponding need to explore all available funding sources including, if necessary, private sector sources.

However there is little doubt that the catchment’s main asset is the active involvement of its people, and its main liability is a shortage of necessary capital.

The last five years have been difficult particularly in the Dryland. The severe flood in 1993 in the Benalla region and the drought of 1994 combined with the slow recovery from the wool price crash in 1990 to impede landholders’ capacity to undertake improvement works. Although groundwater pumping aimed at lowering the watertable (eg at Nagambie) and significant programs of research and baseline measurement have begun, more work on the utilisation of ground-water is required.

In addition, all catchment work shows a benefit / cost ratio greater than 1 and the community is motivated to act. The earlier the work is done, the earlier the benefits will flow.

High priority actions include:

- using local area planning to implement suitable land use and best management practices for the various land types and enterprises
- strengthening the support for Landcare groups by encouraging and resourcing Landcare networks
- supporting industry and regional development authorities to expand opportunities while achieving sustainable and profitable development of land and water resources
- establishing links with local government to ensure appropriate planning requirements are in place
- encouraging property management planning using land capability and biodiversity assessment and the Farm\$mart Program
- advising Government on the development and implementation of Codes of Practice relevant to catchment management
- implementing and enhancing existing approved monitoring and assessment of programs.

TABLE 2: PRIORITY RANKINGS

Rank	IRRIGATION	DRYLAND PLAINS	DRYLAND UPLANDS	RIVERS & WATER QUALITY	PUBLIC LANDS
1	Salinity Irrigation	Changed Flow Regimes*	Pest Plants	Eutrophication /Nutrients	Pest Plants
2	Waterlogging	Soil Acidity	Pest Animals	Pest Plants	Pest Animals
3	Eutrophication /Nutrients	Salinity - Dryland	Soil Acidity	Habitat Loss	Turbidity & Sedimentation
4	Pest Animals	Water Erosion	Salinity - Waterways	Pest Animals	Changed Flow Regimes
5	Pest Plants	Pest Plants	Salinity - Dryland	Turbidity & Sedimentation	Water Erosion
6	Flooding	Changed Land Use	Turbidity & Sedimentation	Water Erosion	Pathogens
7	Pathogens	Eutrophication /Nutrients	Water Erosion	Salinity - Dryland	Habitat Fragmentation
8	Salinity - Waterways	Soil Structure Decline	Soil Structure Decline	Salinity - Waterways	Habitat Loss
9	Changed Flow Regimes	Pest Animals	Soil Nutrient Decline	Salinity -Irrigation	Changed Fire Regimes
10	Turbidity	Turbidity Sedimentation	Habitat Loss & Sedimentation	Changed Land Use	Habitat & Modification

* Flow regimes rated high because of historical impacts rather than future actions. On this occasion, guidelines were misinterpreted.

3.2 Irrigation Program

3.2.1 Salinity and Drainage Sub Program

Objective: To manage the salinity of land and water resources and the quality of water in the Shepparton Irrigation Region in order to maintain and, where feasible, improve the social well-being, environmental quality and productive capacity of the region.

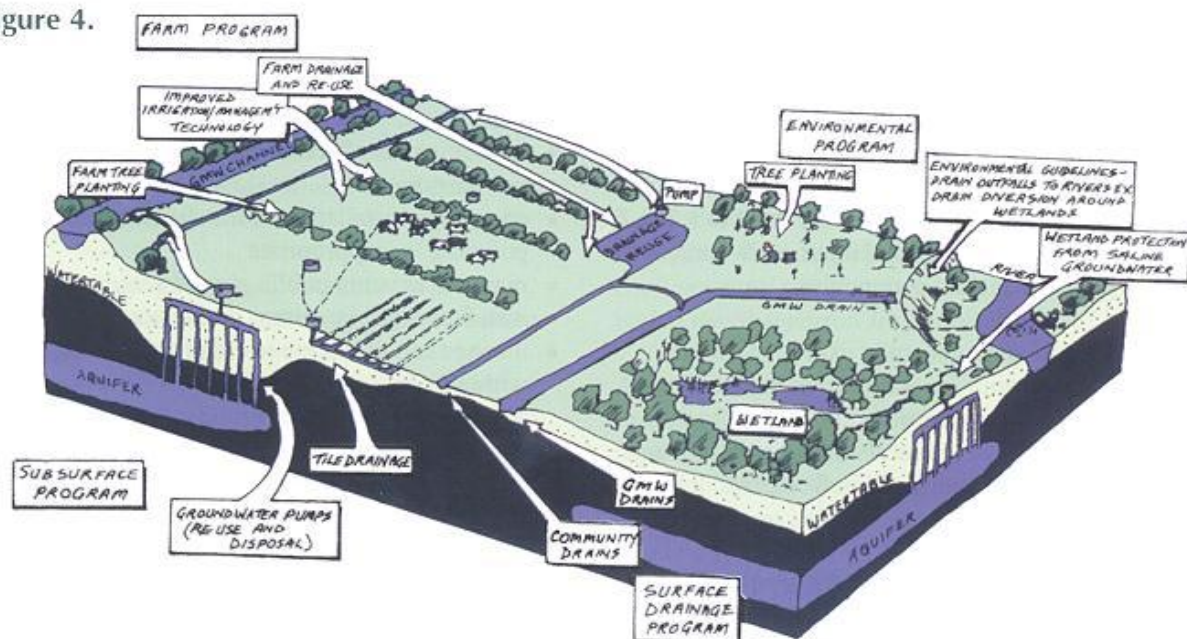
Forty-five percent of the Shepparton Irrigation Region is currently underlain by shallow watertables and this will rise to 60% if nothing is done. In this scenario, losses are expected to rise from the current \$30m to \$47m by 2000 and \$90m by 2020.

High Priority Action

Accelerate implementation of the Shepparton Irrigation Region Land and Water Salinity Management Plan.

The Shepparton Irrigation Region Land and Water Salinity Management Plan (SIRLWSMP) is a Government endorsed plan with a 30 year implementation program. The plan is currently in its seventh year of implementation. It consists of four components: surface drainage, sub-surface drainage, farm management and environmental protection.

Figure 4.



Farm Management Component

Goal: To reduce groundwater accessions, soil salinisation and waterlogging on farms.

This component will continue to encourage landholders to proceed with farm improvement activities and modify farm activities to Best Management Practices (BMP) for water use efficiency, productivity and reduction of accessions to the watertable. Where salinity control is not feasible, farmers are encouraged to move their resources to non-saline land and optimise productivity and environmental outcomes on saline areas through planting salt tolerant species.

The Farm Management Component encourages:

- all properties to develop a whole farm plan
- laser grading irrigation layouts
- production from the better land and retirement of saline non-productive land
- drainage reuse schemes
- tree planting (shelter belts/woodlots/environmental wetlands/agroforestry)
- improved irrigation management
- remodelling of farm channels and drains
- integration of NRM activities into Industry Programs eg. Target 10
- activities consistent with the nutrient and biodiversity strategies
- implementation of micro irrigation on district orchards.

Surface Drainage Component

Goal: To provide, by the year 2020, a surface drainage service to the 267,990 ha of the Shepparton Irrigation Region which is currently undrained. Currently 183,100 ha is served, which is 35% of the area.

The Surface Drainage component will achieve its goal through the construction of a network of Goulburn Murray Water Arterial Drains and Community Surface Drains, supplemented by drainage course declarations which allow clearing of obstructions down major natural drainage lines in the region. Water harvesting into large community owned storages will only be available to special case areas with low water rights or restricted outfall.

The component aims to restore the flooding regime in areas where the water balance has been changed dramatically. In irrigated areas, Drainage Course Declarations will remove major restrictions to drainage flows which cause water to pond in ephemeral wetlands. The reinstatement of more natural flooding regimes will deliver benefits to agriculture and the environment. Pumped outfall of community surface drainage water into Goulburn Murray Water (GMW) supply channels will only be approved where gravity outfall will not be available within five years. Discharge will be allowed subject to system operational requirements, downstream flooding and water quality.

A significant difference between the 1989 Plan and the proposed Surface Drainage Sub-program is a shift in emphasis from predominantly expensive arterial drains to a balanced mix of arterial plus comparatively cheaper community drains. The design level of service for arterial drains has been reduced from a 1 in 10 year rainfall event to a 1 in 2 year rainfall event, thus making it more attractive to both government and community.

Demand for funding generally exceeds available funding, and priority for action is on the basis of a multi criteria analysis based on benefit cost ratios, environmental values, community organisation and agreement, and the ability of landholders to take advantage of a drain.

The rate of progress and the works priority for the construction of community drains depends on a high degree of co-operation and agreement between landholders within each proposed drainage scheme. Agency community drainage officers play a major role in facilitating the negotiations between landholders and designers. Delays in gaining group agreement for a scheme will result in it falling in priority to the advantage of another group which can reach consensus regarding design, cost and cost share for its scheme.

The Surface Drainage component provides for:

- drainage works for 286,040 ha in the SIR
- 282 km of remodelled GMW drains
- 362 km of new GMW drains
- 2104 km of community drains
- 614 km of drainage course declarations.

Sub-Surface Drainage Component

Goal: Where possible and justified, to protect and reclaim the Shepparton Irrigation Region's land and water resources from salinisation through management of the region's groundwater.

Sub-surface drainage works will at least provide adequate leaching of applied salt loads and at best optimise the productive use of pumped groundwater to ensure a favourable salt balance.

As with the surface drainage component, a high level of landholder consensus is and will be required before detailed investigation and installation of a public groundwater pump or evaporation basin will proceed.

The Sub Surface Drainage component will:

- encourage additional groundwater pumping and reuse from 395 existing private groundwater pumps
- encourage installation of a further 365 new private pumps
- encourage installation of tile drains where pumping is inappropriate
- maintain existing public groundwater pumps
- install new public pumps where appropriate
- manage salt discharge to channels and drains within limits set by the Victorian Government and Murray Darling Basin Commission
- install evaporation basins where required
- develop alternative disposal strategies.

Environmental Protection Component

Goal: To protect and where possible, rehabilitate the natural environment of the region from loss or serious damage from high watertable and salinity.

