Australian Government

MURRAY–DARLING BASIN AUTHORITY

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MURRAY–DARLING BASIN AUTHORITY Annual Report 2008–2009

MURRAY–DARLING BASIN AUTHORITY

Annual report

2008–2009

How to use this report

This annual report contains:

- a report on activities from 15 December 2008 related to developing the Basin Plan
- a report for the financial year 2008–09 against the objectives and strategies of the former Murray–Darling Basin Commission's (MDBC's) Strategic Plan 2005–2010
- Murray–Darling Basin Authority (MDBA) financial statements for the year ended 30 June 2009
- a final summary report for MDBC, including financial statements up to and including 14 December 2008.

MDBA subsumed MDBC and its functions on 15 December 2008. Under the transition provisions, MDBA continued to report against the objectives of the MDBC Strategic Plan 2005–2010 and the related Business Plan during the 2008–09 financial year. This allows seamless presentation of the information relating to continuing programs and activities, and provides optimal access to this information for readers of the report.

The Commonwealth *Water Act 2007* requires that MDBA develops and oversees the Basin Plan for the integrated management of Basin water resources in order to protect and restore key environmental assets and ecosystem functions. MDBA's progress in developing the Basin Plan is reported against the 10 objectives for the Basin Plan Program set out in MDBA's new Corporate Plan (which does not officially come into effect until 1 July 2009).

Contents outline

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Back cover: Reed Beds Swamp, within The Living Murray Barmah–Millewa icon site, David Kleinert.
p. 1: In a paddle boat on Gunbower Creek, David Kleinert
p. 83, Canola crop near Cunningar, NSW, Arthur Mostead
pp. 119, 161, the River Murray in the Hattah–Kulkyne National Park, Corey Brown
Front cover: left and centre, Arthur Mostead; right, David Kleinert.

Heading banner and side banner images throughout, and chapter openings (pp. 3, 19, 51, 85, 187) based on a photograph by Arthur Mostead.

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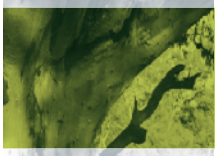
Highlights for 2008–09



- A single agency — the Murray–Darling Basin Authority (MDBA) — now responsible for planning the integrated management of water resources across the whole Murray–Darling Basin.
- The first-ever Basin Plan being developed to manage Basin water resources.
- Significant milestones passed in developing the Basin Plan — in integrating water resource management, compiling and analysing information, and in engaging with stakeholders.
- Major achievements in this record drought: operation of the River Murray system to keep the river running, and delivery of essential water in a fair and efficient way.
- A record volume of interstate water allocation transfers processed, mostly for use in permanent horticulture.
- Close cooperation fostered with the Basin states to protect and enhance shared environmental assets and water resources.
- Effective salinity management achieved, with salt interception schemes diverting around 450,000 tonnes of salt away from the river system this year.
- Five years of data collection across the Basin completed through the Sustainable Rivers Audit, and data made publicly available.
- The Living Murray, one of Australia's most significant river restoration programs, on track to meet its target of recovering an average of 500 GL of environmental water a year.
- The Sea to Hume fishway program on track to open up 2,100 km of the River Murray to free passage by native fish by August 2009.
- A second phase of the South Eastern Australian Climate Initiative (SEACI 2) begun, after the first phase developed further understanding of climate change impacts in the Basin.

Contents

Letter of transmittal

Australian Government

MURRAY–DARLING BASIN AUTHORITY

Senator the Hon Penny Wong
Minister for Climate Change and Water
Parliament House
Canberra ACT 2600

Dear Minister

It is my pleasure to present the annual report of the Murray–Darling Basin Authority (MDBA) for the year ended 30 June 2009.

This report includes a final summary report for the Murray–Darling Basin Commission (MDBC), including financial statements up to and including 14 December 2008. Most of the functions of the MDBC were subsumed by the MDBA on 15 December 2008, when the MDBC ceased to exist.

The report has been prepared in accordance with the *Requirements for annual reports* approved by the Joint Committee of Public Accounts and Audit, under subsection 63(2) of the *Public Service Act 1999* (the Act).

As specified in these requirements, I certify that this agency complies with the Commonwealth Fraud Control Guidelines.

The report notes the significant progress that has been made in regards to the preparation of the proposed Basin Plan, due to be completed in mid 2010.

Section 214 (1) of the *Water Act 2007* requires that the Chief Executive must, as soon as practicable, prepare and give to the Minister, and to each other member of the Murray-Darling Basin Authority Ministerial Council, a report on the Authority's operations during that year.

Subsection 214(3) of the *Water Act 2007* requires that you lay a copy of the report in each House of Parliament within 15 sitting days of that House after the day on which you receive the report.

Yours sincerely

Rob Freeman
Chief Executive
12 November 2009

Chief Executive's review

Entering a new era

This is a time of momentous change in the governance of the Murray–Darling Basin amid continuing serious drought conditions.

For the first time since the waters of the River Murray began to be regulated in 1914, we now have a single agency responsible for planning the integrated management of water resources across the whole Murray–Darling Basin.

The Murray–Darling Basin Authority (MDBA) commenced operations on 8 September 2008. On 15 December, MDBA subsumed the functions of the former Murray–Darling Basin Commission (MDBC), which then ceased to exist.

The centrepiece of MDBA's activities is the development of a Basin Plan to manage the Basin's surface water and groundwater resources and, for the first time, to set binding sustainable diversion limits (SDLs) based on the best and latest scientific, social, cultural and economic knowledge, evidence and analysis.

The detailed blueprint for achieving this is set out in the Commonwealth *Water Act 2007*.

To guide development of the Basin Plan, the Commonwealth Government announced in May 2009 the appointment of the Chair and members of the Murray–Darling Basin Authority — a group of five people who bring a wealth of relevant knowledge and expertise. As Chief Executive, I also am a member.

We held our first meeting in Canberra in June, with subsequent meetings planned for different key regional Basin areas to emphasise the need for local consultation and the gathering of local knowledge.

For further information on the structure and governance of MDBA, see pages xiii–xiv.

Transitioning successfully

While the transition from one agency to the other was complex and resource-intensive, I am proud to report that it was carried out efficiently and professionally — a credit to all staff involved.

Following the transition, we developed the first MDBA Corporate Plan to cover the period 2009–13. It incorporates the new Basin planning role and the reporting requirements under the Water Act.

Following detailed consultation with jurisdictional partners, the Murray–Darling Basin Authority and the Ministerial Council approved the plan at their first meetings in June.

A crucial task for MDBA has been to establish an internal structure to maximise effectiveness under the new plan and to carry out the functions absorbed from the former MDBC. Structural enhancements included the creation of a new Basin Plan Division, and a new Engagement section, with some 'fine tuning' of other areas.

Making significant progress on the Basin Plan

During 2008–09 we passed some significant milestones in the first phase of developing the Basin Plan. These included:

- developing strategies for integrating the management of the Basin's surface water, groundwater and environmental water
- engaging with key agencies to draw together the environmental, social, cultural and economic information needed to describe the Basin's water resources and how they are used
- compiling and analysing the information needed to prepare the Basin Plan
- engaging with and informing the community about the Basin Plan and the Basin's water resources
- publishing *The Basin Plan: a concept statement* and a related fact sheet
- developing a process to identify, map and analyse relevant Basin stakeholders
- developing a stakeholder engagement implementation plan.

Members of the Murray–Darling Basin Authority at their first meeting on 1–2 June 2009. Left to right: Professor Barry Hart; Dr Diana Day; Chief Executive Rob Freeman; Minister for Climate Change and Water, Senator Penny Wong; Chair, Michael Taylor; David Green; Dianne Davidson.

Delivering water

We remain ever-conscious of our ongoing responsibilities — especially, during this prolonged drought, of delivering water to users in a fair and efficient way.

Special water-sharing arrangements were again agreed between partner governments to safeguard the supply of water for critical human needs and to optimise water availability throughout the season. MDBA continued to supply and refine forecasts of water availability and to provide the systems for assessing options for special water-sharing arrangements.

Asset management is a fundamental part of water delivery. MDBA manages large dams, weirs and other infrastructure along the River Murray and the lower Darling, such as the crucial salt interception schemes. During 2008–09 major dam safety projects were advanced at Hume Dam, Dartmouth Dam and Lake Victoria storage, and at other locations.

Capping water diversions

MDBA is responsible for managing the implementation of the Cap on surface water diversions for each river valley in the Basin. Under the Basin Plan, the Cap will be replaced by new sustainable diversion limits for surface water and groundwater.

The Cap audit for 2007–08 (conducted and reported in 2008–09) found that in all valleys where a Cap applies, except for the combined Barwon–Darling – Lower Darling valley in New South Wales, diversions were within the Cap bounds. (New South Wales will report to Ministerial Council on the reasons for the breach and on remedial measures.) Other achievements included: finalising a Cap for the Queensland Border Rivers; and publishing the first-ever report on environmental water in the Water Audit Monitoring Report.

Keeping excess salt out of the Murray

In the Murray–Darling Basin, a naturally saline system, salinity has been a significant problem for many decades. To minimise its impacts, MDBA manages the Basin Salinity Management Strategy.

During 2008–09 salt interception schemes diverted some 450,000 tonnes of salt away from the river system. Peak salinity at Morgan, South Australia was kept below the required level, meeting the target for Basin salinity. Salt interception schemes at Waikerie and Pyramid Creek were completed, and construction began on schemes at Murtho and the Upper Darling.

Trading water

During 2008–09, MDBA's Water Trade Program continued to coordinate and refine the legal instruments needed to facilitate interstate water trade. An unprecedented 593 GL of seasonal interstate allocation transfers were processed, mostly for use in permanent horticulture. Temporary amendments to the Lower Darling and Barmah Choke trading rules were made for 2008–09, creating more opportunities for water users to trade allocations interstate.

Water accounting information gathered this year helped to develop water accounting standards through the National Water Accounting Development project.

Working towards a healthy river

The Living Murray, one of Australia's most significant river restoration programs, has moved close to its water recovery target of returning an average of 500 GL a year to benefit the six environmentally important 'icon sites' on the River Murray.

On current projections, most of the water recovery measures to achieve this target will be completed by the end of 2009. At 30 June, the measures had recovered a total of 342.5 GL long-term Cap equivalent (a type of average taking into account the different characteristics of water entitlements in New South Wales, Victoria and South Australia, and their reliability) for The Living Murray program.

In future, The Living Murray will increasingly focus on actually delivering recovered water to the sites.

The Environmental Works and Measures Program of The Living Murray aims to deliver water and to improve the health of the river system through new and improved infrastructure projects. In 2008–09, the program conducted major hydrologic modelling for supplying and delivering environmental water through these works and measures. A mid-term review of the program helped to prioritise projects to align with the available budget.

Checking river health

MDBA monitors the long-term health of the Basin's rivers through the Sustainable Rivers Audit. The program has completed five years of data collection across the Basin, having sampled 82,060 fish and 294,308 macroinvertebrates from more than 1,000 sites. Hydrological data has been studied from nearly 500 sites. Reports from the first four years of monitoring are publicly available on the MDBA website, and data from the fifth year will be posted in late 2009.

Managing acid sulfate soils

Record low inflows and river levels in recent years have led to the drying of many permanent wetlands in the Murray–Darling Basin, resulting in the exposure of acid sulfate soils. MDBA has been assessing the extent and risk posed by acid sulfate soils at priority wetlands in the River Murray system.

Key achievements in 2008–09 included:

- a desktop assessment of more than 19,000 wetlands throughout the Basin and rapid on-ground assessment of approximately 1,450 wetlands considered to be at risk of acidification
- detailed assessments at high-priority wetlands, including 15 of the Basin's Ramsar wetlands, 80 wetlands on the Murray between Lock 1 (Blanchetown) and Wellington, and sites in the Loddon River catchment in north central Victoria.

Managing risks to water resources

Working with the Basin states, MDBA is tackling six major risks to shared Basin water resources:

- climate change
- increased farm dam development
- increased groundwater extraction
- afforestation (in particular, plantation forestry)
- bushfire impacts on catchments
- reduced irrigation return flows due to improved irrigation efficiencies.

Several technical reports published in 2008–09 have created a better understanding of the impacts of groundwater extraction, bushfires and human-made water bodies.

As part of the development of the Basin Plan, a new, broader approach to managing risks to Basin water resources is being developed. Involving two primary components — risk assessment architecture for the Basin Plan, and risk management and mitigation — this will also build on previous work on risks.

Understanding drought and climate change

Understanding climate variability and longer term climate change is critical for the future of Basin water resources, and therefore for agriculture, communities and the environment.

To tackle this issue, MDBA acted as the lead agency in the South Eastern Australian Climate Initiative (SEACI).

The first phase of the initiative, which ended in June, came to two major conclusions:

- that the current drought in south-eastern Australia has been influenced by the enhanced greenhouse effect
- that regional predictions of future climate suggest south-eastern Australia will become drier and warmer as a result of the enhanced greenhouse effect.

A second phase of SEACI has been successfully negotiated, with CSIRO acting as lead agency.

SEACI 2 will extend the involvement of MDBA with CSIRO, the Bureau of Meteorology, the Victorian Department of Sustainability and Environment, and the Commonwealth Department of Climate Change.

MDBA has continued to communicate the extent and impacts of the continuing record drought through two-monthly drought updates. 'Water in storages' pages on the MDBA website, updated weekly, clearly and graphically show the volumes of water in public storage.

Helping native fish

This year we made significant progress on the navigable pass upgrades of locks and weirs and associated fishway construction. The fishways are an important element in implementing the Native Fish Strategy, which aims to return native fish populations to 60% of estimated pre-European settlement levels by 2050.

The new fishway at Lock 3, the first of a new design, was close to completion by the end of June 2009. As a result of completion of this fishway, approximately 2,100 km of the River Murray will have been opened to fish passage by August 2009. This is the ninth fishway in the visionary 'Sea to Hume' program which aims to give native fish free access to the entire length of the river from the sea up to Hume Dam — a distance of 2,225 km.

Continuously improving performance

As part of the transition to the Murray–Darling Basin Authority, we reviewed the internal performance reporting framework. In particular, we looked at how the internal performance reporting aligned with the reporting obligations specified in the Portfolio Budget Statements and the Water Act. A revised framework — incorporating a holistic approach to quarterly performance reporting and consolidating the reporting on financial and non-financial performance, risk management, project management and workforce metrics — has been developed for implementation during 2009–10.

Looking forward to 2009–10

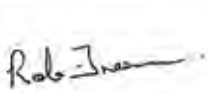
The coming year will see major developments for MDBA.

Stakeholder engagement and community consultation processes will gain maximum momentum as the proposed (or 'draft') Basin Plan nears completion, and is released for evaluation by groups and individuals throughout the Basin.

A program for monitoring and evaluating the effectiveness of the plan will be developed, setting out the principles to be applied and the framework to be used for monitoring and evaluation. It will also include reporting requirements for the Commonwealth and the Basin states, and reviews of the environmental watering plan and the water quality and salinity targets.

The year 2009–10 will also be a time for further consolidating and streamlining MDBA systems and processes.

And, with a professional, vigilant eye on climate conditions, we will remain alert to the most effective ways of delivering reliable water resources to users dependent on the Murray–Darling Basin.



Rob Freeman
Chief Executive
Murray–Darling Basin Authority

MDBA role and functions

The Murray–Darling Basin Authority (MDBA) is an Australian Government agency responsible for planning the integrated management of the water resources of the Murray–Darling Basin (see Figure 1). The agency is part of the portfolio of Environment, Water, Heritage and the Arts, reporting to the Minister for Climate Change and Water.

The Murray–Darling Basin Authority is an integral element of the Australian Government program Water for the Future which has four priorities:

- tackling climate change
- supporting healthy rivers
- using water wisely
- securing our water supplies.

In December 2008, after the Basin states passed legislation to enable the Australian Government to amend the *Water Act 2007* (Cwlth), MDBA assumed responsibility for all functions of the former Murray–Darling Basin Commission (MDBC). MDBC then ceased to exist.

Key MDBA functions include:

- preparing the Basin Plan for adoption by the Minister for Climate Change and Water, including setting sustainable limits on water that can be taken from surface and groundwater systems across the Basin
- advising the minister on the accreditation of state water resource plans
- developing a water rights information service which facilitates water trading across the Murray–Darling Basin
- managing water sharing between the states
- constructing and operating River Murray assets, such as dams and weirs
- managing all aspects of Basin water resources (which include water, organisms and other components and ecosystems that contribute to the physical state and environmental value of the water resource)
- measuring and monitoring water resources in the Basin
- gathering information and undertaking research
- engaging the community in the management of the Basin's resources.

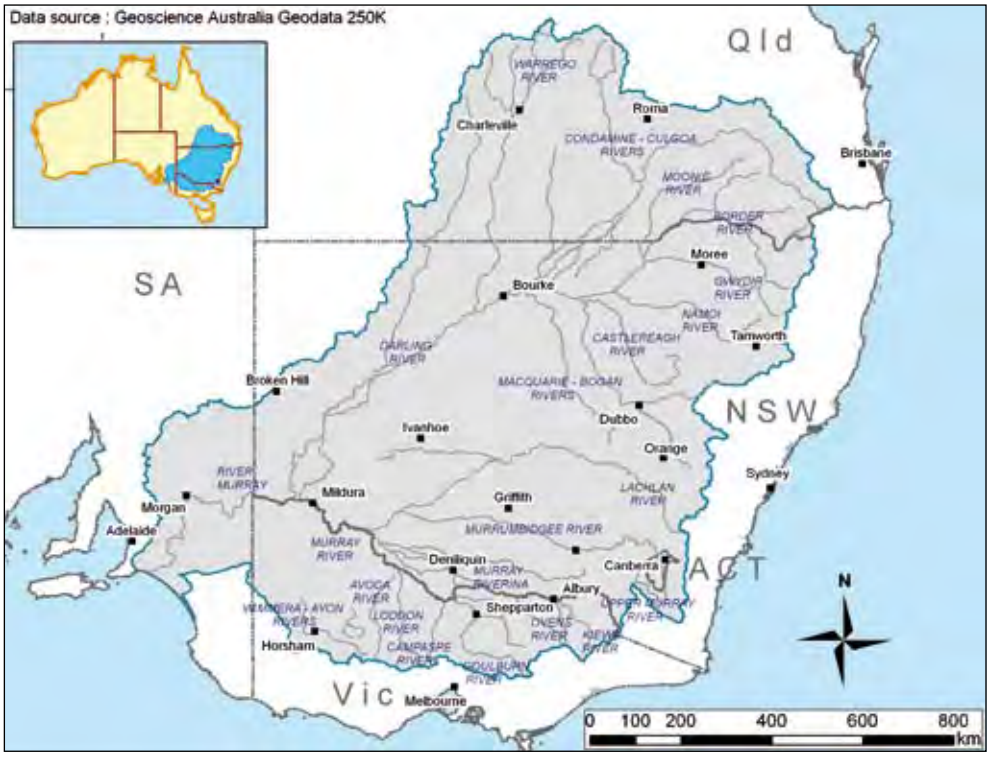


Figure 1 The Murray–Darling Basin. The Basin is the catchment for the Murray and Darling rivers and their many tributaries. In total there are 23 river valleys in the Basin, covering over 1 million square kilometres, or 14% of Australia. The Basin is Australia's most important agricultural area, producing over one-third of Australia's food supply. It is also home to more than 2 million people.

MDBA implements some aspects of its programs itself, while others are implemented through agencies of the state governments who, with the Commonwealth Government, are partners in managing the Basin.

The agency consists of five divisions, headed by Executive Directors who report to the Chief Executive (see Figure 2). The divisions are: Basin Plan; River Murray; Natural Resource Management; Engagement, Secretariat and Communications; and Corporate Services.

As at 30 June 2009, the agency employed 235 people.

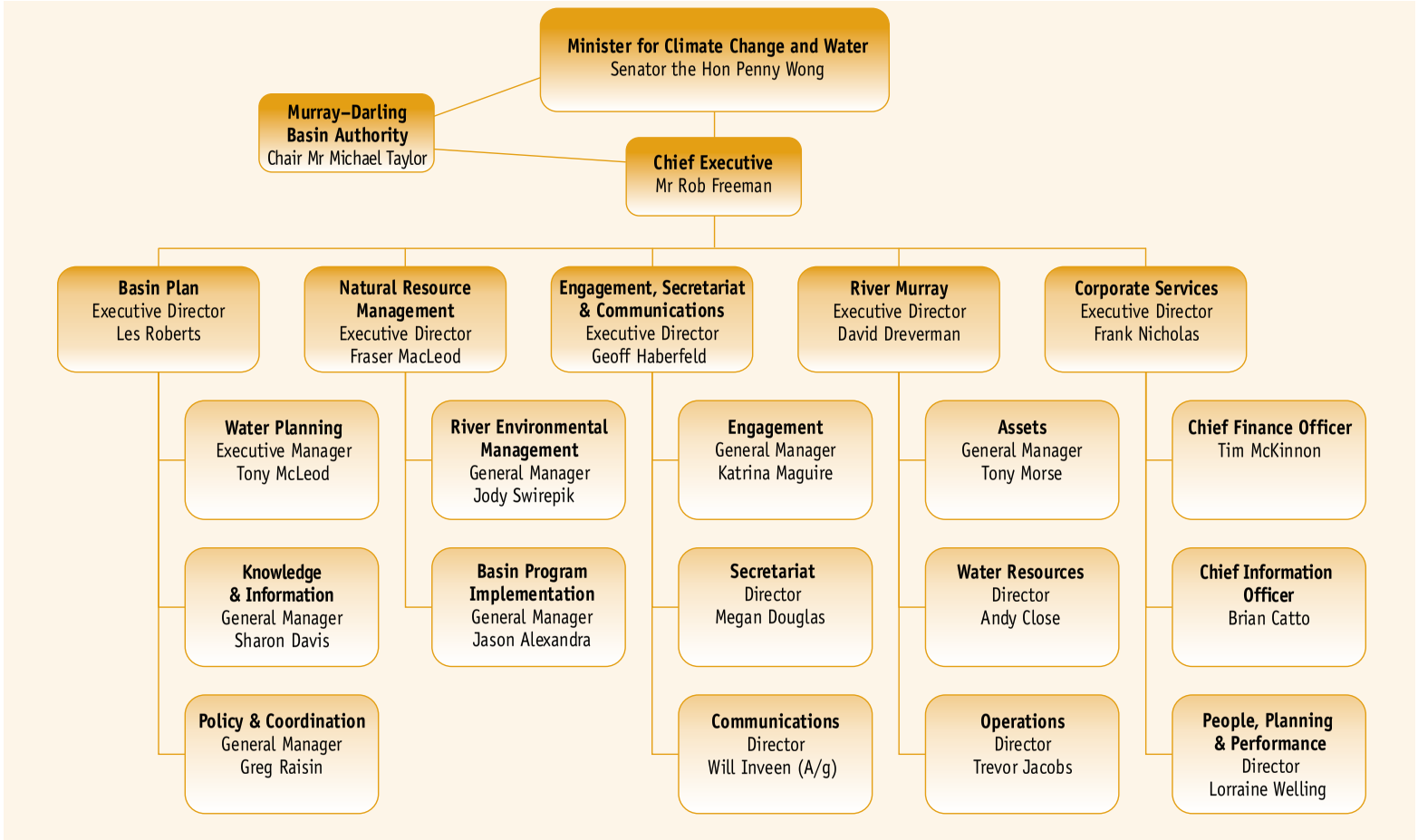


Figure 2 MDBA organisational structure

Governance structure

The governance structure and relationships of the Murray–Darling Basin Authority are outlined in Figure 3. The key elements are:

- the Commonwealth Water Minister, currently the Minister for Climate Change and Water, Senator the Hon Penny Wong
- the six-member Murray–Darling Basin Authority
- the Murray–Darling Basin Ministerial Council
- the Basin Officials Committee
- the Basin Community Committee.

The authority members are listed on page xv. The members of the Ministerial Council and committees are listed in Appendix A.

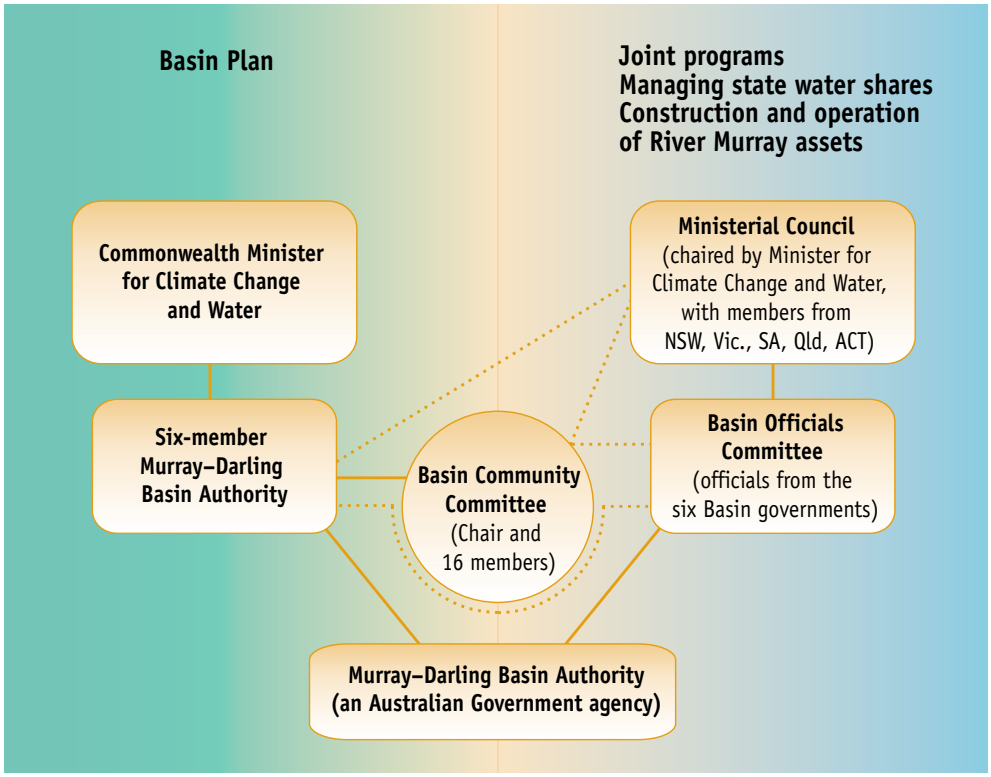


Figure 3 Murray–Darling Basin Authority: governance structure. The solid lines represent reporting and decision-making; the dotted lines represent a more advisory role.

The authority

The six-member Murray–Darling Basin Authority is similar to a board. Its functions and powers are specified in the *Water Act 2007* (Cwlth).

The authority informs and advises the Commonwealth Water Minister, and is directed by the minister on some matters. It sets policy and strategic direction for activities of the agency known as the Murray–Darling Basin Authority (MDBA), including preparation of the Basin Plan. The agency consists of the Chief Executive, and the MDBA staff.

The authority members are as follows:

- Chair Michael Taylor, AO, has held senior positions in the Commonwealth and Victorian public service, most recently as Secretary for the Commonwealth Department of Infrastructure, Transport, Regional Development and Local Government. He has extensive experience and expertise in water, the environment, natural resource management and agriculture.
- Dianne Davidson has a strong management background in natural resources, particularly water and irrigated agriculture. She is currently a member of the South Australian Premier's Climate Change Council and previously served on the South Australian Murray–Darling Basin Natural Resource Management Board.
- Dr Diana Day, a former Associate Professor at the University of Sydney, has expertise in hydrology, environmental issues, water futures and Indigenous educational research. Her studies include research on catchment and stream hydrology, water quality and erosion.
- Rob Freeman, MDBA Chief Executive, previously held senior positions in the Queensland and South Australia public service, most recently as Chief Executive of the South Australian Department of Water, Land and Biodiversity Conservation. He was also South Australian Commissioner and Deputy President of the Murray–Darling Basin Commission.
- David Green has been involved in water policy and water reform in Queensland since the mid-1990s. He is currently a Queensland Water Commissioner and Board Member of the South East Queensland Water Grid Manager and has extensive experience in water resource management and planning, economics, governance and water trading matters.
- Professor Barry Hart is an Emeritus Professor at Monash University and has over 30 years experience in freshwater ecology. He has previously held the positions of Director of the Water Studies Centre at Monash University and Director of Research at the Cooperative Research Centre for Freshwater Ecology.

Murray–Darling Basin Ministerial Council

The Murray–Darling Basin Ministerial Council is established by the Murray–Darling Basin Agreement, Schedule 1 to the *Water Act 2007* (Cwlth), as amended.

The Ministerial Council has an advisory role in the preparation of the Basin Plan by the Murray–Darling Basin Authority, and policy and decision-making roles for matters such as state water shares, and the funding and delivery of natural resource management programs, in accordance with the Murray–Darling Basin Agreement. The council also has a policy and decision-making role relating to water for critical human needs as provided for in the Water Act.

The council may give directions to the Basin Officials Committee concerning the committee's functions and powers under the Murray–Darling Basin Agreement, and can also seek the advice of the Basin Community Committee.

Membership of the Ministerial Council comprises the Commonwealth Water Minister, who also chairs the council, and one minister from each of the Basin states and the ACT.

Basin Officials Committee

The Basin Officials Committee is established by the Murray–Darling Basin Agreement, Schedule 1 to the *Water Act 2007* (Cwlth), as amended.

The committee facilitates cooperation and coordination between the Commonwealth, the Murray–Darling Basin Authority and the Basin states in funding works and managing the Basin water and other natural resources.

The committee is responsible for providing advice to the Ministerial Council, and for implementing policy and decisions of the council on matters such as state water shares and the funding and delivery of natural resource management programs.

The committee has high-level decision-making responsibilities for river operations, including setting objectives and outcomes to be achieved by the authority in River Murray operations.

The committee has an advisory role in relation to the Basin Plan, including advising the authority about engaging the Basin states in the preparation of the proposed plan.

Membership of the committee comprises officials from the six Basin governments, and the committee is chaired by the Commonwealth committee member. The authority's Chair and Chief Executive are non-voting members of the committee.

Basin Community Committee

The 16-member Basin Community Committee advises the Murray–Darling Basin Authority about the performance of its functions, including in relation to:

- engaging the community in the preparation of each draft Basin Plan
- community matters relating to the Basin water resources
- matters referred to the committee by the authority.

The committee must also establish irrigation and environmental water subcommittees, and an Indigenous water subcommittee to guide the consideration of Indigenous matters relevant to the Basin's water resources.

The committee has a role in advising the Murray–Darling Basin Ministerial Council on its functions under the Murray–Darling Basin Agreement, which may include matters such as delivery of natural resource management programs.

In performing these functions, it is likely that the Basin Community Committee will liaise with the wider Basin community, including possibly convening regional meetings with relevant groups during the planning process for the Basin Plan, and undertaking appropriate liaison activities to help provide advice to the authority and the Ministerial Council.

Outcome and output structure

When the 2008–09 Portfolio Budget Statements were prepared, the Murray–Darling Basin Authority was yet to become operational. Therefore no agency statements for MDBA were included in the budget statements. The general outcome specified in the budget statements was 'Managing water resources in the Murray–Darling'.

Under the provisions of the transition of MDBC into MDBA, MDBA continued to report against the objectives of the Strategic Plan 2005–2010 and the related Business Plan during the 2008–09 financial year.

As the Basin Plan Program is a new MDBA program, its outputs are reported against 10 objectives set out in MDBA's new Corporate Plan, which did not officially come into effect until 1 July 2009.

The general outcome and output structure is summarised in Table 1 on page xviii.

Table 1 MDBA outcome and output structure

Outcomes	Outputs
To prepare, implement, monitor and enforce the Basin Plan, and undertake activities relevant to jurisdictional water resource plans, for the sustainable management of water resources in the Murray–Darling Basin.	Develop integrated surface water and groundwater planning requirements for the Basin Plan
	Develop an environmental watering plan for the Basin
	Develop a water quality and salinity management plan for the Basin
	Provide for critical human water needs in the Basin Plan
	Identify and manage the risks associated with the Basin Plan water resources
	Prepare a program to monitor and evaluate the effectiveness of and compliance with the Basin Plan
	Assist the development of an effective and comprehensive water market
	Secure the best available knowledge and information to inform the Basin Plan preparation
	Provide models and data to support the preparation of a Basin Plan
	Effectively engage stakeholders
Protection and enhancement of the Basin's shared environmental assets and water resources.	Coordinate the implementation of The Living Murray
	Improve management of, and compliance with, the Cap on water diversions
	Coordinate the implementation of the Basin Salinity Management Strategy
	Monitor and report on the health of the Basin's water and natural resources to inform better decision making
	Develop policy options to respond to demonstrated risks of significance to shared water resources, including integrated use of surface and groundwater
	Coordinate the implementation of the Native Fish Strategy
Efficient and equitable delivery of water for productive and sustainable domestic consumption, environmental benefit and economic use.	Deliver agreed water shares in the River Murray
	Support the development of open, barrier-free markets for interstate water
	Sustain and improve the physical asset base to contemporary best practice
	Improve environmental and consumptive use outcomes through development of improved water management and delivery tools

Report on performance

Report on performance

Chapter 1 Developing the Basin Plan

Chapter 2 Protecting and enhancing water resources

Chapter 3 Delivering water efficiently and effectively

Chapter 1 and its main subsections relate to the Basin Plan program section of the Murray–Darling Basin Authority's (MDBA's) Corporate Plan 2009–2013.

Chapters 2 and 3 and their main subsections relate to the Murray–Darling Basin Commission's (MDBC's) Strategic Plan 2005–2010. Under the transition provisions, MDBA continued to report against the objectives of the MDBC Strategic Plan 2005–2010 and the related Business Plan during the 2008–09 financial year.

The relevant sections of the MDBA Corporate Plan and the MDBC Strategic Plan are noted under the chapter titles and main subsection headings.

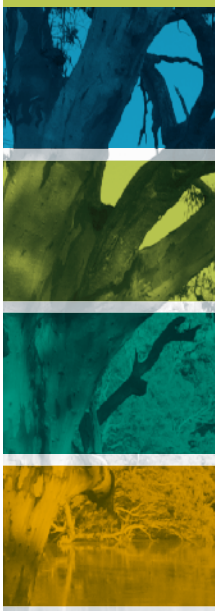
Chapter 1

Developing the Basin Plan

MDBA Corporate Plan 2009–2013, Basin Plan program

The Basin Plan: a concept statement was released in June 2009. It was the first document about the Basin Plan to be published by MDBA

Chapter 1



Overview

The Basin Plan will provide a single, consistent, integrated approach to managing the water resources of the Murray–Darling Basin. Its aim will be to protect and restore key environmental assets — rivers, streams, wetlands, forests, floodplains and billabongs — and key ecosystem functions which are essential to the life of the rivers and their surrounding landscapes, as well as to human activities and cultural values.

The plan will take into account the impact of this protection and restoration on individual communities, industries, regions and the wider economy, and will be developed using the best available scientific, social, cultural and economic knowledge, evidence and analysis. The proposed Basin Plan will be released for public consultation in mid-2010.

A detailed project plan was developed to ensure that the timeframes for preparation of the Basin Plan could be met. There was also intensive effort to recruit the skills and experience necessary to undertake this work. Concurrently, work started on major tasks, including engaging with key agencies to draw together environmental, social, cultural and economic information required to describe the Basin's water resources and how they are used. A concept statement was produced to provide information on the key elements and overall approach for development of the Basin Plan.

The focus of work has been on a number of key areas:

- identifying key environmental assets and functions and determining their water requirements
- reviewing existing knowledge of environmental assets and functions to contribute to a comprehensive Environmental Assets Register for the Basin
- developing a comprehensive report to describe the current social and economic circumstances of the Basin and its communities
- identifying the key principles that will underpin the sustainable diversion limits (SDLs)
- securing the best available hydrologic and groundwater models and modelling capabilities to develop the modelling platforms that will assist in setting the SDLs
- developing the provisions in the Basin Plan for critical human water needs
- developing the water quality and salinity management plan, building on the platform of the National Water Quality Strategy and the Basin Salinity Management Strategy
- developing a framework for evaluating the effectiveness of the Basin Plan.

The Basin Plan

Background

The *Water Act 2007* (Cwlth) requires that the Murray–Darling Basin Authority (MDBA) develops and oversees a plan for the integrated management of Basin water resources in order to protect and restore key environmental assets and ecosystem functions. In doing this, it must take into account the impact of this protection and restoration on individual communities, industries, regions and the wider economy.

The Basin Plan must be based on the best and latest scientific, social, cultural and economic knowledge, evidence and analysis. In preparing the plan, MDBA must consult with Basin state and territory governments, key stakeholders, and rural and regional communities throughout the Basin.

The Basin Plan must include:

- limits on the amount of surface water and groundwater that can be sustainably taken from Basin water resources
- identification of risks to water resources and strategies to manage those risks
- requirements for accreditation of state water resource plans
- an environmental watering plan
- a water quality and salinity management plan
- rules for trading or transfer of tradeable water rights
- a program for monitoring and evaluating the effectiveness of the plan.

Highlights

- Worked on the development of strategies for integrated management of the Basin's surface water, groundwater and environmental water.
- Engaged with key agencies to draw together the environmental, social, cultural and economic information required to describe the Basin's water resources and how they are used.
- Compiled and analysed information for preparation of the Basin Plan.
- Engaged with and informed the community about the Basin Plan and the Basin's water resources, including through publication of *The Basin Plan: a concept statement* and an accompanying fact sheet.
- Developed a process to identify, map and analyse relevant Basin stakeholders, and initiated development of a stakeholder engagement implementation plan.

