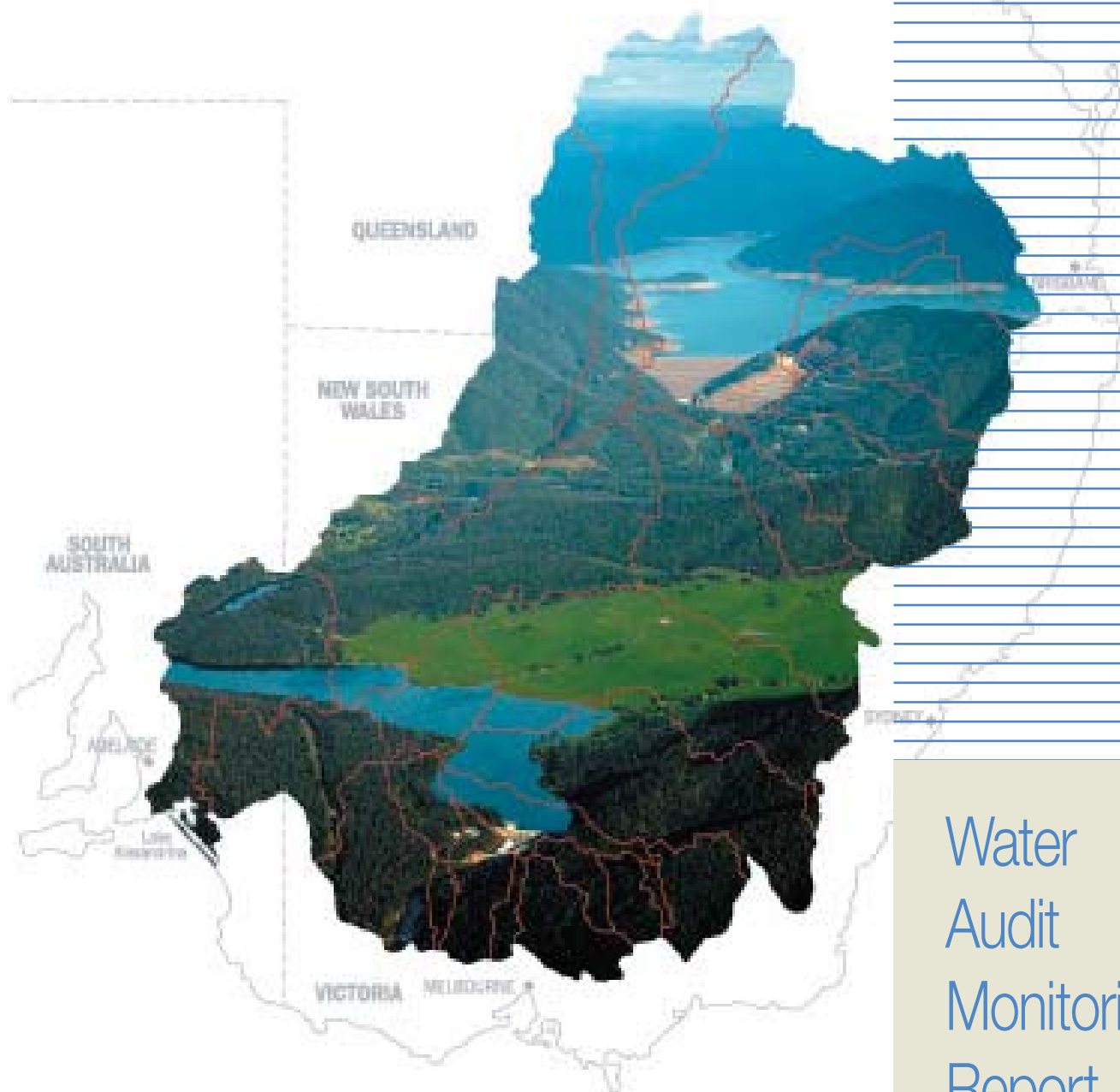


Water Audit Monitoring Report 2004/05

**Report of the Murray-Darling Basin Commission
on the Cap on Diversions**



Water
Audit
Monitoring
Report
2004/05

June 2006



Integrated catchment management in the Murray-Darling Basin

A process through which people can develop a vision, agree on shared values and behaviours, make informed decisions and act together to manage the natural resources of their catchment: their decisions on the use of land, water and other environmental resources are made by considering the effect of that use on all those resources and on all people within the catchment.

Our values

We agree to work together, and ensure that our behaviour reflects the following values.