In addition to environmentally sensitive implementation of the major salinity control works sub-programs (drains, pumps, evaporation basins etc), the Environmental Sub-program will promote and support rehabilitation of degraded land within the SIR, including rehabilitation of wetlands, edges of prior stream depressions and terrestrial remnant vegetation. Revegetation and other environmental works sub-programs will be undertaken to contribute to water quality and habitat diversity within the catchment.

Monitoring Component

The SIRLWSMP has a strong monitoring program set up under the framework of the statewide monitoring strategy.

Goal: To review the efficiency of outcomes achieved by implementing the plan; identify the impact of salinity and nutrient pollution where no plan activity has occurred; and provide data for regular review of priorities and work programs.

Support Component

Goal: To provide a framework to manage and co-ordinate implementation.

This includes communications strategy, policy development, community input, links with local government, community education and

accountability reporting. The plan prepares a detailed annual report for the government and the catchment community.

3.2.2 Water Quality Sub Program

Objective: To reduce phosphorous loads from irrigation drains by 50%.

Irrigation drainage has been identified as a major contributor of nutrients, especially phosphorous to waterways. Nutrient rich low salinity drainage water can be utilised for productive irrigation purposes and a program of retaining tail-water and storm water on farms and diverting water from drains will improve production and reduce nutrient loads in the irrigation season.

High Priority Action

Accelerate implementation of the irrigation component of the Goulburn Broken Water Quality Strategy

This strategy will link strongly with the SIRLWSMP. It will have a major focus on improved water and fertiliser management, increased diversion of drainage water for irrigation and improved management of dairy shed effluent.

3.2.3 Biodiversity Sub Program

Objective: To further incorporate biodiversity into the other irrigation programs, and provide a major focus for the management of reserve areas and how they link into other parcels of private land within the catchment.

Biodiversity has been significantly depleted and modified since European settlement. The Salinity Management Plan has a significant works program which enhances wetlands and riparian ecosystems and protects remnant vegetation.

High Priority Actions

- Develop and implement a Biodiversity Strategy to build on the environmental program of the Salinity Strategy.
- Promote biodiversity awareness to land owners, the community and business / professional organisations.

The sub-program is integrally linked to the Biodiversity Strategy and budgetary items are

reported via the Public Lands program. This strategy will complement the 'National Strategy for the Conservation of Australia's Biological Diversity and Victoria's statewide strategic focus on biodiversity.

3.2.4 Pests Sub Program

Objective: To reduce the economic and environmental impact of pest plants and animals within the Shepparton Irrigation Region.

Aquatic pests like alligator weed, arrow head and European carp pose a significant threat to the region's rivers, channels and drains. Terrestrial weeds including Mullumbimbi Couch and the more traditional 'noxious' weeds also pose a threat to the region's economy.

High Priority Action

Develop and implement Local Area Plans as required for pest plant and animals which are already established or threaten the region's land and water assets.

3.3 Dryland Program

The dryland program comprises land and water, pest management and biodiversity sub-programs. These sub-programs will tackle a raft of dryland natural resource management issues including:

- pest animals
- pest plants
- soil acidity
- soil structure decline
- soil nutrient status
- soil erosion
- wetlands
- habitat management
- changed land use
- turbidity and sedimentation
- salinity of both land and water
- waterlogging
- regional drainage and floodplain management.

The major thrust of the program is to develop delivery systems which integrate actions and simultaneously tackle a broad range of issues. It will build on the single issue approaches such as salinity and take these programs the next step by achieving a cumulative benefit from the work implemented and changes to land use and/or management.

A strategic planning approach both at the local and catchment level is crucial to the successful implementation of the dryland program. The delivery is called Local Area Planning and is to be supported by geographic information systems. Through empowerment of both local groups and key players (eg municipalities), the most suitable land use and best management practices for the various land types and enterprises in the catchment are to be implemented.

Projects will develop strong linkages and partnerships between stakeholders including community groups, local government and water management authorities thus resulting in cumulative impacts.

The Dryland Program is aimed at extensive perennial pasture establishment, increased strategic tree planting using a mix of indigenous trees and shrubs (both on high recharge areas and at break of slope) and a move to deeper rooted pastures on the plains. The Program will result in increased dryland stocking potential with flow on to the agricultural sector. To encourage landholder participation, this program will be tied to a significant weed control element.

Conventional wisdom is that farm viability is a key requirement of successful natural resource management, but enlightened recent research has indicated that there is a diverse range of landholders in the catchment and many do not "fit" the traditional farmer model. For this reason a more innovative approach is required to achieve best practice resource management.

There has been significant community planning and evaluation for the Salinity Program, but little of other aspects. The Board believes this focus must be expanded to encapsulate other land and water management issues including soils erosion, weeds, farm productivity, biodiversity etc. These other resource issues vary between localities in the catchment and are often rightly seen as more relevant than salinity by the catchment community. The current approach is therefore not fulfilling the "Big Picture" approach to natural resource management.

3.3.1 Land and Water Sub Program

Objective: To manage the land and water resources in the dryland area to enhance productive capacity while protecting/rehabilitating ecosystems.

Land use changes associated with agricultural, urban and industrial developments have altered the water balance, accelerated salinity and erosion processes and caused soil structure decline and an increase in soil acidity. The impact of these degradation problems is both local, through lower productivity and reduced resource base, and downstream through water quality decline. High water-using agricultural systems have been developed and implemented to restore the balance in salinity prone areas. The dryland program will be expanded to integrate all high priority processes and achieve sustainable and productive land management.

High Priority Actions

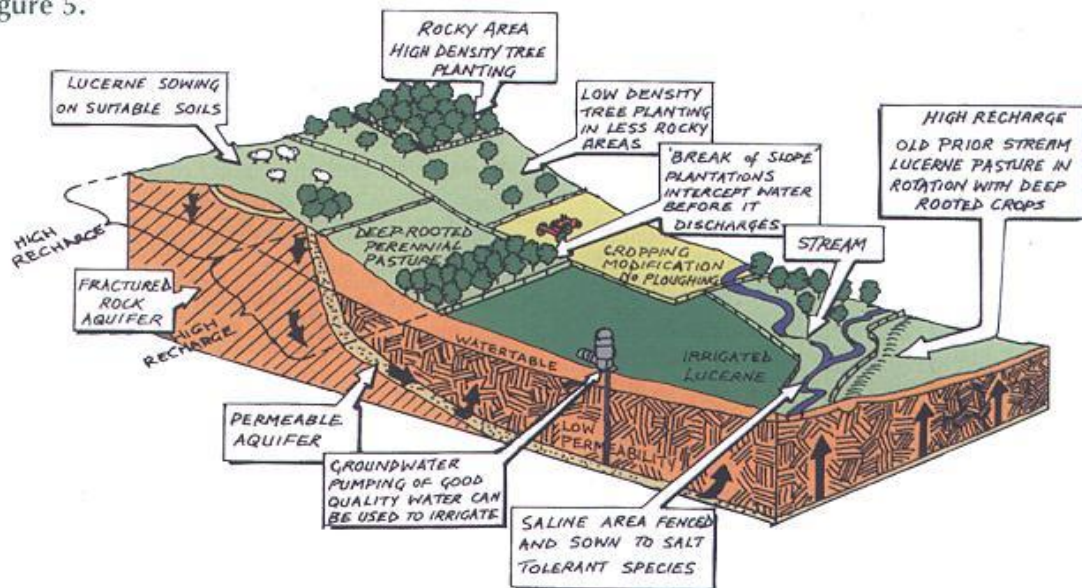
- Accelerate implementation of the Government endorsed Goulburn Broken Salinity Management Plan.
- Significantly reduce sediment/nutrient loads by treating active gully and tunnel erosion in the catchment.
- Develop and implement programs to address soil acidity and soil structure decline.

The strategy for the Dryland Program is to approach land and water management from a land capability/suitability viewpoint with the most appropriate management being applied to achieve a multitude of outcomes under a targeted approach. In many cases, a needs approach to natural resource management will become the vehicle for wider management issues within a sub-catchment.

The holistic Dryland Strategy will provide for:

- broadening the salinity program to include all land and water management including soil loss, pest plant and animals, soil acidity and changed land use
- land use planning consistent with environmental requirements
- the implementation of biodiversity elements within the program
- the implementation of the Water Quality Strategy.

Figure 5.



Salinity Component

The Dryland Salinity Component will:

Where high recharge sites are identified, promote:

- high density tree planting (<500/ha)
- improved cropping practices
- lucerne where appropriate (non-acid soils)
- indigenous vegetation retention
- perennial pasture establishment (phalaris/cocksfoot)
- revegetate with a range of indigenous trees and shrubs.

Encourage groundwater interception through:

- break of slope tree planting
- groundwater interception works (where appropriate)

Where groundwater discharge occurs:

- establish pasture establishment with salt tolerant species
- retain and revegetate with indigenous species.

Promote environmental works, such as:

- fencing out significant wetlands
- tree planting/agroforestry
- incorporation of weeds and biodiversity strategies.

Soil Acidity

Acid soils are a major impediment to establishing perennial pastures in the majority of the Dryland uplands. Over the last 10 years, the acidity of the catchment waterways has dropped by 1 pH unit, reflecting a serious trend. No major study of the

cause of this trend has been undertaken. Soil acidity is likely to be a major component of the Dryland Strategy.

An all encompassing local area planning approach to natural resource management means recognising requirements across a variety of activities (soil erosion, nutrients, weeds, salinity, productivity, biodiversity etc) and tackling them in a co-ordinated manner. The linking of landholders into local area plans is a critical component. Targeting sub catchments with local area plans for treatment will be undertaken on a priority basis using a range of tools such as the GIS services of NRE

3.3.2 Pest Management Sub Program

Objective: To reduce the economic and environmental impact of pest plants and animals within the dryland part of the catchment.

The release of calicivirus provides a window of opportunity on which to build a solid commitment by local groups to increase action on pest management. The Good Neighbour, Rabbit Buster, Weeds Initiative and LandCare 2000 programs give groups an ideal opportunity to make a major impact on pest management issues.