MDBA is currently in the first phase, 'Getting started', of the development of the Basin Plan (see Figure 1.1).

A draft MDBA Corporate Plan 2009–13 was produced in 2008–09 and the final plan was approved by the Murray–Darling Basin Ministerial Council in June. While the Corporate Plan does not come into effect until July 2009, it sets out 10 objectives for developing the Basin Plan which have been adopted for this report.

The 10 objectives and MDBA's progress in achieving them are reported on pages 7–18.

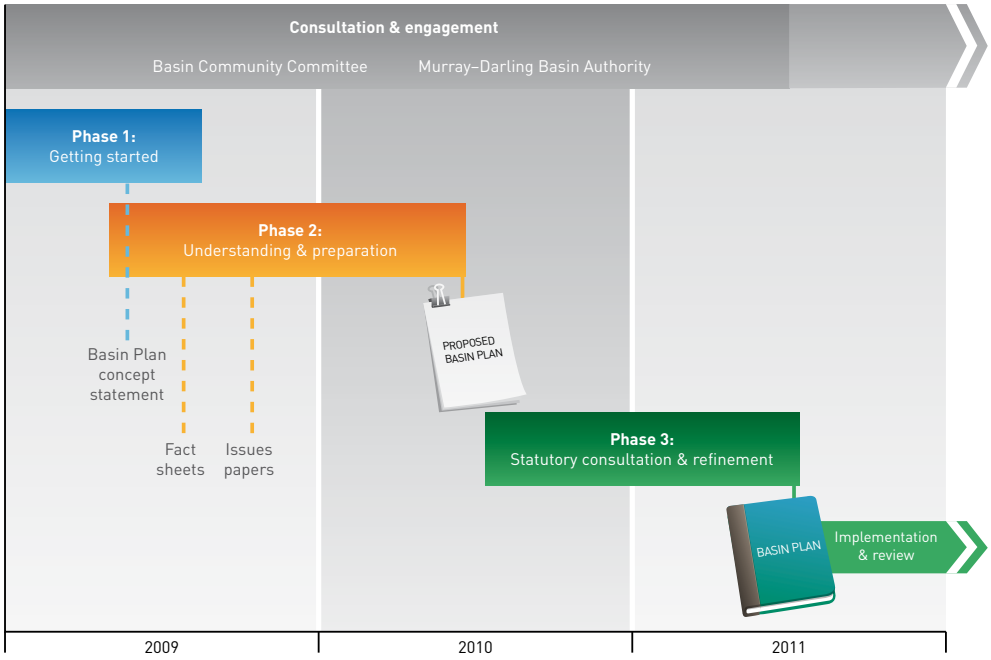


Figure 1.1 Phases and timeline for development of the Basin Plan

MDBA Corporate Plan 2009–2013, Basin Plan Objective 1: Develop integrated surface water and groundwater planning requirements for the Basin Plan

Managing surface water and groundwater

Background

A central element of the Basin Plan is to set environmentally sustainable limits on the amount of water that can be taken from the Basin's water resources. These are known as sustainable diversion limits (SDLs).

The SDLs will limit the quantity of surface water and groundwater that can be taken from the Basin as a whole, as well as from individual water resource plan areas. The SDLs will be designed to ensure that key environmental assets, key ecosystem functions and the productive base of the water resource are not compromised.

The SDLs will take account of the natural variability in the system. In any given year, SDLs will be influenced by a number of variables, including the amount of water in storage, the prevailing climate and inflow conditions, groundwater levels and estimates of recharge, and the connectivity between surface water and groundwater systems. The effects of climate change on the quantity of water available will also be considered when setting the SDLs.

Development of SDLs is a complex and challenging task. Initial work carried out by the Murray–Darling Basin Authority (MDBA) has focused on fully understanding the extraction limits that Basin states already have in place, particularly in relation to the ways in which these are expressed in different states and the ways in which environmental considerations are incorporated.

The investigation has included an examination of the existing Cap on surface-water diversions (see page 36) and the ways in which elements of the current approach may guide SDL development. Significant work has also been initiated to ensure a close linkage between the development of the environmental watering plan, the water quality and salinity management plan, and the SDLs.

Introductory information about the SDLs was included in the publication *The Basin Plan: a concept statement* and an accompanying fact sheet, released in June 2009. Following on from this publication, MDBA plans to release an issues paper in late 2009 to describe the proposed method of developing the SDLs. Comments on the paper will be sought from interested stakeholders.

MDBA Corporate Plan 2009–2013, Basin Plan Objective 2: Develop an environmental watering plan for the Basin

Safeguarding the environment

Background

The rivers and wetlands of the Murray–Darling Basin serve many functions and support many values — economic, environmental and cultural. These rivers and wetlands are now significantly stressed by the combined challenges of drought, climate change and overallocation of water.

The Murray–Darling Basin Sustainable Yields Project (conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO): see <www.csiro.au/mdbsy>) has shown that, under existing water-sharing arrangements, any reductions in water availability due to climate change would lead to a lower proportion of the available water being protected for the environment.

A central element of the Basin Plan is an environmental watering plan to restore and sustain the wetlands and other environmental assets of the Basin and to protect biodiversity dependent on the Basin water resources. This plan will safeguard existing environmental water, plan the recovery of additional water, and coordinate the use of environmental water throughout the Basin.

The environmental watering plan will contain, in relation to the Basin:

- environmental objectives for water-dependent ecosystems
- targets to measure progress against these objectives
- a management framework for environmental water
- the methods used to identify key environmental assets requiring water
- the principles and methods that will set the priorities for applying environmental water.

Definition: environmental water

Environmental water is water used to achieve environmental outcomes, including ecosystem function, biodiversity, water quality, and water resource health.

Currently environmental water is managed both by individual states through rules embedded in water resource plans (such water is called 'planned environmental water'); and by various parties, including the Commonwealth, applying water from water entitlements (called 'held environmental water').

To develop a Basin-wide approach for identifying key environmental assets and functions, the Murray–Darling Basin Authority (MDBA) has undertaken detailed work with key scientific experts, and with state and local management agencies. MDBA is developing a system-wide top-down approach, informed by the best available local and regional information.

A review is being undertaken of existing knowledge on environmental assets and functions that have been identified as important through other processes (including work by state and local agencies). Information from the review is being compiled to develop a comprehensive Environmental Asset Register for the Basin. This work is being done in close liaison with the Commonwealth Environmental Water Holder (see page 26).

MDBA Corporate Plan 2009–2013, Basin Plan Objective 3: Develop a water quality and salinity management plan for the Basin Plan

Improving water quality

Background

The water quality and salinity management plan must both identify the key causes of water quality degradation in the Murray–Darling Basin and include water quality and salinity objectives and targets for the water resources of the Basin.

Declining water quality is an ongoing threat to the Basin's water resource, manifesting in increased incidence of algal blooms, elevated in-river salinity, acidification, and other impacts. Aquatic ecosystems, drinking water quality, industries, irrigated crops, recreational values, and spiritual and cultural values are all threatened by these processes.

The water quality and salinity management plan will be developed having regard to the National Water Quality Management Strategy and the Basin Salinity Management Strategy. These strategies have established processes to set water quality objectives at all levels — catchment, water body, aquifer, water resource plan and Basin — and have already contributed to actions to improve water quality.

Water quality and salinity objectives and targets have been set through local catchment management authority and MDBA processes for some of the Basin's assets. However, protection of the Basin's assets and health requires a more consistent and coordinated approach.

Currently, there is insufficient linkage between national standards and catchment management plans to address the highest risks to water quality.

In 2008–09, the Murray–Darling Basin Authority undertook a review of the target frameworks of the National Water Quality Management Strategy and Basin Salinity Management Strategy, which provide key foundation material for this component of the Basin Plan. The extent to which water quality and salinity targets and objectives have previously been developed for Basin water resources was determined. Relevant interdependencies with the environmental watering plan (see page 8) and sustainable diversion limits (see page 7) were identified.

MDBA Corporate Plan 2009–2013, Basin Plan Objective 4: Provide for critical human water needs in the Basin Plan

Providing water for critical human needs

Background

The Basin Plan must take into account the agreement between the Commonwealth and the Basin states that critical human water needs are the highest priority water use for communities dependent on Basin water resources.

Critical human water needs are the needs for a minimum amount of water to meet core human consumption requirements in urban and rural areas that are dependent on Basin water resources. They also include non-human consumption requirements that, if not met, would cause prohibitively high social, economic or national security costs.

In early 2009, the Murray–Darling Basin Authority began work on developing the Basin Plan provisions for critical human water needs. These provisions will address both the definition of critical human water needs, as well as the overarching arrangements for delivering the water required to meet these needs from Basin water resources. This work will also contribute to preparations for a new water-sharing schedule to the Murray–Darling Basin Agreement.

The new schedule will replace the interim water-sharing arrangements that were agreed for the extremely dry conditions experienced in 2007–08 and 2008–09. It will specify water-sharing arrangements, accounting and operational rules that are required to adapt to extremely dry conditions. The schedule establishes three levels (or 'tiers') of water sharing, ranging from normal conditions (Tier 1) to extreme dry conditions (Tier 3). The provision of water for critical human needs to Basin communities is important in all three tiers, but will become crucial in Tiers 2 and 3 under the new water-sharing schedule.

MDBA Corporate Plan 2009–2013, Basin Plan Objective 5: Identify and manage the risks associated with the Basin water resources

Managing risks

Background

The *Water Act 2007* (Cwlth) requires the Basin Plan to identify risks to the condition and continued availability of the Basin water resources, including risks that arise from:

- the taking and use of water (including through interception activities)
- the effects of climate change
- changes to land use
- the limitations on the state of knowledge on the basis of which estimates about matters relating to Basin water resources are made.

Additionally, the Water Act requires consideration of risks to the full extent of water resources, which include surface water or groundwater, water courses, lakes, wetlands or aquifers (whether or not they currently have water in them), and all aspects of the water resource, including water, organisms and other components and ecosystems that contribute to the physical state and environmental value of the water resource.

The Water Act further requires that the Basin Plan includes the strategies to be adopted to manage, or address, the identified risks.

The Murray–Darling Basin Authority has identified the work necessary to meet the requirements of the Water Act in relation to risks to water resources. It will involve two primary components:

- risk assessment architecture: the enduring principles and approach to Basin Plan risk assessment and the method of delivering the assessment
- risk management and mitigation: development of strategies to reduce the risk to Basin water resources based on outcomes of the risk assessment.

The risk assessment architecture has been designed to comply with the Australian Standard for risk management (AS4360). It will identify all significant current and future risks to water resource condition and availability, and the factors contributing to these risks. After expert analysis on the basis of existing knowledge, it will prioritise risk factors for further investigation and potential treatment through mitigation strategies that are to be included in the Basin Plan.

The requirements of the Water Act necessitate a broader consideration of risks than that under the former Risks to Shared Water Resources Program (see page 46), which focused on six hazards. However, the outcomes of the Risks to Shared Water Resources Program will inform the development of the Basin Plan.

Work on the risk assessment architecture started in 2008–09 and will be incorporated into the proposed Basin Plan in 2009–10.

The application of risk management within a natural resource management regime is a complex and challenging task. However, the adoption of a risk management approach can promote transparency through the decision-making process and is widely recognised as a vital component of complex decision making. Work will start on the risk management and mitigation component in 2009–10, following the identification of key risks to water resources.

MDBA Corporate Plan 2009–2013, Basin Plan Objective 6: Prepare a program to monitor and evaluate the effectiveness of and compliance with the Basin Plan

Monitoring and evaluating the Basin Plan

Background

The *Water Act 2007* (Cwlth) requires the Basin Plan to include a program for monitoring and evaluating the effectiveness of the plan. Every 5 and 10 years this monitoring and evaluation will inform the review and adaptive management of the Basin Plan.

The program must set out the principles to be applied and the framework to be used for the monitoring and evaluation. It must also include the requirements for reporting by the Commonwealth and the Basin states, and reviews of the environmental watering plan and the water quality and salinity targets. In addition, the Murray–Darling Basin Authority (MDBA) is responsible for establishing the methodology, systems, policies and procedures that will be used to support the assessment and enforcement of compliance with the Basin Plan.

In 2008–09, MDBA began work on developing a program to monitor and evaluate the Basin Plan. The framework is being established for evaluating the effectiveness of the Basin Plan components in achieving the expected outcomes and working towards objectives and targets. (The Basin Plan components include the sustainable diversion limits, environmental watering plan, water quality and salinity management plan, trading rules, and accreditation of state and territory water resource plans.) The framework will inform drafting instructions for the Basin Plan monitoring and evaluation program, and technical development of performance measures or indicators.

MDBA is providing high-level advice on monitoring, evaluation, compliance and enforcement issues. Sound working relationships have been developed with key stakeholder groups, and liaison will continue with these groups to identify and deliver effective processes supporting the development and implementation of the Basin Plan. Central to this effort will be collaborative approaches to delivering effective,

transparent and well-regarded program outcomes for both monitoring/evaluation and compliance/enforcement.

To ensure that the best available science underpins our monitoring and evaluation activities, leading scientists and other technical specialists will be engaged. For example, the Independent Sustainable Rivers Audit Group will be asked to provide advice on the ecological monitoring framework for the Basin Plan. Knowledge-holders and specialists in non-ecological areas will also be approached to provide advice and to review the rigour of the proposed framework, methods and protocols, and to contribute vital knowledge and experience.

Further activity over the coming year will focus on developing a method to assess compliance with the long-term annual diversion limit (a mandatory component of the Basin Plan), and on developing systems and policies for operational enforcement of this and other components of the Basin Plan. (The long-term annual diversion limit for water resources in a water resource plan area is the sum of the long-term average sustainable diversion limit and the temporary diversion limit for those water resources, as set out in the Water Act, section 22, item 7.)

MDBA Corporate Plan 2009–2013, Basin Plan Objective 7: Assist the development of an effective and comprehensive water market

Developing an effective water market

Background

'Rules for the trading or transfer of tradeable water rights in relation to Basin water resources' are a mandatory component of the Basin Plan. Tradeable water rights include water access rights (including entitlements and allocations — see definition on page 14), irrigation rights and water delivery rights.

The purpose of water trading rules under the Basin Plan is to enable water to reach its most productive use through the development of efficient water-trading regimes that will maximise economic, social and environmental outcomes within the Murray–Darling Basin. Water trading rules must contribute to achieving the Basin water market and trading objectives of the *Water Act 2007* (Cwlth).

The trading rules under the Basin Plan will complement water market and charge rules that are set by the Commonwealth Minister for Climate Change and Water. Trading rules, which will be broader in scope than water market and charge rules, will address the removal of barriers to trade, the terms and processes for trading water, the manner in which trade is conducted and the provision of information to enable trading to take place.

Definition: 'entitlement' and 'allocation'

Entitlement

Water users in the Basin hold a legal entitlement, or licence, to a share of the available water. The entitlement usually specifies:

- size (or volume) of the share
- source of the water (e.g. the river, catchment or aquifer)
- category (which can be a combination of priority and purpose).

Allocation

An allocation is the specific volume of water allocated to the holders of water entitlements in a given season. The allocation is often quoted as a percentage of the volume of each entitlement. For instance, a 20% allocation in a particular season allows a water user with a 100 ML entitlement to take 20 ML of water.

Preparing water trading rules

In preparing water trading and transfer rules under the Basin Plan, the Murray–Darling Basin Authority (MDBA) must obtain, and have regard to, the advice of the Australian Competition and Consumer Commission (ACCC).

MDBA has continued to provide technical support and input to the ACCC during the 2008–09 year; in addition, MDBA provided information on the historical context of water trade within the Basin. The ACCC released its *Water trading rules: issues paper* on 6 March 2009 (see <http://www.accc.gov.au/content/index.phtml/itemId/863251>). This is the first step of the overall process for preparing ACCC advice to MDBA on water trading and transfer rules.

Under the ACCC consultation process, stakeholders were given eight weeks to comment on the issues paper. The ACCC is reviewing the comments received with a view to preparing a position paper due for release in September 2009. The position paper will then undergo a public consultation process similar to that used for the issues paper.

MDBA Corporate Plan 2009–2013, Basin Plan Objective 8: Secure the best available knowledge and information to inform Basin Plan preparation

Using the best information available

Background

The Basin Plan must be developed on the basis of best available science and socioeconomic analysis. Areas of focus include development of:

- a description of the Basin water resources and the context in which those resources are used, which is a mandatory component of the Basin Plan
- a Strategic Research Plan and a Data and Information Management System to support both the immediate and the enduring needs of the Basin Plan
- relationships with knowledge providers relevant to the work of the Murray–Darling Basin Authority (MDBA).

The description of the Basin water resources and the context of their use will include information about aquatic ecosystems, their size, condition and connectivity.

The social and economic circumstances of communities within the Basin are an important consideration in developing the Basin Plan and will also be described. Drawing on expertise from the Australian Bureau of Statistics, the Australian Bureau of Agricultural and Resource Economics, and the Bureau of Rural Sciences, MDBA is developing a comprehensive report to describe the current social and economic circumstances of the Basin and its communities. The report will present a profile of the people living and working in the Basin; explore the consumptive use of water within the Basin; and examine some of the economic benefits provided by the Basin through agriculture and other industry sectors.

The data from the description will also assist in making assessments to determine sustainable diversion limits and analyse the impact of the Basin Plan on Basin communities. The description of the social and economic circumstances will essentially support the socioeconomic analysis that will be used to inform how, where and when water can be delivered to meet environmental requirements and what the possible costs and benefits of this might be.

MDBA is scoping investment in a number of research initiatives to fill the gaps in existing knowledge, and will consider strategic initiatives to meet knowledge needs in the medium to long term. Knowledge management will be supported by appropriate investments in information and data collation, interrogation and analysis.

A critical component of knowledge management will be building relationships and collaborations with stakeholders in the Basin, including industry sectors, research institutions, community groups and government agencies.

Chapter 1

MDBA Corporate Plan 2009–2013, Basin Plan Objective 9: Provide models and data to support the preparation of a Basin Plan

Modelling the Basin river systems

Background

Hydrologic models and associated data will be used to guide the development of the Basin Plan. In particular, surface water management models will be used to explore the implications of proposed sustainable diversion limits on the amount of water that will be available to meet environmental objectives under a range of possible future climates. Groundwater models will also be used to help determine sustainable diversion limits.

The Murray–Darling Basin Authority (MDBA) is adapting the Basin-wide hydrologic modelling framework developed by the Commonwealth Scientific and Industrial Research Organisation in the Murray–Darling Basin Sustainable Yields Project. This framework will be operational in the second half of 2009 and will be used to link MDBA and state water resource models. Enhancements will be made to the modelling framework to enable efficient investigation of options for changed water management, in particular possible sustainable diversion limits.

Building on its extensive expertise and on previous work by the former Murray–Darling Basin Commission in modelling the River Murray system, MDBA will develop new capacity to model the other river systems of the Basin. MDBA is actively engaging with state governments and the scientific community to access and apply the best available models and modelling capabilities. This will incorporate both surface and groundwater modelling.

Hydrologic modelling using this Basin-wide modelling framework will be used to guide the determination of sustainable diversion limits as well as the development of the water quality and salinity management plan and the environmental watering plan for the Basin Plan.

Engaging with stakeholders

Background

Stakeholder engagement is a major focus for the Murray–Darling Basin Authority (MDBA).

There are a number of statutory drivers for MDBA engagement, with the *Water Act 2007* (Cwlth) specifying requirements for engaging stakeholders in the development of the Basin Plan. MDBA must consult with the Basin Officials Committee (see page xvi), Basin states, the Basin Community Committee (see page xvii), and undertake other consultation as appropriate.

The Basin Plan will require a comprehensive process of community consultation and input, and socioeconomic assessment.

During all phases of the plan's development, MDBA will engage with non-government stakeholders, including the people, communities and industries of the Basin, mainly through a Basin Community Committee and its specialist subcommittees. In addition, other advisory committees may be established and other forms of consultation undertaken.

MDBA will also work closely with all Basin states and their agencies, and with key conservation, Indigenous and industry bodies. As a high priority, MDBA will work in consultation with the Basin Community Committee to work out the best ways of engaging with stakeholders.

Stakeholder engagement in three broad areas — community and environment; Indigenous; and government agencies — offers an opportunity for MDBA to draw on stakeholder knowledge and to build their capacity to participate in, adapt to and implement the current and future Basin planning processes.

The priority for 2008–09 was to establish processes to support the development and implementation of an integrated 'best practice' stakeholder engagement strategy for the effective engagement of the Basin's stakeholders in the development of the Basin Plan.

To date, the Chair of the Murray–Darling Basin Authority, the Executive, and other MDBA experts have given numerous presentations to industry, government and community groups on the development of the Basin Plan. This consultative process will expand with the implementation of the stakeholder engagement strategy.

In June 2009, the Basin Plan concept statement and an accompanying fact sheet were released. The concept statement was the first document about the Basin Plan to be published by MDBA. It explains the key elements and approach being taken in developing the plan. Hard copies have been widely distributed and the document is available on MDBA's website (see <http://www.mdba.gov.au/files/publications/basin-plan-concept-statement.pdf> or <http://www.mdba.gov.au/basin_plan/concept-statement>.

Community and environment

Work was carried out to identify and prioritise stakeholder groups to facilitate effective engagement. Engagement activities have begun, with various MDBA staff, including the Executive, making presentations at stakeholder forums on both Basin Plan issues and engagement processes.

Approximately 100 meetings, workshops and conferences have been attended by MDBA staff and members of the Executive to discuss these issues with stakeholders.

Indigenous

Engagement with Indigenous stakeholders has continued the work begun in The Living Murray initiative's Indigenous Partnerships Program (see page 33) to ensure that Indigenous issues are addressed in the Basin-wide stakeholder engagement strategy.

Government agencies

The focus has been on facilitating meetings with all the Basin states and developing protocols and arrangements for future engagement. Close cooperation with the Department of the Environment, Water, Heritage and the Arts through regular meetings and information sharing was also a priority.

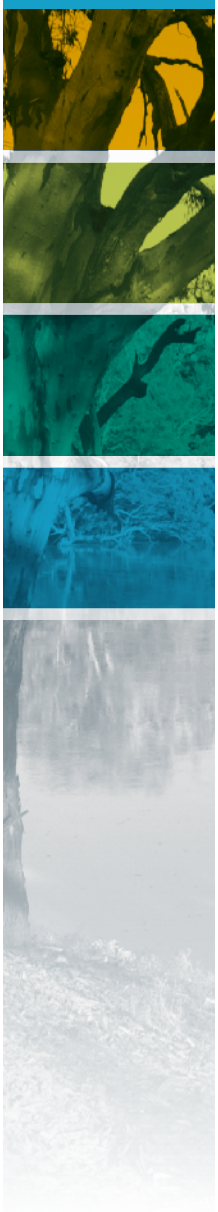
Chapter 2

Protecting and enhancing water resources

MDBC Strategic Plan 2005–2010, Objective 1: Protection and enhancement of the Basin's shared environmental assets and water resources

Reed Beds Swamp, within The Living Murray Barmah–Millewa icon site, shows a positive response after receiving environmental water.

Chapter 2



Overview

In 2008–09 the Murray–Darling Basin Authority (MDBA) has continued to work closely with the Basin states to protect and enhance the Basin's shared environmental assets and water resources.

The Living Murray, a major river restoration program, has made significant progress towards its water recovery target of returning an average of 500 GL of water per year for the benefit of the environment. On current projections, most of the water recovery measures to achieve this target will be completed by the end of 2009.

A key element of The Living Murray is the provision of environmental water at six icon sites. In total, 6.45 GL of allocations against The Living Murray environmental entitlements were used to successfully water various locations in 2008–09 to protect threatened species and maintain important refuges during the continuing drought.

During 2008–09 the ecological health of the Lower Lakes has continued to decline. This year MDBA contributed almost $20 million towards the successful management of the acidification risk in the Lower Lakes, including works to protect the Goolwa Channel and its tributaries from acidification.

In terms of water quality, MDBA implements the Basin Salinity Management Strategy. In 2008–09 salinity management has continued to be effective, with salt interception schemes diverting approximately 450,000 tonnes of salt away from the river system.

MDBA is also responsible for managing the Cap on surface water diversions. In 2008–09 diversions were within established bounds, except in the combined Barwon–Darling – Lower Darling valley in New South Wales.

MDBA also plays a central role in the collection, collation, and analysis of information to support understanding of the Basin. This year, the Sustainable Rivers Audit has completed five years of data collection across the Basin; in total, 82,060 fish and 294,308 macroinvertebrates have been sampled from more than 1,000 sites, and hydrological data from nearly 500 sites. All this monitoring data will progressively be made publicly available through the MDBA website.

Finally, an independent five-year review of the Native Fish Strategy was completed in 2009. The review found that the strategy has been successful in raising awareness and garnering support for the management of native fish across the Basin.

MDBC Strategic Plan 2005–2010, Strategy 1.1: Coordinate the implementation of The Living Murray

Coordinating river restoration

Background

The Living Murray is one of Australia's most significant river restoration programs, with funding of almost $1 billion over the period 2004 to 2012.

The program is a partnership of the Australian Government and the New South Wales, Victorian, South Australian and Australian Capital Territory governments.

Over the long term, The Living Murray aims to contribute to the achievement of a healthy working River Murray system for the benefit of all Australians. As a first step towards this goal, The Living Murray focuses on:

- recovering 500 gigalitres (GL) of water per year, on average, to improve the ecological health of the River Murray system
- improving environmental outcomes at six icon sites.

The six River Murray icon sites were chosen for:

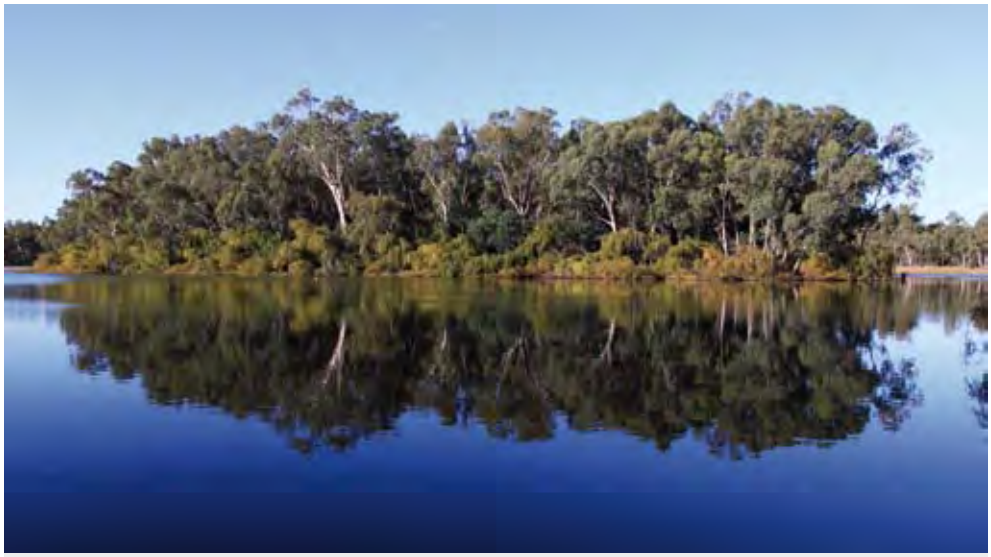
- their high ecological value (most are listed as internationally significant wetlands under the Ramsar Convention on Wetlands)
- their high cultural value to Indigenous and other communities.

The locations of the six icon sites are shown in Figure 2.1.

The Living Murray has made significant progress towards its water recovery target of returning an average of 500 GL per year for the benefit of the six icon sites. On current projections, the majority of water recovery measures to achieve this target will be completed by the end of 2009.

In future years, The Living Murray will increasingly focus on the delivery of recovered water to icon sites.

Figure 2.1 Location of the icon sites. The River Murray Channel icon site extends along the river as shown by the dark blue line.



The River Murray at Torrumbarry Weir, within the River Murray Channel icon site. The Living Murray icon sites all depend on water from the Murray.

Water Recovery Program

Background

The Water Recovery Program coordinates a range of actions to recover water for The Living Murray, including:

- infrastructure measures
- market-based measures
- regulatory measures.

The volume of water recovered is calculated as a long-term Cap equivalent (LTCE) volume (see definition below).

All water recovery measures are subject to an independent review on completion. All final listings on the Environmental Water Register (see definition below) are approved by the Murray–Darling Basin Ministerial Council.

Definition: long-term Cap equivalent

The long-term Cap equivalent (LTCE) is a type of average. It takes into account the different characteristics of water entitlements in New South Wales, Victoria and South Australia, and their reliability. For instance, to recover a long-term Cap equivalent volume of 1,000 ML in the New South Wales Murray region, either a 1,053 ML High Security Water Access Licence could be purchased, or a 1,237 ML General Security Water Access Licence. This measure of water recovery creates a common unit of measure, thus allowing equitable comparison of a broad range of water recovery measures.

Definition: water recovery registers

Water recovery measures have been approved and monitored using a system of three registers. The first stage of approval for a water recovery measure is the Developmental Register. This register is the initial list of those water recovery measures deemed feasible as a Living Murray water recovery measure.

The second stage of approval is the Eligible Measures Register, which lists water recovery measures either ready to be implemented or that are being implemented.

The Environmental Water Register is the third and final stage of approval for a water recovery measure, and the point at which the water entitlement is made formally available to The Living Murray.

Highlights

- A total of 342.5 GL LTCE was listed on the Environmental Water Register as at June 2009.
- Measures under investment and those being implemented are sufficient to recover up to 163.2 GL LTCE more.

As at 30 June 2009, there are 18 water recovery measures either completed or being implemented for The Living Murray program. These have recovered a total of 342.5 GL LTCE of water to date, as shown on the Environmental Water Register (see Table 2.1), and it is expected that a further amount of up to 163.2 GL LTCE of water will be recovered by those measures still being implemented, as shown on the Eligible Measures Register (see Table 2.2).

In May 2009, the Murray–Darling Basin Authority (MDBA) entered the market to buy irrigation entitlements under The Living Murray Water Purchase project. This measure will invest up to $50 million in the purchase of high and general security water entitlements from willing sellers in South Australia, Victoria and New South Wales. Over 400 expressions of interest were received by the closing date of 30 June 2009. The Living Murray Water Purchase project will be completed in the 2009–10 financial year.

In addition, MDBA has been working with the Ricegrowers' Association of Australia to implement the On-farm Water Efficiency Round 2 project. Based on the interest received during the first water efficiency project, Round 2 seeks to recover 9.043 GL of water for The Living Murray. MDBA is acting as the investment proponent for the project and will provide funding to irrigators to implement water savings at a farm-scale level in return for permanent water entitlements.

Table 2.1 Listings on Environmental Water Register (at 30 June 2009)

Proponent	Measure	Volume recovered (GL LTCE)
FINAL LISTINGS		
NSW	Murray Irrigation Limited Supplementary Water Access Licence	17.8
SA	Securing Government Held Water for Environmental use	13
SA	Purchase From Willing Sellers	5
Australian Government	Water through Efficiency Tender	0.18
MDBA	Pilot Market Purchase Measure	13.2

(*continued*)

Table 2.1 Listings on Environmental Water Register (at 30 June 2009) (continued)

Proponent	Measure	Volume recovered (GL LTCE)
INTERIM LISTINGS		
NSW	NSW Package B (First interim listing)	9
NSW	NSW Package B (Second interim listing)	47
NSW	NSW Market Purchase Measure (First Interim Listing)	12.3
NSW	NSW Market Purchase Measure (Second Interim Listing)	45.3
NSW	NSW Market Purchase Measure (Third Interim Listing)	34.2
NSW	Tandou Limited Supplementary Water Access Licence	9.3
VIC	Goulburn Murray Water Recovery Package	120
SA	Securing Government Held Water and Purchase from Willing Sellers	15
MDBA	Ricegrowers' Association On-Farm Water Efficiency Project A1	1.2
Total		**342.5**

Table 2.2 Listings on Eligible Measures Register (at 30 June 2009)

Proponent	Measure	Volume recovered (GL LTCE)
NSW	NSW Package B	7.1
NSW	NSW Market Purchase Measure	21.2–33.2
NSW	NSW Wetland Water Recovery Stage 1	0.55
NSW	Pipe It	0.16
VIC	Goulburn Murray Water Recovery Package	25
VIC	Shepparton Irrigation Area Modernisation Project	30
VIC	Lake Mokoan Water Recovery Package	27
SA	Securing Government-held Water and Purchase from Willing Sellers	2
MDBA	Environmental Water Purchase Project	20–30
MDBA	Ricegrowers' Association On-Farm Water Efficiency Project: Round 2	6.2
MDBA	Sustainable Soils and Farms On-farm Reconfiguration Demonstration	3.07
Total		**163.2** (approx.)

Environmental Delivery Program

Background

The Environmental Delivery Program provides water to the six Living Murray icon sites to maximise ecological outcomes. The watering activities in 2008–09 have utilised allocations to environmental water entitlements acquired through The Living Murray and River Murray Increased Flows (RMIF). (See page 14 for definitions of 'entitlement' and 'allocation'.) The available water is allocated according to agreed annual management objectives. MDBA works closely with jurisdictional partners and the Commonwealth Environmental Water Holder to facilitate this decision-making process.

Highlights

- In total, 6.45 GL of allocations against The Living Murray environmental entitlements were used to successfully water various locations throughout the icon sites to protect threatened species and maintain important refuges during the continuing drought.
- MDBA has contributed $10 million towards the successful management of the acidification risk in the Lower Lakes during 2008–09. A further commitment of $9.6 million will seek to protect the Goolwa Channel and its tributaries from acidification.

Definition: Commonwealth Environmental Water Holder

Environmental water entitlements held by the Australian Government are managed by the Commonwealth Environmental Water Holder. The Commonwealth Environmental Water Holder is a person who, under the *Water Act 2007* (Cwlth), is given the function of using these entitlements to protect and restore the environmental assets of the Murray–Darling Basin, or assets outside the Basin where water is held for that area.

Definition: River Murray Increased Flows

River Murray Increased Flows (RMIF) is water recovered under investment in the Snowy Joint Government Enterprise and available for the River Murray environment. RMIF is initially held in Snowy Hydro's storages. The first water released by Snowy Hydro over and above their annual obligations is credited to the RMIF account in Lake Hume on the Murray. For the purposes of achieving the best environmental outcomes in the Murray, this water is managed under The Living Murray environmental watering framework once it is made available to the authority in the Hume RMIF account.

While the number and volume of entitlements available to The Living Murray increased significantly in 2008–09 (see the information on water recovery, page 23), the annual allocations against these entitlements were low due to the continuing drought in the River Murray system. Only 13.05 GL became available for environmental watering in 2008–09. A significant proportion of this allocation did not become available until the end of the year, thereby limiting its availability for use.

Consistent with The Living Murray Annual Watering Plan for 2008–09, the Environmental Watering Group prioritised sites for potential watering. (The Environmental Watering Group is comprised of partner government agencies and MDBA staff.) Sites were identified according to objectives for an extreme dry climate scenario (i.e. continuing drought and small volumes of water):

- avoid critical loss of threatened species
- avoid irretrievable damage or catastrophic events
- provide refuges to allow recolonisation following drought.

During 2008–09, 6.45 GL of environmental water were delivered to icon sites. A summary of these watering activities and their benefits is provided in Table 2.3. The icon sites also received environmental water from other sources including the Commonwealth Environmental Water Holder and state environmental water accounts.

The unused allocations on The Living Murray entitlements (approximately 6.60 GL) were carried over to 2009–10 consistent with state carry-over rules.

With the continuing drought, and with system inflows tracking close to the historic minimum, the ecological condition of the Lower Lakes continues to decline. Record low water levels in the lakes have resulted in high levels of salinity and an increased risk of acidification.

In response to this risk, in November 2008, the Murray–Darling Basin Ministerial Council established the Real Time Management Strategy to Avoid Acidification of the Lower Lakes, including $10 million to support monitoring of the lakes and pumping from Lake Alexandrina to Lake Albert until 30 June 2009. By maintaining the lake above the critical acidification water level of –0.5 m AHD (Australian height datum), the pumping has managed the acidification risk in Lake Albert during this time. During 2008–09, Lake Alexandrina stayed above its critical acidification threshold of –1.5 m AHD.

In June 2009, the Ministerial Council agreed to contribute $9.6 million towards an emergency package of works and measure to protect the Goolwa Channel and its tributaries from acidification. Construction of a temporary blocking bank at Clayton commenced in June 2009; pumping into the newly formed weir pool to saturate exposed acid sulfate soils is scheduled to commence in August 2009. Development of longer term management options to support the health of the Lower Lakes and Coorong were initiated in 2008–09 by the South Australian Government.

Table 2.3 The Living Murray environmental watering activities, 2008–09 (in chronological order)

Icon site	Watering action	Volume (GL)	Timing	Benefit
Barmah–Millewa Forest	Connect and replenish existing remnant pools in Barmah	0.30	Nov. 2008	Protect and maintain habitat for native fish and turtles; maintain water quality and habitat connectivity in upper reaches of Gulf Creek
Chowilla and Lindsay–Wallpolla	Watering critical drought refuge sites at Chowilla	2.14	Dec. 2008 – Jan. 2009 and Apr.–May 2009	Contribute to maintaining river red gums, black box, other high-priority vegetation and wildlife; provide drought refuge
Gunbower–Koondrook–Perricoota	Watering of Pollock Swamp in Perricoota Forest	1.00	May 2009	Maintain wetland vegetation, and contribute to the maintenance of bird breeding and foraging habitat
Hattah Lakes	Watering of Lake Lockie, Lake Little Hattah and Little Lake Hattah	1.00	May–June 2009	Maintain fringing red gum communities and provide drought refuge for waterbirds
Lower Lakes, Coorong and Murray Mouth (Turvey Drain and Boggy Creek)	Replenish refuges to maintain fish populations	0.01	May–June 2009	Maintain critical refuge habitat for threatened Murray hardyhead and southern pygmy perch species in the Lower Lakes
Chowilla and Lindsay–Wallpolla	Watering critical drought refuges at Lindsay–Wallpolla	2.00	May–June 2009	Contribute to maintaining river red gum communities and providing drought refuges for birds, frogs, tortoises and understorey communities
Total		**6.45**		

Environmental Monitoring Program

Background

The Environmental Monitoring Program monitors the environmental outcomes of The Living Murray, focusing on fish, bird and vegetation communities, in line with the icon site ecological objectives. There are currently four main types of environmental monitoring in place to cover both long-term ecological assessments at icon sites, and assessment of the immediate ecosystem benefits of environmental watering.