Courage

- We will take a visionary approach, provide leadership and be prepared to make difficult decisions.

Inclusiveness

- We will build relationships based on trust and sharing, considering the needs of future generations, and working together in a true partnership.
- We will engage all partners, including Indigenous communities, and ensure that partners have the capacity to be fully engaged.

Commitment

- We will act with passion and decisiveness, taking the long-term view and aiming for stability in decision-making.
- We will take a Basin perspective and a non-partisan approach to Basin management.

Respect and honesty

- We will respect different views, respect each other and acknowledge the reality of each other's situation.
- We will act with integrity, openness and honesty, be fair and credible, and share knowledge and information.
- We will use resources equitably and respect the environment.

Flexibility

- We will accept reform where it is needed, be willing to change, and continuously improve our actions through a learning approach.

Practicability

- We will choose practicable, long-term outcomes and select viable solutions to achieve these outcomes.

Mutual obligation

- We will share responsibility and accountability, and act responsibly, with-fairness and justice.
- We will support each other through necessary change.

Our principles

We agree, in a spirit of partnership, to use the following principles to guide our actions.

Integration

- We will manage catchments holistically; that is, decisions on the use of land, water and other environmental resources are made by considering the effect of that use on all those resources and on all people within the catchment.

Accountability

- We will assign responsibilities and accountabilities.
- We will manage resources wisely, being accountable and reporting to our partners.

Transparency

- We will clarify the outcomes sought.
- We will be open about how to achieve outcomes and what is expected from each partner.

Effectiveness

- We will act to achieve agreed outcomes.
- We will learn from our successes and failures and continuously improve our-actions.

Efficiency

- We will maximise the benefits and minimise the costs of actions.

Full accounting

- We will take account of the full range of costs and benefits, including economic, environmental, social and off-site costs and benefits.

Informed decision-making

- We will make decisions at the most appropriate scale.
- We will make decisions on the best available information, and continuously improve knowledge.
- We will support the involvement of Indigenous people in decision-making, understanding the value of this involvement, and respecting the living knowledge of Indigenous people.

Learning approach

- We will learn from our failures and successes.
- We will learn from each other.

Water Audit Monitoring Report 2004/05

*Report of the
Murray-Darling Basin
Commission on the
Cap on Diversions*

*Water Audit
Monitoring
Report
2004/05*

J U N E 2 0 0 6

Acknowledgments

The development of the Murray-Darling Basin Commission's 2004/05 Water Audit Monitoring Report has involved the valuable input, support and commitment of many people. Each stage of the development of the report was overseen by the members of the inter-Governmental working groups and committees. Without naming each particular contributor, thanks are due to the following agencies:

- Commonwealth Bureau of Meteorology, Australia;
- Australian Government Department of Agriculture, Fisheries and Forestry;
- Office of Sustainability, ACT Chief Minister's Department;
- NSW Department of Natural Resources;
- QLD Department of Natural Resources, Mines and Water;
- SA Department of Water, Land and Biodiversity Conservation;
- VIC Department of Sustainability and Environment; and
- VIC Goulburn-Murray Rural Water Authority.

Cover Image: Aerial view of Dartmouth Dam.
© Michael Bell Photographer.

Recycled Paper: This publication is printed on Monza Satin Recycled, a new generation premium A2+ gloss coated recycled paper. It is produced with 50% recycled fibre (15% post consumer and 35% pre-consumer) with the balance (50%) being oxygen bleached virgin pulp.

This report may be cited as:

Water Audit Monitoring Report 2004/05
Published by the Murray-Darling Basin Commission, Canberra, as per the requirement of the *Murray-Darling Basin Agreement* (Schedule F).

Office Address

Level 5, 15 Moore St, Canberra,
Australian Capital Territory

Postal Address

GPO Box 409, Canberra ACT 2601

Tel: (02) 6279 0100;
from overseas +61 2 6279 0100

Fax: (02) 6248 8053;
from overseas + 61 2 6248 8053

Email: info@mdbc.gov.au

Internet: <http://www.mdbc.gov.au>

ISBN 1 921 038 93 4

MDBC Publication No. 27/06

© Copyright Murray-Darling Basin Commission, 2006

This work is copyright. Graphical and textual information in the work (with the exception of photographs and the MDBC logo) may be stored, retrieved and reproduced in whole or in part, provided the information is not sold or used for commercial benefit and its source (*Water Audit Monitoring Report 2004/05*) is acknowledged. Such reproduction includes fair dealing for the purpose of private study, research, criticism or review as permitted under the Copyright Act 1968. Reproduction for other purposes is prohibited without prior permission of the Murray-Darling Basin Commission or the individual photographers and artists with whom copyright applies.