The dryland program, through a framework of Local Area plans, will develop a strategic approach to pest management.

High Priority Actions

- Complete the Dookie Local Area Plan trial as a model for addressing priority pest plants.
- Utilise the funds made available through the 'Weeds Initiative', 'Good Neighbour' and other initiatives to develop and implement Local Area plans in up to ten high priority areas.
- Accelerate rabbit harbour destruction associated with the rabbit calicivirus program.

Local area plans will be developed in areas where a strategic approach to regionally controlled weed or pest animal management is required to meet the needs and aspirations of the community. They cannot change the responsibilities for weed and pest control but they can be used as a means of attracting incentive to be used as circuit breakers in the community which would normally take advantage of existing community structures and complete existing activities.

Local area plans will form a partnership between land managers (both private and public) and the Government (through the Catchment Management Authority). They should be prepared by the land managers with the support of DNRE and will be based on economic, social and environment parameters.

Despite weeds causing major economic losses in agriculture, very little work has been done on determining the benefit cost of weed control/eradication.

3.3.3 Biodiversity Sub Program

Objective: To incorporate biodiversity into the other dryland programs and provide a major focus for the management of reserve areas and how they link into other parcels of private land within the catchment.

The vast majority of privately owned land in the dryland part of the catchment has been cleared for grazing and cropping. Remnant vegetation is threatened by insect attack and age. To address the problems created by past practices, special attention will be given to the preservation of remnants, both on private land and in reserves, and developing techniques to optimise the habitat potential of revegetation projects for salinity mitigation, soil erosion and stream management.

High Priority Actions

- Identify and manage all priority remnant habitat in the dryland area in accordance with the principles of Ecologically Sustainable Development.
- Increase the area and quality of important conservation areas, particularly native grasslands, grassy woodlands, wetlands, stream frontages and roadsides.
- Complete ecological vegetation class mapping and incorporate into the Regional Vegetation Plan.
- Encourage municipalities to complete and implement roadside and other native vegetation plans.
- Increase adoption of ecological management objectives by water management agencies, the Country Fire Authority and municipalities.

The sub-program is integrally linked to the Regional Biodiversity Strategy and budgetary items are reported via the Public Lands program.

3.4 Public Lands Program

The Public Lands Program focuses on managing the enormous Public Land assets of the region which include some of the State's most valuable forest industries, National/State Parks and Alpine Resorts. The Program will aim to improve the coordination, implementation, monitoring and management of biodiversity across different land tenure in the catchment. The Public Lands Program is concerned with managing the catchment's public natural resource assets in a sustainable manner.

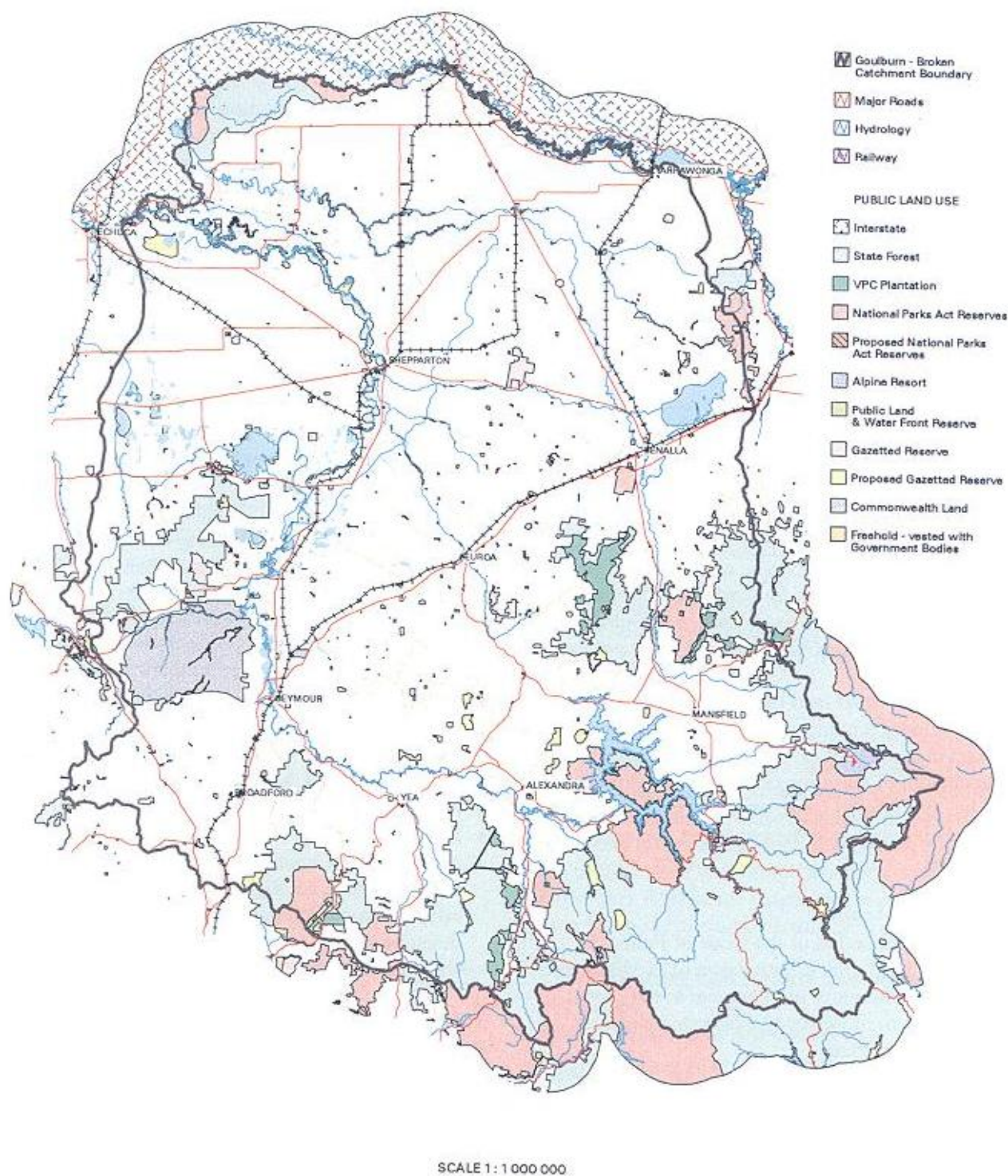
The management of public resource assets can be divided into the following businesses:

- National, State and Regional parks
- Forests
- Crown Lands and Assets
- Alpine Resorts Commission (ARC)

The classification of these lands reflect the Land Conservation Council recommendations for the use and management of public lands in Victoria.

The Public Lands Program comprises the Pest Management, Biodiversity, Water Quality, Parks and Reserves, Forest Management and Fire Management sub-programs.

Figure 6: Public Land Use



3.4.1 Pest Management Sub Program

Objectives: To prevent the establishment in the catchment of wild populations of introduced species which will threaten native flora and fauna and/or the agricultural lands which abut public lands; to eradicate, contain or control wild populations of feral animals and environmental weeds; and to protect indigenous taxa and ecosystems from the impact of genetically modified organisms.

Pest plant and animals threaten terrestrial and aquatic flora and fauna values through competition and habitat modification. Major species include foxes, cats, Indian mynas and St. Johns Wort.

High Priority Action

Improve the efficiency of the Good Neighbour Program and ensure that available resources are directed at priority infestations.

3.4.2 Biodiversity Sub Program

Objectives: To protect representative and ecologically viable samples of Victoria's natural ecosystems which occur in the catchment on public land; and to manage public land so that flora and fauna conservation and management objectives of the Flora and Fauna Guarantee Act 1989 are met.

The publicly owned land in the Goulburn Broken region includes a number of depleted and rare vegetation communities. The preservation and enhancement of these important communities can be achieved through forest management plans, park management plans and the improved management of reserves.

High Priority Actions

- Support application of the Code of Forest Practice in relation to protection of biodiversity
- Support community involvement in the development of Forest Management and Park Management Plans
- Encourage neighbouring private land managers to have input into management of reserves.

3.4.3 Water Quality Sub Program

Objectives: To implement the public lands component of the Water Quality Strategy with priority on sediment reduction and to maintain or improve the environmental quality and ecological integrity of aquatic ecosystems.

Roads and timber harvesting in public lands have the potential to generate significant sediment loads. Best Management practices have been developed and documented in the Code of Forest Practice.

High Priority Action

Support application of the Code of Forest Practice to protect water quality.

3.4.4 Fire Management Sub Program

Objectives: To plan for and manage fire to achieve ecological, land and water management objectives; and to minimise adverse impacts of fire prevention and suppression activities upon flora and fauna.

Fire management on public land is carried out in accordance with DNRE planning documents, including the Code of Fire Management, fire protection plans and area specific plans and guidelines.

High Priority Actions

- Ensure that the habitats of rare or threatened species or communities and other significant biological values are identified in Fire Protection and Prevention Plans, with appropriate fire management specified.
- Support continual review of fire policy and management on public land, with the aim of achieving both ecological objectives and a cost-effective approach to managing the threat of deleterious effects caused by uncontrolled wildfire.