Highlights

- The second annual aerial monitoring of waterbird populations in icon sites was conducted, showing that numbers have declined across icon sites in the last 12 months.
- The 2008 *Icon site condition report* was released, indicating that severe drought conditions continue to limit wetland, floodplain and riverine habitats and hence the ability to meet The Living Murray ecological objectives.
- Field assessments of river red gum and black box tree condition were completed at all icon sites, illustrating the decline in their condition, but also the benefits of environmental watering at targeted locations.
- Condition monitoring at each icon site was optimised to ensure consistent monitoring methods are implemented for fish, birds and vegetation for improved reporting.

In November 2008, the second annual aerial monitoring of waterbird populations at icon sites was conducted. This project is undertaken at the same time as the East Australian Waterbird Survey so that the interpretation of the results includes an understanding of waterbird populations in the broader southern Australian landscape.

The results confirmed that the ongoing drought is having a negative impact on the waterbird numbers at the icon sites. However, it is also possible that some of the response reflected the increased habitat available in adjacent geographical areas such as the Paroo River system.

The 2007–08 *Icon site condition report* was published on the MDBC website in late 2008. Across the system, severe drought conditions continue to have a negative impact on waterbird communities and to limit the availability of other wetland, floodplain and riverine habitats throughout the southern Murray–Darling Basin. Most icon sites featuring floodplains or shallow waters were dry or almost dry and supported few waterbirds. While the main river channel held water, it had relatively few birds and low species diversity.

River red gums and black box continued to decline in all of the icon sites; however, there were benefits from environmental watering at targeted locations. Understorey vegetation is suffering, and losing biodiversity. The overall river condition for fish communities was poor; however, new fishways are restoring passage for the migratory fish community and a major resnagging program has increased the available habitat for large-bodied species between Lake Hume and Yarrawonga.

Important work to standardise monitoring methodologies in condition monitoring plans was undertaken by multijurisdictional icon site teams and MDBA staff. To date, standard methodologies have been developed for fish, waterbird and vegetation condition and these are to be implemented at all icon sites.

The application of standard methods will enable consistent reporting on progress toward the ecological objectives at all icon sites. For example, a consistent method for assessing the condition of river red gum and black box stands in the field will be combined with satellite imagery to produce an assessment of stand condition in each of the icon sites.

Monash University researcher assessing river red gums in Koondrook–Perricoota Forest

Environmental Works and Measures Program

Background

The Environmental Works and Measures Program (EWMP) aims to improve the health of the River Murray system through infrastructure that delivers and manages water to the six Living Murray icon sites. Infrastructure includes water-regulating structures; water-delivery channels; fishways; and complementary works and measures.

Highlights

- The second stage of major hydrologic modelling was completed for the supply and delivery of environmental water associated with major EWMP projects.
- The mid-term review of the program was completed, including prioritisation of projects to ensure the scope of work matched the available budget.
- The delivery model review was completed. The review led to the implementation of stronger, more efficient project governance arrangements.

The Environmental Works and Measures Program is rapidly moving toward a new phase of major construction, set to begin in 2009–10. In 2008–09, the focus of the program moved from developing plans for environmental watering of the icon sites to developing and designing the associated works. Significant progress was made on all projects, with detailed design nearing completion on some (for a summary, see Table 2.4).

The second stage of 'water and works' hydrologic modelling was completed in October 2008. This confirmed the findings of the earlier concept-level modelling, which indicated that it is feasible to supply and deliver the water required to operate the proposed major works. The latest modelling showed that the water supply and delivery are achievable, even under median climate change predictions. The modelling also showed that the works are extremely valuable, that they make substantial contributions to the icon site environmental objectives, and that they enable very efficient use of environmental water. The works will enable the watering of three icon sites using regulated supplies of water, rather than a natural flood event being needed to initiate watering.

The mid-term review of the program was completed in early 2009 with the completion of the project prioritisation and the delivery model review. The prioritisation was undertaken to align projects with the available budget of $275 million. The delivery model review looked at procurement and governance arrangements. It recommended innovative procurement options, including the use of 'early contractor engagement' models that allow contractors to contribute to the design of the works, improving construction efficiency and reducing cost. It also recommended streamlining the approvals process and implementing more focused and efficient governance arrangements. These arrangements have now been implemented, and the establishment of the Murray–Darling Basin Authority and amendment of the Murray–Darling Basin Agreement have provided streamlined approvals.

Table 2.4 Environmental Works and Measures Program achievements and outcomes, 2008–09

Barmah–Millewa Forest
Surveys, modelling and concept design for works to rehabilitate Moira Lake
Modelling and feasibility studies for works and measures to enable Tuppal and Bullatale creeks to bypass rain rejection flows around the forest, thereby reducing unseasonal flooding that is detrimental to the health of the forest
Concept designs for Kynmer Creek regulator and Gulf Creek fishway
Completion of the hydraulic model for the Barmah–Millewa Forest
Completion of Stage 1 of the Barmah Choke Study
Gunbower–Koondrook–Perricoota Forest
Completion of a hydraulic model of Gunbower Forest
Commenced concept design and supply capacity investigations for the option to deliver water to Gunbower Forest via National Channel, Gunbower Creek and Hipwells Road channel
Progressed concept designs for regulators to water Black Swamp, Reedy Lagoon and Yarran wetlands at Gunbower
Koondrook Flood Enhancement Project — completion and approval of the investment proposal and commencement of detailed design and environmental assessment
Hattah Lakes
Significant progress on concept designs for regulators, levees and pumping station
Completed flora and fauna assessment
Significant progress on cultural heritage management plan
Chowilla Floodplain and Lindsay and Wallpolla Islands
Near-completion of detailed design for the Chowilla Creek Environmental Regulator and Pipeclay and Slaney Creek weir upgrades
Further development of operating strategies to manage risks associated with operation of the regulator, including salinity and potential impacts on native fish
Near-completion of detailed design of a suite of works to water Mulcra Island, including the construction of a regulator on Potterwalkagee Creek
Completion and approval of the cultural heritage management plan for the Mulcra Island project
Preparation of a construction proposal for the Mulcra Island project
Concept designs for replacement of the Mullaroo Creek weir and associated structures on the Upper Lindsay River

(*continued*)

Table 2.4 Environmental Works and Measures Program achievements and outcomes, 2008–09 (continued)

Lower Lakes, Coorong and Murray Mouth
Completed detailed design and near completion of construction of a vertical slot fishway to allow passage of small-bodied fish at Tauwitchere Barrage
Feasibility investigations for works to reconnect local surface water catchments with the southern lagoon of the Coorong
Completion of surface water monitoring stations in the Coorong to enable real-time monitoring and adaptive management of future flow releases from the barrages into the Coorong
River Murray Channel
Near-completion of a fishway at Lock 3
Commenced construction of a fishway at Lock 6
Commenced detailed design of fishways on the Edward River at Stephens Weir and the Edward River Offtake Regulator
Completed concept designs for fishways at Locks 11 (Mildura) and 15 (Euston)
Approval of construction for five secondary regulating structures along the River Murray in South Australia to enable enhanced weir pool manipulation
Completion of Stage 4 of the Hume to Yarrawonga resnagging program to restore habitat for native fish

Indigenous Partnerships Program

Background

The Indigenous Partnerships Program engages Indigenous people in The Living Murray program in a way that ensures their social, spiritual, cultural, environmental and economic interests are included in planning and management of the icon sites.

A memorandum of understanding between the former MDBC and the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) provides a meaningful basis for engaging Indigenous people at a strategic level in The Living Murray program. MDBA funds and supports MLDRIN.

Highlights

- The Murray Lower Darling Rivers Indigenous Nations (MLDRIN) celebrated their 10th anniversary of engagement in natural resource management activities.
- Implementation of use and occupancy mapping progressed, including training and study to identify how the tool can be used in natural resource management.
- Support for Indigenous engagement at icon sites was enhanced, with facilitators now working at all sites.

The Murray Lower Darling Rivers Indigenous Nations (MLDRIN) celebrated their 10th anniversary with a festival in Echuca in December 2008 that included a symposium on Indigenous interests in water, cultural displays, and a dinner attended by Indigenous people from all along the River Murray.

The Living Murray Indigenous Partnerships Program continued to work closely with MLDRIN in the introduction of use and occupancy mapping and the exploration of the concept of 'cultural flows' as a potential outcome of Indigenous engagement in water management.

Following on from the successful Yorta Yorta Pilot use and occupancy mapping project undertaken in early 2008, a study tour was organised with members of the Yorta Yorta leadership group to help them develop skills in utilising the knowledge gained through the use and occupancy mapping process. The group met with Canadian First Nation leaders to gain insights regarding the application of this knowledge and other research in natural resource management contexts.

Training in data collection for use and occupancy mapping was undertaken with four Living Murray Indigenous facilitators and 10 Indigenous community members. This is the first time in Australia that this type of training has been undertaken.

Six Indigenous facilitators are now working with their respective Indigenous communities at each of the icon sites.

Definition: use and occupancy mapping

Use and occupancy mapping is a survey method for documenting Indigenous peoples' contemporary use of land and water; it is a tool for developing planning and management strategies based on Indigenous peoples' social, cultural and environmental relationships to those areas of usage. The Canadian-devised method has been jointly adopted here in Australia for the first time by MLDRIN and MDBA.

Communications and Consultation Program

Background

The Living Murray's Communications and Consultation Program aims to:

- ensure that individuals and groups have an opportunity to provide input into decisions affecting them
- ensure that all relevant information and a diversity of views are considered in the decision-making process
- increase awareness and understanding of and support for The Living Murray Initiative.

Highlights

- Consultation between The Living Murray program and the community progressed through the Community Reference Group.
- The engagement of three state-based communications coordinators resulted in an increased focus on informing and consulting with communities.
- A variety of communication materials, including a DVD and The Living Murray pages on MDBA's new website, were created to increase awareness and understanding of The Living Murray.

The Living Murray Community Reference Group is an important part of The Living Murray's consultation program. The group comprises 29 members (and a Chair) who represent a range of interests and regions relating to the Murray–Darling system and the six icon sites. These members are an important point of contact for The Living Murray program, providing advice on the River Murray Channel Significant Ecological Asset Environmental Management Plan and on The Living Murray Environmental Watering Plan, and seeking out the views of a wide range of interests within affected communities.

The Living Murray Community Reference Group met twice during 2008–09. The first meeting was held in Albury in September 2008 and the second in Canberra in May 2009.

In addition to the activities of the Community Reference Group, state-based communication coordinators were engaged in New South Wales, South Australia and Victoria. The role of the coordinators is to provide additional communication and consultation support for The Living Murray partners, and their work has resulted in an increased focus on informing and consulting with communities on The Living Murray program.

Awareness, understanding of and support for The Living Murray were furthered through new communication materials. Twenty-one publications were developed on a range of issues. These included various products on the purchase of water by The Living Murray and a fact sheet on environmental watering activities during 2007–08. Most publications are available on The Living Murray pages of the MDBA website (at <http://www.mdba.gov.au/programs/tlm>), which were launched in February 2009.

A *Gunbower–Koondrook–Perricoota Storylines* DVD was completed in partnership with Environment Victoria. The DVD highlights the importance of this forest to the community and increased community awareness of the issues at this icon site.

Chapter 2

MDBC Strategic Plan 2005–2010, Strategy 1.2: Improve management of, and compliance with, the Cap on water diversions

Managing the Cap on water diversions

Definition: the Cap

The Cap refers to a cap on diversions of surface water from the Murray–Darling Basin. It was established in 1995 to limit future increases in such diversions.

It is seen as an essential first step in establishing management systems to achieve healthy rivers and sustainable water use.

The Cap varies from year to year, depending on inflow. Its main objectives are:

- to enhance the riverine environment by maintaining and, where appropriate, improving existing flows in MDB waterways
- to achieve sustainable water consumption by developing and managing Basin water resources to meet ecological, commercial and social needs.

The Cap promotes sustainable use of Basin resources by:

- preserving the existing security of supply for river valleys
- helping maintain water quality
- encouraging efficient use of water, which reduces waterlogging and land salinisation
- preventing further deterioration of the flow regime for the environment.

The Cap will be replaced by sustainable diversion limits under the Basin Plan (see page 7).

Background

The Murray–Darling Basin Authority (MDBA) is responsible for managing the implementation of the Cap on water diversions for each river valley in the Basin as set by Schedule E to the Murray–Darling Basin Agreement. The annual Cap target in each valley is calculated by a Cap model approved by the Murray–Darling Basin Authority.

MDBA's responsibilities include arranging for the audit of compliance with the Cap by the Independent Audit Group; and preparing and publishing the annual Water Audit Monitoring Report using information provided by the states/territories.

Highlights

- The Cap audit for 2007–08 (conducted and reported in 2008–09) found that in all valleys where a Cap applies, except for the combined Barwon–Darling – Lower Darling valley in New South Wales, diversions were within acceptable bounds.
- The Cap for the Queensland Border Rivers was finalised.
- Out of 18 models requiring approval, eight have been approved and seven are being audited.
- A report on environmental water was published for the first time in the Water Audit Monitoring Report.

The Cap has kept the aggregate level of water extractions in the Basin below the level of extraction in 1993–94 (see Figure 2.2).

The key findings of the Independent Audit Group Cap audit for 2007–08 (conducted and reported in 2008–09) were:

- Diversions of 4,514 GL from rivers in the Murray–Darling Basin were the lowest since 1983–84, reflecting worsening drought conditions and the onset of climate change throughout most of the Basin.
- Diversions in all Cap valleys in South Australia and Victoria were within acceptable bounds for Cap management.

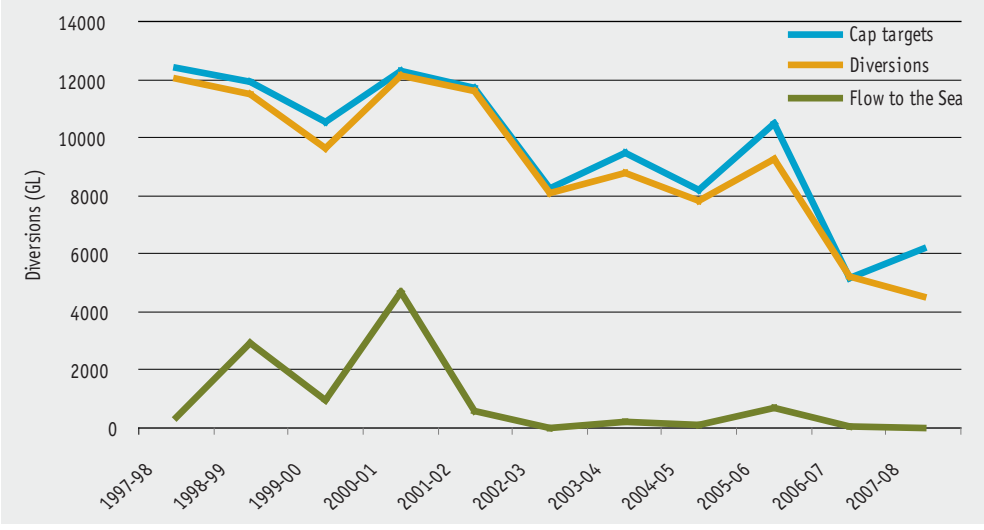


Figure 2.2 Annual diversions against annual Cap targets, 1997–98 to 2007–08. Flow to the sea is also shown. The overall decline in flow to the sea, and the lowering of Cap targets and consequent reduction of diversions, are the result of decreased inflows into rivers and decreased water availability.

- In New South Wales, diversions in the combined Barwon–Darling – lower Darling valley exceeded the Cap. As a consequence, MDBA declared a Cap breach in the valley. As required by Schedule E of the MDB Agreement, NSW reported to the Ministerial Council in June 2009 on the Cap breach. NSW will report to the next Council meeting on the reasons for the breach and remedial measures, including the time needed to fix the breach.
- The Cap for the New South Wales Border Rivers is expected to be finalised in 2009.
- Diversions were within acceptable bounds for Cap management for all other New South Wales valleys where the Cap has been defined.
- In Queensland, the Cap has been set for the Border Rivers, Warrego, Paroo, Nebine and the Moonie catchments. The Border Rivers Cap applies from 2008–09. A Cap proposal for the Condamine–Balonne system is expected within six months of the finalisation of its Resource Operation Plan, which is currently subject to a judicial review.
- Also in Queensland, the Warrego, Paroo, Nebine and Moonie valleys were found to be within Cap.
- In the absence of a Cap model, the Australian Capital Territory Cap could not be audited.

Accreditation of Cap models progressed significantly in 2008–09. Of 24 Cap valleys in the Basin, Caps have not been defined in three valleys, and three other valleys currently do not require a Cap model. Of the remaining 18 Cap valleys, Cap models have been approved for eight, seven are currently being audited, and two — Victoria's Wimmera–Mallee and Queensland's Border Rivers — are ready for audit. Significant progress has also been made towards developing the Cap model for the Australian Capital Territory.

In 2008, Ministerial Council adopted a protocol under Schedule E for adjusting Caps for environmental entitlements and uses. This protocol requires MDBA to report in the annual Water Audit Monitoring Report on environmental entitlements created, allocations for environmental use, trade in environmental entitlements and allocations, and Cap adjustments for environmental use. MDBA published, for the first time, a report on environmental water in the Water Audit Monitoring Report 2007–08. This highlights that:

- total water available for environmental use was 95 GL
- total environmental use was 41 GL
- total net consumptive environmental use was 20 GL
- the Cap adjustment for environmental use was 44 GL.

MDBC Strategic Plan 2005–2010, Strategy 1.3: Coordinate the implementation of the Basin Salinity Management Strategy

Managing salinity

Background

Salinity has been recognised as a significant problem in the Murray–Darling Basin for many decades. The Murray–Darling Basin Authority (MDBA) manages the Basin Salinity Management Strategy (BSMS), a key element of which is accountability for in-river salinity impacts of new land and water management actions.

The target for river salinity and salt loads in the Murray and major tributary valleys is less than 800 EC* for 95% of the time at Morgan, South Australia.

EC: Electrical conductivity unit commonly used to indicate the salinity of water (1 EC = 1 microsiemens per centimetre, measured at 25 °C).

Highlights

- Peak salinity at Morgan, South Australia remained below 800 EC.
- Salt interception schemes diverted approximately 450,000 tonnes of salt away from the river system in 2008–09.
- All partner governments have remained in net credit on the salinity registers.

Definition: salinity registers

The salinity registers are a salinity-based accounting system underpinning the Basin Salinity Management Strategy. The system provides an accounting record of states' actions that affect river salinity.

Table 2.5 summarises salinity levels recorded at Morgan, South Australia, over four time intervals to June 2009: 1, 5, 10 and 25 years. The comparison shows a long-term reduction of peak salinity. This decline in salinity reflects the combined effects of reduced salt mobilisation into the river due to the cumulative benefits of salinity mitigation works and measures, and drought.

Eighteen salt interception schemes intercept saline groundwater and drainage flows before they reach the River Murray and its tributaries (Figure 2.3). Of these, five are state-owned schemes. Currently, the non-state schemes divert approximately 450,000 tonnes of salt away from the River Murray each year (Table 2.6), offsetting predicted increases in average salinity by 71 EC by the year 2011 at Morgan.

Table 2.5 Summary of salinity levels recorded at Morgan, South Australia

	Time interval	Average	Median	Peak	% time > 800 EC*
1 year	July 2008 – June 2009	489	468	624	0%
5 years	July 2004 – June 2009	433	429	785	0%
10 years	July 1999 – June 2009	466	451	826	0%
25 years	July 1984 – June 2009	537	513	1,220	7%

*Correct to the nearest whole number.

During 2008–09:

- At the Loxton Salt Interception Scheme, the Thieles, Rillis and Caravan Park floodplain borefields were formally commissioned and the salinity benefits included in the salinity registers.
- The full borefield for the Pyramid Creek scheme is now operational and it is expected that the full scheme will be formally commissioned during 2009–10.
- Contracts have been let for the supply of materials and services required for construction of the Murtho Salt Interception Scheme.
- Construction of the Waikerie 2L scheme is now finalised and it is planned to formally commission the works early in 2009–10.

1 Waikerie	7. Bookpurnong	13. Mildura – Merbein
2. Waikerie 2L	8. Murtho	14. Lake Hawthorn
3. Sunlands – Qualco	9. Rufus River	15. Psyche Bend
4. Woolpunda	10. Upper Darling	16. Mallee Cliffs
5. Noora	11. Curlwaa	17. Barr Creek
6. Loxton	12. Buronga	18. Pyramid Creek

Figure 2.3 Salt interception schemes in the Murray–Darling Basin

Table 2.6 Joint salt interception scheme performance reporting, 2008–09

Salt interception scheme	Volume pumped (ML)	Salt load diverted (tonnes)	Average salinity (EC)	Target achieved (% of time)	Power consumption (kWh) Totals
Pyramid Creek	943	26,632	41,532	100%	123,922
Barr Creek	94	1,313	15,080	100%	3,095
Mildura–Merbein	1,567	46,520	41,046	68%	82,175
Mallee Cliffs	2,216	72,390	51,042	85%	683,781
Buronga	2,590	75,490	45,542	89%	516,950
Bookpurnong	1,407	35,019	22,771	100%	602,749
Loxton	1,466	35,374	38,433	100%	518,343
Woolpunda	5,221	95,886	30,000	98%	4,226,197
Waikerie	3,191	49,685	25,800	96%	1,268,550
Rufus River					
Line 1	301	2,077	6,943	100%	11,675
Line 2	135	5,117	56,915	98%	30,157
Line 3	64	3,034	68,762	100%	31,681
Line 4	45	1,540	52,381	100%	25,786
Minor Pump Station	0	0	200,000	100%	0
Major Pump Station	388	6,906		100%	1,410
Total Rufus River groundwater diversion	933	18,674	77,000		

Under the terms of the BSMS, each salinity register entry is reviewed every five years. These reviews cover recent actions with a significant salinity impact as well as the salinity impacts from tributary valleys that arise from major land and water use decisions of the past.

For example, actions such as new irrigation developments can generate a debit on the registers because in some areas they may produce increased salt loads to the River Murray. By comparison, actions such as investing in infrastructure (e.g. salt interception schemes) or improved irrigation practices can generate a credit.

Annually, each state/territory provides information to MDBA on activities with significant salinity effects for the year. MDBA calculates the salinity cost of these activities and updates the salinity registers for independent review by salinity auditors. In November 2008, the independent auditors confirmed that all contracting governments remained in net credit on the salinity register in 2007–08.

Chapter 2

MDBC Strategic Plan 2005–2010, Strategy 1.4: Monitor and report on the health of the Basin's water and natural resources to inform better decision making

Monitoring Basin health

Sustainable Rivers Audit

Background

The Sustainable Rivers Audit (SRA) provides a long-term assessment of the condition and health of the Basin's 23 river valleys. Assessments are based on indicators from five environmental themes — fish, macroinvertebrates, hydrology, vegetation and physical form. Data collection is undertaken using scientific methods applied consistently across the Basin. An independent panel of scientists prepares the river health assessment every three years, with the next report due in 2011.

The data collected by the SRA is a key input to the Basin Plan and other programs of the Murray–Darling Basin Authority (MDBA). SRA indicators are being used to evaluate the ecosystem stress for different hydrology scenarios. As well, the data and experience from the SRA are informing the development of the Basin Plan's monitoring and evaluation framework.

Highlights

- The Sustainable Rivers Audit has completed five years of data collection across the Basin; in total, 82,060 fish and 294,308 macroinvertebrates have been sampled from more than 1,000 sites, and hydrological data from nearly 500 sites.
- Expected species lists or reference conditions for all themes across the Basin have been modelled or constructed, with innovative approaches for macroinvertebrates and physical form developed in 2008–09.
- Data from the first four years of monitoring is publicly available and data from the fifth year will become available in late 2009. Reports are available on the archived MDBC website (at <http://www.mdbc.gov.au/SRA/river_health_check_-_sra_report_one>).

The Sustainable Rivers Audit has generated the largest set of Basin-wide ecological data (see the highlights above), with substantial immediate and long-term value. It is designed and managed as a long-term data collection program, quite independent of its immediate value in reporting on river health across the Basin.

The *SRA report 1* was the first Basin-wide assessment of river health, based on data collected from 2004 through 2007 on three environmental themes, namely fish, macroinvertebrates and hydrology. Since its launch in June 2008, *SRA report 1* has been

widely distributed through the Internet and in hard copy (over 1,000 hard copies have been distributed). It remains the definitive assessment of the health of the Basin's rivers and is frequently referred to.

The data collected by the Sustainable Rivers Audit increases each year, and in 2008–09 it has been extensively used by MDBA programs, the National Water Commission, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), state agencies and university researchers, among others. For example, it has been used by the NSW State of the Catchments and State of the Environment reporting; in reporting for the Victorian Index of Stream Condition; and in testing of the National Water Commission's Framework for Assessment of Rivers and Wetland Health. Both New South Wales and Victoria have expanded the audit methods to coastal regions.

River Murray Water Quality Monitoring Program

Background

The River Murray Water Quality Monitoring Program addresses MDBA's responsibilities under Part VII of the Murray–Darling Basin Agreement. The program samples and analyses water quality from 35 sites along the River Murray and the lower ends of its major tributaries. The results are used to assess overall water quality and the potential impact of floodplain development proposals on water quality.

Highlights

- Emergency assistance was provided in determining the extent of the autumn algal blooms along the Murray.
- The Blue-green Algal Bloom Advisory Panel was convened and support provided.
- In total 85 floodplain development proposals were assessed for their potential to affect the quality of the River Murray.

During March 2009, algal blooms developed to red alert levels along the River Murray, initially between Hume Dam and Torrumbarry Weir (a distance of 587 km along the river). MDBA used aerial reconnaissance and survey to collect digital still and video footage along the Murray, confirming the extent and continuity of the bloom within 24 hours. This method added significantly to field sampling and supported rapid response.

MDBA assessed possible mitigation options using revised river operation procedures but, due to reduced water availability, there was no potential to increase flows to disperse the bloom without jeopardising water supply for essential needs in 2009–10. New South Wales and Victoria enacted treatment processes to protect water supplies pending the decline of the bloom with the onset of cooler weather.

During April 2009, further algal blooms developed along the Murray as far downstream as Tooleybuc in the Edward River and in the Murray around Euston. By this stage some 800 km of the Murray was under red alert. A second aerial survey was flown in April to trace the extent of the bloom and support accurate public safety alerts. Red alerts were progressively lifted as the bloom receded through April and May.

On 9 April 2009, the Minister for Climate Change and Water established a Blue-green Algal Bloom Advisory Panel to provide expert advice and ensure coordinated Basin-wide responses. The panel met in both April and May, recommending the harmonisation of state responses and consistent approaches to communication. The panel commented that the actions by New South Wales in managing the Murray bloom were exemplary.

MDBA continued to provide responses to a large number of proposed development applications along the Murray floodplain under clause 49 of the Murray–Darling Basin Agreement. Eighty-five proposals were assessed during the year. Assessments are based on the Ministerial Council's stated policy of maintaining or improving water quality.

Algal bloom forming in Lake Mulwala at Yarrawonga. The bloom is the lighter green area extending from the river bank in the centre of the photo.

Northern Basin Program

Background

The aim of the Northern Basin Program has been to improve understanding and management of the Darling River, its tributaries and their floodplains and wetlands, with a focus on socioeconomic, ecological and hydrological issues across the northern Murray–Darling Basin. Its role was to coordinate and communicate MDBA initiatives in the northern Murray–Darling Basin region.

When MDBA subsumed MDBC and its functions, the activities undertaken by the Northern Basin Program were absorbed into a number of new functional areas, including the Basin Plan (see page 3), stakeholder engagement (see page 17) and natural resource management programs (pages 19–50).

Evaluation of the Narran Lakes Environmental Water Purchase

As part of the agreement in March 2008 to purchase environmental water for the Narran Lakes, the former MDBC requested an evaluation of the purchase. The final report of this evaluation was completed by MDBA in June 2009 (see <http://www.mdba.gov.au/files/publications/Options-for-environmental-water.pdf>). The water purchase was found to be a success, supplying water to the area where waterbirds were breeding; by the end of the breeding event, close to 50,000 young birds had fledged.

Water trade in the northern Murray–Darling Basin

In the northern regions of the Murray–Darling Basin, water trading and water resource management generally are vastly different from those in the southern regions of the Basin. In collaboration with the Water Trade Program (see page 66), a project on water trade in the northern Basin scoped the key issues concerning water resource governance, management and trade to provide advice and direction for further research towards policy/program options and institutional design options.

MDBC Strategic Plan 2005–2010, Strategy 1.5: Develop policy options to respond to demonstrated risks of significance to shared water resources, including integrated use of surface and groundwater

Developing options to respond to risks

Risks to Shared Water Resources Program

Background

In 2004, the Murray–Darling Basin Ministerial Council noted the emergence of a number of activities and processes that could present a risk to the shared water resources of the Murray–Darling Basin. The following six hazards were identified:

- climate change
- increased farm dam development
- increased groundwater extraction
- afforestation (in particular, plantation forestry)
- bushfire impacts on catchments
- reduced irrigation return flows due to improved irrigation efficiencies.

In response to this, the Risks to Shared Water Resources program was established to develop and implement, in partnership with Murray–Darling Basin states/territories, a strategic response to the six identified hazards and any future identified hazards. The Murray–Darling Basin Risks Strategy was approved by the Murray–Darling Basin Ministerial Council in December 2007.

Highlights

- Methods and guidelines were developed to consistently assess risks across the Murray–Darling Basin, building on the 2007 assessment methods.
- Basin states/territories produced risk assessments of all six hazards, based on revised methods and the results of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Murray–Darling Basin Sustainable Yields Project.
- Several technical reports were published on the impacts of groundwater extraction and bushfires, and the mapping of human-made water bodies.

During 2008–09, the Risks to Shared Water Resources Program focused on improving the methods for assessing risks across the Basin and improving knowledge about the six hazards.

A comprehensive Risk Assessment Guideline was developed in close consultation with Basin states/territories, for use by jurisdictions in undertaking their 2008 risk assessments. The guideline built on the preliminary risk assessments completed in 2007, and was aimed at: improving the comparability of risk assessments across jurisdictions; incorporating assessment of climate change and bushfire hazards; assessing risk at several scales; and drawing on the result of the CSIRO Murray–Darling Basin Sustainable Yields Project.

The risk assessments carried out to date indicate the following:

- The risks are complex and their impacts vary across the Basin. We need to better understand interactions, cumulative impacts, and uncertainty about the risk factors and effectiveness of current actions.
- Risks are being managed to some degree by the jurisdictions, and there is potential to build on existing actions for improved risk management. There are considerable information gaps that need to be filled before the effectiveness of management can be determined.
- Jurisdictions already have some mechanisms in place to manage many of the risks.
- Climate change has been identified as having probably the greatest future impact on water availability in the Basin.
- Of the risks that can be actively managed by the jurisdictions, growth in farm dams and groundwater extraction have been identified as high priorities for action.

The Risks to Shared Water Resources Program recognised the importance of improving knowledge of the risk factors and commissioned a number of projects to address this. Several technical reports were published during 2008–09 (see <http://www.mdbc.gov.au/nrm/Risks_to_Shared_Water_Resource>), including:

- a report on human-made water bodies, including farm dams
- a report on the estimated impact of groundwater extraction on streamflow
- a series of reports examining the impacts of the 2003 bushfires in eastern Victoria on water yield and water quality.

The Risks to Shared Water Resources Program has identified a series of additional projects aimed at filling strategic and specific knowledge and information gaps. When completed, the results of these investigations will further inform future risk assessments.

Provisions of the *Water Act 2007* (Cwlth) and transition to the Murray–Darling Basin Authority have altered the context and direction of the Risks to Shared Water Resources Program. The Water Act includes in the mandatory content of the Basin Plan a requirement to identify risks to the condition and continued availability of the Basin water resources, as well as strategies to manage the risks. This will include a broader consideration of risks not limited to the six hazards that were the focus of the Risks to Shared Water Resources program (see pages 11–12).

MDBC Strategic Plan 2005–2010, Strategy 1.6: Coordinate the implementation of the Native Fish Strategy

Restoring native fish populations

Background

Native fish populations are estimated to be at only 10% of pre-European settlement levels; they continue to be threatened by flow regulation, habitat degradation, reduced water quality, barriers to fish movement and alien fish species.

The aim of the Native Fish Strategy is to return native fish populations to 60% of estimated pre-European settlement levels by 2050.

Highlights

- Construction at Lock 3 of the first new 'dual type' fishway, consisting of a vertical slot fishway to pass larger species, and a 'lock' to enable the movement of small-bodied fish, neared completion.
- An independent five-year review of the Native Fish Strategy found that the strategy has been successful.
- Emergency rescues of several endangered fish species in South Australia, New South Wales and Victoria were undertaken in response to extreme drought and bushfire conditions.
- A highly successful Native Fish Awareness Week, held in northern New South Wales and south-east Queensland, showcased local community achievements.

Native Fish Awareness Week: students from Moree Primary School learning about fish habitat and behaviour by making catfish nests.

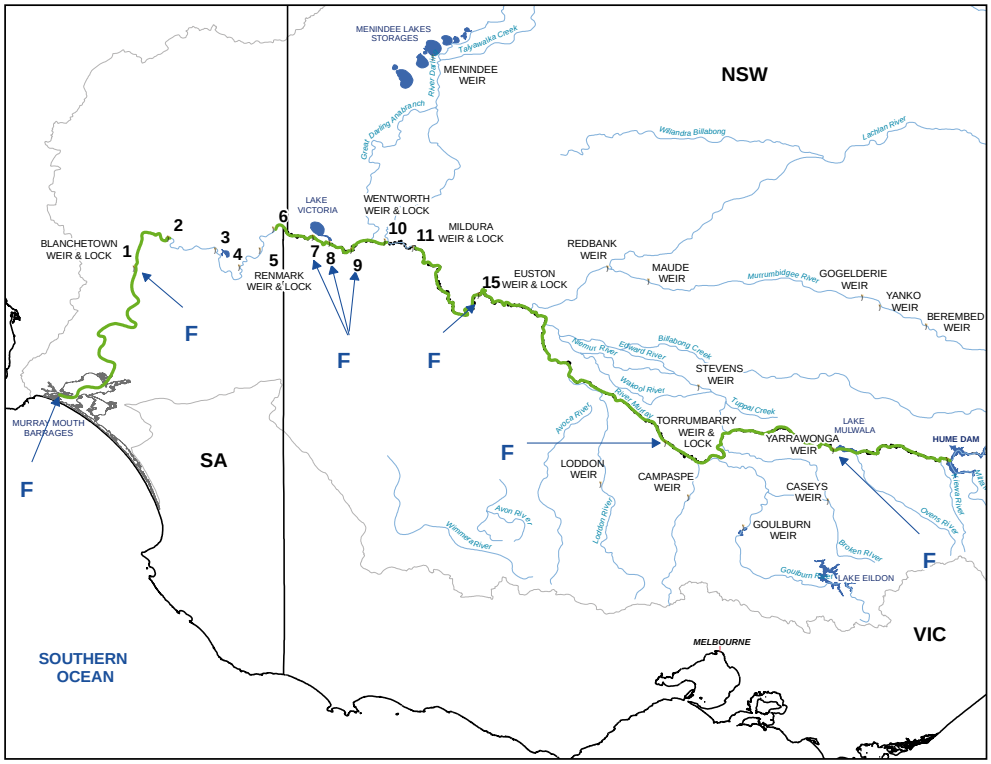


Figure 2.4 Progress on providing fish passage as part of the Sea to Hume program at the end of 2008–09. The green line shows the length of the River Murray open to fish passage. 'F' marks the locations of the fishways.

The 'Sea to Hume' program is restoring fish passage along the River Murray from the sea upstream to Hume Dam — a distance of 2,225 km. The program, which started in 2001, will be completed by June 2011. Figure 2.4 shows the progress made on the program. (For additional information, see page 76.)

The new fishway at Lock 3, which is the first of a new design incorporating a 1:18 gradient vertical-slot-type plus a fish 'lock', was close to completion by the end of June 2009. As a result of this fishway, approximately 2,100 km of the river will have been opened to fish passage by August 2009. Construction of a similar 'dual type' design started at Lock 6 in June 2009. At the barrages, construction of a vertical slot fishway for small-bodied fish at Tauwitchere Barrage (near Pelican Point) began in 2009.

An independent five-year review of the Native Fish Strategy was completed in 2009. The review found that the strategy has been successful in raising awareness and garnering support for the management of native fish across the Basin. In particular, the review recommended that the objectives and targets of the Native Fish Strategy should be aligned with the Basin Plan.

Barred galaxia. Inset: Following the bushfires in early 2009, Victorian Department of Sustainability and Environment staff rescue barred galaxias from burnt creek habitats in the upper Goulburn catchment.