To the extent permitted by law, the copyright holders (including its employees and consultants) exclude all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this report (in part or in whole) and any information or material contained in it.

I&D 11179

Foreword

June 2006

The Hon Peter McGauran, MP
Chairman, Murray-Darling Basin Ministerial Council
Parliament House
CANBERRA ACT 2600

Dear Minister

I have great pleasure in submitting to you the Water Audit Monitoring Report 2004/05. The Council established the Cap in 1995 and set the operating frame work in 1996. The Council formalised the operating rules for the Cap in the form of Schedule F to *Murray-Darling Basin Agreement* in 2000. The Water Audit Monitoring Report 2004/05 is the ninth in a series of the reports on the Cap on Diversion and has been produced as a requirement of Schedule F.

The Water Audit Monitoring Report 2004/05 complements the Independent Audit Group Report 2004/05. Whereas the focus of the Independent Audit Group Report is the Cap compliance and the activities related to it, this Report provides a broader picture of the Cap compliance, water use, accuracy of water use figures, climatic overview for the water year, water availability through allocations, off-allocations and water trading, storages losses, and groundwater use.

Schedule F requires the Commission to maintain a Diversion Cap Register. The updated Diversion Cap Register is appended to the Water Audit Monitoring Report. The Diversion Cap Register provides details for every designated Cap valley and for every reporting year since 1997/98 of annual Cap adjustments for trade, trade adjusted annual Cap targets, annual diversions, annual Cap credits and cumulative Cap credits since 1997/98. This Register is the formal record of diversions and Cap compliance in the Basin.

The text in Chapters 4, 5, 6, 7 and 8 and data published in this Report have been supplied by the States and Territory. The published data are considered to be the best available estimates for Water Diversion, Water Trade, Cap targets and other data. If better estimates become available in future, the Diversion Cap Register will be amended accordingly. The Diversion and Trade figures in this Report are considered to be the latest figures for the water year and supersede those reported in the Independent Audit Group Report 2004/05.

The Commission appreciates the co-operation received from the States and Territory Governments Officers in compiling this Report.

Yours sincerely



Wendy Craik
Chief Executive



Contents

Water Audit Monitoring Report 2004/05

1	Introduction	1
2	Background	4
2.1	Audit of Water Use in the Murray-Darling Basin, June 1995	4
2.2	The Cap	4
2.3	IAG Review of Cap Implementation 2004/05	5
3	The Year in Review	6
3.1	Water Use	6
3.2	Accuracy of Measurement	9
3.3	Climatic Overview 2004/05	10
3.4	Definition of Cap	13
3.5	Comparison of 2004/05 Water Use with the Cap	14
4	Review of 2004/05 Water Usage in New South Wales	18
4.1	Water Management Overview	18
4.2	Water Use Overview	18
4.3	Border Rivers	18
4.4	Gwydir	19
4.5	Namoi/Peel	20
4.6	Macquarie/Castlereagh/Bogan	20
4.7	Barwon-Upper Darling	21
4.8	Lachlan	22
4.9	Murrumbidgee	22
4.10	Lower Darling	23
4.11	Murray	23
5	Review of 2004/05 Water Usage in Victoria	25
5.1	Overview	25
5.1.1	Water Use Capping Measures	25
5.1.2	Volumes Diverted	25
5.1.3	Off-Quota	25
5.1.4	Deliveries	25
5.1.5	Trading	26
5.1.6	Environmental Flows	26
5.2	Goulburn	26
5.3	Broken	27
5.4	Loddon	27
5.5	Campaspe	28
5.6	Wimmera-Mallee	29
5.7	Kiewa	29
5.8	Ovens	30
5.9	Murray (including Mitta Mitta)	30
6	Review of 2004/05 Water Usage in South Australia	31
6.1	Overview	31
6.2	River Murray Water Management 2004/05	31
6.3	Impacts on River Murray Water Use	31