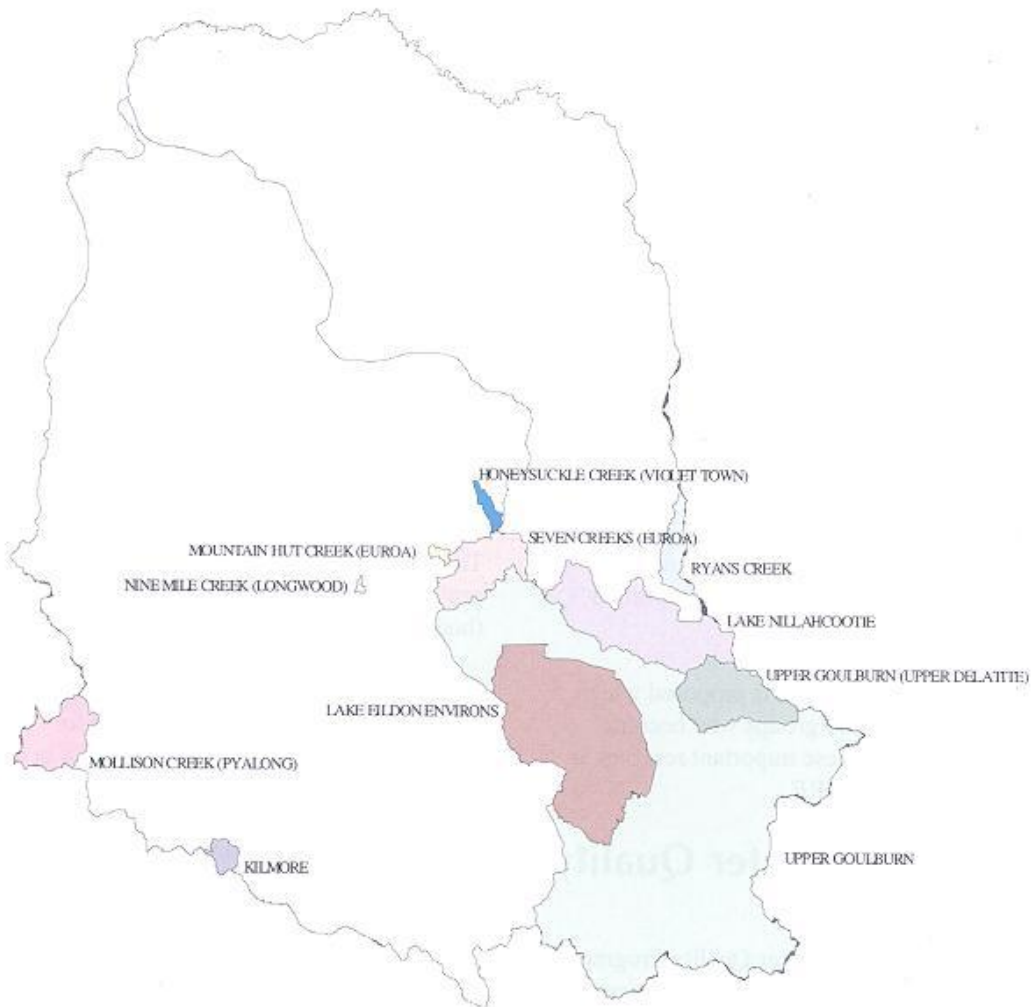
3.4.5 Public Lands Program Delivery

Parks and Forests

The Public Lands Program will be delivered through the adoption of best practice, normally through management plans or codes of practice, such as:

- Code of Forest Practice for Timber Production
- Central Highlands Forest Management Plan
- Regional Forest Agreement

Figure 7: Proclaimed water supply catchments for the Goulburn Broken Catchment



LEGEND

- HONEYSUCKLE CREEK (VIOLET TOWN)
- KILMORE
- KING RIVER (LAKE WILLIAM HOVELL)
- LAKE EILDON ENVIRONS
- LAKE NILLAHCOOTIE
- MOLLISON CREEK (PYALONG)
- MOUNTAIN HUT CREEK (EUROA)
- NINE MILE CREEK (LONGWOOD)
- RYANS CREEK
- SEVEN CREEKS (EUROA)
- UPPER GOULBURN
- UPPER GOULBURN (UPPER DELATITE)



Produced by T.J. Partridge,
Goulburn Broken Dryland Salinity Management Plan,
Dept. Natural Resources & Environment,
Bendigo, 02/06/1996.
Source of data: PWSC from DCNR Corporate Library.

- Parks Management Plans
- Water Quality Strategy and
- Biodiversity Strategy

These will ensure that the key issues of biodiversity and water quality will be tackled in an appropriate manner on the larger areas of public land in the catchment.

Small Reserves

The reserves dotted throughout the 'cleared' part of the catchment are of particular interest. These reserves are often:

- the last 'quality' remnants of some vegetation types
- not managed or managed at a low level
- at risk from changes being experienced on neighbouring private land eg, rising watertables, insect attack, changed water regimes and pests.

The management of these areas will be enhanced by their integration into Local Area Plans. It is pointless tackling the threats to these important reserves in isolation.

A primary initiatives program is proposed which will include all LandCare groups who become involved in managing these important reserves as an equal partner with DNRE.

3.5 River and Water Quality Program

The River Management / Water Quality Program aims to reduce nutrient inflows into catchment streams, repair stream bank and bed degradation, and implement preventative action to limit further breakdown. Floodplain management and ecology elements are also being targeted. The program recognises rivers and streams provide critical habitat and biolinks.

The River and Water Quality Program comprises the water quality management, river and stream management, floodplain and regional drainage functions in the catchment.

3.5.1 Water Quality Sub Program

Objective: *To reduce potential phosphorous loads in catchment waterbodies by 65% over 20 years to minimise risks of blue-green algal blooms in the catchment and in the Murray River.*

The Goulburn Broken Catchment has been identified as a major contributor of nutrients to the Murray River (300 tonnes of phosphorous and 3000 tonnes of nitrogen annually). Blue-green algal blooms, resulting from excessive nutrients in the waterbodies, are occurring more frequently and pose unacceptable risks to public health and the regions billion dollar food processing and export industries. A catchment based water quality strategy has been developed to manage the risk of algal blooms. This strategy focuses attention on major nutrient sources in the catchment, especially irrigation drainage, diffuse dryland contributions and sewerage treatment plants.

High Priority Actions

- Begin implementation of the Goulburn Broken Water Quality Strategy
- Expand the Water Quality Strategy to address other important water quality parameters.

The Water Quality Strategy comprises a series of projects which tackle downstream water quality (both within and outside the GB Catchment).

The Water Quality Strategy is a major plank of the Catchment Strategy and its goals are to:

- minimise blue green algae outbreaks in the catchment
- minimise/optimize water treatment costs
- minimise nutrient contributions to the River Murray
- enhance the river environments
- foster regional development (through better water quality for industry, agriculture and community).

The Water Quality Strategy tackles:

- co-ordination and community involvement
- community education
- non structural planning
- local water quality issues
- other water quality issues
- research and Investigation
- monitoring/evaluation/reporting.

The Water Quality Strategy will reduce nutrient inputs from:

- irrigation drainage
(in association with Irrigation Program)
- diffuse nutrient sources
- sewerage treatment plants
- urban stormwater
- intensive animal industry.

3.5.2 Stream Management Sub Program

Objective: To improve the condition of 3000 km of stream to good or excellent over 30 years while maintaining the environmental conditions of streams currently rated good and excellent.

45% of the 9900 km of streams in the catchment is estimated to be in very poor or moderate environmental condition. These streams impact on water quality by contributing sediments, nutrients and turbidity. Aquatic biota, riparian habitats and public assets including water storages, bridges and roads are at risk.

High Priority Actions

- Accelerate implementation of the existing waterway stability and restoration programs of Waterway Management Authorities
- Reduce the incidence of weed infestation on river/stream banks
- Improve habitat values for native fish species through biodiversity programs (habitat management)
- Finalise stream management plans for all major unregulated streams
- Complete the review of river frontage licences to achieve adoption of best management practices.

3.5.3 Floodplain Management Sub Program

Objective: To ensure development in flood prone areas is appropriate with the nature of the flood plain.

Arrangements associated with floodplain management need to be improved to achieve an appropriate balance between minimising the economic costs and maximising the environmental benefits of flooding.

High Priority Action

Develop and implement a floodplain management strategy including appropriate planning requirements.

Floodplain management is not to be confused with drainage. Properly designed drainage is about the orderly transfer of excess water after a designed event. When this event is exceeded, flooding occurs in a natural fashion.

Floodplain management is about the minimisation of damage caused by flood events. There are long standing problems associated with floodplain

management. The most important of these is that most flood protection infrastructure is not owned by a government department or authority.

Other long standing problems include :

- lack of agreement to flood strategies/schemes
- inadequate levee management
- ineffective planning controls
- community concern leading up to floods and anger following major events.

Most urban centres on the plains have floodplain management strategies completed. However little coordinated implementation has been undertaken in rural areas.

There are a number of organisations acting in floodway management, but no single organisation has authority. The Catchment Management Authority will be responsible for floodplain management and will:

- rationalise the numbers of organisations involved
- clarify their responsibilities
- resolve cost sharing arrangements for operations & maintenance and replacement of infrastructure
- establish links with local government and develop a flood plain management overlay.

3.5.4 Regional Drainage Sub Program

Objective: To manage regional drainage to minimise impacts on the environment and infrastructure.

Areas of the catchment require access to drainage to ensure long term economic, social and environmental sustainability in a controlled manner. Drainage activities must be in accord with the MDBC Salinity and Drainage Strategy.

High Priority Actions

- Continue implementation of the drainage component of the Shepparton Irrigation Region Land and Water Salinity Management Plan
- Clarify responsibilities and develop/implement a catchment drainage strategy which has a major focus on dryland drainage issues.

Considerable concerns have been raised by the various authorities about the apparent increase in flows in regional streams and depressions in recent years. These increases are thought to have resulted from changed land use (particularly laser grading and uncontrolled private drainage works).

Drainage works are currently controlled or influenced by numerous authorities and private groups within the catchment. In the Irrigation area, the community drains are managed by local groups and municipalities and are considered to be well co-ordinated.

In the Dryland, little is known about constructed drains, although there is evidence that many have been constructed by private groups and municipalities to relieve local flooding.

To avoid conflicts and provide for better drainage control, one body should be responsible for policies and drainage standards.

3.6 Biodiversity Strategy

The Catchment Board believes the protection and enhancement of natural assets is crucial for the health of the catchment, and that land degradation solutions should incorporate biodiversity maintenance and enhancement. The Catchment Board sees the development of a biodiversity program for the catchment as high priority.

A Regional Biodiversity Strategy is being developed to tackle key biodiversity issues such as forest concentration in the upper catchment and management difficulties with dispersed public lands such as box ironbark forests, grassy woodlands and water frontages and roadsides elsewhere in the catchment. The integration of the management of these Public Lands and surrounding private lands is a critical success factor.