Extended drought across the southern Basin and extreme bushfires in Victoria saw an unprecedented demand on emergency interventions this year. During one week in early March, the Murray–Darling Basin Authority (MDBA) received applications for emergency funding from New South Wales, South Australia and Victoria. For example:

- Hundreds of endangered native fish in Victorian streams were rescued from areas affected by the 2009 bushfires, where ash and sediment posed a risk to water quality. In a rescue jointly funded by the Victorian Government and MDBA, 394 barred galaxias and 35 Macquarie perch were taken into 'temporary captive maintenance' after much of their primary habitat was burnt. The rescued fish were moved to safe refuges at Heidelberg and Snobs Creek until stream conditions recover.
- By early 2009, the Wakool River system in New South Wales had dried to a series of disconnected pools. Deoxygenation, probably the result of high ambient temperatures, triggered a significant fish kill in Colligen Creek and a smaller kill in the Merran. Assisted by MDBA funding, NSW Department of Primary Industries staff and local landholders captured 105 Murray cod, 20 golden perch and 9 silver perch from the remnant pools in Merran Creek and transported them to larger refuge waterholes in the nearby Wakool River.

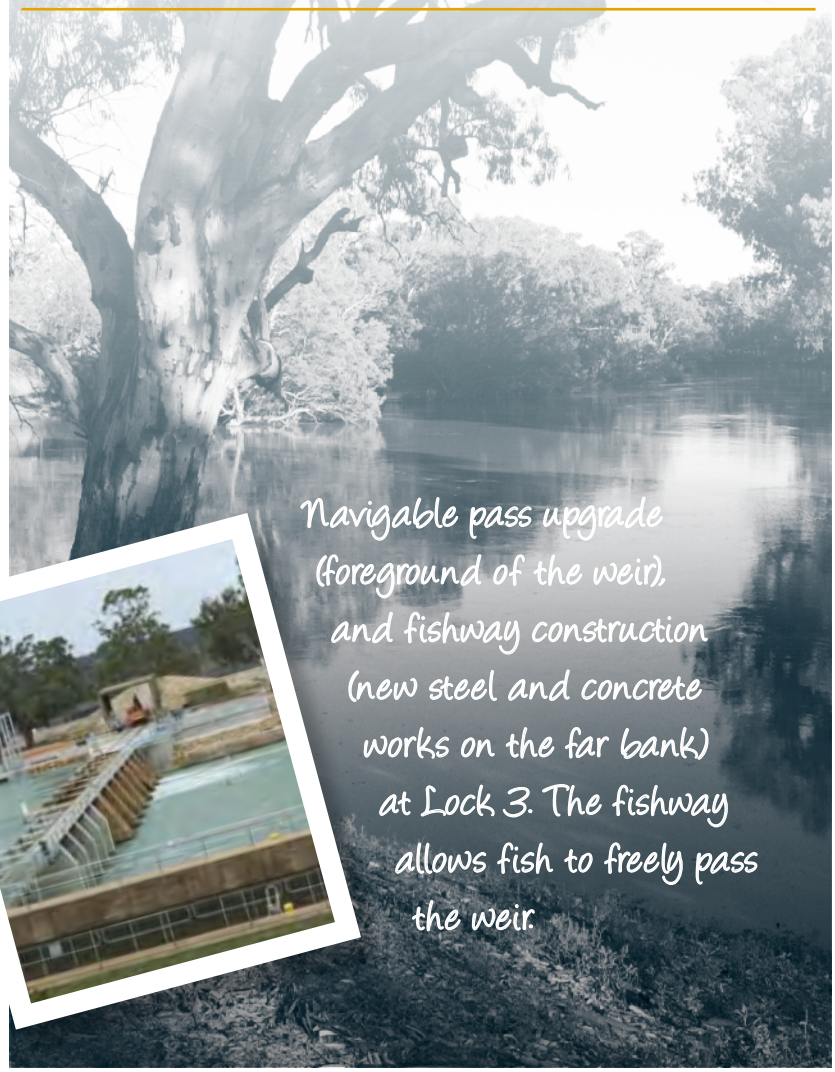
As part of Native Fish Awareness Week, a week-long tour was held throughout south-east Queensland and northern New South Wales to engage on native fish issues with a wide variety of groups. These included four school visits, one Indigenous community meeting, two recreational angler events, one local government meeting, four landholder visits and two evening community forums.

Recognising local community achievements that progress native fish management goals was a key focus of the week, and many local groups from Toowoomba to Tamworth had the opportunity to showcase their efforts to representatives from around the Basin.

Chapter 3

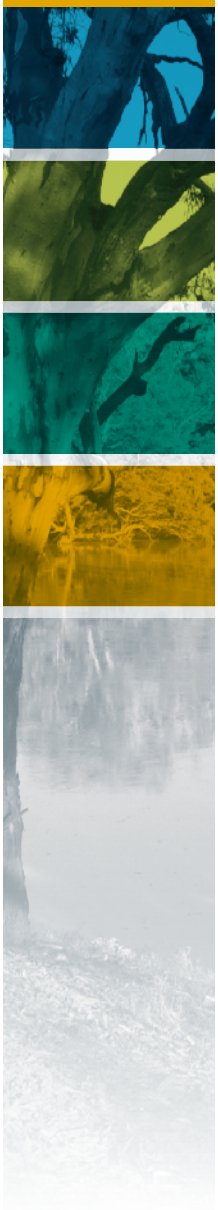
Delivering water efficiently and equitably

MDBC Strategic Plan 2005–2010, Objective 2: Efficient and equitable delivery of water for productive and sustainable domestic consumption, environmental benefit and economic use



Navigable pass upgrade (foreground of the weir), and fishway construction (new steel and concrete works on the far bank) at Lock 3. The fishway allows fish to freely pass the weir.

Chapter 3



Overview

No other drought on the historical record comes close to the severity of the current drought. In another extremely dry year, keeping the River Murray running and delivering essential water have been a major achievement. Many challenges have arisen and been met in the sharing of the Murray waters between New South Wales, Victoria and South Australia, and in the day-to-day operation of the river system.

Special water sharing arrangements were again agreed between partner governments to safeguard the supply of water for critical human needs and to optimise water availability throughout the season. The accounting of these special sharing arrangements was independently reviewed to confirm state water entitlements.

The volume of water traded set new records during the year and proved critical to buyers and sellers alike in ameliorating the impacts of another extremely dry year.

Asset management is a fundamental part of water delivery. The many assets covered by the Murray–Darling Basin Agreement include large dams, weirs and other infrastructure, such as the crucial salt interception schemes.

With the merging of the functions of the former Murray–Darling Basin Commission into the Murray–Darling Basin Authority (MDBA), two significant actions were required in relation to the management of these assets:

- preparation of an Asset Agreement, which was signed by the partner governments and MDBA at the Ministerial Council meeting on 12 June 2009
- preparation of an Asset Management Plan. At 30 June 2009, good progress had been made by the state constructing authorities (SCAs) and MDBA on drawing up a plan, with the intention of finalising Version 1 in 2009.

Major dam safety projects have been advanced at Hume Dam, Dartmouth Dam and Lake Victoria storage. Major maintenance and renewals projects have been undertaken at other locations, such as Menindee Lakes, Yarrawonga Weir and the Murray Mouth barrages.

The navigable pass upgrade of the locks and weirs (and associated fishway construction) made significant gains. Completion of these works in 2011 will not only achieve the goal of upgrading the occupational health and safety standards at the locks and weirs but will also fulfil a major goal of The Living Murray program: giving native fish free access to the entire length of the Murray from the sea up to Hume Dam, a distance of 2,225 km.

MDBC Strategic Plan 2005–2010, Strategy 2.1: Deliver agreed water shares in the River Murray

Delivering agreed water shares

Background

The following key actions are undertaken to deliver agreed water shares in the River Murray system to the states, including in extreme conditions:

- regularly assess the water resources of the River Murray system to determine the volume of water available to each state
- operate structures under MDBA's control, and determine and review procedures for efficient and effective operation
- establish, operate and maintain a system of continuous monitoring of the volumes of stored water, and of flows in the River Murray and from its tributaries
- liaise with state and federal authorities on matters related to the River Murray system to provide an up-to-date and comprehensive flow of information.

Highlights

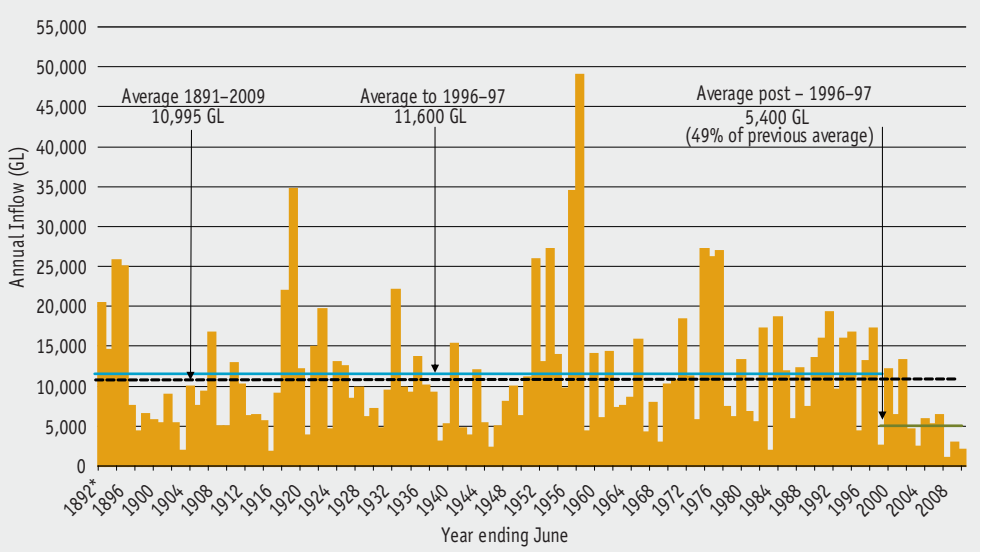
- Sustaining Murray flows and delivering essential water requirements throughout the entire season was again a real achievement in 2008–09, given the continuing extreme drought.
- In response to extremely low water availability, special water sharing arrangements were adopted and a series of drought contingency measures implemented to improve water availability.
- MDBA continued to supply and refine forecasts of water availability and to provide the systems for assessing options for special water sharing arrangements.
- Water trade proved critical in mitigating the impacts of severe drought; very large volumes of water were traded, in particular from the Murrumbidgee Valley.

Low water availability

Climate change and drought, or climate variability, have resulted in below-average rainfall in much of the Murray–Darling Basin and below-average inflows into the River Murray system over the past decade. No other drought on the historical record comes close to the severity of the current situation (see Figure 3.1).

Based on the lessons learned from these extremely dry conditions, a new framework has been established in the *Water Act 2007* (Cwlth) and the Murray–Darling Basin Agreement to provide for critical human water needs in very dry periods.

In early 2009, work began on the Basin Plan provisions relating to water for critical human needs (see page 10). At the same time, work began on a new schedule to the Murray–Darling Basin Agreement for Water Sharing. The new schedule will replace, for the long term, the interim water sharing arrangements that were agreed for the extremely dry conditions experienced in 2007–08 and 2008–09. It will specify water sharing arrangements as well as accounting and operational rules that are required to adapt to extremely dry conditions.



Note: Total includes Darling inflows but excludes Snowy Scheme releases.

*Year ending 30 June 1892.

Figure 3.1 River Murray system annual inflows from July 1891 to June 2009

Rainfall and inflows

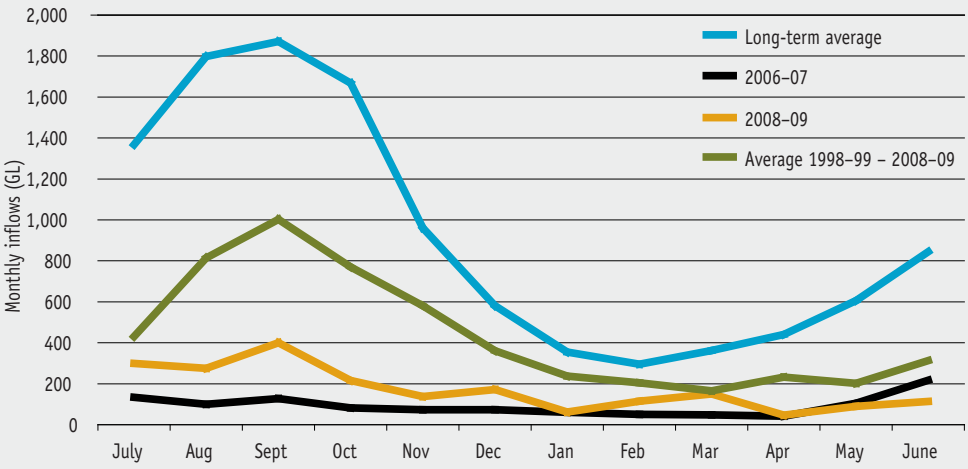
Rainfall was below average in 2008–09 for the southern Basin, which follows a longer term trend of severe rainfall deficits over the last 5 to 10 years. Above-average rainfalls were seen in November and December; however, January saw a return to hot and dry conditions and to longer term rain deficits, particularly across the higher yielding catchments of the Victorian Alps and Snowy Mountains.

In May there was very heavy rainfall (up to 400 mm) along the coast of south-east Queensland and northern New South Wales. This caused major flooding in coastal rivers; however, further inland the rainfall was less intense, although some areas in the northern Murray–Darling Basin received over 100 mm. The only significant streamflow responses were in the Moonie River in southern Queensland and the upper tributaries of the Border Rivers, but the total volume of water was very small. River transmission losses were high as water dissipated along complex anabranch systems, and only around 30 GL reached Menindee Lakes.

In 2008–09, total inflows to the River Murray system (excluding Snowy Scheme releases) were 2,075 GL. This is the third lowest inflow in the 118 years of records (see Figure 3.1) and only 19% of the long-term average of 10,995 GL.

The 2008–09 year was preceded by two years of very low inflows, and the combined three-year total of 6,115 GL is by far the lowest on record and almost half the previous historic minimum of 11,180 GL in the years 1943 to 1946. Monthly inflows through 2008–09 remained well below long-term monthly averages as well as averages for the last 10 years (see Figure 3.2).

River Murray system inflows have been below average for nine out of the last ten years. It will take a sustained period of above-average rainfall for river system inflows to recover to levels approaching the long-term average.



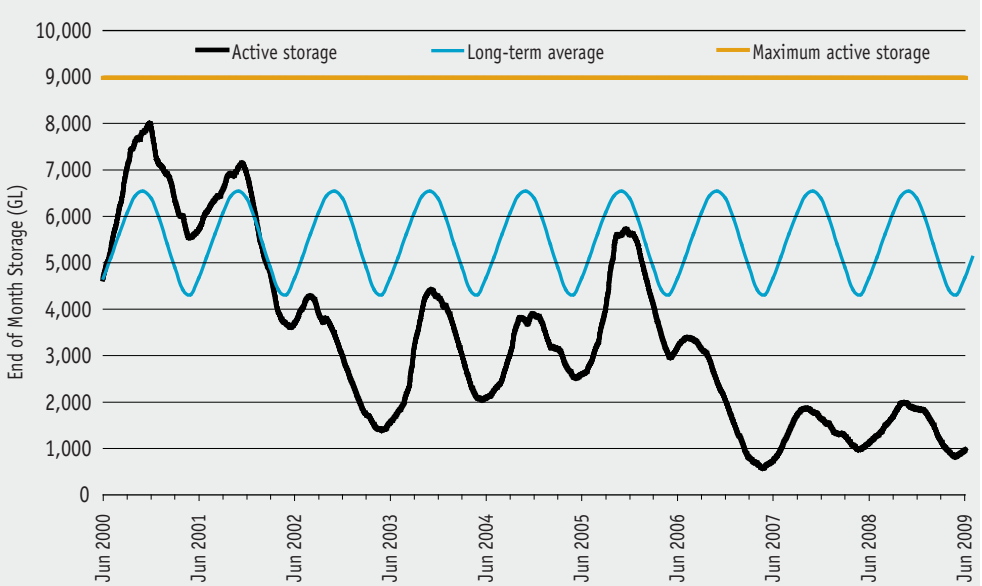
Note: Total includes Darling inflows but excludes Snowy Scheme releases.

Figure 3.2 River Murray system monthly inflows, 2008–09

Active storage

Active storage under MDBA control at the beginning of July 2008 was 1,270 GL, or 14% of capacity. By 30 June 2009, active storage had decreased to 1,190 GL, or 13% of capacity. Although this was 200 GL more than the historic minimum of 990 GL set at 30 June 2007, active storage was still well below the June long-term average of 5,100 GL. Storage levels have now been below average since early 2002 (Figure 3.3).

Water shares for New South Wales and Victoria in MDBA storages at the beginning and end of 2008–09 are shown in Table 3.1.



Note: Maximum storage = 8,980 GL

Figure 3.3 MDBA active storage, June 2000 to June 2009

Table 3.1 Water shares for New South Wales and Victoria, June 2008 and June 2009

	Storage at June 2008 (GL)			Storage at June 2009 (GL)		
Storage	**NSW**	**Vic.**	**Total**	**NSW**	**Vic.**	**Total**
Dartmouth Reservoir	205	409	615	358	397	755
Hume Reservoir	269	183	453	163	135	298
Lake Victoria	168	36	204	41	99	139
Menindee Lakes	541	0	541	228	0	228
Total	**1,183**	**629**	**1,812**	**790**	**630**	**1,420**

Notes:

Data relates to active storage.

Menindee Lakes has been in New South Wales control since March 2002. This resource does not become available to MDBA until the storage exceeds 640 GL.

Accounts are based on the best available data, which may contain some unverified operational data that could change in the future. Figures are rounded to the nearest GL.

Improving environmental outcomes

MDBA managed the delivery of 6.45 GL of The Living Murray environmental water at important sites along the Murray in Victoria, New South Wales and South Australia (details at page 28). This environmental watering commenced in mid-April to maximise the benefits of autumn conditions and supplemented water provided by state governments and the Commonwealth Environmental Water Holder.

The Lock 8 weir pool was raised temporarily in May, to minimise inflow to Lake Victoria for maintenance works, watering several wetlands and assisting with the pumping of The Living Murray water to wetlands on Mulcra Island. At Yarrawonga Weir (Lake Mulwala), a full drawdown took place in June to control the spread of the invasive aquatic weed *Egeria densa* (see pages 60–61).

In spring 2008, 800 ML of water managed by the New South Wales Murray Wetlands Working Group was used to maintain wetland vegetation at Reed Beds Swamp, which is a significant waterbird breeding area within the Barmah–Millewa Forest. The delivery of this water via Gulpa Creek was undertaken with the cooperation of New South Wales State Forests and New South Wales State Water.

During March 2009, algal blooms developed to 'red alert' levels along the River Murray, initially between Hume Dam and Torrumbarry Weir (a distance of 600 km) (see also page 43).

MDBA assessed possible mitigation options but, due to reduced water availability, there was no potential to increase flows to disperse the bloom without jeopardising water supply for essential needs in 2009–10. New South Wales and Victoria enacted treatment processes to protect water supplies pending the decline of the bloom with the onset of cooler weather.

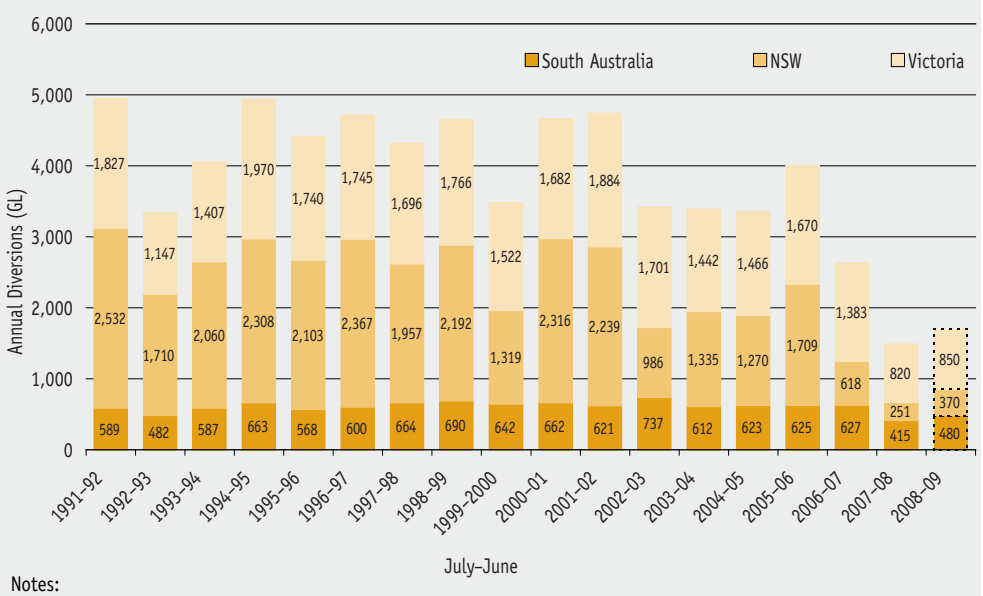
During April 2009, further algal blooms developed along the Murray as far downstream as Tooleybuc in the Edward River and in the Murray around Euston. By this stage some 800 km of the Murray was under red alert.

The Murray was not the only river to suffer from algal blooms, and red alerts were issued across the Basin, including on the lower Darling, Murrumbidgee and Lachlan rivers, and for Copeton, Keepit, Pindari, Split Rock and Chaffey dams.

Low state irrigation allocations and diversions

In Victoria, irrigators with high security licences for the Murray Valley were allocated only 35% of their entitlement. In New South Wales, irrigators with high security water licences for the Murray Valley were allocated 95% of their entitlement, while holders of general security licences were allocated only 12%. In South Australia, irrigators with high security licences were allocated 18% of their entitlement.

The total amount of water diverted by the states was around 1,600 GL, which includes water traded in from the Murrumbidgee (see Figure 3.4). Around 580 GL of allocated water in 2008–09 was carried over by individual water licence holders in preparation for the 2009–10 water year.



Notes:

Diversions include the lower Darling and any inter-valley trade received by a state.

Data presented for 2008–09 are based on hydrographic and operational data for New South Wales and Victoria and approximate data from the South Australian Department of Water, Land and Biodiversity Conservation.

Figure 3.4 River Murray system: state diversions, 1991–92 to 2008–09

Flow to South Australia

Flow to South Australia was 1,180 GL in the 2008–09 year, which was only one-quarter of the long-term median of 4,800 GL. The flow has now been below the normal entitlement (1,850 GL) for almost three years and has exceeded the long-term median in only two of the past 11 years.

MDBA, working with South Australia, altered the pattern of flows to maintain a sufficient flow past Lock 1 throughout the year. The Lock 1 flow minimised the wind-driven movement of saline water from the Lower Lakes upstream towards Adelaide's drinking water offtakes. Higher flows were delivered over the summer and autumn when diversions and evaporation losses were highest, with much lower flows during the winter and spring.

The Murray component of the Snowy Mountains Scheme

At 1 July 2008, the required annual release (RAR) from Murray 1 Power Station was 261 GL. RAR was gradually increased during 2008–09 to 816 GL and an additional 72 GL was released by Snowy Hydro under flexibility arrangements, resulting in a total release of 888 GL. The partner governments agreed that water released under the flexibility arrangements would be held over for use in 2009–10.

Special arrangements for water sharing and contingencies

In response to the continued low water resource availability, the partner governments agreed to special arrangements for the sharing of water resources between the states. These included:

- agreement that jurisdictions would be responsible for reserving water to meet critical human water needs in their state
- agreement on a number of contingency measures to assure delivery of critical human water needs as necessary
- provision in 2008–09 of South Australia's full dilution and loss entitlement of 696 GL to address water loss and system requirements
- agreement that water carried over from 2007–08 to 2008–09 by water users within a state would be quarantined from water availability estimates in 2008–09.

A series of operational measures continued in 2008–09 to maximise water availability, including:

- disconnecting a number of wetlands permanently inundated by weir pools to reduce evaporation, although a number of priority wetlands were watered for environmental benefits (for more information, see page 65)
- reduction of minimum regulated flows to reduce evaporation and maximise storage levels in the upper Murray.

An independent review of the accounting of special sharing arrangements was undertaken to confirm state water entitlements. The review found that entitlements were in accordance with the special water sharing arrangements, and recommendations were made for improving transparency. A series of upgrades to MDBA's models was also undertaken to improve sharing outcomes.

Significant challenges for operation of the River Murray system

With near-record low storage levels and inflows, the year began with most of New South Wales, Victoria and South Australia on zero or near-zero water allocations.

System operations were aimed at maximising water availability by storing as much water as possible in Dartmouth Reservoir and minimising losses along the river. (Dartmouth Reservoir is large, deep and in a cooler environment than other storages, and therefore loses less water to evaporation.) This meant that, as happened in 2007–08, river levels and flows fell well below historic averages.

Upper Murray system

At the start of 2008–09, storage in Dartmouth Reservoir was at 696 GL (18% of capacity) and storage in Hume Reservoir was 484 GL (16% of capacity).

Hume Reservoir in April 2009, when the amount of water fell to 2% capacity, the lowest since autumn 1968

Despite severe drought, the strategy of maximising storage in Dartmouth resulted in storage rising to 835 GL (21% of capacity) by the end of June 2009. While a useful improvement, this remains well below the long-term average of 1,530 GL.

Releases from Dartmouth remained at minimum rates for much of the year and were increased to 500 ML/day over the summer months, with some pulses of over 3,000 ML/day, to meet downstream demands. Releases from Hume averaged 10,000 ML/day over the summer months — well below the peak rates of 25,000 ML/day seen in years of high allocation.

Storage in Hume Reservoir peaked in early October at 1,069 GL (35% of capacity) and gradually fell to a low of 64 GL (2% of capacity) on 25 April — the lowest level since autumn 1968 when Hume storage fell as low as 28 GL (<1% of capacity). By the end of June 2009, Hume storage had recovered to 328 GL (11% of capacity) compared with the long-term June average of 1,530 GL.

Mid-Murray

In late April 2009, water stored in Lake Mulwala was used to help supply downstream requirements, resulting in the level of the lake falling. Thereafter, a full drawdown of Lake Mulwala took place from May to July in an effort to control the spread of the exotic aquatic weed leafy elodea (*Egeria densa*). Excessive growth of the weed was affecting recreational and tourism activities, and was interrupting the normal operation of both the power station and the fishway at Yarrawonga weir.

Lake Mulwala. A full drawdown of the lake took place from May to July 2009 to control the spread of *Egeria densa*, an invasive aquatic weed.

The lowering of the lake level is a method that provides viable weed control over the whole of the lake and is expected to provide recreational and tourism benefits for a number of years into the future.

A period of extreme hot and dry weather during late January 2009 resulted in higher irrigation demand and transmission losses and led to a period of very low river flows through Sunraysia.

Lake Victoria

Lake Victoria reached a peak of 366 GL (54% of capacity) in January 2009 after good rainfall had increased flows from both the Murray and Darling systems. The volume was drawn down to 141 GL (21% of capacity) in May 2009, which is the second lowest level on record. (The lowest was in July 1999 when the lake was intentionally lowered to 120 GL to assist a cultural heritage survey.) By 30 June, storage in Lake Victoria had recovered to 239 GL (25% of capacity).

Menindee Lakes

In September 2008, New South Wales began releasing water from Menindee Lakes to the Murray system, gradually increasing flows from around 100 ML/day to over 3,500 ML/day. Flows were slowly reduced to around 500 ML/day by February.

There was good rainfall in parts of the northern Basin during February, particularly near Bourke and Walgett, but much of it fell on flat, dry countryside and did not reach the river system. During March and April 2009, Menindee received only about 190 GL of inflow, which increased the storage level from 7% to 15% of capacity to secure Broken Hill's water supply and provide for local requirements.

Lake Menindee, the largest storage in the Menindee Lakes scheme. The lake has been empty since 2002.

Lower Lakes

The condition of the Lower Lakes in South Australia is grave and continued to deteriorate during 2008–09. Due to low flows to South Australia, the water level in Lake Alexandrina reached a new record low of –1.04 m AHD in April 2009, although it did rise slightly after that (see Figure 3.5). There has been no discharge to the sea since October 2006.

As the lake levels drop, more mudflats are exposed, and there is a serious risk of acidification. Pumping of water from Lake Alexandrina to Lake Albert started in May 2008 to maintain the Lake Albert water level and prevent further exposure of sulfide sediments. South Australia ceased pumping on 30 June 2009 and is currently looking at alternative management options, such as bioremediation, to reduce the risks of acidification within Lake Albert.

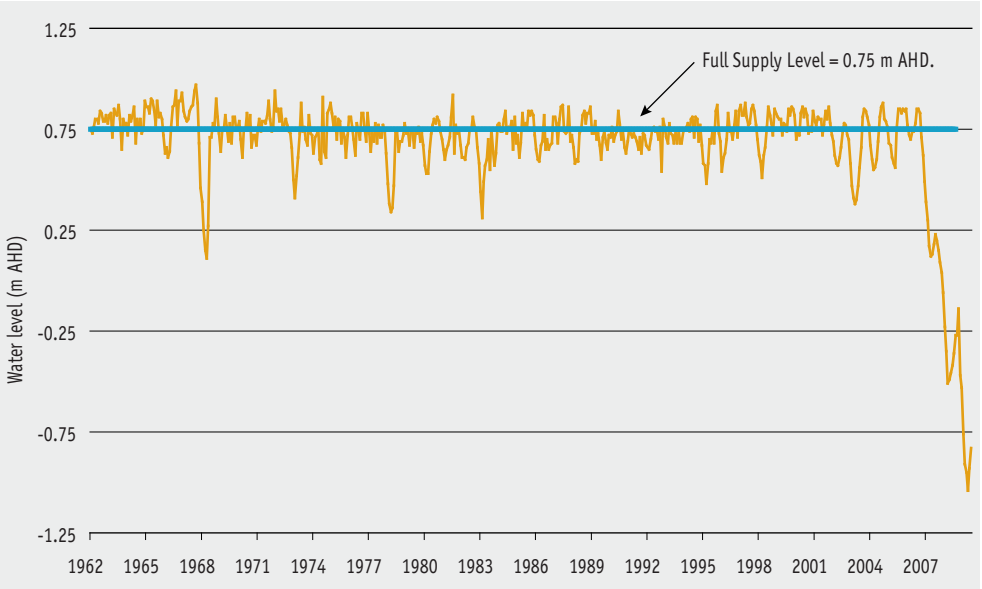


Figure 3.5 Lake Alexandrina water levels, January 1962 to July 2009

Definition: bioremediation

Bioremediation is the use of micro-organisms and their by-products as a means of reverting the chemistry of a contaminated environment to an uncontaminated state. Processes being considered for Lake Albert include using micro-fine limestone and planting shallow-rooted plants to mitigate the risks of acidification in the lake.

Operations review

The River Murray System Operations Review built momentum during the year. Progress included:

- preparation of a required 'objectives and outcomes' document on river operations
- review of the benefits of having more variability in releases from Dartmouth Dam
- review of lessons learned during the current drought
- documentation of river operating rules and practice
- initial hydrological modelling studies on some matters that were of particular interest to jurisdictions (e.g. Lindsay River Allowance and possibilities for South Australia's storage right).

In addition to these projects, additional future priorities will include a review of the operations relationship between the lower Darling and the River Murray system, and the continuation of a study on the future management of the Barmah Choke (see page 68). The operations review also has close links to the Darling River Water Savings Project, which includes consideration of possible infrastructure improvements to the Menindee Lakes to yield water savings.

In coming years, the operations review will continue to adapt to changes in the water policy context of the River Murray system, such as the Basin Plan and Water for the Future. The operations review will provide operational detail to support the implementation of these policies for the River Murray system.

Water monitoring data for the River Murray

One of MDBA's responsibilities is to manage and streamline the collection and delivery of reliable and timely water information for day-to-day river operations and other business activities. An automated data acquisition system has been implemented to deliver near to real-time river information to river operators and modellers. This system continues to expand as more data is ingested via the automated data acquisition system. Recent developments and increases in data acquisition coverage enabled information on daily river levels and storage volumes to be delivered to the general public via the MDBA website (see pages 106, 108–109).

With very low river levels continuing as a result of the drought, there is an ongoing need for additional flow measurements to maintain the accuracies of flow-rating tables

across the system. In locations of critical importance, upgrades in technology and installation of additional monitoring stations are essential to ensure that the best information is collected and made available to all stakeholders. A number of monitoring sites have been installed and/or upgraded, funded by both Bureau of Meteorology modernisation and extension funding, and MDBA funding. This includes the installation of two new acoustic Doppler velocity meters at the South Australian border to improve the reliability and accuracy of flow measurements to South Australia.

Water resource modelling

MDBA develops, operates and maintains river models and hydrographic data management systems used for purposes such as river management, water sharing and salinity management, and for other water resource issues and projects.

The ongoing water scarcity focused attention on state water shares in 2008–09. Extensive work was undertaken in reviewing MDBA's record of state water diversions and in supporting an external review of the River Murray state water accounts. Modelling for The Living Murray initiative has been well advanced through the course of the year (see below). Forecasts of water availability continue to be refined, and systems provided for assessing resource management options.

Key modelling tasks completed include:

- developing rostering and scheduling methods for the delivery of The Living Murray water to the icon sites, and systems to account for water use under The Living Murray
- extensive upgrading of MDBA's modelling suite including:
  - the addition of detailed icon site models
  - development and implementation of models capable of employing genetic algorithms to select the optimum strategy from a range of alternative strategies
- assessing options for state water sharing
- informing Lower Lakes management decisions
- improving access to continuously monitored real-time data
- maintaining and developing the Basin Salinity Management Strategy salinity register
- supporting Cap processes, including publication of the Water Audit Monitoring Report and improvements to the management of water audit data
- assisting CSIRO and the eWater CRC (see page 80) in the development of models
- reconciling traded allocations
- providing probability-based forecasts.

Wetland disconnection

In response to critical water shortages in 2007–08, several wetlands were temporarily disconnected from the river in order to reduce evaporative losses under the Dry Inflow Contingency Planning Initiative.

Of the 10 wetlands disconnected in the River Murray system under this initiative, several were watered in 2008–09 in order to avoid environmental damage, and one wetland was reconnected.

A rigorous monitoring program continued at each disconnected wetland in 2008–09 to allow rapid identification of, and response to, any impacts on the environment and/or water supplies. Under the monitoring protocol developed by the Murray–Darling Freshwater Research Centre, monitoring will continue for six months following the refilling of disconnected wetlands.

Acid Sulfate Soils Risk Assessment Project

Record low inflows and river levels in recent years have led to the drying of many permanent wetlands in the Murray–Darling Basin, resulting in the exposure of acid sulfate soils. The impacts of these soils had previously become an issue only at localised sites, but it became clear that acid sulfate soils may present a significant larger scale issue in some parts of the Basin.

In March 2008, the Ministerial Council agreed to support an urgent project aimed at assessing the spatial extent of, and risk posed by, acid sulfate soils at priority wetlands in the River Murray system, including Ramsar wetlands and other key environmental sites in the Murray–Darling Basin.

Key achievements in 2008–09 include:

- desktop assessment of more than 19,000 wetlands throughout the Basin
- development of a standardised method for rapid assessment of acid sulfate soils, and delivery of training courses on identification and rapid on-ground assessment of acid sulfate soils to more than 75 regional agency staff and landholders
- rapid on-ground assessment of approximately 1,450 wetlands
- detailed assessments at high-priority wetlands, including 15 of the Basin's Ramsar wetlands, 80 wetlands on the River Murray between Lock 1 (Blanchetown) and Wellington, and sites in the Loddon River catchment in north central Victoria.

The project was also instrumental in collecting data to support the emergency management of acidification risk under way in South Australia's Lower Lakes and its tributaries.

Definition: acid sulfate soils

Acid sulfate soils form naturally when sulfate-rich water (e.g. saline groundwater, or sea water) mixes with sediments containing iron oxides and organic matter. Under waterlogged, anaerobic (oxygen-free) conditions, bacteria convert sulfates to sulfides. These sulfides react with metals to form sulfidic sediments.

While this process occurs naturally, changes to the hydrology of inland rivers and wetlands have contributed to the accumulation of these sediments in some areas. If left undisturbed and covered with water, sulfidic sediments pose little threat. When exposed to oxygen, such as under drought conditions, chemical reactions may lead to the generation of sulfuric acid. When these sulfuric sediments are re-wetted and the amount of sulfuric acid produced exceeds the buffering capacity of the system, there is a risk that sulfuric acid may be released into the water, adversely affecting the health of wetlands and/or rivers.

Other risks associated with acid sulfate soils include mobilisation of heavy metals, decrease in oxygen in the water column, and production of noxious gases. These processes can lead to substantial environmental damage and serious impacts on water supplies and human health.

MDBC Strategic Plan 2005–2010, Strategy 2.2: Support the development of open, barrier-free markets for interstate water

Developing the interstate water market

Background

The Water Trade Program seeks to ensure the effective and efficient operation of an interstate water market within the southern connected Murray–Darling Basin.

During 2008–09, the Water Trade Program continued to coordinate and refine the legal instruments required to facilitate interstate water trade: Schedule D to the Murray–Darling Basin Agreement and its supporting protocols.

Highlights

- During 2008–09, an unprecedented volume of 593 GL of interstate allocation transfers were processed, mostly for use in permanent horticulture — the highest ever volume of interstate allocation transfers.
- Temporary amendments to the Lower Darling and Barmah Choke trading rules were made for 2008–09, creating more opportunities for water users to trade allocations interstate.
- Water accounting information gathered this year has assisted the National Water Accounting Development project by developing water accounting standards.