Contents

6.4	Metropolitan Adelaide and Associated Country Areas	32
6.5	Country Towns	32
6.6	Lower Murray Swamps	32
6.7	Lower Murray Swamps Rehabilitation Progress Update	33
6.8	All Other Purposes (Highland Irrigation)	34
6.9	River Murray Drought Water Allocation Policy	34
6.10	Water Information Management in South Australia	35
6.11	Irrigators Response to the 2004/05 Water Year in South Australia	35
6.12	Changes to Water and Natural Resources Legislation	36
6.13	Environmental Management and Watering Opportunities in 2004/05	36
6.14	Future Water Management Activities	37
7	Review of 2004/05 Water Usage in Queensland	38
7.1	Water Planning and Management Overview	38
7.2	Stream Flow and Water Use Overview	42
7.3	Condamine-Balonne	43
7.3.1	Condamine	43
7.3.2	Balonne	44
7.4	Border Rivers/Macintyre Brook	44
7.5	Moonie	45
7.6	Warrego	45
7.7	Paroo	46
8	Review of 2004/05 Water Usage in ACT	47
8.1	Review of Water Use in the ACT	47
8.2	Progress of Water Reforms in the ACT	47
8.3	ACT Water Resources Strategy	47
9	Water Trading in the Murray-Darling Basin	48
9.1	History of Water Trading	48
10	Water Availability for the Year 2004/05	50
10.1	Water Availability	50
10.1.1	Volumetric Allocations	50
10.1.2	Continuous Accounting	50
10.1.3	Allocation Transferred into Valley	50
10.1.4	Carryover from the Previous Year	50
10.2	Allocated Water	50
10.3	Access to Water Not in the Allocation System	51
10.3.1	Supplementary Access (Off-allocation) and Water-Harvesting	51
10.3.2	Area Licences on Unregulated Streams	51
10.3.3	Irrigation System Losses	51
10.4	Comparison of Use of Allocated Water with the Allocated Volume	51
11	Comparison of Actual Flows with Natural Flows	57
12	Impoundments and Losses in Major On-Stream Storages	61

Contents

13	Groundwater Use in the Basin	63
13.1	Context	63
13.2	Groundwater Data for 2004/05	63
13.3	Groundwater Use since 1999/00	63
14	Conclusion	66
	Glossary	67
	APPENDIX A: Cap Register - Annual Cap Adjustments for Trade (ML)	70
	APPENDIX B: Cap Register - Trade Adjusted Annual Cap Targets (GL)	71
	APPENDIX C: Cap Register - Annual Diversions (GL)	72
	APPENDIX D: Cap Register - Annual Cap Credits (GL)	73
	APPENDIX E: Cap Register - Cumulative Cap Credits (GL)	74
	APPENDIX F: Cap Register for Metropolitan Adelaide	75
	APPENDIX G: Barmah-Millewa Forest Environmental Account	75

List of Tables & Figures

List of Tables

Table 1.	2004/05 Cap Compliance by State	2
Table 2.	Murray-Darling Basin Diversions in 2004/05	7
Table 3.	Accuracy of Diversion Estimates in 2004/05	9
Table 4.	Comparison of Diversions with Cap Levels in 2004/05	16
Table 5.	Comparison of diversions with Cap levels in 2004/05 for Metro-Adelaide & Associated Country Areas, South Australia	17
Table 6:	Water diversions in Queensland since 1993/94	46
Table 7.	Intra-Valley, Net Inter-Valley and Net Interstate Water Entitlement Transfers in 2004/05	49
Table 8.	Water Allocated in 2004/05	53
Table 9.	Carryovers for 2004/05	54
Table 10.	Use of Allocated Water in 2004/05	55
Table 11.	Use of Valley Allocations in 2004/05	56
Table 12.	Comparison of 2004/05 Actual and Natural Annual Flows for Key Sites within the Murray-Darling Basin.	58
Table 13.	Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2004/05	61
Table 14.	Basin-wide Groundwater Data for 2004/05 aligned along the designated Cap valleys	65

List of Figures

Figure 1.	Murray-Darling Basin Diversions - 1983/84 to 2004/05	8
Figure 2.	Murray-Darling Basin Diversions - 1983/84 to 2004/05 (usage under 1000 GL/yr)	8
Figure 3.	Rainfall Deciles for the Murray-Darling Basin for the July 2004 to June 2005 Period	11
Figure 4.	Rainfall Deciles for the Murray-Darling Basin for the November 2004 to April 2005 Period	11
Figure 5.	Temperature Anomaly for the 12 Month Period July 2004 to June 2005	12
Figure 6.	Temperature Anomaly for the 3 Month Period December 2004 to February 2005	12
Figure 7.	Utilisation of allocated water as percentage of the allocated volume since 1997/98	52
Figure 8.	Plots of Flows at Selected Sites Showing 2004/05 Actual and Natural (Modelled) Flows in Victoria	59
Figure 9.	Groundwater Use in the Basin since 1999/00	64

1. Introduction

In June 1995, in response to an audit of water use in the Murray-Darling Basin, the Murray-Darling Basin Ministerial Council agreed to cap water use within the Basin. To ensure that the development, management and operation of the Cap is an open and transparent process, the Ministerial Council agreed that a Water Audit Monitoring Report should be produced and published annually.