A State Biodiversity Strategy is being developed in line with the National Strategy for the Conservation of Australia's Biological Diversity. Other important conventions include the Flora and Fauna Guarantee Act and the RAMSAR convention. It is proposed that the Regional Biodiversity Strategies will enhance the many existing programs within the catchment by introducing biodiversity opportunities as a prerequisite for continued funding via the Catchment Board's budgetary process.

The key components of the Regional Biodiversity Strategy will include:

- identification of components of biodiversity and threatening processes
- integration of biodiversity with natural resource programs
- management of threatening processes
- education and community involvement
- ongoing research/knowledge development
- monitoring and reporting.

The Regional Biodiversity Program will have two streams.

Enhancement of existing Programs.

- all revegetation programs will have a biodiversity component.
- all NRM programs will have guidelines which will ensure remnant vegetation is protected/enhanced.
- rural zones will have a biodiversity overlay and appropriate planning mechanisms which will protect remnant vegetation.
- Best Management Practices will be developed in conjunction with local government on roadside management.
- management plans for parks and forests will include biodiversity objectives.
- the review of agricultural licences will develop BMP for grazing of streams.

New Programs

In some areas, the assets are of such importance that a targeted approach is required. Assistance will be through local area plans which will involve all the land managers in a designated area.

The Catchment Management Authority will finalise the Biodiversity Strategy to enhance the current natural resource management programs within the catchment.

Milestones

- all NRM projects to include biodiversity objectives
- biodiversity strategy completed
- overlay on local government planning schemes.

4. FUTURE RESOURCE MANAGEMENT

Role of the new Catchment Management Authority

As part of the recent review of catchment Management Structures, a Catchment Management Authority will be established on July 1 1997. The mission, scope and objectives of the new CMA are outlined below.

Mission

To ensure the sustainable development of natural resource-based industries, the protection of land and water resources and the conservation of natural and cultural heritage.

Objectives

- To involve the community in decisions relating to natural resource management within their region.
- To promote sustainable development of natural resource-based industries.
- To collaborate with industry and economic development organisations in achieving sustainable and profitable development of catchment communities.
- To maintain and improve the quality of water and condition of rivers.
- To prevent and, where possible, reverse land degradation (including salinity control).
- To minimise damage to natural ecosystems and natural resource-based industries caused by pest plants and animals.
- To minimise damage to public and private assets from flooding and erosion.

Scope

The Authority, in partnership with the State Government and the community, will be responsible for the development and co-ordination through budget processes of implementation of an approved Regional Catchment Strategy which defines the vision for the catchment with respect to the nine areas outlined and will set targets and work programs to achieve this.

FUNCTIONS OF THE CATCHMENT MANAGEMENT AUTHORITY

The responsibilities of the Catchment Management Authority will include:

Implementation of the Regional Catchment Strategy

- Development and ongoing review of the Regional Catchment Strategy.
- Identification of priority activities and work programs to implement the Regional Catchment Strategy.
- Provision of advice to the State Government on both Federal and State resourcing priorities at a regional level through budget processes.
- Negotiation with DNRE on an annual approved work program for DNRE Regions relevant to implementation of Catchment Strategy.
- Provision of services related to integrated waterway and floodplain management. These will focus on the maintenance and improvement of river health and the minimisation of costs of flooding, whilst preserving the natural functions of the floodplain. These services will relate to:
 - waterway management,
 - co-ordination/management of water quality,
 - co-ordination/management of floodplains,
 - co-ordination/management of rural drainage including management of regional drainage schemes,
 - management of Crown frontages; and
 - management of Heritage Rivers outside National Parks.

Services may include field extension, provision of advice, co-ordination, works, referral and enforcement consistent with approved functions.

Monitoring

Monitoring and reporting on condition and management of land and water resources.

Reporting

The Authority will be required to submit an annual report to the State Government on outcomes achieved against targets.

It should be noted that CMAs will have direct responsibility for service delivery for waterway and floodplain-related activities. It is the view of Government that once the CMAs have been established and have gone through a complete three year business planning cycle the transfer of other service delivery functions which are relevant to the implementation of the Catchment Strategy may be considered.

STRUCTURE OF A CATCHMENT MANAGEMENT AUTHORITY

The basic structure of the CMA has been developed to maximise community involvement in decision making and to ensure that the new Authority fully utilises the skills and expertise of existing service delivery groups.

The basic structure of a CMA comprises:

The Board

Which is directly responsible for the development of strategic direction for land and water management in the Region and ultimately responsible for all the functions undertaken by the Authority.

Implementation Committees

Which are responsible for the development of detailed work programs and the oversight of on-ground program delivery for specific issues or sub-catchments. This will include both the salinity plan implementation groups and any new committees which the Board considers may be necessary to deal with resource management gaps, specific issues or sub-catchments.

5. WHO PAYS?

The Financing Strategy aims to ensure that equitable cost-sharing arrangements continue. Beyond that, it seeks to:

- identify relevant funding programs compatible with catchment proposals at all government levels, and arrange for catchment inclusion;
- rationalise means of assembling funding flow from within the catchment in the interests of financial efficiency and directiveness; and
- explore and cultivate private sector opportunities to supplement both of the above.

5.1 Where the money comes from

Catchment funding arrangements are currently through a variety of processes. Individual programs are funded through a range of sources including Government (state, federal and local), community and the business sector.

Where new strategies are required, or existing strategies modified, it is proposed the Catchment Management Authority will negotiate and recommend cost sharing approaches based on a combination of beneficiary, polluter and user pays approaches. Adoption of the new strategy will only occur after considerable consultation and agreement by the parties expected to fund the scheme.

Cost sharing arrangements have been developed and agreed upon within the catchment over the last five years for each of the programs already in place. The principles under which these agreements have been made are as follows.

Beneficiary Pays

This principle has largely been adopted in the salinity program because of the problems of defining polluters. In most cases, decisions made over 100 years ago are now impacting on the catchment environment. In these cases it is impractical to apportion blame because of a lack of

knowledge and inter-generation equity, and it is better to focus on who will benefit from works and apportion costs accordingly.

The *beneficiary pays* principle is the cornerstone of the MDBC Salinity and Drainage Strategy, and appears to be the most appropriate approach when dealing with diffuse sources of pollutants.

Polluter Pays

This approach is appropriate when pollution is identified from point sources. If an enterprise/activity is polluting, then the relevant authority can require it to address the problem and pay for it.

The Victorian policy for sewerage authorities to dispose to land by the year 2000 wherever possible is funded totally by ratepayers. The Nutrient Strategy is a good example within the region where point source nutrient loads are to be identified and the polluter required to cease/modify disposal.

User Pays

Where clear benefit can be related to a particular use of a resource (eg irrigation water), the user should pay for the resource.

However, non-consumptive users avoid the *user pays* net in many cases. Examples include the recreational industry which does not pay for use of weirs, and the food processing industry which benefits from water use by irrigators within the catchment. Both benefit enormously from the irrigation infrastructure and water quality management, but do not contribute directly to their costs.

Within the region several examples of the use of cost sharing exist (see Dryland/Irrigation/Water Quality Strategies). For instance, the initial Irrigation Program (1989) proposed a cost share of 50% from Governments (State & Federal), with 50% from catchment stakeholders (landholders 83%, local government 17%).

5.2 Indicative Costs

Appendix 1 sets out three year indicative costs of two programs for implementing the Strategy, one program assuming no real increase in Government expenditure, and the other an accelerated program based on priorities and what can be effectively expended on works within the catchment.

The Catchment Strategy will remain a living document and be implemented over a long time frame. The Catchment Management Authority will prepare a three year rolling business plan which will be reviewed annually after considering catchment priorities and funding availability.

The 1995/96 expenditure is detailed in appendix 2 and is summarised in the table below.

TABLE 3: GOVERNMENT EXPENDITURE PATTERNS 1995/96.

PROGRAM	FEDERAL		STATE		TOTAL	
	\$	%	\$	%	\$	%
River & Water Quality	1,502,025	55	1,251,138	45	2,753,163	11
Irrigation	5,769,760	46	6,786,500	54	12,556,259	49
Dryland	900,976	26	2,501,260	74	3,402,236	13
Public Lands	20,000	0	6,648,123	100	6,648,123	26
TOTALS	8,192,761	32	17,187,021	68	25,396,969	100

6. KEEPING IN TOUCH

6.1 Monitoring, Reporting and Communication.

The Catchment Management Authority will report on the condition of the catchment to:

- monitor long term degradation trends
- measure improvement over time associated with works and measures prescribed by the Catchment Strategy
- integrate land and water monitoring.

There are a number of Government Acts which have enforcement provisions. These include the CALP, Water, Local Government Environment Protection, Vermin and Noxious Weeds and the Water Acts. Where these Acts require land managers to be reasonable, the Catchment Strategy will develop principles on which reasonableness should be defined.

Awareness and understanding are critical factors in behavioural change. Enforcement will only be used where the rate of change drops to unacceptable levels or the threat the catchment is so great that immediate action is warranted.

In very sensitive areas, or where the catchment is threatened with substantial ramifications, the use of the Special Area Planning provisions is proposed. So far, these provisions have been used predominantly for water supply catchment protection within sub-catchments.

It is important that catchment community attributes are explored in greater detail with communities thoroughly and continually advised on catchment needs, plans and progress through a well-planned communication strategy.

The Communications Strategy is needed to explore the degree of social diversity within the catchment. Attitudinal, lifestyle and resourcing capabilities are known to differ. More investigation in this direction

is expected to improve communications between the Catchment Management Authority and the community, raising them to a more personally meaningful state for individuals to increase their levels of interest and commitment.

Other elements of the Communications Strategy will be directed towards decision-makers at all levels in all tiers of government and the private sector (who may determine funding and constraint / regulation issues) and broader state and national communities so that they will understand the state and national significance of the work being done in the catchment (particularly its pilot program status).