Interstate allocation transfers

Water market trends from the 2007–08 water season for interstate allocation transfers have continued into the 2008–09 water season, albeit on a much larger scale (see Figure 3.6). This was primarily due to low water resource availability and only a small allocation pool available for use.

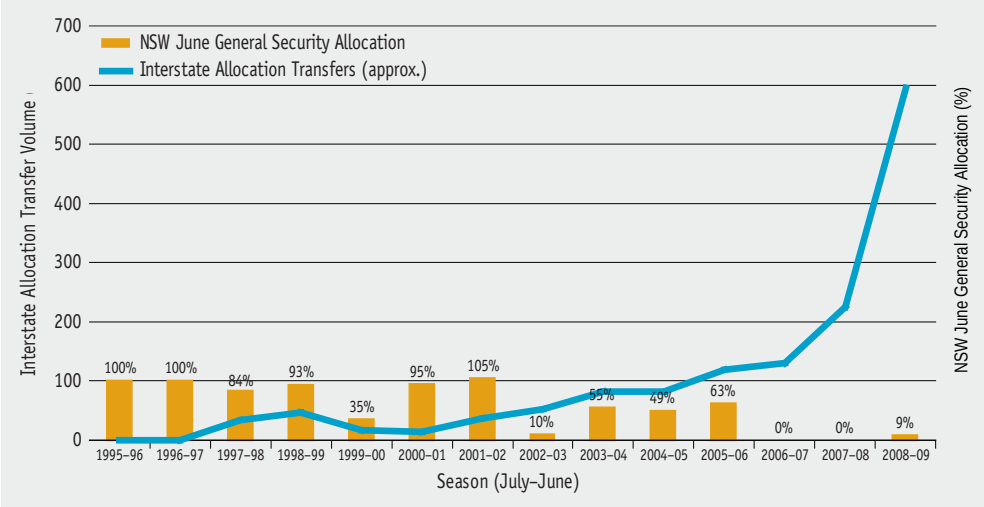


Figure 3.6 Increase of interstate allocation transfers against New South Wales end-of-season general security allocation, 1995–96 to 2008–09

Total interstate water trade in the southern connected Basin for 2008–09 was 593 GL compared with total interstate allocations trades of 225 GL for the 2007–08 year. Again, New South Wales was a net exporter of interstate allocation trades of 553 GL. Both Victoria and South Australia were net importers of interstate allocation trades, with Victoria importing a net of 217 GL and South Australia importing a net of 336 GL. (Amounts are given to the nearest GL.)

The increase in volumes of interstate water transfers highlights the increasing importance of the water market to water users. With ever-changing priorities among water users, the interstate water market has continued to evolve, creating flexibility to buy and sell water products across state boundaries.

Temporary changes to Lower Darling trading rules

Under normal trading rules, water cannot be traded out of the Lower Darling when the management of the Menindee Lakes is under New South Wales control. The former Murray–Darling Basin Commission (MDBC) agreed to relax this rule for 2008–09, allowing allocation transfers from the Lower Darling to the River Murray system.

The relaxation of the Lower Darling trading rules created the ability for water users holding water entitlement within the Lower Darling to trade allocation out of the system. This allowed these users to make informed business decisions regarding their individual water management.

Barmah Choke trading rules

In September 2007, the former MDBC agreed to allow water allocations to be transferred from above to below the Barmah Choke for the remainder of the 2007–08 water year.

Under normal flow conditions, water allocation transfers downstream through the Barmah Choke are not allowed, as the choke constrains the volume of water that can pass. As low-flow conditions prevailed during the 2008–09 year, constraints on the channel capacity of the Barmah Choke were unlikely, given the small quantities of water to be delivered in the season. For this reason the Murray–Darling Basin Authority (MDBA) made three announcements during the 2008–09 water season that allowed water allocation transfers to water users to occur from above to below the Barmah Choke for the whole of the 2008–09 year. The relaxation assisted these water users in making management decisions regarding their individual water management.

Definition: the Barmah Choke

The Barmah Choke is a section of the River Murray upstream from Echuca that is narrow, constraining the volume of water that can pass during major floods. About 25,000 years ago, an uplift of land created the Cadell Tilt, a north–south geographical fault on the earth's surface near Deniliquin and Echuca. The impact of the Cadell Tilt on the River Murray led to flooding of the original path of the Murray and a 'break out' at the Barmah Choke, creating a new path for the river. The cut through the Cadell Tilt at the Barmah Choke is much narrower than the original broad valley to the north.

During floods, large volumes of water are temporarily banked up behind the Barmah Choke, flooding the wetland system known as the Barmah–Millewa Forest.

Improving water accounting systems

During 2008–09, the independent Water Accounting and Development Committee (WADC)[1] office moved from within the MDBC premises to the Bureau of Meteorology, which is responsible under the *Water Act 2007* (Cwlth) for the development of water accounting standards.

The focus of water accounting activities within MDBA over the past year has been to:

- support the Bureau of Meteorology's production of the Method Pilot National Water Account due for publication in December 2009, including by developing water accounting standards
- develop environmental water accounting and reporting for the Murray–Darling Basin.

A major task completed during the year was the Murray–Darling Basin Environmental Water Recovery Report.

1 The Water Accounting Development Committee (WADC) was established by the Natural Resources Management Ministerial Council as an independent advisory body. (The Ministerial Council was formed by agreement between Australian federal, state and territory governments.) WADC has been replaced by the Water Accounting Standards Board (WASB), which is based at the Bureau of Meteorology. WASB functions as an independent expert advisory board and is responsible for the oversight and coordination of all Australian Water Accounting Standards development activities.

A windless day at the Barmah Choke, a narrow part of the River Murray that runs through the Barmah–Millewa Forest. The photograph was taken in July 2008.

Dartmouth Reservoir in May 2009.

MDBC Strategic Plan 2005–2010, Strategy 2.3: Sustain and improve physical asset base to contemporary best practice

Managing assets

Background

The River Murray Operations assets, principally those shown at Schedule A of the Murray–Darling Basin Agreement, are owned by the asset-controlling governments (Australia, New South Wales, Victoria and South Australia). An Asset Agreement is in place between the four partner governments and the Murray–Darling Basin Authority (MDBA) regarding the management of the River Murray Operations assets. For the most part MDBA carries out its roles and responsibilities under the Asset Agreement and the Murray–Darling Basin Agreement through the state constructing authorities from New South Wales, Victoria and South Australia. The relevant authorities are:

- State Water Corporation (State Water NSW) (the NSW Department of Water and Energy also undertakes significant works in relation to salt interception schemes, river improvement works, hydrometric and water quality monitoring, and environmental works)
- Goulburn–Murray Water (Victoria)
- South Australian Minister for the River Murray, including the operating agents South Australian Water Corporation (SA Water) and the South Australian Department of Water, Land and Biodiversity Conservation.

The River Murray Division of MDBA oversees the works associated with management of the assets. The Executive Director River Murray has particular delegations under the Murray–Darling Basin Agreement and the Asset Agreement.

A strong relationship has developed between MDBA and the state constructing authorities, so that maintenance is proactive, decision making is generally by consensus, and issues are raised by the constructing authorities at an early stage.

Highlights

- The navigable pass upgrade and associated fishway construction at Lock 3 were near completion; the contract was awarded for construction of similar works at Locks 2, 4, 5 and 6; and construction started at Lock 6.
- The Dam Safety Project at Dartmouth progressed to detailed design stage, in conjunction with completion and running of a physical hydraulic model of the spillway.
- The Hume Spillway Southern Junction dam safety project progressed to detailed design and approval of the business case to proceed to construction.

- The concept designs for dam safety projects progressed, involving Hume Spillway flood routing capacity, Hume Spillway Southern Training Wall and Lake Victoria storage.
- The sand pumping project at the Murray Mouth was refined to maintain the connection between the Coorong and the sea in spite of no flow through the barrages for more than two years, resulting in a 20% reduction in cost.
- Construction was completed at Waikerie 2L Salt Interception Scheme (SIS), bringing Pyramid Creek SIS to full borefield production, and the floodplain component of the Loxton SIS was commissioned.
- All major contracts were let for construction of the Murtho SIS, and a contract was awarded for project management of the construction of the Upper Darling SIS.
- The lock refurbishment program was well under way, with completion of work at Locks 1, 5 and 10.

Assessment of asset management

Each year the Murray–Darling Basin Authority (MDBA) inspects all the River Murray Operations assets, specifically to assess the performance of the staff at each site (and the asset managers of the state constructing authorities) in relation to the operation and maintenance of the assets. Assessment criteria include condition of the assets, operations and maintenance documentation, occupational health and safety documentation and performance, achievement of the works program set for the year, and expenditure against budget in meeting the program.

At the time of preparing this report, the annual assessment of the structures for 2008–09 was under way. Although not complete, it is pleasing to report that the general standard of maintenance is improving overall and that some of the sites have made significant improvements in the condition of the assets as well as completion of work programs on time and within budget.

Compliance with ANCOLD Guidelines

MDBA places a high priority on ensuring all its dam assets comply with Australian National Committee on Large Dams (ANCOLD) Guidelines. In 2008–09, significant progress was made on six major dam safety projects that will help to substantially meet this key performance indicator within five to ten years, depending on future funding. The six priority projects to be addressed are:

- strengthening a spillway training wall at Hume Dam
- improving drainage and filter capacity at the embankment–spillway southern junction at Hume Dam
- improving the flood discharge capacity at Hume Dam

- improving the flood discharge capacity at Dartmouth Dam
- upgrading the outlet structure at Lake Victoria storage
- improving the structural stability of some of the embankments along Frenchmans Creek and at Lake Victoria storage.

Two steering committees with appropriate jurisdictional input have been established to oversee the works, which are in the concept design or detailed design stage. Murray–Darling Basin Ministerial Council approval and funding has been obtained to construct the Hume Dam Spillway Southern Junction upgrade. Business cases are to be produced for approval, funding and construction of the other five projects.

Major works on assets in 2008–09

Dartmouth Dam

A hydraulic model, at a scale of 1:60, of the Dartmouth Dam spillway has been constructed and is being used to assist with detailed design of the spillway upgrade and crest remedial works at the dam. Even at this scale, the model is over 3 m high. It is a valuable aid in assessing the impact of flood discharges through the spillway and over the excavated rock cascade downstream of the spillway crest.

A consultant has been appointed to undertake the detailed design of the spillway upgrade and crest remediation works at the dam. Work will be done to test the design assumptions on the hydraulic model and refine details to optimise the performance of the upgraded structure.

Hydraulic model of Dartmouth Dam in action. The model is being used to test the design of upgrades to the dam.

The size of Dartmouth Dam presents many challenges for operations and maintenance. Following the successful replacement of the low-level outlet works refilling valve in May 2008, refurbishment of the pumps and pipework in the low-level drainage gallery was completed during the year. Improvements were made to some components of the embankment instrumentation that will provide safer access and allow more efficient operation of the system. Site office security and the visitors' centre displays were upgraded. In accordance with ANCOLD guidelines for dam safety management, the comprehensive (five-yearly) dam safety inspection was carried out in May 2009.

Hume Dam

This year the emphasis at Hume Dam has been on progressing the three dam safety projects. To support the studies, geotechnical investigations have been completed in the embankment and in the foundation of the main embankment. A three-dimensional digital model of the spillway southern junction and spillway southern training wall has been developed. It includes details of embankment zones, the concrete core wall, the tower block and the various drainage systems. The model is used to assist with stability analyses of the existing structures and the detailed design of the proposed remedial works.

The flood hydrology studies are near completion. Early indications are encouraging in that large-scale spillway augmentation may not be required. However, because this is such a critical matter, further checking of the results is under way, prior to finalising recommendations in 2009–10.

The spillway southern junction concept design has been finalised, optimising dam safety improvement for dollar investment. The concept is currently being taken to detailed design; the consultants are working closely with construction experts to ensure a robust, constructible design is achieved.

The geotechnical investigations highlighted that significant ongoing settlement of the embankment could be expected. As a result, the design options for maintaining stability of the spillway southern training wall have moved towards external buttressing of the wall rather than a straightforward replacement of the existing anchor bars. This year, concepts have been finalised and a recommendation prepared for consideration by State Water NSW and MDBA.

Planned maintenance and surveillance activities at Hume Dam continued in accordance with schedules. Some of the more significant tasks are load testing on a number of the post-tensioned cables in the concrete gravity dam section, and the ongoing program to sand blast and repaint one or two of the large spillway gates per year. The outlet works gantry crane 25-year structural certification and 10-year electrical and mechanical certification were completed during 2008–09.

Yarrawonga Weir

A program of significant strengthening work on the superstructure that supports the winches for operation of the large spillway gates at both the northern and southern weir structures was completed this year. The storage (Lake Mulwala) was drawn down

View from downstream of Yarrawonga Weir showing the southern structure gates, superstructure housing the winches, and the fish lock adjacent to the power station in the foreground.

in the period from May to July 2009 in a repeated effort to control an invasive aquatic weed (*Egeria densa*) by exposing it to frosts and drying out (see page 60).

Yarrawonga Weir was assessed as the best maintained MDBA asset during 2007–08. In recognition of their performance, the Goulburn–Murray Water site team, led by Tony Beamish, was awarded MDBA's Collings Trophy by the Rt Hon. Ian Sinclair, AC (President of the former Murray–Darling Basin Commission) in November 2008. Over the past 12 months the team had made significant progress in finalising a number of important projects following the major upgrade of the site about six years ago. Typical works included painting of the bridge beams, superstructure, the large gates, and refurbishment of the winches and controls.

Other locks and weirs

The lock chamber refurbishment program continued this year, with the successful completion of works at Lock 5 and Lock 10 in October 2008 followed by Lock 1 in April 2009. The works are part of a six-year planned maintenance program on all of the locks along the river. The comprehensive maintenance involves dewatering of the locks; repainting of the four large gates; refurbishment or replacement of the large valves used to fill and empty the locks, including the frames that hold the valves; and inspection of the drains under the locks. It provides the opportunity to inspect and/or repair any other items not normally accessible while the lock is in service. The lock is closed to river traffic during the maintenance works and so the works are programmed to minimise inconvenience to the public.

The review of options for upgrading the existing Dethridge Weir at Lock 11 (Mildura) has been completed. The study determined that mechanised gates could be retrofitted to the existing trestles to improve operation of the weir and, when combined with other improvement measures, would extend the life of the existing weir structure, potentially by up to 40 years. A prototype trestle will now be fabricated to test the proposed system.

Navigable pass upgrade and fishways project

By the end of 2008–09, upgrade of the navigable pass and construction of a fishway were almost completed at Lock 3 (Overland Corner). In November 2008, approval was given by Ministerial Council for SA Water to award a single contract to construct the navigable pass upgrade and fishways at Locks 2, 4, 5 and 6. Construction work commenced at Lock 6 and is now well advanced.

Detailed design has commenced on a similar upgrade of the navigable pass and fishway at Lock 15 (Euston), and provision for fish passage at Lock 11 (Mildura) in conjunction with the upgrade of the Dethridge Weir trestles. Once the above fishways are completed, provision for fish passage will have been established on the main stem of the river between the sea and Hume Dam, a distance of 2,225 km.

Lake Victoria

Studies commenced during the year to address the higher priority dam safety projects at Lake Victoria in response to actions recommended by the 2007 Portfolio Risk Assessment. A consultancy was awarded to develop options for remedial works, and prepare concept designs for the preferred options to upgrade the outlet regulator structure and for remedial works at the major creek crossings along the banks of Frenchmans Creek.

At Scaddings Bridge, which provides access to Lock 8 from the Lake Victoria road, the existing steel bridge piers were encased in concrete to extend their life.

In 2008–09, a significant change to the staff establishment at Lake Victoria was finalised. It provides greater capacity to the cultural heritage program as well as enabling cooperation across all programs in place at Lake Victoria. When combined with the significant investment over the past two years in major plant and other upgrades, it has been possible to achieve a noticeable improvement in the condition of the water delivery assets as well as major advances in the land and cultural heritage management programs.

In 2007–08, a scientific review panel consisting of experts with skills in cultural heritage, riverine ecology, geomorphology, hydrology and rangeland management was convened. In the past year, the panel has reviewed vegetation and erosion monitoring reports and made recommendations on improvements to these monitoring programs. It is currently working on a redesign of the monitoring programs to make sure they are appropriately designed for monitoring impacts on cultural heritage at the lake. The panel will play an ongoing role in reviewing monitoring activities, identifying and guiding further research needs and reviewing the results of such research.

Ewe Island Barrage from the air. Moving from the background to the foreground, we see the sea, then Younghusband Peninsula, a section of the Coorong, and the barrage (centre). The sand behind the barrage is a dry area of the bed of Lake Alexandrina.

Barrages

The low level of the Lower Lakes and the continuing drought conditions have meant that large sections of the barrages have been retaining sea water on the Coorong side but no fresh water on the lake side. Maintenance of the seals and additional works to minimise leakage of salt water into the Lower Lakes has been an important task for the barrages team this year.

MDBA has provided resources and advice to the South Australian Government relating to acid sulfate soils risk and other risks at the Lower Lakes.

Menindee Lakes

In accordance with ANCOLD guidelines for dam safety management, the comprehensive (five-yearly) dam safety inspection of the Menindee structures was carried out in June this year.

Detailed and user-friendly operation and maintenance manuals have been prepared for the Menindee site. The manuals have been adapted for other sites, and the other state constructing authorities are referring to them when upgrading their operations and maintenance manuals.

Mitta Mitta River channel improvements

Erosion protection and repair works were required in 2006–07 following that season's operations, which involved transfer of very large volumes of water from Dartmouth Reservoir to Hume Reservoir. These works were continued in 2007–08 to enable the Mitta Mitta River to sustain prolonged high flows into the future. Works to maintain channel capacity continued in 2008–09, with a focus on the control of willows that have fallen into the river and caused erosive flow diversions around them.

Works have also targeted broader environmental outcomes for the riparian zone, where possible, through revegetation, willow control and stock exclusion.

Hume to Yarrawonga reach

Hume to Yarrawonga River Management Plan

Works continued under the 2002 River Management Plan for the Hume to Yarrawonga reach of the River Murray. The advisory group, with wide representation, continues to meet regularly to review progress and provide advice to MDBA on future directions for the program.

Hume to Yarrawonga River Murray Works Program

By the end of 2008–09, river management plans had been completed for all 15 subreaches of the 200 km Hume to Yarrawonga reach of the River Murray. These plans assist in the preparation of annual streamside restoration work programs. The second of a four-year accelerated program of works has now been completed. As a result, it is expected that the capital works component of the plan will be completed by 2011. With nine years of on-ground works behind it, the outcomes from this program are now highly visible.

Erosion control works comprised of willow removal, placement of log and rock revetments and the construction of timber groynes (small jetties that protect against erosion) have allowed for the restoration of a further 5.5 km of degraded river in 2008–09. Other works included fencing off 15 km of riverbank and establishing 42,000 native plants.

Work began in 2008 on developing a monitoring program to assess the effectiveness of the erosion control works for managing the impacts of channel change. The monitoring program will inform adaptive management and enhance the existing works program by improving understanding of geomorphic processes.

Controlling erosion with a log revetment on the River Murray near Corowa

Hume to Yarrawonga reach land management review

Significant progress continued in 2008–09 towards finalising the program of purchasing easements in the Hume to Yarrawonga reach to confirm MDBA's rights to pass regulated flows within existing channel capacity on affected properties in Victoria and New South Wales. The easement purchase program closed on 30 June 2008. By November 2008, all 107 offers for purchase of easements had been issued or reissued and 84 accepted.

Murray Mouth sand pumping

It is now well over two years since water flowed through the barrages to the sea. Dredging at the Murray Mouth has been maintained to enable connectivity between the sea and the Coorong. This is the seventh year of operation of the dredges. It has been successful not only in achieving tidal ratio targets in the Tauwitchere and Goolwa arms of the Coorong but also in reducing costs. The total cost of dredging for 2008–09 was $4.5 million — a $0.4 million reduction in actual dollars from the 2007–08 costs.

The use of bathymetry (that is, surveying underwater topography), aerial photography and sophisticated hydraulic modelling has ensured that the dredging operations are providing the best shape and depth of channels to optimise tidal water flow without being so strong that sand transport from the ocean simply refills the dredged channels. It is the third year in a row that use of a one-dredge operation has kept expenditure well below budget.

MDBC Strategic Plan 2005–2010, Strategy 2.4: Improve environmental and consumptive use outcomes through development of improved water management and delivery tools

Improving river modelling

Background

The Murray–Darling Basin Authority (MDBA) strategy to improve water management and delivery tools includes the creation of:

- a daily model of the River Murray system
- a real-time model of the upper Murray.

The work involves extensive collaboration with research organisations such as the eWater Cooperative Research Centre (CRC).

Highlights

- A test case for the eWater CRC River Manager software product, for the River Murray upstream of Yarrawonga, is under way.

Definition: eWater Cooperative Research Centre (CRC)

eWater CRC is a joint venture made up of 45 Australian water-cycle management, consulting and research organisations, supported by the Australian Government's Cooperative Research Centres Program. eWater builds water management tools for partners and also markets those tools. The tools include decision software, guidelines, forecasting models and databases designed for use in operating river systems, managing catchments, developing monitoring programs, and guiding investment in river and catchment restoration.

River operations and planning tools for the River Murray system

The eWater CRC is developing the next generation of tools to support river system planning, management and operation. Two products are being developed:

- River Manager: a model to support planning and policy decision making
- River Operator: a model to support day-to-day operation decisions.

River Manager

Significant acceleration has occurred in the development of River Manager as a result of additional funding from the Department of the Environment, Water, Heritage and the Arts and the National Water Commission. The accelerated development culminated

in the release of a base model, which is ready to initiate hydrology testing. As part of the acceleration, the River Manager model is being trialled in four catchments across the Murray–Darling Basin in partnership with the relevant jurisdictions. MDBA is contributing resources to support the design of River Manager (in relation to the way in which the model describes physical and management functions) and the trialling of River Manager on the River Murray. MDBA also contributes through representation on the High-Level Steering Committee, User Reference Group and Technical User groups.

River Operator

Work commenced in the last financial year to develop River Operator. River Operator is being designed to support the efficient management of water storage, flow and delivery in regulated river systems. It will support operation decisions such as how much water should be released from storage on a given day. River Operator builds on the functionality provided by River Manager. Development in the last year has focused on creating an interface to enable river operators to interact with the model in a way similar to that for current tools.

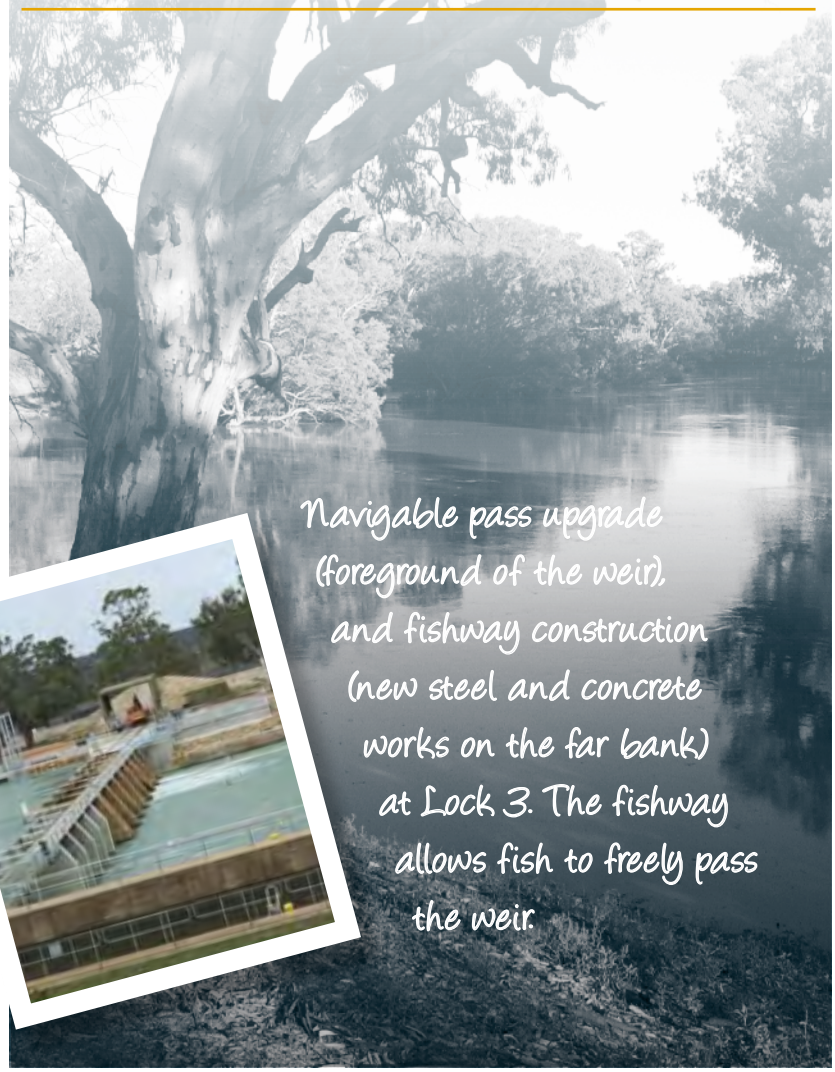
A real-time model of the upper Murray

MDBA continued to work with the state data providers to automate the process of gathering data for daily river operations and improving the hydrographic networks. In 2008–09, MDBA initiated a dialogue with the Bureau of Meteorology to explore the possibility of leveraging the hydrologic forecasting activities occurring within the bureau to develop a real-time rainfall run-off model for the upper Murray and mid-Murray.

Chapter 3

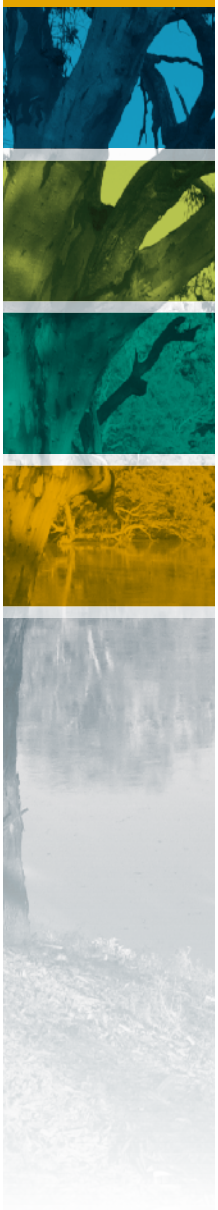
Delivering water efficiently and equitably

MDBC Strategic Plan 2005–2010, Objective 2: Efficient and equitable delivery of water for productive and sustainable domestic consumption, environmental benefit and economic use



Navigable pass upgrade (foreground of the weir), and fishway construction (new steel and concrete works on the far bank) at Lock 3. The fishway allows fish to freely pass the weir.

Chapter 3



Overview

No other drought on the historical record comes close to the severity of the current drought. In another extremely dry year, keeping the River Murray running and delivering essential water have been a major achievement. Many challenges have arisen and been met in the sharing of the Murray waters between New South Wales, Victoria and South Australia, and in the day-to-day operation of the river system.

Special water sharing arrangements were again agreed between partner governments to safeguard the supply of water for critical human needs and to optimise water availability throughout the season. The accounting of these special sharing arrangements was independently reviewed to confirm state water entitlements.

The volume of water traded set new records during the year and proved critical to buyers and sellers alike in ameliorating the impacts of another extremely dry year.

Asset management is a fundamental part of water delivery. The many assets covered by the Murray–Darling Basin Agreement include large dams, weirs and other infrastructure, such as the crucial salt interception schemes.

With the merging of the functions of the former Murray–Darling Basin Commission into the Murray–Darling Basin Authority (MDBA), two significant actions were required in relation to the management of these assets:

- preparation of an Asset Agreement, which was signed by the partner governments and MDBA at the Ministerial Council meeting on 12 June 2009
- preparation of an Asset Management Plan. At 30 June 2009, good progress had been made by the state constructing authorities (SCAs) and MDBA on drawing up a plan, with the intention of finalising Version 1 in 2009.

Major dam safety projects have been advanced at Hume Dam, Dartmouth Dam and Lake Victoria storage. Major maintenance and renewals projects have been undertaken at other locations, such as Menindee Lakes, Yarrawonga Weir and the Murray Mouth barrages.

The navigable pass upgrade of the locks and weirs (and associated fishway construction) made significant gains. Completion of these works in 2011 will not only achieve the goal of upgrading the occupational health and safety standards at the locks and weirs but will also fulfil a major goal of The Living Murray program: giving native fish free access to the entire length of the Murray from the sea up to Hume Dam, a distance of 2,225 km.

MDBC Strategic Plan 2005–2010, Strategy 2.1: Deliver agreed water shares in the River Murray

Delivering agreed water shares

Background

The following key actions are undertaken to deliver agreed water shares in the River Murray system to the states, including in extreme conditions:

- regularly assess the water resources of the River Murray system to determine the volume of water available to each state
- operate structures under MDBA's control, and determine and review procedures for efficient and effective operation
- establish, operate and maintain a system of continuous monitoring of the volumes of stored water, and of flows in the River Murray and from its tributaries
- liaise with state and federal authorities on matters related to the River Murray system to provide an up-to-date and comprehensive flow of information.

Highlights

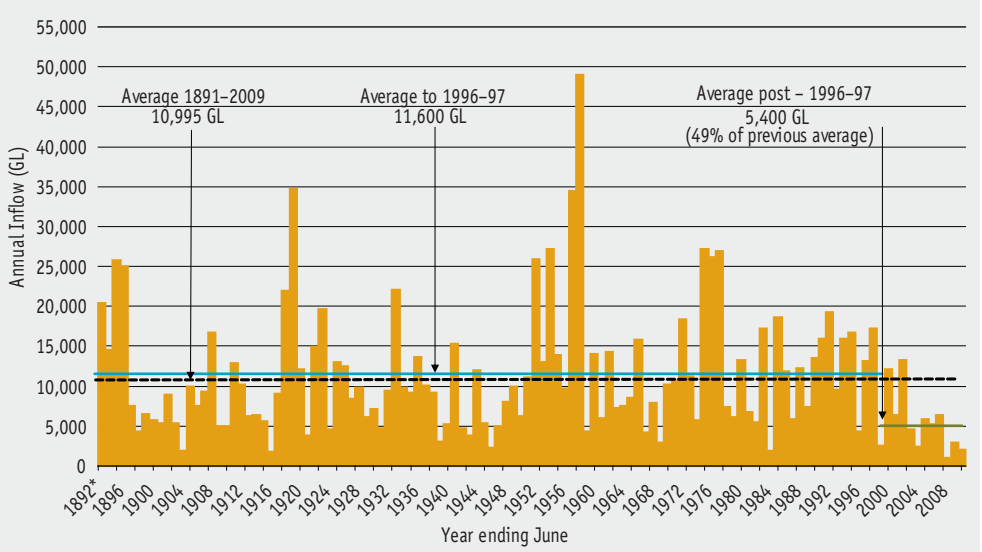
- Sustaining Murray flows and delivering essential water requirements throughout the entire season was again a real achievement in 2008–09, given the continuing extreme drought.
- In response to extremely low water availability, special water sharing arrangements were adopted and a series of drought contingency measures implemented to improve water availability.
- MDBA continued to supply and refine forecasts of water availability and to provide the systems for assessing options for special water sharing arrangements.
- Water trade proved critical in mitigating the impacts of severe drought; very large volumes of water were traded, in particular from the Murrumbidgee Valley.

Low water availability

Climate change and drought, or climate variability, have resulted in below-average rainfall in much of the Murray–Darling Basin and below-average inflows into the River Murray system over the past decade. No other drought on the historical record comes close to the severity of the current situation (see Figure 3.1).

Based on the lessons learned from these extremely dry conditions, a new framework has been established in the *Water Act 2007* (Cwlth) and the Murray–Darling Basin Agreement to provide for critical human water needs in very dry periods.

In early 2009, work began on the Basin Plan provisions relating to water for critical human needs (see page 10). At the same time, work began on a new schedule to the Murray–Darling Basin Agreement for Water Sharing. The new schedule will replace, for the long term, the interim water sharing arrangements that were agreed for the extremely dry conditions experienced in 2007–08 and 2008–09. It will specify water sharing arrangements as well as accounting and operational rules that are required to adapt to extremely dry conditions.



Note: Total includes Darling inflows but excludes Snowy Scheme releases.

*Year ending 30 June 1892.

Figure 3.1 River Murray system annual inflows from July 1891 to June 2009

Rainfall and inflows

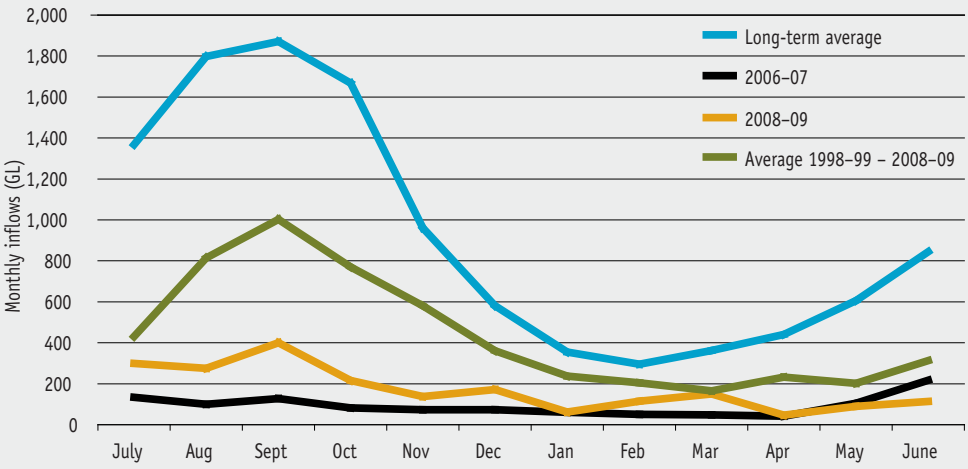
Rainfall was below average in 2008–09 for the southern Basin, which follows a longer term trend of severe rainfall deficits over the last 5 to 10 years. Above-average rainfalls were seen in November and December; however, January saw a return to hot and dry conditions and to longer term rain deficits, particularly across the higher yielding catchments of the Victorian Alps and Snowy Mountains.

In May there was very heavy rainfall (up to 400 mm) along the coast of south-east Queensland and northern New South Wales. This caused major flooding in coastal rivers; however, further inland the rainfall was less intense, although some areas in the northern Murray–Darling Basin received over 100 mm. The only significant streamflow responses were in the Moonie River in southern Queensland and the upper tributaries of the Border Rivers, but the total volume of water was very small. River transmission losses were high as water dissipated along complex anabranch systems, and only around 30 GL reached Menindee Lakes.

In 2008–09, total inflows to the River Murray system (excluding Snowy Scheme releases) were 2,075 GL. This is the third lowest inflow in the 118 years of records (see Figure 3.1) and only 19% of the long-term average of 10,995 GL.

The 2008–09 year was preceded by two years of very low inflows, and the combined three-year total of 6,115 GL is by far the lowest on record and almost half the previous historic minimum of 11,180 GL in the years 1943 to 1946. Monthly inflows through 2008–09 remained well below long-term monthly averages as well as averages for the last 10 years (see Figure 3.2).

River Murray system inflows have been below average for nine out of the last ten years. It will take a sustained period of above-average rainfall for river system inflows to recover to levels approaching the long-term average.



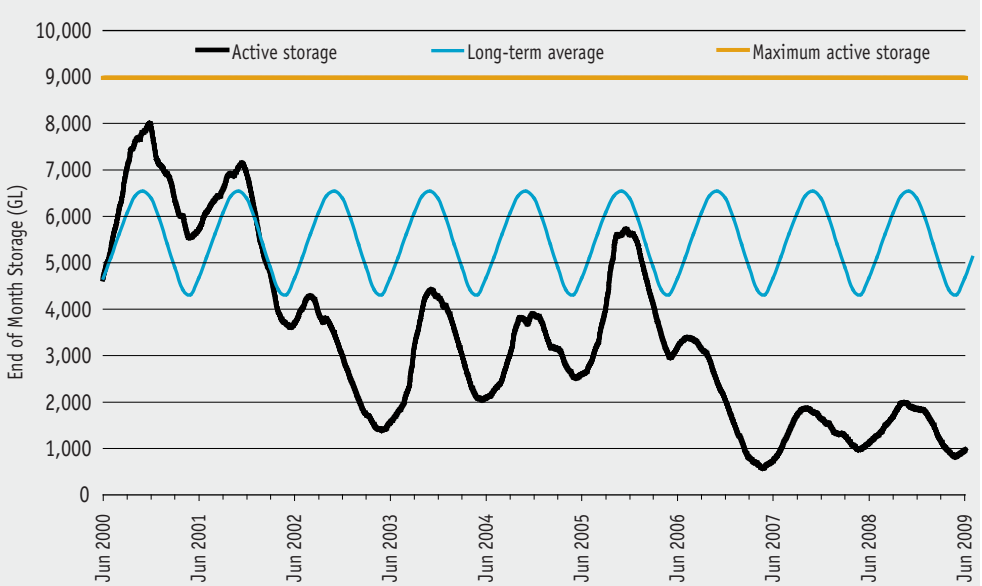
Note: Total includes Darling inflows but excludes Snowy Scheme releases.

Figure 3.2 River Murray system monthly inflows, 2008–09

Active storage

Active storage under MDBA control at the beginning of July 2008 was 1,270 GL, or 14% of capacity. By 30 June 2009, active storage had decreased to 1,190 GL, or 13% of capacity. Although this was 200 GL more than the historic minimum of 990 GL set at 30 June 2007, active storage was still well below the June long-term average of 5,100 GL. Storage levels have now been below average since early 2002 (Figure 3.3).

Water shares for New South Wales and Victoria in MDBA storages at the beginning and end of 2008–09 are shown in Table 3.1.



Note: Maximum storage = 8,980 GL

Figure 3.3 MDBA active storage, June 2000 to June 2009

Table 3.1 Water shares for New South Wales and Victoria, June 2008 and June 2009

	Storage at June 2008 (GL)			Storage at June 2009 (GL)		
Storage	**NSW**	**Vic.**	**Total**	**NSW**	**Vic.**	**Total**
Dartmouth Reservoir	205	409	615	358	397	755
Hume Reservoir	269	183	453	163	135	298
Lake Victoria	168	36	204	41	99	139
Menindee Lakes	541	0	541	228	0	228
Total	**1,183**	**629**	**1,812**	**790**	**630**	**1,420**

Notes:

Data relates to active storage.

Menindee Lakes has been in New South Wales control since March 2002. This resource does not become available to MDBA until the storage exceeds 640 GL.

Accounts are based on the best available data, which may contain some unverified operational data that could change in the future. Figures are rounded to the nearest GL.

Improving environmental outcomes

MDBA managed the delivery of 6.45 GL of The Living Murray environmental water at important sites along the Murray in Victoria, New South Wales and South Australia (details at page 28). This environmental watering commenced in mid-April to maximise the benefits of autumn conditions and supplemented water provided by state governments and the Commonwealth Environmental Water Holder.

The Lock 8 weir pool was raised temporarily in May, to minimise inflow to Lake Victoria for maintenance works, watering several wetlands and assisting with the pumping of The Living Murray water to wetlands on Mulcra Island. At Yarrawonga Weir (Lake Mulwala), a full drawdown took place in June to control the spread of the invasive aquatic weed *Egeria densa* (see pages 60–61).

In spring 2008, 800 ML of water managed by the New South Wales Murray Wetlands Working Group was used to maintain wetland vegetation at Reed Beds Swamp, which is a significant waterbird breeding area within the Barmah–Millewa Forest. The delivery of this water via Gulpa Creek was undertaken with the cooperation of New South Wales State Forests and New South Wales State Water.

During March 2009, algal blooms developed to 'red alert' levels along the River Murray, initially between Hume Dam and Torrumbarry Weir (a distance of 600 km) (see also page 43).

MDBA assessed possible mitigation options but, due to reduced water availability, there was no potential to increase flows to disperse the bloom without jeopardising water supply for essential needs in 2009–10. New South Wales and Victoria enacted treatment processes to protect water supplies pending the decline of the bloom with the onset of cooler weather.

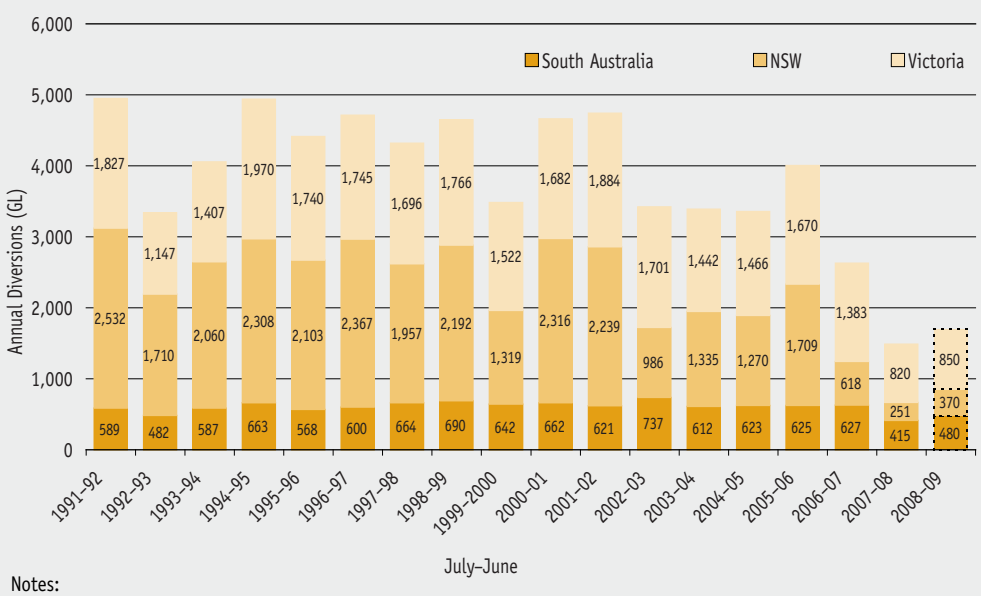
During April 2009, further algal blooms developed along the Murray as far downstream as Tooleybuc in the Edward River and in the Murray around Euston. By this stage some 800 km of the Murray was under red alert.

The Murray was not the only river to suffer from algal blooms, and red alerts were issued across the Basin, including on the lower Darling, Murrumbidgee and Lachlan rivers, and for Copeton, Keepit, Pindari, Split Rock and Chaffey dams.

Low state irrigation allocations and diversions

In Victoria, irrigators with high security licences for the Murray Valley were allocated only 35% of their entitlement. In New South Wales, irrigators with high security water licences for the Murray Valley were allocated 95% of their entitlement, while holders of general security licences were allocated only 12%. In South Australia, irrigators with high security licences were allocated 18% of their entitlement.

The total amount of water diverted by the states was around 1,600 GL, which includes water traded in from the Murrumbidgee (see Figure 3.4). Around 580 GL of allocated water in 2008–09 was carried over by individual water licence holders in preparation for the 2009–10 water year.



Notes:

Diversions include the lower Darling and any inter-valley trade received by a state.

Data presented for 2008–09 are based on hydrographic and operational data for New South Wales and Victoria and approximate data from the South Australian Department of Water, Land and Biodiversity Conservation.

Figure 3.4 River Murray system: state diversions, 1991–92 to 2008–09

Flow to South Australia

Flow to South Australia was 1,180 GL in the 2008–09 year, which was only one-quarter of the long-term median of 4,800 GL. The flow has now been below the normal entitlement (1,850 GL) for almost three years and has exceeded the long-term median in only two of the past 11 years.

MDBA, working with South Australia, altered the pattern of flows to maintain a sufficient flow past Lock 1 throughout the year. The Lock 1 flow minimised the wind-driven movement of saline water from the Lower Lakes upstream towards Adelaide's drinking water offtakes. Higher flows were delivered over the summer and autumn when diversions and evaporation losses were highest, with much lower flows during the winter and spring.

The Murray component of the Snowy Mountains Scheme

At 1 July 2008, the required annual release (RAR) from Murray 1 Power Station was 261 GL. RAR was gradually increased during 2008–09 to 816 GL and an additional 72 GL was released by Snowy Hydro under flexibility arrangements, resulting in a total release of 888 GL. The partner governments agreed that water released under the flexibility arrangements would be held over for use in 2009–10.

Special arrangements for water sharing and contingencies

In response to the continued low water resource availability, the partner governments agreed to special arrangements for the sharing of water resources between the states. These included:

- agreement that jurisdictions would be responsible for reserving water to meet critical human water needs in their state
- agreement on a number of contingency measures to assure delivery of critical human water needs as necessary
- provision in 2008–09 of South Australia's full dilution and loss entitlement of 696 GL to address water loss and system requirements
- agreement that water carried over from 2007–08 to 2008–09 by water users within a state would be quarantined from water availability estimates in 2008–09.

A series of operational measures continued in 2008–09 to maximise water availability, including:

- disconnecting a number of wetlands permanently inundated by weir pools to reduce evaporation, although a number of priority wetlands were watered for environmental benefits (for more information, see page 65)
- reduction of minimum regulated flows to reduce evaporation and maximise storage levels in the upper Murray.

An independent review of the accounting of special sharing arrangements was undertaken to confirm state water entitlements. The review found that entitlements were in accordance with the special water sharing arrangements, and recommendations were made for improving transparency. A series of upgrades to MDBA's models was also undertaken to improve sharing outcomes.

Significant challenges for operation of the River Murray system

With near-record low storage levels and inflows, the year began with most of New South Wales, Victoria and South Australia on zero or near-zero water allocations.

System operations were aimed at maximising water availability by storing as much water as possible in Dartmouth Reservoir and minimising losses along the river. (Dartmouth Reservoir is large, deep and in a cooler environment than other storages, and therefore loses less water to evaporation.) This meant that, as happened in 2007–08, river levels and flows fell well below historic averages.

Upper Murray system

At the start of 2008–09, storage in Dartmouth Reservoir was at 696 GL (18% of capacity) and storage in Hume Reservoir was 484 GL (16% of capacity).

Hume Reservoir in April 2009, when the amount of water fell to 2% capacity, the lowest since autumn 1968

Despite severe drought, the strategy of maximising storage in Dartmouth resulted in storage rising to 835 GL (21% of capacity) by the end of June 2009. While a useful improvement, this remains well below the long-term average of 1,530 GL.

Releases from Dartmouth remained at minimum rates for much of the year and were increased to 500 ML/day over the summer months, with some pulses of over 3,000 ML/day, to meet downstream demands. Releases from Hume averaged 10,000 ML/day over the summer months — well below the peak rates of 25,000 ML/day seen in years of high allocation.

Storage in Hume Reservoir peaked in early October at 1,069 GL (35% of capacity) and gradually fell to a low of 64 GL (2% of capacity) on 25 April — the lowest level since autumn 1968 when Hume storage fell as low as 28 GL (<1% of capacity). By the end of June 2009, Hume storage had recovered to 328 GL (11% of capacity) compared with the long-term June average of 1,530 GL.

Mid-Murray

In late April 2009, water stored in Lake Mulwala was used to help supply downstream requirements, resulting in the level of the lake falling. Thereafter, a full drawdown of Lake Mulwala took place from May to July in an effort to control the spread of the exotic aquatic weed leafy elodea (*Egeria densa*). Excessive growth of the weed was affecting recreational and tourism activities, and was interrupting the normal operation of both the power station and the fishway at Yarrawonga weir.

Lake Mulwala. A full drawdown of the lake took place from May to July 2009 to control the spread of *Egeria densa*, an invasive aquatic weed.

The lowering of the lake level is a method that provides viable weed control over the whole of the lake and is expected to provide recreational and tourism benefits for a number of years into the future.

A period of extreme hot and dry weather during late January 2009 resulted in higher irrigation demand and transmission losses and led to a period of very low river flows through Sunraysia.

Lake Victoria

Lake Victoria reached a peak of 366 GL (54% of capacity) in January 2009 after good rainfall had increased flows from both the Murray and Darling systems. The volume was drawn down to 141 GL (21% of capacity) in May 2009, which is the second lowest level on record. (The lowest was in July 1999 when the lake was intentionally lowered to 120 GL to assist a cultural heritage survey.) By 30 June, storage in Lake Victoria had recovered to 239 GL (25% of capacity).

Menindee Lakes

In September 2008, New South Wales began releasing water from Menindee Lakes to the Murray system, gradually increasing flows from around 100 ML/day to over 3,500 ML/day. Flows were slowly reduced to around 500 ML/day by February.

There was good rainfall in parts of the northern Basin during February, particularly near Bourke and Walgett, but much of it fell on flat, dry countryside and did not reach the river system. During March and April 2009, Menindee received only about 190 GL of inflow, which increased the storage level from 7% to 15% of capacity to secure Broken Hill's water supply and provide for local requirements.

Lake Menindee, the largest storage in the Menindee Lakes scheme. The lake has been empty since 2002.

Lower Lakes

The condition of the Lower Lakes in South Australia is grave and continued to deteriorate during 2008–09. Due to low flows to South Australia, the water level in Lake Alexandrina reached a new record low of –1.04 m AHD in April 2009, although it did rise slightly after that (see Figure 3.5). There has been no discharge to the sea since October 2006.

As the lake levels drop, more mudflats are exposed, and there is a serious risk of acidification. Pumping of water from Lake Alexandrina to Lake Albert started in May 2008 to maintain the Lake Albert water level and prevent further exposure of sulfide sediments. South Australia ceased pumping on 30 June 2009 and is currently looking at alternative management options, such as bioremediation, to reduce the risks of acidification within Lake Albert.

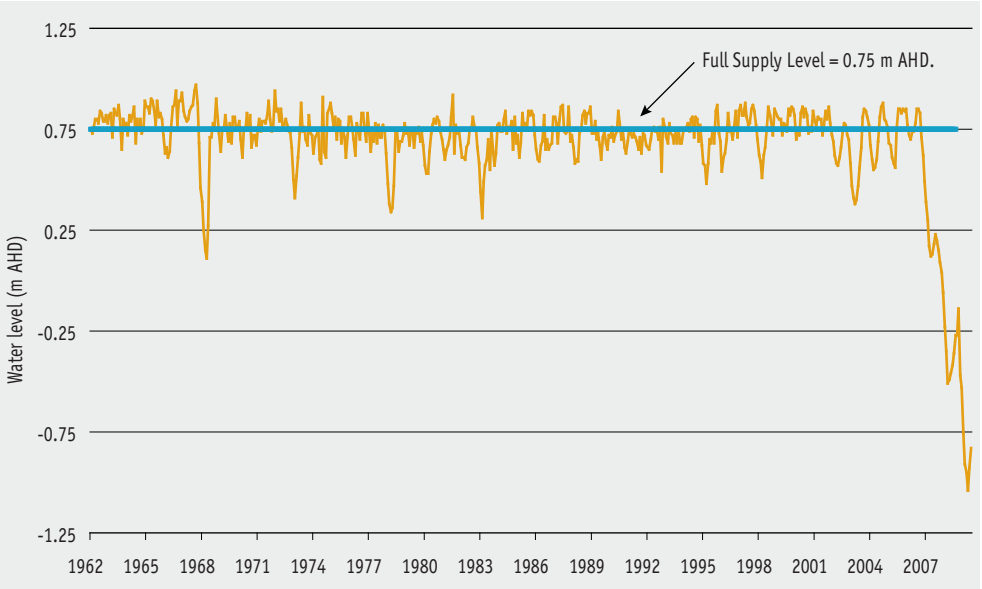


Figure 3.5 Lake Alexandrina water levels, January 1962 to July 2009

Definition: bioremediation

Bioremediation is the use of micro-organisms and their by-products as a means of reverting the chemistry of a contaminated environment to an uncontaminated state. Processes being considered for Lake Albert include using micro-fine limestone and planting shallow-rooted plants to mitigate the risks of acidification in the lake.

Operations review

The River Murray System Operations Review built momentum during the year. Progress included:

- preparation of a required 'objectives and outcomes' document on river operations
- review of the benefits of having more variability in releases from Dartmouth Dam
- review of lessons learned during the current drought
- documentation of river operating rules and practice
- initial hydrological modelling studies on some matters that were of particular interest to jurisdictions (e.g. Lindsay River Allowance and possibilities for South Australia's storage right).

In addition to these projects, additional future priorities will include a review of the operations relationship between the lower Darling and the River Murray system, and the continuation of a study on the future management of the Barmah Choke (see page 68). The operations review also has close links to the Darling River Water Savings Project, which includes consideration of possible infrastructure improvements to the Menindee Lakes to yield water savings.

In coming years, the operations review will continue to adapt to changes in the water policy context of the River Murray system, such as the Basin Plan and Water for the Future. The operations review will provide operational detail to support the implementation of these policies for the River Murray system.

Water monitoring data for the River Murray

One of MDBA's responsibilities is to manage and streamline the collection and delivery of reliable and timely water information for day-to-day river operations and other business activities. An automated data acquisition system has been implemented to deliver near to real-time river information to river operators and modellers. This system continues to expand as more data is ingested via the automated data acquisition system. Recent developments and increases in data acquisition coverage enabled information on daily river levels and storage volumes to be delivered to the general public via the MDBA website (see pages 106, 108–109).

With very low river levels continuing as a result of the drought, there is an ongoing need for additional flow measurements to maintain the accuracies of flow-rating tables

across the system. In locations of critical importance, upgrades in technology and installation of additional monitoring stations are essential to ensure that the best information is collected and made available to all stakeholders. A number of monitoring sites have been installed and/or upgraded, funded by both Bureau of Meteorology modernisation and extension funding, and MDBA funding. This includes the installation of two new acoustic Doppler velocity meters at the South Australian border to improve the reliability and accuracy of flow measurements to South Australia.

Water resource modelling

MDBA develops, operates and maintains river models and hydrographic data management systems used for purposes such as river management, water sharing and salinity management, and for other water resource issues and projects.

The ongoing water scarcity focused attention on state water shares in 2008–09. Extensive work was undertaken in reviewing MDBA's record of state water diversions and in supporting an external review of the River Murray state water accounts. Modelling for The Living Murray initiative has been well advanced through the course of the year (see below). Forecasts of water availability continue to be refined, and systems provided for assessing resource management options.

Key modelling tasks completed include:

- developing rostering and scheduling methods for the delivery of The Living Murray water to the icon sites, and systems to account for water use under The Living Murray
- extensive upgrading of MDBA's modelling suite including:
  - the addition of detailed icon site models
  - development and implementation of models capable of employing genetic algorithms to select the optimum strategy from a range of alternative strategies
- assessing options for state water sharing
- informing Lower Lakes management decisions
- improving access to continuously monitored real-time data
- maintaining and developing the Basin Salinity Management Strategy salinity register
- supporting Cap processes, including publication of the Water Audit Monitoring Report and improvements to the management of water audit data
- assisting CSIRO and the eWater CRC (see page 80) in the development of models
- reconciling traded allocations
- providing probability-based forecasts.

Wetland disconnection

In response to critical water shortages in 2007–08, several wetlands were temporarily disconnected from the river in order to reduce evaporative losses under the Dry Inflow Contingency Planning Initiative.

Of the 10 wetlands disconnected in the River Murray system under this initiative, several were watered in 2008–09 in order to avoid environmental damage, and one wetland was reconnected.

A rigorous monitoring program continued at each disconnected wetland in 2008–09 to allow rapid identification of, and response to, any impacts on the environment and/or water supplies. Under the monitoring protocol developed by the Murray–Darling Freshwater Research Centre, monitoring will continue for six months following the refilling of disconnected wetlands.

Acid Sulfate Soils Risk Assessment Project

Record low inflows and river levels in recent years have led to the drying of many permanent wetlands in the Murray–Darling Basin, resulting in the exposure of acid sulfate soils. The impacts of these soils had previously become an issue only at localised sites, but it became clear that acid sulfate soils may present a significant larger scale issue in some parts of the Basin.

In March 2008, the Ministerial Council agreed to support an urgent project aimed at assessing the spatial extent of, and risk posed by, acid sulfate soils at priority wetlands in the River Murray system, including Ramsar wetlands and other key environmental sites in the Murray–Darling Basin.

Key achievements in 2008–09 include:

- desktop assessment of more than 19,000 wetlands throughout the Basin
- development of a standardised method for rapid assessment of acid sulfate soils, and delivery of training courses on identification and rapid on-ground assessment of acid sulfate soils to more than 75 regional agency staff and landholders
- rapid on-ground assessment of approximately 1,450 wetlands
- detailed assessments at high-priority wetlands, including 15 of the Basin's Ramsar wetlands, 80 wetlands on the River Murray between Lock 1 (Blanchetown) and Wellington, and sites in the Loddon River catchment in north central Victoria.

The project was also instrumental in collecting data to support the emergency management of acidification risk under way in South Australia's Lower Lakes and its tributaries.

Definition: acid sulfate soils

Acid sulfate soils form naturally when sulfate-rich water (e.g. saline groundwater, or sea water) mixes with sediments containing iron oxides and organic matter. Under waterlogged, anaerobic (oxygen-free) conditions, bacteria convert sulfates to sulfides. These sulfides react with metals to form sulfidic sediments.

While this process occurs naturally, changes to the hydrology of inland rivers and wetlands have contributed to the accumulation of these sediments in some areas. If left undisturbed and covered with water, sulfidic sediments pose little threat. When exposed to oxygen, such as under drought conditions, chemical reactions may lead to the generation of sulfuric acid. When these sulfuric sediments are re-wetted and the amount of sulfuric acid produced exceeds the buffering capacity of the system, there is a risk that sulfuric acid may be released into the water, adversely affecting the health of wetlands and/or rivers.

Other risks associated with acid sulfate soils include mobilisation of heavy metals, decrease in oxygen in the water column, and production of noxious gases. These processes can lead to substantial environmental damage and serious impacts on water supplies and human health.

MDBC Strategic Plan 2005–2010, Strategy 2.2: Support the development of open, barrier-free markets for interstate water

Developing the interstate water market

Background

The Water Trade Program seeks to ensure the effective and efficient operation of an interstate water market within the southern connected Murray–Darling Basin.

During 2008–09, the Water Trade Program continued to coordinate and refine the legal instruments required to facilitate interstate water trade: Schedule D to the Murray–Darling Basin Agreement and its supporting protocols.

Highlights

- During 2008–09, an unprecedented volume of 593 GL of interstate allocation transfers were processed, mostly for use in permanent horticulture — the highest ever volume of interstate allocation transfers.
- Temporary amendments to the Lower Darling and Barmah Choke trading rules were made for 2008–09, creating more opportunities for water users to trade allocations interstate.
- Water accounting information gathered this year has assisted the National Water Accounting Development project by developing water accounting standards.

Interstate allocation transfers

Water market trends from the 2007–08 water season for interstate allocation transfers have continued into the 2008–09 water season, albeit on a much larger scale (see Figure 3.6). This was primarily due to low water resource availability and only a small allocation pool available for use.

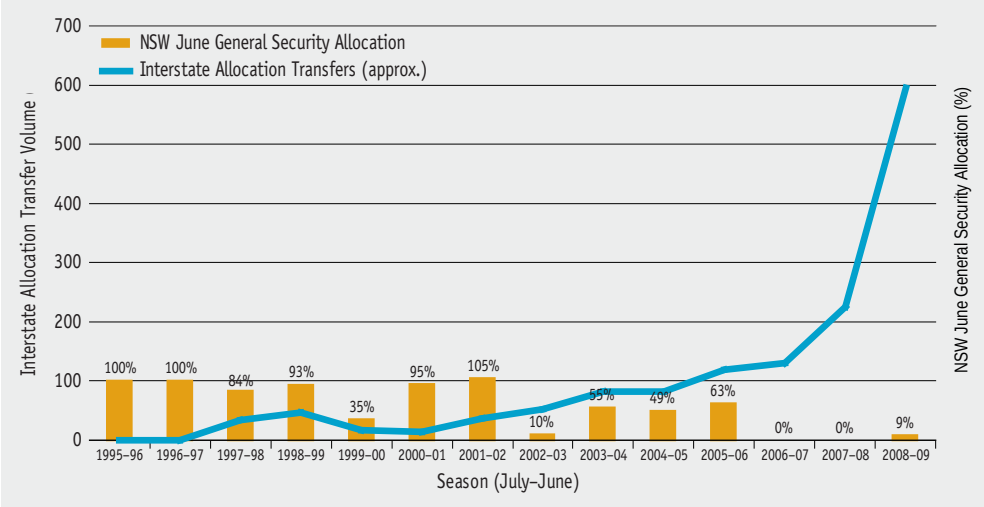


Figure 3.6 Increase of interstate allocation transfers against New South Wales end-of-season general security allocation, 1995–96 to 2008–09

Total interstate water trade in the southern connected Basin for 2008–09 was 593 GL compared with total interstate allocations trades of 225 GL for the 2007–08 year. Again, New South Wales was a net exporter of interstate allocation trades of 553 GL. Both Victoria and South Australia were net importers of interstate allocation trades, with Victoria importing a net of 217 GL and South Australia importing a net of 336 GL. (Amounts are given to the nearest GL.)

The increase in volumes of interstate water transfers highlights the increasing importance of the water market to water users. With ever-changing priorities among water users, the interstate water market has continued to evolve, creating flexibility to buy and sell water products across state boundaries.

Temporary changes to Lower Darling trading rules

Under normal trading rules, water cannot be traded out of the Lower Darling when the management of the Menindee Lakes is under New South Wales control. The former Murray–Darling Basin Commission (MDBC) agreed to relax this rule for 2008–09, allowing allocation transfers from the Lower Darling to the River Murray system.

The relaxation of the Lower Darling trading rules created the ability for water users holding water entitlement within the Lower Darling to trade allocation out of the system. This allowed these users to make informed business decisions regarding their individual water management.

Barmah Choke trading rules

In September 2007, the former MDBC agreed to allow water allocations to be transferred from above to below the Barmah Choke for the remainder of the 2007–08 water year.

Under normal flow conditions, water allocation transfers downstream through the Barmah Choke are not allowed, as the choke constrains the volume of water that can pass. As low-flow conditions prevailed during the 2008–09 year, constraints on the channel capacity of the Barmah Choke were unlikely, given the small quantities of water to be delivered in the season. For this reason the Murray–Darling Basin Authority (MDBA) made three announcements during the 2008–09 water season that allowed water allocation transfers to water users to occur from above to below the Barmah Choke for the whole of the 2008–09 year. The relaxation assisted these water users in making management decisions regarding their individual water management.

Definition: the Barmah Choke

The Barmah Choke is a section of the River Murray upstream from Echuca that is narrow, constraining the volume of water that can pass during major floods. About 25,000 years ago, an uplift of land created the Cadell Tilt, a north–south geographical fault on the earth's surface near Deniliquin and Echuca. The impact of the Cadell Tilt on the River Murray led to flooding of the original path of the Murray and a 'break out' at the Barmah Choke, creating a new path for the river. The cut through the Cadell Tilt at the Barmah Choke is much narrower than the original broad valley to the north.

During floods, large volumes of water are temporarily banked up behind the Barmah Choke, flooding the wetland system known as the Barmah–Millewa Forest.

Improving water accounting systems

During 2008–09, the independent Water Accounting and Development Committee (WADC)[1] office moved from within the MDBC premises to the Bureau of Meteorology, which is responsible under the *Water Act 2007* (Cwlth) for the development of water accounting standards.

The focus of water accounting activities within MDBA over the past year has been to:

- support the Bureau of Meteorology's production of the Method Pilot National Water Account due for publication in December 2009, including by developing water accounting standards
- develop environmental water accounting and reporting for the Murray–Darling Basin.

A major task completed during the year was the Murray–Darling Basin Environmental Water Recovery Report.

1 The Water Accounting Development Committee (WADC) was established by the Natural Resources Management Ministerial Council as an independent advisory body. (The Ministerial Council was formed by agreement between Australian federal, state and territory governments.) WADC has been replaced by the Water Accounting Standards Board (WASB), which is based at the Bureau of Meteorology. WASB functions as an independent expert advisory board and is responsible for the oversight and coordination of all Australian Water Accounting Standards development activities.

A windless day at the Barmah Choke, a narrow part of the River Murray that runs through the Barmah–Millewa Forest. The photograph was taken in July 2008.

Dartmouth Reservoir in May 2009.

MDBC Strategic Plan 2005–2010, Strategy 2.3: Sustain and improve physical asset base to contemporary best practice

Managing assets

Background

The River Murray Operations assets, principally those shown at Schedule A of the Murray–Darling Basin Agreement, are owned by the asset-controlling governments (Australia, New South Wales, Victoria and South Australia). An Asset Agreement is in place between the four partner governments and the Murray–Darling Basin Authority (MDBA) regarding the management of the River Murray Operations assets. For the most part MDBA carries out its roles and responsibilities under the Asset Agreement and the Murray–Darling Basin Agreement through the state constructing authorities from New South Wales, Victoria and South Australia. The relevant authorities are:

- State Water Corporation (State Water NSW) (the NSW Department of Water and Energy also undertakes significant works in relation to salt interception schemes, river improvement works, hydrometric and water quality monitoring, and environmental works)
- Goulburn–Murray Water (Victoria)
- South Australian Minister for the River Murray, including the operating agents South Australian Water Corporation (SA Water) and the South Australian Department of Water, Land and Biodiversity Conservation.

The River Murray Division of MDBA oversees the works associated with management of the assets. The Executive Director River Murray has particular delegations under the Murray–Darling Basin Agreement and the Asset Agreement.

A strong relationship has developed between MDBA and the state constructing authorities, so that maintenance is proactive, decision making is generally by consensus, and issues are raised by the constructing authorities at an early stage.

Highlights

- The navigable pass upgrade and associated fishway construction at Lock 3 were near completion; the contract was awarded for construction of similar works at Locks 2, 4, 5 and 6; and construction started at Lock 6.
- The Dam Safety Project at Dartmouth progressed to detailed design stage, in conjunction with completion and running of a physical hydraulic model of the spillway.
- The Hume Spillway Southern Junction dam safety project progressed to detailed design and approval of the business case to proceed to construction.

- The concept designs for dam safety projects progressed, involving Hume Spillway flood routing capacity, Hume Spillway Southern Training Wall and Lake Victoria storage.
- The sand pumping project at the Murray Mouth was refined to maintain the connection between the Coorong and the sea in spite of no flow through the barrages for more than two years, resulting in a 20% reduction in cost.
- Construction was completed at Waikerie 2L Salt Interception Scheme (SIS), bringing Pyramid Creek SIS to full borefield production, and the floodplain component of the Loxton SIS was commissioned.
- All major contracts were let for construction of the Murtho SIS, and a contract was awarded for project management of the construction of the Upper Darling SIS.
- The lock refurbishment program was well under way, with completion of work at Locks 1, 5 and 10.

Assessment of asset management

Each year the Murray–Darling Basin Authority (MDBA) inspects all the River Murray Operations assets, specifically to assess the performance of the staff at each site (and the asset managers of the state constructing authorities) in relation to the operation and maintenance of the assets. Assessment criteria include condition of the assets, operations and maintenance documentation, occupational health and safety documentation and performance, achievement of the works program set for the year, and expenditure against budget in meeting the program.

At the time of preparing this report, the annual assessment of the structures for 2008–09 was under way. Although not complete, it is pleasing to report that the general standard of maintenance is improving overall and that some of the sites have made significant improvements in the condition of the assets as well as completion of work programs on time and within budget.

Compliance with ANCOLD Guidelines

MDBA places a high priority on ensuring all its dam assets comply with Australian National Committee on Large Dams (ANCOLD) Guidelines. In 2008–09, significant progress was made on six major dam safety projects that will help to substantially meet this key performance indicator within five to ten years, depending on future funding. The six priority projects to be addressed are:

- strengthening a spillway training wall at Hume Dam
- improving drainage and filter capacity at the embankment–spillway southern junction at Hume Dam
- improving the flood discharge capacity at Hume Dam

- improving the flood discharge capacity at Dartmouth Dam
- upgrading the outlet structure at Lake Victoria storage
- improving the structural stability of some of the embankments along Frenchmans Creek and at Lake Victoria storage.

Two steering committees with appropriate jurisdictional input have been established to oversee the works, which are in the concept design or detailed design stage. Murray–Darling Basin Ministerial Council approval and funding has been obtained to construct the Hume Dam Spillway Southern Junction upgrade. Business cases are to be produced for approval, funding and construction of the other five projects.

Major works on assets in 2008–09

Dartmouth Dam

A hydraulic model, at a scale of 1:60, of the Dartmouth Dam spillway has been constructed and is being used to assist with detailed design of the spillway upgrade and crest remedial works at the dam. Even at this scale, the model is over 3 m high. It is a valuable aid in assessing the impact of flood discharges through the spillway and over the excavated rock cascade downstream of the spillway crest.

A consultant has been appointed to undertake the detailed design of the spillway upgrade and crest remediation works at the dam. Work will be done to test the design assumptions on the hydraulic model and refine details to optimise the performance of the upgraded structure.

Hydraulic model of Dartmouth Dam in action. The model is being used to test the design of upgrades to the dam.

The size of Dartmouth Dam presents many challenges for operations and maintenance. Following the successful replacement of the low-level outlet works refilling valve in May 2008, refurbishment of the pumps and pipework in the low-level drainage gallery was completed during the year. Improvements were made to some components of the embankment instrumentation that will provide safer access and allow more efficient operation of the system. Site office security and the visitors' centre displays were upgraded. In accordance with ANCOLD guidelines for dam safety management, the comprehensive (five-yearly) dam safety inspection was carried out in May 2009.

Hume Dam

This year the emphasis at Hume Dam has been on progressing the three dam safety projects. To support the studies, geotechnical investigations have been completed in the embankment and in the foundation of the main embankment. A three-dimensional digital model of the spillway southern junction and spillway southern training wall has been developed. It includes details of embankment zones, the concrete core wall, the tower block and the various drainage systems. The model is used to assist with stability analyses of the existing structures and the detailed design of the proposed remedial works.

The flood hydrology studies are near completion. Early indications are encouraging in that large-scale spillway augmentation may not be required. However, because this is such a critical matter, further checking of the results is under way, prior to finalising recommendations in 2009–10.

The spillway southern junction concept design has been finalised, optimising dam safety improvement for dollar investment. The concept is currently being taken to detailed design; the consultants are working closely with construction experts to ensure a robust, constructible design is achieved.

The geotechnical investigations highlighted that significant ongoing settlement of the embankment could be expected. As a result, the design options for maintaining stability of the spillway southern training wall have moved towards external buttressing of the wall rather than a straightforward replacement of the existing anchor bars. This year, concepts have been finalised and a recommendation prepared for consideration by State Water NSW and MDBA.

Planned maintenance and surveillance activities at Hume Dam continued in accordance with schedules. Some of the more significant tasks are load testing on a number of the post-tensioned cables in the concrete gravity dam section, and the ongoing program to sand blast and repaint one or two of the large spillway gates per year. The outlet works gantry crane 25-year structural certification and 10-year electrical and mechanical certification were completed during 2008–09.

Yarrawonga Weir

A program of significant strengthening work on the superstructure that supports the winches for operation of the large spillway gates at both the northern and southern weir structures was completed this year. The storage (Lake Mulwala) was drawn down

View from downstream of Yarrawonga Weir showing the southern structure gates, superstructure housing the winches, and the fish lock adjacent to the power station in the foreground.

in the period from May to July 2009 in a repeated effort to control an invasive aquatic weed (*Egeria densa*) by exposing it to frosts and drying out (see page 60).

Yarrawonga Weir was assessed as the best maintained MDBA asset during 2007–08. In recognition of their performance, the Goulburn–Murray Water site team, led by Tony Beamish, was awarded MDBA's Collings Trophy by the Rt Hon. Ian Sinclair, AC (President of the former Murray–Darling Basin Commission) in November 2008. Over the past 12 months the team had made significant progress in finalising a number of important projects following the major upgrade of the site about six years ago. Typical works included painting of the bridge beams, superstructure, the large gates, and refurbishment of the winches and controls.

Other locks and weirs

The lock chamber refurbishment program continued this year, with the successful completion of works at Lock 5 and Lock 10 in October 2008 followed by Lock 1 in April 2009. The works are part of a six-year planned maintenance program on all of the locks along the river. The comprehensive maintenance involves dewatering of the locks; repainting of the four large gates; refurbishment or replacement of the large valves used to fill and empty the locks, including the frames that hold the valves; and inspection of the drains under the locks. It provides the opportunity to inspect and/or repair any other items not normally accessible while the lock is in service. The lock is closed to river traffic during the maintenance works and so the works are programmed to minimise inconvenience to the public.

The review of options for upgrading the existing Dethridge Weir at Lock 11 (Mildura) has been completed. The study determined that mechanised gates could be retrofitted to the existing trestles to improve operation of the weir and, when combined with other improvement measures, would extend the life of the existing weir structure, potentially by up to 40 years. A prototype trestle will now be fabricated to test the proposed system.

Navigable pass upgrade and fishways project

By the end of 2008–09, upgrade of the navigable pass and construction of a fishway were almost completed at Lock 3 (Overland Corner). In November 2008, approval was given by Ministerial Council for SA Water to award a single contract to construct the navigable pass upgrade and fishways at Locks 2, 4, 5 and 6. Construction work commenced at Lock 6 and is now well advanced.

Detailed design has commenced on a similar upgrade of the navigable pass and fishway at Lock 15 (Euston), and provision for fish passage at Lock 11 (Mildura) in conjunction with the upgrade of the Dethridge Weir trestles. Once the above fishways are completed, provision for fish passage will have been established on the main stem of the river between the sea and Hume Dam, a distance of 2,225 km.

Lake Victoria

Studies commenced during the year to address the higher priority dam safety projects at Lake Victoria in response to actions recommended by the 2007 Portfolio Risk Assessment. A consultancy was awarded to develop options for remedial works, and prepare concept designs for the preferred options to upgrade the outlet regulator structure and for remedial works at the major creek crossings along the banks of Frenchmans Creek.

At Scaddings Bridge, which provides access to Lock 8 from the Lake Victoria road, the existing steel bridge piers were encased in concrete to extend their life.

In 2008–09, a significant change to the staff establishment at Lake Victoria was finalised. It provides greater capacity to the cultural heritage program as well as enabling cooperation across all programs in place at Lake Victoria. When combined with the significant investment over the past two years in major plant and other upgrades, it has been possible to achieve a noticeable improvement in the condition of the water delivery assets as well as major advances in the land and cultural heritage management programs.

In 2007–08, a scientific review panel consisting of experts with skills in cultural heritage, riverine ecology, geomorphology, hydrology and rangeland management was convened. In the past year, the panel has reviewed vegetation and erosion monitoring reports and made recommendations on improvements to these monitoring programs. It is currently working on a redesign of the monitoring programs to make sure they are appropriately designed for monitoring impacts on cultural heritage at the lake. The panel will play an ongoing role in reviewing monitoring activities, identifying and guiding further research needs and reviewing the results of such research.