6.2 Further information

For further information please contact Mr Bill O'Kane, Goulburn Catchment Management Authority. Ph: (03) 5822 2288

For detailed information on specific aspects of the Catchment Strategy please contact:

Irrigation	
Ken Sampson	03 58335360
Water Quality	
Pat Feehan	03 58335687
Dryland	
Neville Penrose	03 57611611
Biodiversity	
Rod McLennan	03 58311777
Pest Plants & Animals	
Murray Chapman	03 57612612
Natural Heritage Trust	
Bruce Radford	03 57841303
Waterway Management	
• Upper Goulburn	
Russell Wealands	03 57972001
• Mid Goulburn Broken	
Graeme Taylor	03 57218672
• Lower Goulburn	
Justin Sheed	03 58312067

Appendix 1

Indicative Three Year Costs of Programs & Sub Programs

The table below provides a summary of indicative costs of sub programs. Priorities will be reviewed during the three year period of the Strategy leading to possible changes in the level of support. Details on costs will be worked through a business planning process which will allocate funds on an annual basis.

PROGRAM / Sub- Program-	Indicative Three Year Cost to Local Communities, State and Federal Governments (\$'000)	
	Existing Funding Level	Accelerated Program
IRRIGATION		
- Salinity and Drainage		
Farm	90,000	94,000
Surface drainage	36,000	39,000
Sub Surface Drainage	10,000	12,000
Environment	1,900	2,200
Monitoring	1,500	1,800
Support	4,300	4,700
Soils	na	na
- Water Quality	3,500	23,000
- Biodiversity	na	1,100
- Pests	1,200	1,300
DRYLAND		
- Land and Water	27,000	39,000
- Pest Management	13,000	17,000
- Biodiversity	1,700	7,600
PUBLIC LANDS		
- Pest Management - Parks	1,000	1,300
- Biodiversity - Parks	200	400
- Water Quality	na	na
RIVER AND WATER QUALITY		
- Water Quality	21,000	62,000
- Stream Management	10,000	12,000
- Floodplain Management	na	na
- Regional Drainage	na	na

Note:

Indicative costs include DNRE costs at regional level and normal farm management activities associated with protection and enhancement of land and water resources.

Appendix 2

TABLE 1 - Project Summary - Public Lands Projects 1995/96

PROJ No.	Agency	Man Unit	Title	Federal Source	Sub Prog.	\$	State Source	Sub Prog.	\$	Co-ordinator	Totals \$
DNRE	Crown Land		Tenure and Fee Collection				CLBP		142350		142350
DNRE	Crown Land		Natural resource Systems and Support				CLBP		9783		9783
DNRE	Crown Land		Statutory Planning				CLBP		48387		48387
DNRE	Fire		Fuel Reduction Burns				HASE		120995		120995
DNRE	Fire		Roads and Tracks				HASE		146674		146674
DNRE	Fire		Detection				HASE		102700		102700
DNRE	Fire		Fire Fight Equip and Maintenance				HASE		26455		26455
DNRE	Fire		Firebreaks				HASE		23439		23439
DNRE	Fire		Business Management				HASE		26700		26700
DNRE	Fire		Training				HASE		56063		56063
DNRE	Fire		Education and Interpretation Programs				HASE		13730		13730
DNRE	Forest		Business Management				TIS		36698		36698
DNRE	Forest		Wood Utilisation				TIS		12825		12825
DNRE	Forest		Resource Inventory & Mgt Info Systems				TIS		28872		28872
DNRE	Forest		Rabbits				TIS		0		0
DNRE	Forest		Other Pests				TIS		66573		66573
DNRE	Forest		Noxious Weeds				TIS		65514		65514
DNRE	Forest		Disturbed Site Regeneration				TIS		2007		2007
DNRE	Forest		Statutory Planning				TIS		500		500
DNRE	Forest		Timber Production				TIS		516059		516059
DNRE	Forest		Visitor Facilities & Management				TIS		600206		600206
DNRE	Forest		Recreation/Conservation				TIS		6312		6312
DNRE	Forest		Forest Establishment				TIS		577367		577367
DNRE	Forest		Roads & Tracks				TIS		271660		271660
DNRE	Forest		Timber Harvesting & Sales				TIS		9400		9400
DNRE	Forest		Seed Collection				TIS		194857		194857
DNRE	Forest		Silviculture				TIS		108629		108629
DNRE	Forest		Non-Timber Forest Produce				TIS		15830		15830
DNRE	Parks		Overheads				NPRP		354327		354327
DNRE	Parks		Visitor Management				NPRP		577550		577550
DNRE	Parks		Education & Interpretations				NPRP		106182		106182
DNRE	Parks		Visitor Facilities				NPRP		391215		391215
DNRE	Parks		Rabbits				NPRP		16093		16093
DNRE	Parks		Other Pests and Animals				NPRP		127845		127845
DNRE	Parks		Noxious Weeds				NPRP		115020		115020
DNRE	Parks		Tenure Management & Fee Collection				NPRP		35290		35290
DNRE	Parks		Enforcement				NPRP		123309		123309
DNRE	Parks		Business Management				NPRP		350391		350391
DNRE	Parks		Corporate Services				NPRP		476216		476216
DNRE	Parks		Training				NPRP		62631		62631
DNRE	Parks		Roads & Tracks				NPRP		68270		68270
DNRE	Parks		Wetland Program Management				NPRP		31964		31964
DNRE	Parks		F & F Habitat Management				NPRP		82269		82269
DNRE	Parks		Historic & Cultural Sites				NPRP		15459		15459
DNRE	Parks		Disturbed Site Revegetation				NPRP		5504		5504
DNRE	Parks		Management Plans				NPRP		478003		478003
DNRE	PEG		Remnant Box Woodland Survey				20000		20000		20000
				ANCA							
				TOTAL			20000		6668123		6668123

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TABLE 2 - Project Summary - Dryland Projects 1995/96