Ewe Island Barrage from the air. Moving from the background to the foreground, we see the sea, then Younghusband Peninsula, a section of the Coorong, and the barrage (centre). The sand behind the barrage is a dry area of the bed of Lake Alexandrina.

Barrages

The low level of the Lower Lakes and the continuing drought conditions have meant that large sections of the barrages have been retaining sea water on the Coorong side but no fresh water on the lake side. Maintenance of the seals and additional works to minimise leakage of salt water into the Lower Lakes has been an important task for the barrages team this year.

MDBA has provided resources and advice to the South Australian Government relating to acid sulfate soils risk and other risks at the Lower Lakes.

Menindee Lakes

In accordance with ANCOLD guidelines for dam safety management, the comprehensive (five-yearly) dam safety inspection of the Menindee structures was carried out in June this year.

Detailed and user-friendly operation and maintenance manuals have been prepared for the Menindee site. The manuals have been adapted for other sites, and the other state constructing authorities are referring to them when upgrading their operations and maintenance manuals.

Mitta Mitta River channel improvements

Erosion protection and repair works were required in 2006–07 following that season's operations, which involved transfer of very large volumes of water from Dartmouth Reservoir to Hume Reservoir. These works were continued in 2007–08 to enable the Mitta Mitta River to sustain prolonged high flows into the future. Works to maintain channel capacity continued in 2008–09, with a focus on the control of willows that have fallen into the river and caused erosive flow diversions around them.

Works have also targeted broader environmental outcomes for the riparian zone, where possible, through revegetation, willow control and stock exclusion.

Hume to Yarrawonga reach

Hume to Yarrawonga River Management Plan

Works continued under the 2002 River Management Plan for the Hume to Yarrawonga reach of the River Murray. The advisory group, with wide representation, continues to meet regularly to review progress and provide advice to MDBA on future directions for the program.

Hume to Yarrawonga River Murray Works Program

By the end of 2008–09, river management plans had been completed for all 15 subreaches of the 200 km Hume to Yarrawonga reach of the River Murray. These plans assist in the preparation of annual streamside restoration work programs. The second of a four-year accelerated program of works has now been completed. As a result, it is expected that the capital works component of the plan will be completed by 2011. With nine years of on-ground works behind it, the outcomes from this program are now highly visible.

Erosion control works comprised of willow removal, placement of log and rock revetments and the construction of timber groynes (small jetties that protect against erosion) have allowed for the restoration of a further 5.5 km of degraded river in 2008–09. Other works included fencing off 15 km of riverbank and establishing 42,000 native plants.

Work began in 2008 on developing a monitoring program to assess the effectiveness of the erosion control works for managing the impacts of channel change. The monitoring program will inform adaptive management and enhance the existing works program by improving understanding of geomorphic processes.

Controlling erosion with a log revetment on the River Murray near Corowa

Hume to Yarrawonga reach land management review

Significant progress continued in 2008–09 towards finalising the program of purchasing easements in the Hume to Yarrawonga reach to confirm MDBA's rights to pass regulated flows within existing channel capacity on affected properties in Victoria and New South Wales. The easement purchase program closed on 30 June 2008. By November 2008, all 107 offers for purchase of easements had been issued or reissued and 84 accepted.

Murray Mouth sand pumping

It is now well over two years since water flowed through the barrages to the sea. Dredging at the Murray Mouth has been maintained to enable connectivity between the sea and the Coorong. This is the seventh year of operation of the dredges. It has been successful not only in achieving tidal ratio targets in the Tauwitchere and Goolwa arms of the Coorong but also in reducing costs. The total cost of dredging for 2008–09 was $4.5 million — a $0.4 million reduction in actual dollars from the 2007–08 costs.

The use of bathymetry (that is, surveying underwater topography), aerial photography and sophisticated hydraulic modelling has ensured that the dredging operations are providing the best shape and depth of channels to optimise tidal water flow without being so strong that sand transport from the ocean simply refills the dredged channels. It is the third year in a row that use of a one-dredge operation has kept expenditure well below budget.

MDBC Strategic Plan 2005–2010, Strategy 2.4: Improve environmental and consumptive use outcomes through development of improved water management and delivery tools

Improving river modelling

Background

The Murray–Darling Basin Authority (MDBA) strategy to improve water management and delivery tools includes the creation of:

- a daily model of the River Murray system
- a real-time model of the upper Murray.

The work involves extensive collaboration with research organisations such as the eWater Cooperative Research Centre (CRC).

Highlights

- A test case for the eWater CRC River Manager software product, for the River Murray upstream of Yarrawonga, is under way.

Definition: eWater Cooperative Research Centre (CRC)

eWater CRC is a joint venture made up of 45 Australian water-cycle management, consulting and research organisations, supported by the Australian Government's Cooperative Research Centres Program. eWater builds water management tools for partners and also markets those tools. The tools include decision software, guidelines, forecasting models and databases designed for use in operating river systems, managing catchments, developing monitoring programs, and guiding investment in river and catchment restoration.

River operations and planning tools for the River Murray system

The eWater CRC is developing the next generation of tools to support river system planning, management and operation. Two products are being developed:

- River Manager: a model to support planning and policy decision making
- River Operator: a model to support day-to-day operation decisions.

River Manager

Significant acceleration has occurred in the development of River Manager as a result of additional funding from the Department of the Environment, Water, Heritage and the Arts and the National Water Commission. The accelerated development culminated

in the release of a base model, which is ready to initiate hydrology testing. As part of the acceleration, the River Manager model is being trialled in four catchments across the Murray–Darling Basin in partnership with the relevant jurisdictions. MDBA is contributing resources to support the design of River Manager (in relation to the way in which the model describes physical and management functions) and the trialling of River Manager on the River Murray. MDBA also contributes through representation on the High-Level Steering Committee, User Reference Group and Technical User groups.

River Operator

Work commenced in the last financial year to develop River Operator. River Operator is being designed to support the efficient management of water storage, flow and delivery in regulated river systems. It will support operation decisions such as how much water should be released from storage on a given day. River Operator builds on the functionality provided by River Manager. Development in the last year has focused on creating an interface to enable river operators to interact with the model in a way similar to that for current tools.

A real-time model of the upper Murray

MDBA continued to work with the state data providers to automate the process of gathering data for daily river operations and improving the hydrographic networks. In 2008–09, MDBA initiated a dialogue with the Bureau of Meteorology to explore the possibility of leveraging the hydrologic forecasting activities occurring within the bureau to develop a real-time rainfall run-off model for the upper Murray and mid-Murray.

Management and accountability

Management and accountability

Chapter 4 Using best practice financial, management and governance systems

Chapter 4 and its main subsections relate to the Murray–Darling Basin Commission's Strategic Plan 2005–2010. Under the transition provisions, MDBA continued to report against the objectives of the Strategic Plan 2005–2010 and the related Business Plan during the 2008–09 financial year.

The relevant sections of the MDBC Strategic Plan are noted under the chapter titles and main subsection headings.

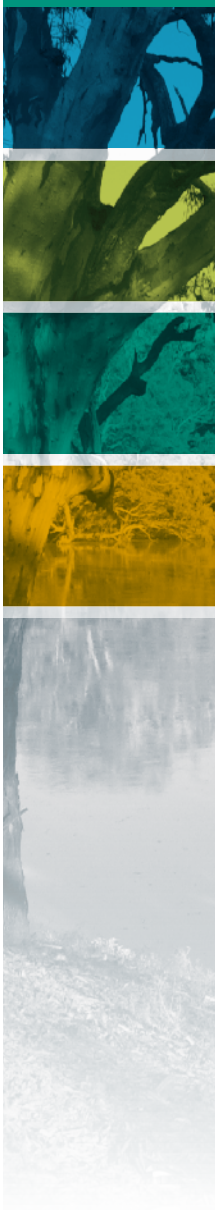
Chapter 4

Using best-practice financial, management and governance systems

MDBC Strategic Plan 2005–2010, Objective 3: Delivery of high-quality advice to council, and achievement of its endorsed priorities, through strengthened capacity of the commission and the commission office

Members of the Murray–Darling Basin Authority, in Canberra in June 2009 for their first meeting, pose on the steps of Parliament House.

Chapter 4



Overview

Corporate services were provided to the Murray–Darling Basin Authority (MDBA) by the Department of the Environment, Water, Heritage and the Arts under a memorandum of understanding from 8 September to 14 December 2008. Following the transition of staff and systems from the Murray–Darling Basin Commission (MDBC) to MDBA on 15 December, MDBA provided all corporate services internally.

The establishment of MDBA as a new Commonwealth agency, and of the corporate governance framework and corporate service delivery that the new status entailed, was a major focus during 2008–09. This involved the implementation of sound policies, practices and procedures under both the *Financial Management and Accountability Act 1997* (Cwlth) and the *Public Service Act 1999* (Cwlth).

Priority was also given to implementing reporting frameworks to ensure that MDBA met its obligations in relation to financial reporting, risk and fraud management, Senate Order requirements for contracts and file creation, freedom of information requirements and Legal Services Directions.

Effective management of media relations, online initiatives, publication production, and information resources all strengthened stakeholder and community access to information about the Basin and the work of MDBA and the former MDBC.

MDBC Strategic Plan 2005–2010, Objective 3, Strategy 3.1: Employ contemporary best-practice financial and management systems

Enhancing financial and management systems

Highlights

- Developed Chief Executive Instructions to provide clear and comprehensive guidance to staff on corporate governance matters.
- Reconfigured all financial frameworks to comply with obligations under the *Financial Management and Accountability Act 1997* (Cwlth) and *Public Service Act 1999* (Cwlth).
- Developed the first MDBA Corporate Plan covering the period 2009–10 to 2012–13.
- Successfully implemented a project management framework.

Business planning

The approved Murray–Darling Basin Commission (MDBC) Strategic Plan 2005–10 and the 2008–09 Business Plan provided the framework under which MDBC and the Murray–Darling Basin Authority (MDBA) operated during 2008–09 in order to implement our responsibilities under the Murray–Darling Basin Agreement, and the policies and decisions of the Ministerial Council.

In July 2008 work started on the business planning cycle for 2009–10, which involved consultation with jurisdictional partners on the range of program activities and expenditure. Consultation was carried out through high-level committees, working groups and taskforces where relevant.

Following the transition of the MDBC functions to MDBA on 15 December 2008, and in accordance with Schedule 1 to the *Water Act 2007* (Cwlth), work started on the development of the first MDBA Corporate Plan to cover the period 2009–10 to 2012–13. The plan builds on a draft developed by MDBC and incorporates the new Basin planning role and the reporting requirements under the Water Act. Detailed consultation was undertaken with jurisdictional partners during the development of the plan, and the proposed plan was considered by the Basin Officials Committee in May 2009. It was then submitted to Ministerial Council and approved at the council's 12 June meeting. The plan was also endorsed by the Murray–Darling Basin Authority at its first meeting on 1–2 June 2009.

Performance reporting

Financial and non-financial performance and progress in 2008–09 were reported against the MDBC Strategic Plan and Business Plan, as outlined in the previous section above.

Two summaries of progress against the Strategic Plan's key performance indicators are included in this annual report:

- up to and including 14 December 2008 in the MDBC report (page 195)
- for the whole financial year in Appendix B of the MDBA report (page 165).

MDBA took the opportunity created by the transition of the MDBC functions to review the internal performance reporting framework, in particular how the internal performance reporting aligned with the reporting obligations specified in the Portfolio Budget Statements and the Water Act. A revised framework — incorporating a holistic approach to quarterly performance reporting and consolidating reporting on financial and non-financial performance, risk management, project management and workforce metrics — is now being developed for implementation during 2009–10.

Project Management Framework

During 2008–09, research into an MDBA Project Management Framework (PMF) was carried out, and the design was completed and approved. Starting with a pilot program during 2008 and full implementation on 1 April 2009, the PMF enables MDBA project managers to apply consistent, transparent and effective project management and project reporting processes for minor and major projects.

To widen the understanding and use of the PMF, a program of targeted information sessions, training courses and staff mentoring was undertaken.

A key output of the PMF will be the production of Executive project status reports to optimise the overseeing of MDBA's major projects.

Financial management

The key focus during the year was developing and implementing a robust financial framework that meets the requirements of the *Financial Management and Accountability Act 1997* (FMA Act). This required the development of new financial policies and procedures, and the reconfiguration of all financial and human resource systems.

The major achievements in the financial area included:

- termination and finalisation of MDBC's activities up to and including 14 December 2008, and the audit of the closing financial statements
- development of a comprehensive set of Chief Executive Instructions and financial procedures to guide staff on financial obligations and internal processes
- development of a new financial delegation framework based on greater devolution of financial responsibilities to improve decision making
- reconfiguration of the electronic finance system (called 'Finance 1') to implement the government accounting framework, to enable the interface and interaction with the Department of Finance and Deregulation and with the Commonwealth Budget Management System, and to meet the Portfolio Budget Statements reporting requirements

- transition of the human resources system to the Public Service Act framework, including the implementation of transition arrangements for human resources and the development of additional system functionality and reporting capabilities
- establishment and implementation of a procurement framework compatible with the Commonwealth Procurement Guidelines, which included the review and revision of all documentation and templates
- establishment of the financial records and structures of The Living Murray Initiative (LMI) and River Murray Operations (RMO) joint ventures — two additional jurisdictional structures created by the transition process (see page 90).

Financial performance

MDBA's total expenditure for 2008–09 was $177.678 million, which was $44.604 million below the expenditure budget.

Table 4.1 explains the main features of MDBA funding in 2008–09.

Table 4.1 MDBA funding in 2008–09

Murray–Darling Basin Authority		2007–08 Actuals $'000	2008–09 Actuals $'000	2008–09 Variance $'000
Outcome 1	Revenue	2,571	517,641	515,070
	Expenses	5	177,678	177,673
	Surplus/(deficit)	2,566	339,963	337,397
Total departmental	Revenue	2,571	517,641	515,070
	Expenses	5	177,678	177,673
	Surplus/(deficit)	2,566	339,963	337,397

Financial position

MDBA was established under the *Water Act 2007* (Cwlth) in March 2008. It commenced operations on 8 September 2008 with initial funding for the establishment of the authority and the Basin Plan function.

The transfer of MDBC functions to MDBA on 15 December 2008 also resulted in the transfer of the residual assets and liabilities of MDBC. Cash of $441.487 million transferred to the MDBA Special Account was reported as income, and a surplus of liabilities over assets of $11.199 million was reported as negative contributions to equity, contributing to an operating surplus for 2008–09 of $339.963 million.

Assets and asset management

MDBA non-financial assets at the end of 2008–09 were $5.062 million. These assets consist mainly of information and communications technology (ICT) infrastructure, office fitout and office equipment.

Liabilities

Liabilities administered directly by MDBA at the end of 2008–09 amounted to $53.909 million. These mainly consist of amounts owing to suppliers and provisions for employee entitlements.

Total equity

MDBA ended the year with total equity of $331.33 million (see Table 4.2). This was due primarily to the transfer of MDBC assets and liabilities, in particular cash resources of $441.487 million.

Table 4.2 MDBA equity at end of 2008–09

Measurement	2007–08 $ million	2008–09 $ million
Assets	2.566	385.239
Liabilities	–	53.909
Total equity	2.566	331.330

Discretionary grant programs

MDBA did not make any discretionary grants during 2008–09.

Managed assets: joint ventures

Concurrent with the transition of MDBC functions and residual assets and liabilities to MDBA, two joint ventures were established to hold the jurisdictional assets previously held by MDBC on behalf of the relevant jurisdictions. The joint ventures were established through two agreements between the partner governments:

- the Asset Agreement for River Murray Operations Assets (RMO joint venture agreement)
- the Further Agreement on Addressing Water Overallocation and Achieving Environmental Objectives in the Murray–Darling Basin — Control and Management of Living Murray Assets (LMI joint venture agreement).

The RMO joint venture held net assets of $1.952 billion and the LMI joint venture held net assets of $546.498 million at 30 June 2009.

The RMO joint venture agreement acknowledges that each jurisdiction exercises control over its share of the RMO assets through its representative on the Murray–Darling Basin Ministerial Council and its representative on the Basin Officials Committee. The jurisdictions acknowledge that the RMO assets are managed by MDBA on their behalf.

The LMI joint venture agreement acknowledges that The Living Murray assets are controlled jointly by The Living Murray partner governments. These governments acknowledge that The Living Murray assets are not under MDBA's control but that MDBA has management responsibilities for these assets.

Procurement activities

Purchasing and procurement

Since it commenced operations on 8 September 2008, MDBA has conducted its procurement in accordance with the Commonwealth Procurement Guidelines.

Under the MDBC transition provisions, all existing MDBC commitments and contracts became MDBA commitments and contracts. All these contracts continue to operate until their completion, or variation by MDBA, in accordance with the contractual arrangements entered into by MDBC.

Procurement framework

MDBA has adopted a devolved procurement framework that places responsibility for procurement with financial delegates. To support these delegates, Chief Executive's Instructions for procurement have been established, and ongoing training is provided on financial delegations and procurement. In addition, work on developing a comprehensive procurement procedural guide began during the year, and the guide is expected to be released in the first quarter of 2009–10.

A central procurement and contracts unit provides advice and assistance to line areas conducting procurement. The unit ensures compliance with relevant instructions, policies and procedures and compliance with the Commonwealth Procurement Guidelines in addition to providing probity advice and maintaining standard tender and contract templates.

Performance against core purchasing policies

MDBA has complied with the mandatory procurement procedures of the Commonwealth Procurement Guidelines, as mentioned above. Relevant policy and legislative obligations — such as the policy on small and medium enterprises, the 30-day payment policy, and the Legal Service Directions — were met.

MDBA advertises tender opportunities through the AusTender website. Documentation is available from the MDBA website, which also includes a facility for tender submission.

Our first Annual Procurement Plan, for 2009–10, was published on AusTender in June 2009 and will be updated as required throughout the next year.

Reporting

All contracts with a value of $10,000 or more, including continuing contracts transferred from MDBC, were reported on AusTender.

MDBA met the requirements to report on the Senate Order on Government Agency Contracts for the calendar year 2008 and the financial year 2008–09. All contracts with a value of $100,000 or more are listed at <http://www.mdba.gov.au/about/tenders>.

MDBA met the requirement to report to the Department of Finance and Deregulation relating to authorisations to spend public money under Regulation 10 of the Financial Management and Accountability Regulations 1997.

Consultancy services

MDBA conducts procurement for consultancy services in accordance with the Commonwealth Procurement Guidelines and the Chief Executive's Instructions. Selection of consultants is determined by the principle of value for money. All procurement of consultancy services meets transparency and accountability requirements.

Expenditure on consultancies during 2008–09

Since MDBA commenced operations on 8 September 2008 and until 30 June 2009, 21 new consultancy contracts were entered into, involving total commitments of $1.070 million. A further 12 consultancies involving total commitments of $4.981 million were transferred to MDBA on 15 December 2008 under the MDBC transition provisions.

At 30 June 2009, 17 ongoing consultancy contracts were active, involving total commitments of $5.955 million.

Details of contracts let by MDBA in 2008–09 to the value of $10,000 or more are available on AusTender or from MDBA as a PDF file.

The list of consultancy contracts let in 2008–09 to the value of $100,000 or more is at <http://www.mdba.gov.au/about/corporate_documents/contact_listings>. Anyone who cannot access this list can obtain it in a suitable alternative format by contacting MDBA.

Information on expenditure on contracts and consultancies is also available on the AusTender website at <www.tenders.gov.au>.

Exempt contracts

During 2008–09 there were no standing offers or contracts in excess of $10,000 (GST inclusive) exempted by the Chief Executive from being published on AusTender under the *Freedom of Information Act 1982* (Cwlth).

Access by the Auditor-General

MDBA's consultancy agreements comply with Australian National Audit Office (ANAO) requirements. The standard long-form consultancy agreement allows for ANAO access. The short-form agreement does not include a provision allowing ANAO access. Other agreements may include a requirement for ANAO access depending on the nature of the services.

MDBC Strategic Plan 2005–2010, Objective 3, Strategy 3.2: Strengthen corporate, technical and policy capacity of the commission and the commission office to deliver on its obligations to partners, staff and the general public

Strengthening corporate, technical and policy capacity

Highlights

- Facilitated transition of 189 of 191 MDBC staff to MDBA to ensure ongoing provision of services and programs.
- Implemented MDBA's inaugural graduate program.

Staff transition to MDBA

Significant resources were devoted by both the Murray–Darling Basin Commission (MDBC) and the Murray–Darling Basin Authority (MDBA) to ensure a smooth transition of MDBC staff to MDBA. MDBC staff were offered employment with MDBA, and 189 of the 191 employed at the time of transition on 15 December 2008 accepted the offer.

To facilitate the smooth transition of the staff to MDBA and the Australian Public Service, a number of critical tasks were undertaken including:

- aligning the MDBC position classification structure with the Australian Public Service classification structure
- transmission of the MDBC Collective Agreement 2006–09 to MDBA
- obtaining approvals to allow the continuation of certain employment conditions for staff transferring from MDBC — for example, continuation of coverage of long service leave under the *Long Service Leave Act 1976* (ACT)
- developing key human resource policies to align MDBA with the *Public Service Act 1999* (Cwlth) and the Australian Public Service environment
- providing training on the Australian Public Service Code of Conduct and Values, and the requirements for financial management, human resource management and record management.

Learning and development

MDBA places a high priority on learning and development, with the prime focus during 2008–09 being on the transition of MDBC staff and the induction of new staff to MDBA. Targeted training was provided to develop a knowledge and understanding of employee obligations in the Australian Public Service. There was also a continuing focus on strengthening leadership and building people management capability at all levels.

Key activities during the year included:

- a range of courses on Australian Public Service induction and the Code of Conduct; the *Financial Management and Accountability Act 1997* (Cwlth); the Commonwealth Government Procurement Guidelines; and record management
- a training program on advanced selection techniques aimed at enhancing the recruitment process
- project management training to underpin implementation of the MDBA Project Management Framework
- a leadership course for executive-level staff, focusing on organisational leadership, strategic influence and change management
- executive coaching
- a two-day Senior Executive Service (SES) transition workshop, focusing on the priorities for the new MDBA; accountabilities of SES employees in the Australian Public Service; governance; and building relationships with the minister's office and jurisdiction agencies.

Workforce planning

The MDBC Workforce Plan 2007–2010 provided a framework under which we continued to enhance our approach to workforce planning. During 2008–09 we continued to implement the plan, with an additional key focus of managing the transition of staff to MDBA.

Key activities included:

- implementing a capability framework to align with the Australian Public Service classification structure
- reviewing our employee exit survey, providing us with valuable feedback in relation to retention strategies
- reviewing our induction program
- revising our learning and development program to take account of the transition to the Australian Public Service
- enhancing monthly human resources statistical reporting to the MDBA Executive to ensure that our reporting provides an accurate platform for future workforce analysis.

The above work will underpin a new three-year Strategic Workforce Plan that will be developed and implemented during 2009–10.

Recruitment

MDBA has developed a range of strategies and initiatives to address changes in recruitment processes that ensure alignment with Australian Public Service requirements. Our focus has been on the retention and recruitment of high-calibre

people to achieve MDBA's strategic outcomes and to provide the necessary specialist capabilities.

In a year of rapid growth, the number of employees reached 235 by 30 June 2009. During 2008–09 we undertook a total of 98 recruitment activities, 81 of which were external, and attracted over 900 applicants.

Under section 72(1)(d) of the Public Service Act, 191 offers were made to former MDBC employees, with a total of 189 accepting an offer of engagement to work with MDBA following transition on 15 December 2008.

During 2008–09, MDBA began recruitment for its inaugural graduate program, which will start in early 2010. The program attracted 174 applicants, who progressed through a series of assessment activities, resulting in a shortlist of 26. MDBA is also participating for the first time in the Indigenous Graduate Program conducted by the Australian Public Service Commission.

MDBA aims to recruit six graduates from the two programs. They will participate in a variety of structured learning and development activities, including a Diploma of Government, as well as on-the-job and technical learning and development activities.

Collective Agreement

On 15 December 2008, the MDBC Collective Agreement 2006–09 transmitted to MDBA. This agreement covered all new employees and those transferring from MDBC, except Senior Executive Service (SES) employees and those covered by an individual employment contract (IEC). (Before 15 December 2008, MDBA did not need a collective agreement as it had no non-SES employees.)

The Collective Agreement has a nominal expiry date of 19 October 2009. Negotiations for a new Enterprise Agreement for all non-SES staff started in April 2009, and it is expected that this will be in place in October 2009.

Determination of Senior Executive Service remuneration

MDBA has twelve SES employees, seven of whom transitioned from MDBC. SES rates of pay are set by the Chief Executive, in consultation with the employee and in accordance with MDBA's SES remuneration policy.

The remuneration packages for those SES employees who transitioned from MDBC are covered by individual employment contracts (IECs), which were novated to MDBA. The remuneration package for all new SES employees is provided through a section 24(1) determination under the Public Service Act. The salary package offered to an SES employee may include a vehicle allowance, a car parking space and performance pay.

Performance pay

New SES staff appointed to MDBA may be eligible for performance pay if they achieve a rating of 'exceeds job requirements' or higher in their annual performance assessment. Details of payments made during 2008–09 are shown in Table 4.3.

SES employees who transitioned from MDBC are not eligible for performance pay, as this had been rolled into their basic salary package.

MDBA's SES arrangements will be reviewed during 2009–10 with the aim of making these consistent for all SES employees.

Non-SES staff are not eligible for performance pay.

Table 4.3 MDBA Senior Executive Service employees — performance pay

	Classification SES Bands 1 and 2	
	2007–08[1]	2008–09[2]
Number of performance payments	n/a	5
Average performance pay	n/a	$4,953
Range of performance pay	n/a	$1,517–$11,499
Total paid	**n/a**	**$24,766**

Notes:

1 Performance pay bonus payments are not applicable in 2007–08 as MDBA did not commence operations until September 2008.

2 All payments in 2008–09 were made on a pro rata basis as employment did not span the full appraisal period.

Special terms and conditions for non-SES employees

Where appropriate, special terms and conditions of employment are currently provided to non-SES employees through:

- individual employment contracts (for nine non-SES employees who transitioned from MDBC)
- section 24(1) determinations under the Public Service Act (for five non-SES employees appointed to MDBA).

Staffing profile

The tables on pages 97–99 summarise statistics on staffing in 2008–09.

Table 4.4 MDBA staff by employment status as at 30 June 2009

Employment category	Male	Female	Total
Ongoing			
Full-time	110	92	202
Part-time	1	14	15
Subtotal	111	106	217
Non-ongoing			
Full-time	4	7	11
Part-time	5	2	7
Subtotal	9	9	18
Total	**120**	**115**	**235**

Table 4.5 MDBA staff by job classification and gender as at 30 June 2009

Classification	Gender	Subtotal	Total
Australian Public Service Level 1 (APS 1)	Female Male	3 1	4
APS 2	Female Male	1 0	1
APS 3	Female Male	3 0	3
APS 4	Female Male	12 2	14
APS 5	Female Male	26 11	37
APS 6	Female Male	28 18	46
Executive Level 1 (EL 1)	Female Male	29 38	67
EL 2	Female Male	10 40	50
Senior Executive Service	Female Male	3 9	12
Chief Executive	Male	1	1
Total		**235**	**235**

Note: The Chair and the other four part-time members of the Murray–Darling Basin Authority (see page xv) are not included.

Table 4.6 Age profile of MDBA staff as at 30 June 2009

Age	Ongoing	Non-ongoing	Total
<25	9	3	12
25–34	53	5	58
35–44	70	3	73
45–54	53	1	54
55–64	29	2	31
65+	3	4	7
Total	**217**	**18**	**235**

Table 4.7 MDBA staff by equal employment opportunity group as at 30 June 2009

	Ongoing	Non-ongoing	Total	Percentage
Female	114	1	115	48.94%
Non–English speaking background	33	4	37	15.74%
Indigenous	0	0	0	0%
People with a disability	2	0	2	0.85%
Proportion of staff volunteering personal data				95.32%

Table 4.8 MDBA staff by employment agreement as at 30 June 2009

Category	Number of staff
Australian Public Service (APS)	208
Senior Executive Service (SES)	12
Individual employment contracts (IECs)	9
Section 24(1) determinations[1]	5
Chief Executive	1
Total	**235**

Note: The Chair and the other four part-time members of the Murray–Darling Basin Authority (see page xv) are not included.

1 Determinations under section 24(1) of the *Public Service Act 1999* (Cwlth) are written determinations by the Chief Executive in relation to remuneration and other conditions of employment.

Table 4.9 MDBA staff — base salaries by classification as at 30 June 2009

Classification	Salary range
Australian Public Service Level 1 (APS 1)	$36,147–$40,464
APS2	$41,622–$46,592
APS3	$47,899–$53,494
APS4	$54,992–$59,742
APS5	$61,745–$67,955
APS6	$70,159–$77,217
Executive Level 1 (EL 1)	$79,556–$92,433
EL 2	$97,738 –$115,187
Senior Executive Service 1 (SES 1)	$135,198–$161,972
SES 2	$177,840–$205,165

Note: The salary ranges incorporate salaries under the Collective Agreement, individual employment contracts and section 24(1) determinations under the *Public Service Act 1999* (Cwlth) (written determinations by the Chief Executive in relation to remuneration and other conditions of employment).

Occupational health and safety

MDBA's occupational health and safety policies aim to ensure a safe and healthy workplace in line with the requirements of the *Occupational Health and Safety Act 1991* (Cwlth). In particular, MDBA strives to provide a safe system of work practices to prevent work-related injuries and illnesses. Under its rehabilitation policy and guidelines, MDBA supports injured and ill employees and provides an early-return-to-work program.

MDBC staff were covered by the *Occupational Health and Safety Act 1989* (ACT) and related legislation before transition to MDBA on 15 December 2008. An important focus in 2008–09 was the development of new Health and Safety Management Arrangements in compliance with the requirements of the Commonwealth Occupational Health and Safety Act and related legislation.

A number of seminars were held during the year to improve staff understanding of occupational health and safety in the workplace. Occupational health and safety also continued to be an important focus during the induction of new staff and contractors. Appropriate signage throughout MDBA premises has also been put in place to further improve staff awareness of occupational health and safety issues.

MDBA has an Occupational Health and Safety Committee, which has carried on the work undertaken by the equivalent MDBC committee. There are two designated work groups as defined in the ACT Occupational Health and Safety Act, and health and safety representatives and deputy health and safety representatives for each work group.

MDBA has also put in place a Harassment Contact Officers Group, a First Aid Officers Group and a Fire Wardens Group. Each of these groups reports to the Occupational Health and Safety Committee.

Section 68 of the Commonwealth Occupational Health and Safety Act addresses the requirement for reporting to Comcare accidents or incidents that cause death or serious personal injury or incapacity, or that are otherwise dangerous. This year no such accidents or incidents were reported to Comcare. No investigations were conducted during the year and no notices have been issued under sections 29, 46 or 47 of the Act.

Commonwealth Disability Strategy

Definition: Commonwealth Disability Strategy

The Commonwealth Disability Strategy is a framework for Australian Government agencies to help improve access for people with a disability to government programs, services and facilities. The strategy includes a performance reporting framework built around the five key roles of government: policy adviser, regulator, purchaser, provider and employer.

MDBA's performance in implementing the Commonwealth Disability Strategy is outlined in Table 4.10.

Table 4.10 Performance in implementing the Commonwealth Disability Strategy, 2008–09

Performance indicator	Results
Policy adviser role	
Ensure that new policies and information accessible to the public consider the impact on the lives of people with disability	MDBA started developing its first Disability Action Plan, to cover the 2009–11 period. All news from MDBA, including media releases, is available in HTML format on the MDBA website. A plan is in place to increase the accessibility of public information on the website for people with a visual impairment. In addition, specific scientific and technical information can be converted on request into an accessible format for people with a visual impairment.
Public announcements of new or proposed policy/program initiatives are available in accessible formats for people with disabilities	Information on public announcements is available on MDBA's website, and on request in various formats.

(*continued*)

Table 4.10 Performance in implementing the Commonwealth Disability Strategy, 2008–09 (continued)

Performance indicator	Results
Regulator role	
Ensure that links to relevant legislation are available in accessible formats	The MDBA website provides links to the *Water Act 2007* (Cwlth) in accessible formats.
Purchaser role	
Publicly available information on agreed purchase specifications is provided in accessible formats for people with disability	Procurements valued at $80,000 or more are advertised and are available for download on AusTender, which meets the Australian Government online standards on access for people with disability.
Mechanisms are in place to manage risk and occupational health and safety issues including the risks for people with disability	Purchasing activities have an established mechanism in place for managing risk and occupational health and safety requirements.
Employer role	
Ensure that new human resource policies and programs consider the impact on the lives of people with disability	All MDBA employment policies and procedures comply with the requirements of the *Disability Discrimination Act 1992* (Cwlth). Human resources policies include the principle of reasonable adjustment to accommodate the needs of people with disability.
Consider the requirements of people with disabilities in recruitment processes	Applicants are requested to advise whether they require accessible formats when preparing their application. Applicants are also asked to advise whether they require special arrangements during the recruitment process. Recruitment and selection activities apply reasonable adjustment to candidates with disabilities. MDBA networked with a disability employment agency in recruiting to fill vacancies.
Occupational Health and Safety Plan considers the needs of people with a disability	Assistive furniture was purchased to meet specific occupational health and safety requirements for employees with a disability.
Training and development programs consider the needs of people with a disability	Information on disability is covered in training where relevant. Choice of venues for training conducted by MDBA considers the needs of people with a disability.
Complaints or grievance mechanisms, including access to external mechanisms, are in place to address issues and concerns raised by staff	The Collective Agreement sets out complete procedures for complaints and grievances. These procedures apply to all employees and situations.

Legal services

Legal services during the year were provided to MDBA and to the former MDBC primarily by a legal officer seconded from the legal firm Blake Dawson. As part of preparation for transition, MDBA utilised the legal panel established by the Department of the Environment, Water, Heritage and the Arts to assist with the provision of legal support. Following transition, the internal demand for legal services increased and the use of the panel assisted in efficiently servicing that demand.

MDBA implemented a number of important initiatives in relation to legal services during the year including:

- contributing to the development of the *Water Act 2007* (Cwlth), the new Murray–Darling Basin Agreement and the aspects of the Water Regulations 2008 that relate to MDBA, and providing advice to the Department of the Environment, Water, Heritage and the Arts, MDBA staff members and partner jurisdictions on amendments to protocols and schedules to the Murray–Darling Basin Agreement
- introducing new business management systems for obtaining legal services from both internal and external legal service providers to ensure compliance with the Legal Services Directions 2005
- providing advice to all MDBA divisions in relation to program delivery and legislative obligations, including guidance to program areas on the transition of key documents and programs from the former MDBC to MDBA
- developing and implementing a series of seminars for external stakeholders and MDBA staff to increase their understanding of the governance structure under which MDBA operates
- implementing a new delegations instrument under the Water Act
- establishing a new advisory committee structure.

Given the level of legal support required by MDBA, the Executive approved the establishment of an in-house legal team.

MDBC Strategic Plan 2005–2010, Objective 3, Strategy 3.4: Develop and maintain necessary communication, and technical and corporate information resources

Developing information and communication resources

Highlights

- Established the second phase of the South Eastern Australian Climate Initiative (SEACI 2).
- Continued a strong partnership with the Murray–Darling Freshwater Research Centre.
- Consolidated spatial assets into centralised repositories.
- Upgraded information and communications technology (ICT) network to meet MDBA requirements.

Research partnerships

South Eastern Australian Climate Initiative

Understanding climate variability, as well as the longer term climate changes, is critical for the future of water resources, agriculture, communities and the environment across south-eastern Australia. To address this issue, the Murray–Darling Basin Authority (MDBA) led the establishment of the South Eastern Australian Climate Initiative Phase 1 (SEACI 1), which was completed in June 2009. SEACI 1 was established to answer some key questions relating to the causes and impacts of climate change and climate variability across south-eastern Australia.

Key findings of the research are:

- that the current drought in south-eastern Australia has been influenced by the enhanced greenhouse effect
- regional predictions of future climate suggest that south-eastern Australia will become drier and warmer as a result of the enhanced greenhouse effect.

In light of the success of SEACI 1, MDBA successfully negotiated a second phase. SEACI 2 will extend the involvement of MDBA with CSIRO, the Bureau of Meteorology, the Victorian Department of Sustainability and Environment, and the Commonwealth Department of Climate Change. A science plan and funding agreement were formally agreed to by the partners in June 2009.

Murray–Darling Freshwater Research Centre

MDBA has been working closely with the Murray–Darling Freshwater Research Centre, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and La Trobe University to refine the strategic and science plan for the research centre, with the intent of ensuring it is well positioned to provide policy advice that supports the management of aquatic ecosystems in the Basin. The basic ecological knowledge

developed by the research centre will be fundamental in making informed decisions on sustainable diversion limits for valleys as part of the first Basin Plan.

During 2008–09, the research centre has made significant contributions to a range of MDBA endeavours. These include the Sustainable Rivers Audit, The Living Murray, Integrated Basin Reporting, the Basin Salinity Management Strategy, the Native Fish Strategy and the former Northern Basin Program. In addition, the centre has supported MDBA and collaborated with the eWater Cooperative Research Centre in a number of activities. These include developing a decision support tool for water management at Hattah; reviewing the activities of the former Northern Basin Program; completing the Fish Spawning and Recruitment project; and providing ongoing input in the Acid Sulfate Soil Risk Assessment Project, particularly in relation to the Wakool system.

Spatial information management

The collection, collation, and provision of natural resource information is crucial to many aspects of MDBA business. MDBA manages and maintains spatial data assets, coordinates spatial data collection and use, and supports involvement in joint activities with other natural resource management agencies.

In 2008–09, MDBA centralised its fundamental spatial data holdings within its corporate GIS (geographic information system) environment. This resource will be continually enhanced in line with the MDBA's strategic direction for natural resource information management, providing a platform for the development of future online mapping services.

Considerable effort has been put into consolidating MDBA's imagery, terrain and bathymetry data holdings acquired from individual projects. (Bathymetry is the survey of underwater topography.) This has enabled MDBA to be an important contributor to national initiatives such as the National Elevation Data Framework and has allowed data investments in the past to be used for current and future requirements. Data and spatial data support services are regularly provided to MDBA programs and to significant MDBA projects.

Information and communications technology

Preparing for, and managing, the transition of information systems and processes from the former Murray–Darling Basin Commission (MDBC) to MDBA was the main priority during the year. Establishing the ICT systems and services for a new Commonwealth agency required a full review of operations, with a focus on system security and compliance with government standards.

Significant achievements during the year included:

- upgrading the firewall system to provide more robust protection of the network
- upgrading and certification of the Internet gateway to a higher level of protection
- implementing a FedLink connection to allow secure communications with other government agencies

- upgrading the electronic records management system (TRIM), supported by an extensive staff training program and a comprehensive manual on record management practices and implementation
- upgrading the desktop operating environment to Microsoft Office 2007, supported by a major staff training program
- implementing ICT initiatives to improve MDBA's environmental performance.

To oversee ongoing improvement and developments in ICT, an Information Management Committee was established at the senior management level. The first task for this committee was to start developing an MDBA Enterprise Information Strategy. Significant progress was made on the strategy, which is expected to be endorsed by the Executive in the first quarter of 2009–10.

MDBC Strategic Plan 2005–2010, Objective 3, Strategy 3.5: Use Council priorities to drive communication, feedback and information delivery activities with stakeholders and communities

Communicating with stakeholders and communities

Highlights

- Strong public interest shown in Basin water issues, with key messages being carried by all forms of media across most parts of the Basin.
- New website launched, and received 175,000 hits per month.
- New interactive 'Water in storages' website pages launched by the Minister for Climate Change and Water.
- MDBC's 2007–08 annual report received a silver Australasian Reporting Award.

Communication and information delivery

The Murray–Darling Basin Authority (MDBA) continued to make significant efforts in 2008–09 to keep partner governments, water users and the community aware of river operations and water resource issues in the Murray–Darling Basin.

Media

Thirty-nine media releases about the Basin were distributed and many interviews given by the Chief Executive. The extent and impacts of the continuing record drought were communicated through two-monthly drought updates, media releases, and through the monthly *eLetter*, now going out to more than 2,500 subscribers within and beyond the Basin. In addition, information on river operations is released through weekly reports, posted on the home page of the MDBA website at <http://www.mdba.gov.au/>.

Media monitoring confirmed strong public interest in Basin water issues, with key messages being carried by all forms of media across most parts of the Basin. Much of the coverage was provided by regional radio, followed by regional print media and then television. Online news services, while growing in extent, continued to provide fairly patchy coverage.

Website and publications

The new MDBA website receives about 175,000 'hits' a month. About 90,000 pages are viewed per month, and the number of visitors averages about 18,000 a month.

New features include interactive 'Water in storages' pages (see Figure 4.1, pages 108–109), launched by the Minister for Climate Change and Water in April 2009. At the click of a mouse, maps on these pages clearly and graphically show the volumes of water in public storage, updated weekly; and estimated volumes of water in private storage, water commitments, allocations, and system losses, updated quarterly. The pages brought together a range of inputs requiring data and expertise from the areas of natural resource information, river operations and communications.

This is the first time such information has been available for the entire Murray–Darling Basin from a single source (see <http://www.mdba.gov.au/water/waterinstorage>). The website has been receiving an average of 500 hits per week.

In addition to other new features, such as a new publications ordering system and a new image collection, the MDBA website carried over a number of existing functions from the Murray–Darling Basin Commission (MDBC) website, such as live river data, weekly forecasts and flow and salinity reports. The live river data function provides daily data feeds at 64 points across the River Murray system, enabling river users to access accurate, up-to-date information on storage, flow rates and levels as well as information on water quality, including salinity.

The transition of publication production from the MDBC to MDBA was successfully managed, with centralised production continuing to drive improvements in quality, consistency, and environmental sustainability. The MDBC 2007–08 annual report received a silver Australasian Reporting Award, advancing from the previous year's bronze award.

Feedback

Service charter

MDBA will be developing its first Client Service Charter during 2009–10. The charter will set out the standards of service clients can expect and how they can give feedback on our performance.

Complaints about services

No formal complaints were received by MDBA or MDBC during the year.

Access and equity

MDBA deals with culturally diverse groups, including Aboriginal peoples. MDBA funds the Murray Lower Darling Rivers Indigenous Nations (MLDRIN), a self-formed and defined confederation of Indigenous groups with responsibilities for their country founded under traditional laws and customs.

MDBA has a collaborative relationship with MLDRIN and funds a large proportion of the organisation's operational costs to help ensure its capacity to engage with MDBA and other natural resource management agencies. MLDRIN has provided advice on, and helped to develop, the Living Murray Indigenous Partnerships Program, which included close involvement in the introduction of use and occupancy mapping.

Of particular importance, MLDRIN is well positioned to provide strategic advice in its area of the Basin on how best to engage local Indigenous communities in future Basin planning.

MDBA also supports and promotes Indigenous recruitment and career development within the agency.

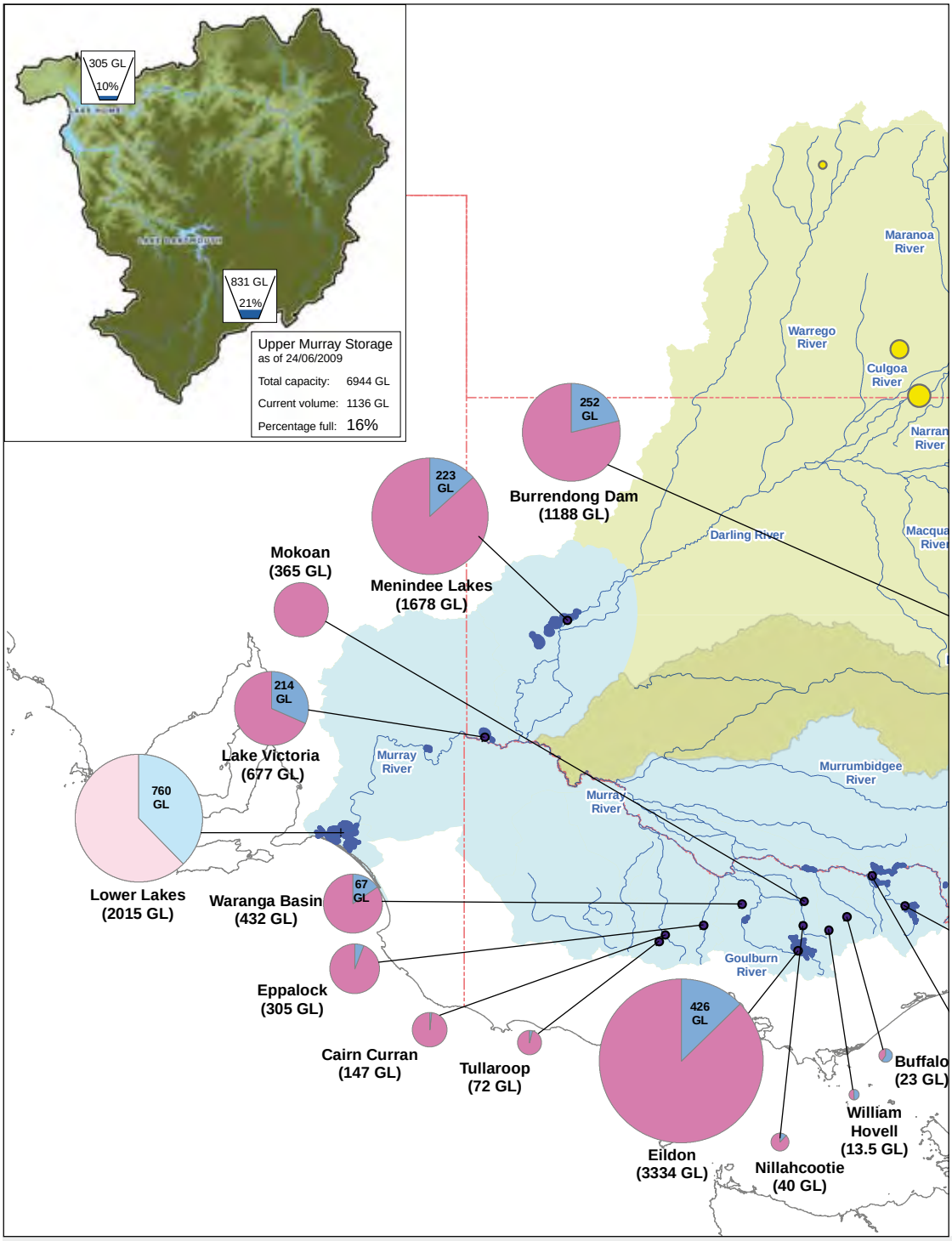
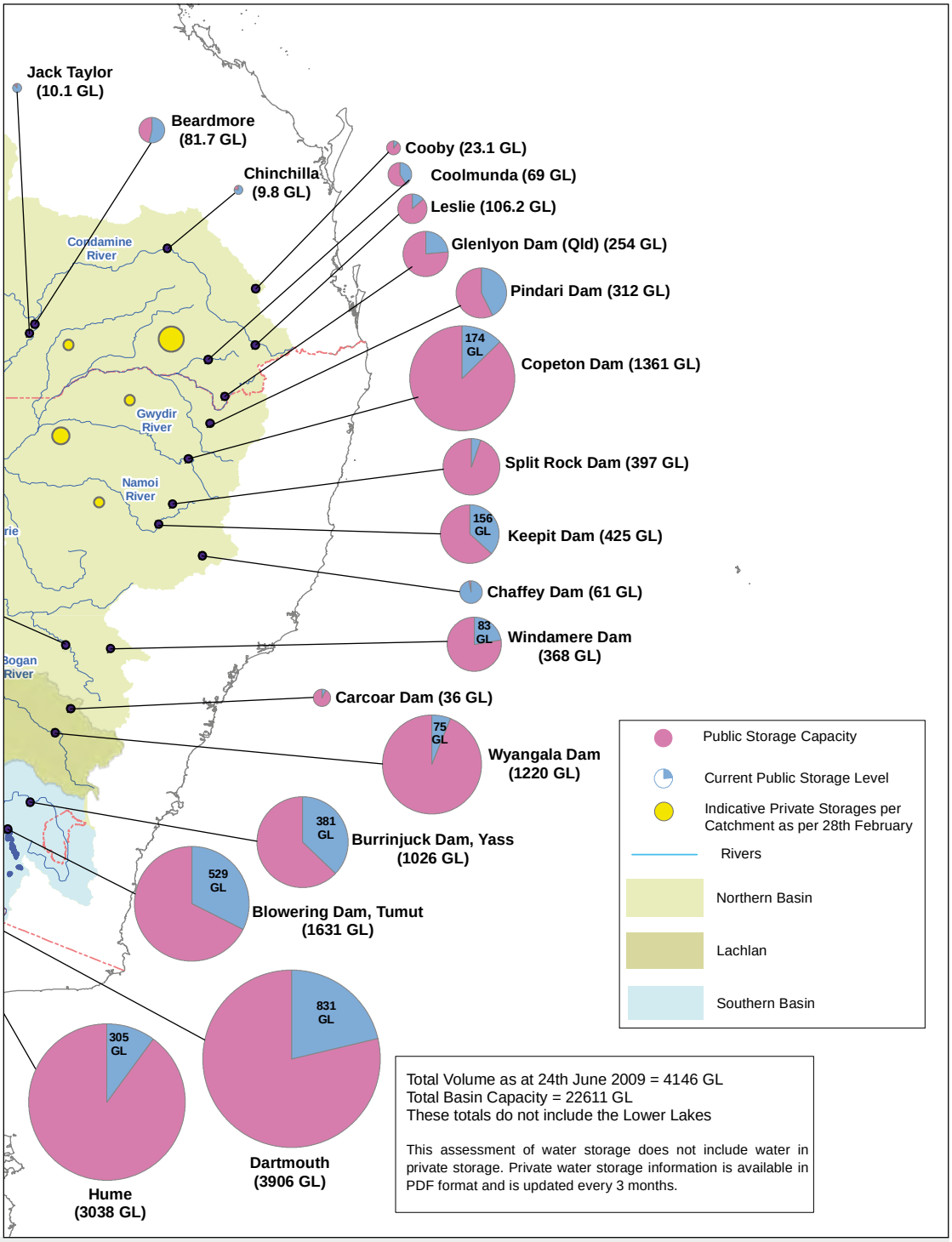


Figure 4.1 The main 'water in storages' map for 24 June 2009, originally produced for the MDBA website. The pie charts clearly show the amounts of water (in blue) in each of the reservoirs and other storages. Launched in April 2009, these maps are updated weekly.



Inset (top left): the 'water in storages' website pages also provide information for each catchment. The 24 June 2009 information for the Upper Murray catchment is provided as an example. On the website, there are also links to comparisons of the current water level and the historical average.

Chapter 4

MDBC Strategic Plan 2005–2010, Objective 3, Strategy 3.6: Ensure effective institutional and governance arrangements are in place

Ensuring effective governance

Highlights

- Established senior governance committees to oversee MDBA operations.
- Developed the fraud, risk and business continuity frameworks.
- Implemented the Certificate of Compliance system.

Senior management committees

Executive Committee

The Executive Committee of the Murray–Darling Basin Authority (MDBA) is chaired by the Chief Executive. Its membership is comprised of the executive directors of MDBA's five divisions: Basin Plan; Natural Resource Management; River Murray; Engagement, Secretariat and Communications; and Corporate Services (also see page xiii).

The Executive Committee is the main forum in which governance requirements are discussed. The committee meets fortnightly and considers the positioning, safeguarding and enabling that is necessary for MDBA to achieve its business outcomes.

During 2008–09, the committee considered the following key issues: strategic and corporate planning and budgets; financial performance; water recovery issues; the risk management framework; provision of delegations under the *Water Act 2007* (Cwlth); workforce planning; the employee Enterprise Agreement; the Project Management Framework; and the Certificate of Compliance framework.

Information Management Committee

The Information Management Committee is chaired by the Executive Director Natural Resource Management. Other members are the Executive Director Engagement, Secretariat and Communications; General Manager Assets; and the Chief Information Officer. The committee was established as a subcommittee of the Executive to provide advice and strategic direction in the management of MDBA's information and communications technology (ICT) needs. It also discusses and endorses all projects with ICT components or impacts.

The committee meets monthly. During the year it considered the following key issues: the Enterprise Information Strategy, ICT security, and standardisation of software and hardware.

Occupational Health and Safety Committee

The Occupational Health and Safety Committee is a subcommittee of the Executive and is chaired by the General Manager Assets. Its membership is comprised of the health and safety representatives for MDBA's two designated work groups; a representative of the Workplace Consultative Committee; the Director People, Planning and Performance; the Chief Fire Warden; and the Occupational Health and Safety Coordinator.

The committee is established in accordance with the *Occupational Health and Safety Act 1991* (Cwlth) and meets quarterly. The committee is an integral part of MDBA's Health and Safety Management Arrangements. In 2008–09 it considered a range of health and safety issues including the new Health and Safety Management Arrangements; reporting on workplace incidents and injuries; appointment of health and safety representatives; linking with first aid officers, fire wardens and harassment contact officers; and ensuring staff awareness of health and safety issues.

Human Resource Management Committee

The Murray–Darling Basin Commission's Human Resources Committee was chaired by the General Manager Corporate Services and its membership was comprised of the Director People, Planning and Performance, the Human Resources Coordinator, and two representatives of the Workplace Consultative Committee. During the period before transition, the prime role of the committee was to review a range of revised policies and procedures before submission to the Executive for approval.

During 2009–10 the committee will be restructured as a subcommittee of the Executive to provide strategic advice on human resources management issues covering workforce planning, performance management, learning and development, workplace relations, and recruitment.

Business Managers Committee

The Business Managers Committee is the MDBA governance body responsible for planning and coordinating cross-divisional issues to facilitate the implementation of MDBA's business. It is comprised of all business managers at Senior Executive Service Band 1 level and Executive Level 2 who report directly to the executive directors, and one executive director (on a six-monthly rotational basis).

The committee is focused on carrying out the business of MDBA, in particular on identifying appropriate management strategies for cross-divisional issues, and ensuring there is adequate communication to ensure an integrated team. The committee also provides support as required to the Executive Committee.

Audit Committee

The Audit Committee reports to the Chief Executive and is chaired by the Executive Director Basin Plan Division. Its membership is comprised of an independent Deputy Chairman (Mr Paul McGrath), the executive directors of the River Murray Division and the Corporate Services Division, and the General Manager River Environmental Management. The committee meets quarterly.

The objective of the committee is to provide independent assurance and assistance to the Chief Executive on the integrity of MDBA's financial data and processes; its risk, control and compliance framework; and its external accountability responsibilities. In particular the committee ensures that MDBA:

- has a sound internal control framework, including effective identification and management of business risks, with supporting procedures in place
- has an appropriate fraud control plan and supporting procedures
- has reliable financial and management reporting systems
- ensures clearance of financial statements
- ensures compliance with applicable laws, regulations and government policies
- maintains an effective and efficient audit service.

In 2008–09 the committee considered a range of governance issues relating to the transitional arrangements between the former MDBC and MDBA, as well as risk management, fraud risk management, business continuity, the internal audit work plan, the Certificate of Compliance framework and internal audit reports, actions and recommendations.

Workplace Consultative Committee

The Workplace Consultative Committee is the key mechanism for employee consultation and involvement in the review and development of policies and procedures linked to employee conditions and employment. Membership is comprised of six elected employee representatives.

Risk management

The effective management of risk is a key component of MDBA's planning and review systems. Effective risk management is recognised as fundamental to good corporate governance and sound management practice. The Audit Committee monitors key risks and supervises the development of policies and procedures for risk management.

Under the transitional provisions, the risk management arrangements applying to MDBC were carried over to MDBA until replaced by new arrangements. A detailed organisational risk assessment has been undertaken and a risk management plan prepared. The plan focuses on risks that affect the achievement of key corporate objectives and risks that affect most, if not all, MDBA functions and processes. Each identified risk was assessed by consequence, likelihood and effectiveness of existing control measures. Additional risk mitigation activities were proposed where appropriate, aimed at reducing risks to acceptable levels.

The risk management plan and the implementation of associated treatments are to be considered by the Audit Committee at each of its meetings.

Training in risk management was conducted for staff and managers. Further targeted training and upgrading of induction processes is planned for 2009–10. Training and

information in relation to the Australian Public Service Values and Code of Conduct and the Australian Public Service Commission Ethics Advisory Service was also provided.

MDBA's insurable risks have been identified as part of Comcover's insurance renewal process and will be reassessed annually. MDBA received a 4.8% discount on its Comcover premium following the completion of Comcover's annual Risk Management Benchmarking Survey in March 2009. Comcover has assessed MDBA's overall risk performance to be satisfactory in the implementation of an enterprise-wide risk management framework. MDBA is covered by Comcare for risks associated with injury to employees.

Fraud control

Under the transitional arrangements, the MDBC Fraud Risk Assessment and Fraud Control Plan 2007–09 were carried over to MDBA until new arrangements were developed. MDBA undertook a detailed fraud risk assessment and developed a fraud control plan in 2009. The 2009–11 Fraud Risk Assessment and Fraud Control Plan and associated treatments and actions will be monitored at each of the Audit Committee's meetings.

A program of fraud awareness training was undertaken by MDBC before transition and continued by MDBA. Further targeted training and upgrading of induction processes is planned for 2009–10.

There were no cases of suspected fraud during 2008–09.

Business continuity and ICT disaster recovery plans

MDBC arrangements in relation to business continuity and disaster recovery were also carried across to MDBA.

Following transition, MDBA undertook a business impact assessment and started developing a Business Continuity Plan, an ICT Disaster Recovery Plan and a Business Continuity Policy.

The Business Continuity Plan will describe the arrangements to ensure the continuity of MDBA's key services after a significant, unexpected and disruptive incident (such as a fire). It will also describe MDBA's management structure; staff roles and responsibilities; criteria for activation; procedures to continue core business activities and manage the recovery from emergencies, disasters and other disruptive events; and maintenance procedures. The pandemic section of the plan was approved in May 2009 and was used to guide MDBA's actions during the swine influenza outbreak.

The ICT Disaster Recovery Plan will provide recovery procedures to address the potential loss of critical ICT resources (e.g. hardware, data and voice network equipment, critical business data and critical business systems).

Both plans are expected to be approved in the first quarter of 2009–10. Once in operation they will be regularly reviewed, monitored by the Audit Committee, and updated as necessary.

Internal audit

Internal audit services during the year were provided by Ernst & Young.

The 2008–09 Internal Audit Plan was developed after consideration of MDBA's strategic risks and following discussions with senior managers. There was a particular focus during the year on the corporate risks associated with the establishment of a new agency. Internal audits conducted during the year covered:

- financial processes
- Certificate of Compliance processes (relating to compliance with the Australian Government financial management framework)
- compliance with Commonwealth Procurement Guidelines
- compliance with Legal Services Directions
- MDBA's financial reporting and budget management framework
- employee benefits.

Two audits begun in the former MDBC were completed by MDBA due to ongoing relevance. These involved reviews of procurement and management of statutory taxes.

The audits found a strong and positive attitude to internal control and identified matters that require a continued focus, including training and documentation of procedures in relation to procurement and treatment of goods and services tax and fringe benefits tax, acquittal of credit cards and travel, and development of Certificate of Compliance procedures for the new MDBA.

A number of recommendations were made in relation to the completed audits but no serious control breaches were identified.

The Audit Committee monitors the implementation of report recommendations through regular status reports.

Certificate of Compliance

As part of MDBA's governance framework, an online Certificate of Compliance system was implemented in 2009. The system underpins the certification that the Chief Executive must provide by 15 October each year to the Minister for Climate Change and Water and the Minister for Finance and Deregulation, of the agency's compliance with the Australian Government's financial management framework.

The certificate is completed by all staff who hold financial delegations and all senior executives to ascertain compliance during the financial year with the following:

- *Financial Management and Accountability Act 1997*
- Financial Management and Accountability Regulations 1997
- Financial Management and Accountability Orders 2005
- Financial Management and Accountability (Finance Minister to Chief Executives) Delegation 2007 (No. 2) as amended from time to time

- Australian Government's foreign exchange risk management requirements
- legal and financial requirements for the management of special accounts
- the financial management policies of the Commonwealth.

The system also allows for the identification of compliance with internal procedures and policies, and areas for potential streamlining of internal processes.

External scrutiny

Auditor-General reports

The Auditor-General did not table any specific reports that examined program delivery by MDBC or MDBA during the year.

MDBA reviews all cross-agency reports issued by the Auditor-General; where the reports are assessed as relevant to MDBA operations, practices and procedures are reviewed in line with the recommendations contained in the reports. A key responsibility of the Audit Committee is to oversee the implementation of the recommendations contained in these reports.

Commonwealth Ombudsman

There were no formal reports from the Commonwealth Ombudsman in relation to MDBA during the year.

Parliamentary committees

During 2008–09, MDBA gave evidence at three inquiries conducted by parliamentary committees — all by the Senate Standing Committee on Rural and Regional Affairs and Transport.

This committee conducted a hearing into the long-term sustainable management of the Murray–Darling Basin, and released the report resulting from this inquiry on 25 June 2009. It recommended that the Commonwealth work towards a full and unconditional referral of powers relevant to the management of the Murray–Darling Basin and, in the absence of such full referral, consider other options to provide for complete federal management. It also recommended that the Basin Plan be implemented in accordance with the current arrangements in the *Water Act 2007* (Cwlth), although efforts should be made to expedite the end of transitional arrangements to achieve the full implementation of the Basin Plan as soon as possible.

On 21 November 2008, the committee released a report on the Water Amendment Bill 2008. The committee concluded that the Bill would enable water resources in the Murray–Darling Basin to be managed in the national interest, optimising environmental, economic and social outcomes. Further, the committee found that the Bill represents the basis for the long-term reform of water management in the Murray–Darling Basin.

The committee also conducted a hearing into water management in the Coorong and Lower Lakes (including consideration of the Emergency Water (Murray–Darling Basin Rescue) Bill 2008). It released its report on 10 October 2008. With respect to the management of the Coorong and the Lower Lakes, the committee concluded that, while not ideal, the effects of introducing sea water would be 'less dramatic' than the problems posed by acidification.

Judicial decisions and decisions of administrative tribunals

There were no judicial decisions or decisions of administrative tribunals relating to MDBC or MDBA during the year.

Freedom of information

Two freedom of information (FOI) requests were received during 2008–09. One request sought information not held by MDBA and the second sought publicly available information.

The *Freedom of Information Act 1982* (Cwlth) gives individuals the right to view documents held by Australian Government ministers and agencies, with some exceptions. Under section 8 of the Act, MDBA is required to report on:

- our organisation and functions (for more information see pages xi–xvii and 110–115)
- arrangements for outside participation (see below)
- the types of documents we hold (see below)
- our FOI procedures, facilities and contact details (see below).

Documents we hold

The types of documents we hold include:

- representations to the Minister for Climate Change and Water on various aspects of government activity
- working files, including correspondence, analysis and advice
- internal administrative records, such as personnel files, staffing and financial records and office procedures
- papers relating to new and amending legislation, drafting instructions and draft legislation
- briefing papers and submissions prepared for the Minister for Climate Change and Water
- documents relating to meetings and committees (such as agendas, minutes and reports)
- copies of questions asked in Parliament, together with related replies
- tender documents
- government (including agency) policy statements, communiqués, guidelines, and media releases

- contracts
- educational materials
- reports on research, water audits and MDBA activities
- spatial data and water modelling information.

Arrangements for outside participation

MDBA consults members of the public and bodies outside the Australian Government's administration when developing policy and programs, and administering legislation. In addition to general public consultation, MDBA receives advice from various committees and other bodies.

Generally, people can participate by making oral or written representations to MDBA. Several formal arrangements under the *Water Act 2007* (Cwlth) exist to facilitate input from Basin states, members of the public and other bodies.

How to lodge a freedom of information request

If you want to view one or more documents, you must send us a request in writing — by mail, fax or email. You need to provide an address in Australia where we can send notices under the Freedom of Information Act, and you also need to include:

- the $30 application fee (a cheque or money order made out to the Murray–Darling Basin Authority)
- as much detail as possible about the document(s) you want to access
- a phone number in case we need to clarify your request.

If your request is approved, you will be provided with either a copy of the document(s) or the opportunity to inspect them at our Canberra office. Copying charges may apply.

More information

For more information, contact our Freedom of Information Coordinator in one of the following ways:

Mail:
FOI Coordinator
Murray–Darling Basin Authority
GPO Box 1801
Canberra ACT 2601

Email: foi@mdba.gov.au

Phone: 02 6279 0452

Fax: 02 6248 8053

Directions under section 175 of the Water Act

There have been no directions given by the Minister for Climate Change and Water under section 175 of the *Water Act 2007* (Cwlth).

List of figures and tables

Figures

Tables

Abbreviations and acronyms

ACCC	Australian Competition and Consumer Commission
AHD	Australian Height Datum
ANAO	Australian National Audit Office
ANCOLD	Australian National Committee on Large Dams
APS	Australian Public Service
BSMS	Basin Salinity Management Strategy
CAC	Community Advisory Committee
CAC Act	*Commonwealth Authorities and Companies Act 1997* (Cwlth)
COAG	Council of Australian Governments
CRC	Cooperative Research Centre
CRG	community reference group
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cwlth	Commonwealth
DEWHA	Department of Environment, Water, Heritage and the Arts
EC	electrical conductivity unit
EL	Executive Level
ESD	ecologically sustainable development
EWMP	Environmental Works and Measures Program
FMA Act	*Financial Management and Accountability Act 1997* (Cwlth)
GL	gigalitre
IAG	Independent Audit Group
ICT	information and communications technology
IEC	individual employment contract
LMI	Living Murray Initiative
LTCE	long-term Cap equivalent
MDBA	Murray–Darling Basin Authority

MDBC	Murray–Darling Basin Commission
MDFRC	Murray–Darling Freshwater Research Centre
ML	megalitre
MLDRIN	Murray Lower Darling Rivers Indigenous Nations
NFS	Native Fish Strategy
NRM	natural resource management
OH&S	occupational health and safety
RAR	required annual release
RMIF	River Murray Increased Flows
RMO	River Murray Operations
SDL	sustainable diversion limit
SEACI	South Eastern Australian Climate Initiative
SES	Senior Executive Service
SIS	salt interception scheme
SRA	Sustainable Rivers Audit
TLM	The Living Murray
WADC	Water Accounting Development Committee
WAM	water audit monitoring
WCC	Workplace Consultative Committee

Glossary

acid sulfate soils. Soils formed naturally when sulfate-rich water (e.g. saline groundwater or sea water) mixes with sediments containing iron oxides and organic matter. Under waterlogged, anaerobic (oxygen-free) conditions, bacteria convert sulfates to sulphides, which can form sulfidic sediments. When these sediments are exposed to oxygen, such as under drought conditions, chemical reactions may lead to the generation of sulfuric acid.

allocation. An allocation is the specific volume of water allocated to the holders of water *entitlements* in a given season. The allocation is often quoted as a percentage of the volume of each entitlement. For instance, a 20% allocation in a particular season allows a water user with a 100 ML entitlement to take 20 ML of water.

anabranch. A branch of a river that leaves the main stream and rejoins it further downstream.

ANCOLD. The Australian National Committee on Large Dams Incorporated (ANCOLD Inc.) is an incorporated voluntary association of organisations and individual professionals with an interest in dams in Australia. It is the Australian national committee of the International Commission on Large Dams (ICOLD). A variety of ANCOLD technical working groups produce, for example, guidelines on design, management and risk assessment of dams.

aquifer. An underground layer of soil, rock or gravel able to hold and transmit water.

barrages. Five low, wide weirs built at the Murray Mouth to reduce the amount of seawater flowing in and out of the mouth due to tidal movement. They also help control the water level in the Lower Lakes and River Murray below Lock 1.

Barmah Choke. A narrow section of the River Murray constraining the volume of water that can pass during major floods. During floods, large volumes of water are temporarily banked up behind the Barmah Choke, flooding the wetland system known as the Barmah–Millewa Forest.

baseline conditions. Conditions regarded as a reference point for the purpose of comparison.

Basin Plan. The *Water Act 2007* (Cwlth) requires that the Murray–Darling Basin Authority (MDBA) develops and oversees the Basin Plan for the integrated management of Basin water resources. The Basin Plan will provide for limits on the quantity of water that may be taken from the Basin water resources.

Basin Salinity Management Strategy (BSMS). This strategy guides communities and governments in working together to control salinity in the Murray–Darling Basin. It establishes targets for the river salinity of each major tributary valley and the Murray–Darling system.

biodiversity. The variety of life forms, plants, animals and micro-organisms; the genes they contain; the ecosystems they form; and ecosystem processes.

Cap on water diversions. The limit imposed on the volume of surface water that can be diverted from rivers for consumptive uses. Started in 1995 as the Interim Cap.

catchment. The area of land drained by a river and its tributaries.

channel capacity. The volume of water that can pass along the river channel at a certain point without spilling over the tops of the banks.

Commonwealth Environmental Water Holder. Environmental water entitlements held by the Australian Government are managed by the Commonwealth Environmental Water Holder, a person who, under the *Water Act 2007* (Cwlth), is given the function of using these entitlements to protect and restore the environmental assets of the Murray–Darling Basin, or assets outside the Basin where water is held for that area.

connectivity. Related to maintaining connections between natural habitats, such as a river channel and adjacent wetland areas.

consumptive use. The use of water for private benefit consumptive purposes, including irrigation, industry, urban, and stock and domestic use.

critical human water needs. The needs for a minimum amount of water to meet core human consumption requirements in urban and rural areas that are dependent on Basin water resources. They also include non-human consumption requirements that, if not met, would cause prohibitively high social, economic or national security costs.

drawdown. Lowering the water level in a weir pool.

dredging. A process whereby machines equipped with scooping or suction devices remove mud etc., in order to deepen a waterway.

easement. A grant of rights over land by a property owner in favour of another person to enter onto land for the purpose of installing and maintaining facilities such as cables, pipelines, etc. An easement may also grant the right to cross over land in order to gain access to other land.

EC. Electrical conductivity unit commonly used to indicate the salinity of water (1 EC = 1 microsiemen per centimetre, measured at 25°C).

end-of-valley targets. A water quality target for salinity, set for a point in the lower reach of each catchment.

entitlement. Water users in the Basin hold a legal entitlement, or licence, to a share of the available water. An *allocation* is the specific volume of water allocated to the holder of an entitlement in a given season.

environmental flows. Any river flow pattern provided with the intention of maintaining or improving river health.

environmental outcome. Project outcomes that benefit the ecological health of the river system.

environmental water. Water used to achieve environmental outcomes, including ecosystem function, biodiversity, water quality, and water resource health.

Environmental Works and Measures Program (EWMP). A major program to deliver works and measures to improve the health of the River Murray system by making the best use of the water currently available, optimising the benefits of any water recovered in the future, and considering other policy interventions.

fishway. A structure that provides fish with passage past an obstruction in a stream.

flow regime. The spatial and temporal pattern of flows in a river.

GL. Gigalitre, i.e. 1 billion litres (1,000,000,000 litres).

hydrology. The study of the distribution and movement of water.

icon sites. These six locations were chosen for *The Living Murray* program because they are of regional, national and international importance for their ecological value, and there is concurrence that they are at risk and require improved water flow regimes. These sites are Barmah–Millewa Forest, Gunbower–Koondrook–Perricoota Forest, Hattah Lakes, Chowilla Floodplain and Lindsay–Wallpolla Islands, Murray Mouth, Coorong and Lower Lakes, and the River Murray Channel.

lock. A rectangular chamber of concrete with gates at each end. It allows vessels to move from one water level to another.

long-term Cap equivalent. A type of average which takes into account the different characteristics of water entitlements in New South Wales, Victoria and South Australia, and their reliability. This measure of water recovery creates a common unit of measure, thus allowing equitable comparison of a broad range of water recovery measures.

macroinvertebrate. An invertebrate animal (animal without a backbone) large enough to be seen without magnification.

ML. Megalitre, i.e. 1 million litres.

Murray–Darling Basin. The entire tract of land drained by the Murray and Darling Rivers. The Basin covers land in Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia.

Native Fish Strategy (NFS). This strategy aims to ensure that the Murray–Darling Basin sustains viable fish populations and communities throughout its rivers. The strategy's goal is to rehabilitate native fish communities to 60% of their estimated pre-European settlement levels within 50 years of implementation.

Ramsar/Ramsar listing. A Ramsar listing denotes the inclusion of a wetland area on the List of Wetlands of International Importance — an inventory prescribed by the Convention on Wetlands (more commonly known as the Ramsar Convention, which was signed in Ramsar, Iran, in 1971). As one of the original contracting parties to the Convention, Australia has designated 65 sites for this list.

reference group. A committee involving a range of expertise to inform and critique projects and project findings.

regulated flow. A controlled flow rate resulting from the influence of a regulating structure, such as a dam or weir.

riparian. Of, inhabiting, or situated on, the bank or floodplain of a river.

river health. Status of a river system based on water quality, ecology and biodiversity.

River Murray Increased Flows (RMIF). Water recovered under investment in the Snowy Joint Government Enterprise and managed under *The Living Murray* framework.

salinity. The concentration of dissolved salts in groundwater or river water, usually expressed in electrical conductivity units (EC, see above) or milligrams of dissolved solids per litre.

salinity registers. A salinity-based accounting system underpinning the *Basin Salinity Management Strategy*. The system provides an accounting record of states' actions that affect river salinity.

salt interception scheme. Involves large-scale groundwater pumping and drainage projects that intercept saline water flows and dispose of them, generally by evaporation.

southern connected Basin. The upper River Murray and the River Murray in South Australia, and regulated reaches of the Goulburn, Campaspe, Loddon and Murrumbidgee river systems.

sustainable diversion limits. A central element of the *Basin Plan* is to set environmentally sustainable limits on the amount of water that can be taken from the Basin's water resources. These are known as sustainable diversion limits (SDLs). The SDLs will limit the quantity of surface water and groundwater that can be taken from the Basin.

Sustainable Rivers Audit (SRA). A program designed to measure the health of the rivers within the Murray–Darling Basin. The audit aims to determine the ecological condition and health of river valleys in the Basin; to give a better insight into the variability of river health indicators over time; and to trigger changes to natural resource management.

The Living Murray. One of Australia's most significant river restoration programs, with funding of almost $1 billion over the period 2004 to 2012. The program is a partnership of the Australian Government and the New South Wales, Victorian, South Australian and Australian Capital Territory governments.

water recovery. Implementation of measures that result in water being made available under The Living Murray environmental watering plan.

water recovery registers. Water recovery measures have been approved and monitored using a system of three registers. The first stage of approval for a water recovery measure is the Developmental Register; the second is the Eligible Measures Register; and the third and final stage is the Environmental Water Register.

weir. A dam placed across a river or canal to raise or divert the water, or to regulate or measure the flow.

weir pool. The body of water stored behind a weir.

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