Proj No.	Agency	Man. Unit Title	Federal Source	Sub Prog.	\$	State Source	Sub Prog.	\$	Coordinator	Totals \$
	DNRE	CALM	Extension (Benalla)			BASE		179928	R Patrick	179928
	DNRE	PARKS	Good Neighbour (Benalla)			BASE	NPBP	37155	K Ritchie	37155
	DNRE	PARKS	Good Neighbour (Mid Goulburn)			BASE	NPBP	10926	B Radford	10926
	DNRE	CALM	On farm salinity control (Broadford)			BASE		38179	R Chaffe	38179
	DNRE	CALM	Pest animals (Benalla)			BASE		8370	R Patrick	8370
	DNRE	CALM	Pest animals (Dogs - Broadford)			BASE		105983	R Chaffe	105983
	DNRE	CALM	Pest animals (Other - Broadford)			BASE		10162	R Chaffe	10162
	DNRE	CALM	Pest animals (Other - Mid Goulburn)			BASE		11400	B Radford	11400
	DNRE	CALM	Pest animals (Rabbits - Mid Goulburn)			BASE		59748	B Radford	59748
	DNRE	CALM	Pest animals (Rabbits - Mid Goulburn)			BASE	LPIS	6000	B Radford	6000
	DNRE	CALM	Pest animals (Rabbits)			BASE		52261	R Patrick	52261
	DNRE	CALM	Pest plants (Benalla)			BASE		24959	R Patrick	24959
	DNRE	CALM	Pest plants (Broadford)			BASE		28128	R Chaffe	28128
	DNRE	CALM	Pest plants (Mid Goulburn)			BASE		99953	B Radford	99953
	DNRE	CALM	Rabbit action (6 Groups)			BASE		31500	R Patrick	31500
	DNRE	CALM	Rabbits (Broadford)			BASE		17290	R Chaffe	17290
	DNRE	CALM	River Management (Broadford)			BASE		40803	R Chaffe	40803
	DNRE	CALM	Soil Conservation (Broadford)			BASE		68933	R Chaffe	68933
	DNRE	CALM	Soil Conservation (Mid Goulburn)			BASE		34400	B Radford	34400
	DNRE	CALM	Statutory planning (Broadford)			BASE		24214	R Chaffe	24214
	DNRE	W W	Program coordinator	NLP	CATCH	30000				30000
	DNRE	CALM	Works and implementation (Benalla)			BASE	LPIS	95000	R Patrick	95000
	DNRE	CALM	Works and implementation (Broadford)			BASE	LPIS	65000	R Chaffe	65000
	DNRE	CALM	Works and implementation (Mid Goulburn)			BASE	LPIS	32000	B Radford	32000
94046F	DNRE		Landcare discussion groups.	NLP	NMRS	72000				72000
94134F	DNRE	VFF	Operation Blue Hills	NLP	NMRS	20000	BASE			40000
95002F	COMM	BCLG	Invasion by feral animals & noxious weeds	NLP	Land/Com	6500		20000	R Patrick	6500
95004F	DNRE	AV	Profitable pastures for Landcare	NLP	Land/Com	14000				14000
95006F	COMM	UGCLG	Upper Goulburn catchment project	NLP	Land/Com	15000				15000
95008F	COMM	SPCLMG	Community dev. for sustainable dev.	NLP	Land/Com	6200				6200
95009F	COMM	SPCLMG	Habitat prot. (grey crowned babbler)	NLP	STB	15000				15000
95011F	COMM	SPCLMG	Community access to mapping for land man.	NLP	Land/Com	5000				5000
95022F	COMM	FCLG	Taking Stock	NLP	TV	10000				10000
95023F	COMM	UBRLC	Land man. project	NLP	TV	10000				10000
95024F	COMM	DLG	Ribbons of green 11	NLP	TV	10000				10000
95026F	COMM	M-TTLPG	Land degradation awareness	NLP	Land/Com	13200				13200
95032F	DNRE	Glenaroua	Hill Grazing Strat. to Imp. Per. Pastures	NLP	Land/Part	48760				48760
95039F	COMM	M-TLG	Regent Honeyeater Veg Retention	NLP	STB	13000				13000
95043F	DNRE		Comm. Access to NR Information	NLP	Land/Part	64975				64975
95045F	COMM	NLG	Tree Start 1995/96	NLP	TV	2800				2800
95046F	COMM	NLG	Nagambie Landcare 3CS Project	NLP	Land/Com	12691				12691
95061F	COMM	SCCG/CKL	Creek Survival-Man Strategies	NLP	Land/Com	9860				9860
95063F	COMM	W-BLPG	Wildlife Corridors	NLP	TV	3100				3100
95066F	COMM	BLFFG	Salinity treatment using forestry	NLP	TV	2000				2000
95077F	DNRE	AV	Beyond Soilcare	NLP	Land/Part	94500				94500
95083F	DNRE	CALM	Wilby almonds tech. support	NLP	Land/Part	48930			B Goodson	48930
95085F	COMM	SLPG	Dem. land man. Options for acid soils (Swanpool)	NLP	Land/Com	3500				3500
95089F	DEL SHIRE		Goulburn dryland catch. man. plan	NLP	Land/Part	35000				35000
95099F	DNRE	AV	Improve past program	NLP	Land/Part	24960				24960
95100F	COMM	WRLG	Lake Makooan/15 Mile Crk	NLP	TV	10000				10000
C230	DNRE	CNR	Riverine plain small stream salinity assess.				Salinity	50000		50000
D120	GMW		Develop of G/W plan				Salinity	7000		7000
E110	DNRE	DAEM	Community Ed Officer- GB Dryland	NLP	NMRS	28000				28000
E123	DNRE	DAEM	SPAC Annual Report/Review				Salinity	3500		3500
E219GD	DNRE	CALM	Community Salinity Grants (Dryland)				Salinity	14000	M Chapman	14000
F113	DNRE	DAEM	Dryland Salinity Team Leader				Salinity	56500		56500
F127	DNRE	DAEM	GBD SMP Implementation Officer	NLP	NMRS	25250				25250
F205	DNRE	CNR	Plan Coordinator - GB Dryland				Salinity	65182		65182
F216	DNRE	CALM	On Farm Salinity Control (Benalla)				Salinity	171844	M Chapman	171844
F217	DNRE	CNR	Farm Advisory Service - Alexandra				Salinity	105000		105000
F278	DNRE	DAEM	Establishment Of Pastures by Air				Salinity	18000		18000
F279	DNRE	CNR	Implementation Of Works LMUS				Salinity	39000		39000
F280	DNRE	CNR	Implem. of Works Cornelia CK Catchment				Salinity	12000		12000
F284	DNRE	CNR	Specialist Forestry Officer	NLP	NMRS	27250				27250
F284	DNRE	DAEM	Specialist Forestry Officer				Salinity	27250		27250
F285	DNRE	DAEM	Pastures Officer				Salinity	24000		24000
F285B	DNRE	DAEM	Municipal Natural Resources Officer				Salinity	5000		5000
G156	DNRE	CNR	GDSMP Grants - Seymour				Salinity	24000		24000
G157	DNRE	CNR	GDSMP Grants - Cordelia CK LMU				Salinity	6183		6183
G216	DNRE	CALM	On Farm Salinity Works (Benalla)	NLP	NMRS	50000		117285	M Chapman	167285
G217	DNRE	CNR	On Farm Works - Alexandra	NLP	NMRS	65000		85000		150000
G701	GMW		Waive G/W Mgt Charges, Dryland Areas				Salinity	5000		5000
G801	GMW		Farm exploratory drilling (dryland)	NLP	NMRS	24000		30000		54000
R131	DAEM		Eval of P-grasses for recharge water accessions				Salinity	9000		9000
R269	GMW		Consultancy-drainage & man. saline discharge				Salinity	20000		20000
R280A	GMW		Goulburn stream salinity mon. & assess.				Salinity	51788		51788
R280B	GMW		Goulburn Stream Salinity mon. & assess.				Salinity	32000		32000
R328	DNRE	CNR	Catchment mapping & groundwater studies				Salinity	67000		67000
R484	GMW		GB dryland salinity investigation & assess.				Salinity	39000		39000
R525	DNRE	CNR	Evaluation of BOS				Salinity	35343		35343
R546	DNRE	DAEM	Grazing trials on P pastures v annual pastures	NLP	NMRS	27250		17000		44250
R562	GMW	Drylands	Uplands G/W Pumping Dvt				Salinity	11500		11500
S102B	DNRE	CNR	SPAC Support				Salinity	34000		34000
S103B	DNRE	CNR	SPAC				Salinity	30000		30000
S130	DNRE	DAEM	Economic Support For GB Dryland SMP				Salinity	43000		43000
S258	DNRE	DAEM	Use of GIS in Implementation & Monitoring				Salinity	28250		28250
S258	DNRE	CNR	Use of GIS In Implementation Monitoring	NLP	NMRS	28250				28250
T003	DNRE	CALM	Dryland Bore Monitoring				Salinity	9000	M Chapman	9000
T046	SKM	GDSMP	Mandatory Groundwater Monitoring				Salinity	7600		7600
T052	DNRE	CNR	Groundwater and Discharge Monitoring				Salinity	10893		10893
T060			Mandatory Environmental Monitoring				Salinity	6328		6328
T060B	DNRE	DAEM	Mandatory Environmental Monitoring				Salinity	3272		3272
2206	DNRE	ISIA	GIS Data Dryland (GBDSMP)	NLP	NMRS	25000		25000	M Morris	50000
			TOTALS			900976		2501260		3402236

Goulburn Broken Catchment Management Authority

TABLE 3 - Project Summary - Irrigation Projects 1995/96

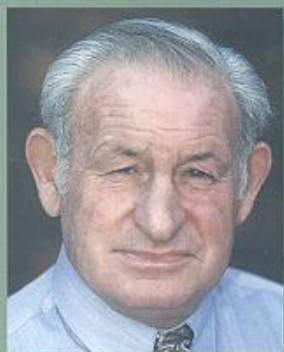
Proj No.	Agency	Man Unit Title	Federal Source	Sub Prog.	\$	State Source	\$	Co-ordinator	Total \$
94061F	DNRE	SIRSDB	HRD	Partnership	2254000	0	0	M Young	2254000
D115	DNRE	ISIA	NLP	Partnership	50572	0	0	G McFarlane	50572
E100	DNRE	ISIA	MDBC	NRMS	52800	Salinity	132000	A Heupermann	184800
F097	DNRE	ISIA			0	Salinity	72500	G McFarlane	72500
H098A (E)	DNRE	ISIA		NRMS	48750	Salinity	179500	C Norman	228250
H099B	DNRE	ISIA	MDBC		0	Salinity	65600	C Norman	65600
F120	DNRE	ISIA	NLP	NRMS	82500	Salinity	96750	C Norman	179250
F121	DNRE	ISIA	MDBCP		65000	Salinity	104400	C Norman	169400
F146	DNRE	ISIA			20151	Salinity	30000	C Norman	50151
G099A	DNRE	ISIA	NLP	NRMS	0	Salinity	139800	K Sampson	139800
G099C	DNRE	ISIA	MDBCP		105000	Salinity	105000	D Lawler	210000
R010	DNRE	ISIA			270000	Salinity	328500	C Norman	598500
R011	DNRE	ISIA			0	Salinity	214000	R Wildes	214000
R012	DNRE	ISIA			0	Salinity	237000	M Rogers	237000
R014	DNRE	ISIA			0	Salinity	99000	N Austin	99000
R105	DNRE	ISIA			0	Salinity	81900	B Garrett	81900
R113	DNRE	ISIA			0	Salinity	56500	K Olsson	56500
R146A	DNRE	ISIA			0	Salinity	104000	R Baigent	104000
R147	DNRE	ISIA			0	Salinity	25000	J Heath	25000
R216	DNRE	ISIA			0	Salinity	35182	J Heath	35182
S102A	DNRE	ISIA			0	Salinity	45600	A Heupermann	45600
S103A	DNRE	ISIA			0	Salinity	36000	K Sampson	36000
S124	DNRE	ISIA			0	Salinity	40000	K Sampson	40000
S820	DNRE	ISIA	NLP	NRMS	25512.5	Salinity	25545	M Morris	51058
2451	DNRE	ISIA	NRMS		37284.9		124283	M Schulz	37285
2550	DNRE	ISIA	LWRDDC		49945		0	M Bethune	49945
5402	DNRE	ISIA	RRDC		17496.8		0	A Heupermann	17497
5410	DNRE	ISIA	LWRDDC		185108		0	O Gyles	185108
5417	DNRE	ISIA	RRDC		9072.6		0	M Schulz	9073
F273	DNRE	ISIA			0	Salinity	48320	J Heath	48320
3014	DNRE	ISIA	ACIAR		8962.25		0	M Schulz	8962
3521	DNRE	ISIA	DRDC		82463		29457	K Kelly	111920
2178	DNRE	ISIA	NLP	NRMS	29897.25		0	C Mahoney	29897
2448	DNRE	ISIA	MDBC	Drainage	47077.2		0	S Maher	47077
2484	DNRE	ISIA	MDBC	NRMS	24080		0	N Austin	24080
2488	DNRE	ISIA	MDBC	NRMS	26700		0	M Bethune	26700
2489	DNRE	ISIA	MDBC	NRMS	89930		0	O Gyles	89930
2490	DNRE	ISIA	NRMS		40650		0	O Gyles	40650
2555	DNRE	ISIA	LWRDDC		54563		0	G Roberts	54563
2616	DNRE	ISIA	NLP	NRMS	32000		0	R McAllister	32000
FD99A	DNRE	ISIA	NLP	NRMS	23100		116900	C Norman	140000
2580	DNRE	ISIA	LWRDDC		30724	Pivot	22281.6	N Austin	53006
C813	GMW		MDBC	DP	22500	Salinity	22500	W Trehella	45000
D100	GMW				0	Salinity	61444	W Trehella	61444
D116	GMW		MDBC	DP	45000	Salinity	61756	W Trehella	106756
D117	GMW				0	Salinity	82000	W Trehella	82000
D118	GMW				0	Salinity	36947	W Trehella	36947
D484A	GMW		MDBC	DP	85000	Salinity	101722	W Trehella	186722
D484B	GMW		MDBC	DP	160000	Salinity	160000	W Trehella	320000
D800	GMW		MDBC	DP	783000	Salinity	1375785	W Trehella	2158785
D806	GMW		MDBC	DP	100000	Salinity	100000	W Trehella	200000
D841	GMW		MDBC	DP	50000	Salinity	187152	W Trehella	237152
D847	GMW				0	Salinity	9737	W Trehella	9737
F807	GMW		MDBC	DP	30000	Salinity	51200	W Trehella	81200
F814	GMW				0	Salinity	52000	W Trehella	52000
F817	GMW				0	Salinity	27000	W Trehella	27000
F818	GMW		MDBC	DP	60000	Salinity	65764	W Trehella	125764
G123	GMW		MDBC	DP	197500	Salinity	217500	W Trehella	415000
G700	GMW				0	Salinity	285000	W Trehella	285000
G800	GMW		MDBC	DP	150000	Salinity	264468	W Trehella	414468
G803	GMW				0	Salinity	12000	W Trehella	12000
R282	GMW				0	Salinity	35833	W Trehella	35833
R480	GMW		MDBC	DP	35000	Salinity	60509	W Trehella	95509
R486	GMW				0	Salinity	91114	W Trehella	91114
R499	GMW				0	Salinity	128321	W Trehella	128321
R522	GMW				0	Salinity	37000	W Trehella	37000
S802	GMW		MDBC	DP	40000	Salinity	170603	W Trehella	210603
S815	GMW		MDBC	DP	40000	Salinity	93109	W Trehella	133109
95034F	COMM	ULG	NLP	Land/Comm	11500		0	Udenda Landcare	11500
95044F	COMM	G-SLG	NLP	Land/Comm	12260		0	Gingare/Stanhope L/Care	12260
95047F	COMM	ECS&DESIG	NLP	Land/Comm	13000		0	Ethnic/CVE Shepp L/Care	13000
95032F	COMM	SPAC	NLP	Land/Comm	51000		0	CALP	51000
95016F	COMM	IDE&LG	NLP	TV	3000		0	Invergordon L/Care	3000
95019F	COMM	KLG	NLP	OBT	1200		0	Katunga L/Care	1200
95071F	COMM	NWMLG	NLP	TV	6960		0	NW Moorooopa L/Care	6960
95080F	COMM	B/TLMG	NLP	TV	4500		0	Burrumine/Tungamah L/C	4500
C144	DNRE	CNR	MDBC	DP	80000	Salinity	105000	R McLennan	185000
C137	DNRE	CNR			0	Salinity	80200	R McLennan	80200
C304	DNRE	CNR			0	Salinity	47000	R McLennan	47000
C138	DNRE	CNR			0	Salinity	20000	R McLennan	20000
C105	DNRE	CNR			0	Salinity	32900	R McLennan	32900
F221	DNRE	CNR	NLP	TV	25000	Salinity	45000	R McLennan	70000
G226	DNRE	CNR			0	Salinity	56400	R McLennan	56400
F236	DNRE	CNR			0	Salinity	29500	R McLennan	29500
T072	DNRE	CNR			0	Salinity	21630	R McLennan	21630
E219	DNRE	CNR			0	Salinity	21070	R McLennan	21070
					0				
			TOTALS		5769760		6786500		12556259

Goulburn Broken Catchment Management Authority

TABLE 4 - Project Summary - River & Water Quality Projects 1995/96

Proj No.	Agency	Man unit	Title	Source	Federal Sub Prog.	\$	Source	State \$	Co-ordinator	Totals \$
95025F	COMM	M-TLG	Lake Makoon/15 Mile Ck Water Quality	NLP	TV	10000		0		10000
95020F	COMM	NCWMP	Stream Man. Action (Mid Goulburn)	NLP	CATCH	40000		0		40000
95033F	COMM	GMW	Accelerated Est. Of Nutrient Man Strategy	NLP	CATCH	300000		0		300000
95035F	COMM	CLAG	Reveg/Stabilise Lake Cooper Foreshores	NLP	TV	10000		0		10000
	COMM	M-TTLPG	Mollyullah Tatong Riparian Project	NLP	NRMS	14000		0		14000
95030F	COMM	BRMB	Eval Aquatic Habitat & Restoration Works	NLP	CATCH	60000		0		60000
95084F	COMM	SCCG/GCI	Seven Creeks Native Aquatic Veg Trail	NLP	Land/com	4163		0		4163
	COMM	GVEG	Testing off creek watering systems for stock	NLP		10000		0		10000
95064F	COMM	W-BLPG	Rivers- Streams (Warrenbayne)	NLP	TV	6000	TV	6000		12000
95037F	COMM	BRMB	Broken River Urban Stormwater QIP	NLP	CATCH	30000		0		30000
95086F	COMM	MLMG	Gully and Stream Bank Erosion	NLP	TV	8000		0		8000
95042F	COMM	GVEG	Feasibility study of carp as a multiple use resource	NLP	CATCH	30550		0		30550
95073F	COMM	SCDCLG	Weed Control Reveg. & Water Quality Demo Sites	NLP	Land/com	12000		0		12000
95081F	COMM	UGRMA	Establish UGRMA	NLP	CATCH	50000		0		50000
	DNRE	PEG	Monitoring River Health	CEPA		10000		0	K Ward	10000
V327	DNRE	AV	On Farm Nutrient Runoff & Man Pastures/Hort	NLP	NRMS	53000		0		53000
	DNRE	ISIA	Land Based Disposal of Wastewater	NLP	NRMS	54700		0	A Heupermann	54700
5504	DNRE	ISIA	Subcatchment Water Quality	MDBC	NRMS	68558		0	N Austin	68558
2175	DNRE	AV	Irrigated dairy Effluent	NLP	NRMS	55000	BASE	55000	D Small	110000
2530	DNRE	AV	Nutrient Loss in Orchards	LWRRDC		31460		0	P Jerie	31460
V408	DNRE	ISIA	Land Based Disposal of Wastewater	NLP	NRMS/WA	26308	Salinity	26308	A Heupermann	52616
C114	DNRE	CNR	Impact of saline disposal on rivers & streams			0	Salinity	70000	A Robley	70000
	DNRE	AV	Dairy Effluent Extension Officer	NLP		47500		0	J Wheeler	47500
	DNRE	PEG	Impact Of Salt			0	Salinity	69368		69368
R215	DNRE	AV	Farm Nutrient management	NLP	NRMS	30700	Salinity	30600	A Heupermann	61300
	DNRE	ISIA	Dev. nutrient quality targets for dairy subcatchments	NLP	NRMS/DRDC	184746		0	M Collins	184746
V211	DNRE	PEG	Barnaby/Milewa Watering Strategies	NLP	NRMS/L&E	35259		0	K Ward	35259
VCE1	DNRE	PEG	Timeshare Flooding	LWRRDC		68455		0	K Ward	68455
	DNRE	CNR	Integrated Aquaculture/Agriculture	RIRDC		37500	BASE	37500	G Goolley	75000
	DNRE	PEG	On Route Wetlands	LWRRDC		20160		0	K Ward	20160
V331	DNRE	PEG	IWS (Flood Plain Eco)	NLP	NRMS	18966		0	K Ward	18966
V407	DNRE	AV	Demo/Dev Dairy Effluent Management	NLP	NRMS	95000		0	F Smith	95000
	EPA		River Health Monitoring			0	EPA	50000	L Dixon	50000
	EPA		Mercury in the Upper Goulburn			0	EPA	20000	D Tiller	20000
	EPA		Rubicon sediments			0	EPA	20000	L Metzling	20000
	EPA		Rotenone in streams			0	EPA	80000	J Barton	80000
	EPA		Upland Fish Farms			0	EPA	30000	L Metzling	30000
	GMW		Water Quality testing (Nagambie)			0	BASE/GSC	48000	G Earle	48000
C806A	GMW		Nutrient Impact on the River Murray			0	Salinity	47994	P Feehan	47994
	GMW		Lake Makoon Restoration Strategy			0	GMW	100000	P Feehan	100000
	GMW		Headworks Sample Testing			0	BASE	4000	T Court	4000
	GMW		Algal and Nutrient Monitoring			0	BASE/GSC	44800	G Earle	44800
D841	GMW		Shepp Drain Salt Load Monitoring			0	Salinity	256000	P Feehan	256000
C806B	GMW		Nutrients In Drain Water & R. Murray			0	Salinity	52000	P Feehan	52000
	GMW		Lake Makoon Catchment Influence of Stream Mgt.	NLP	WATER	80000		0		80000
C230	GMW	GBDSMP	Monitoring (C230,R269,R280)			0	Salinity	140788	W Treshella	140788
	GMW		Blue-Green Algae Control and Mgt.			0	BASE/GSC	50000	Bhat	50000
	GMW		Economic Benefits of Nutrient Reduction			0	BASE	8000	S Cntchell	8000
	GMW		Physio chemical and biological monitoring of Vc streams			0	BASE/GSC	4780	G Earle	4780
	GVW		Land Based Disposal of Wastewater-Legal Agreement	NLP	WATER	60000		0	P McManermmann	60000
95001F	MASNV		Municipal Soil and Water	NLP	LAND	13000	Salinity/Municipal	26000	B Gill	39000
	WMA	BRMB	Natural Disaster Flood Restoration -1993			0	State	348000	G Taylor	348000
	WMA	BRMB	Operational Plan			0		360000	G Taylor	360000
	WMA	BRMB	Evaluate Aquatic Habitat restoration	NLP/ANCA		70000		0	G Taylor	70000
	WMA	BRMB	Lake Makoon Catchment Project	NLP		16500	Salinity	16500	G Taylor	33000
	WMA	UGRMA	River Management (Upper Goulburn)			0		600000	B Grogan	600000
						0		0		0
TOTALS							1502025		1251138	2753163

Membership



Mr John Dainton
(Chairperson)



Mr Bill O'Kane
(Chief Executive Officer)



Mr Huw Davies



Mrs Ailsa Fox



Mr John Gray



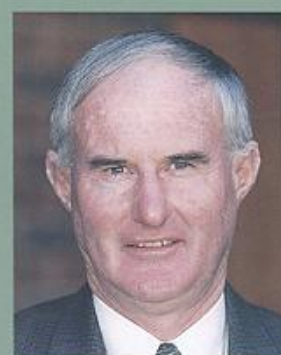
Mr Athol McDonald



Mrs Dianne McPherson



Mr Craig Madden



Mr Tom Perry



Mr Peter Ryan



Mr Chris McRae



Mr Chris Halpin