This report outlines the water usage within the Murray-Darling Basin for the 2004/05 water year, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

The water year in the Queensland Murray-Darling valleys is October to September. The water year for the remainder of the Basin is July to June.

This report outlines water usage in the States by designated river valley (Section 3.1), includes estimates of the accuracy of water use figures presented (Section 3.2), provides a climatic overview for the water year (Section 3.3), defines the Cap for each State (Section 3.4) and reviews Cap compliance of States (Section 3.5).

In addition to detailing water use, this report also contains information on the States' implementation of management rules in designated river valleys that impact on water use within the Basin. Each State has provided a description of their major activities occurring in 2004/05 and further actions that each State plans to undertake over the coming years (Sections 4 to 8).

Other information provided within this report includes water trading throughout the Basin (Section 9), water availability for the year (Section 10), a comparison of actual and natural flows at key sites within the Basin (Section 11) and impoundments and losses in major on-stream storages (above 10 GL capacity) (Section 12).

Section 13 provides information on the use of groundwater in the Basin.

The Diversion Cap Register, which is, maintained in accordance with the requirements of Schedule F and Barmah-Millewa Forest environmental diversions, are reported in Appendix A–F and Appendix G, respectively.

To permit rapid assessment of the findings of this report, **Table 1** summarises the compliance of each of the Basin States with the objectives of the Cap.

Table 1. 2004/05 Cap Compliance by State

<i>State / Territory</i>	<i>2004/05 Cap Compliance</i>
New South Wales	
Border Rivers	An IQQM (Interim) model yet to be audited and approved by the Commission is available. The IAG could not audit the NSW Border Rivers Cap as a Cap is yet to be defined. The Commission meeting 87 - 15 March 2006 noted that Queensland and New South Wales were finalising an Inter-Governmental Agreement to establish a framework to enable Cap targets to be established for the Border Rivers NSW. The 2004/05 diversion was 125 GL.
Gwydir	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2004/05 diversion of 165 GL was below the annual Cap target of 271 GL. The Valley has a cumulative Cap credit of 224 GL since 1997/98.
Namoi/Peel	An IQQM model approved by the Commission available to determine the Cap compliance for the Namoi valley. A climate-diversion relationship is available for Peel and an IQQM model is under development. The 2004/05 diversion of 190 GL was below the annual Cap target of 250 GL. The Valley has a cumulative Cap credit of 34 GL since 1997/98.
Macquarie/Castlereagh/Bogan	An IQQM (Interim) model submitted for audit and yet to be approved by the Commission is available to determine Cap compliance. The 2004/05 diversion of 102 GL was below the annual Cap target of 287 GL. The Valley has a cumulative Cap credit of 195 GL since 1997/98.
Barwon-Darling/Lower Darling	Council Meeting 29 - 25 August 2000 decided to combine the Barwon-Darling and Lower Darling into a single Designated River Valley for Cap accounting purpose. An IQQM (Interim) for the Barwon-Darling and MSM (Interim) for the Lower Darling, both of which are yet to be approved by the Commission, are available to determine the Cap compliance. The combined Barwon-Darling/Lower Darling Cap valley was declared in breach of the Cap by Commission Meeting 84 – 7 June 2005. The combined valley diversion of 186 GL exceeded its annual Cap target of 116 GL. The combined Valley's cumulative Cap debit of 154 GL at the end of 2004/05 exceeded the trigger of 62 GL for Special Audit. A Special Audit by the IAG conducted in February 2006 confirmed the Cap exceedence. Subsequently, Commission Meeting 87 - 15 March 2006 declared that the combined Barwon-Darling/Lower Darling Cap Valley continues to exceed the Cap.
Lachlan	An IQQM model approved by the Commission is available to determine Cap compliance. The 2004/05 diversion of 36 GL was below the annual Cap target of 60 GL. The Lachlan valley has a cumulative Cap credit of 6 GL since 1997/98.
Murrumbidgee	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2004/05 diversion of 1618 GL for the Murrumbidgee valley was above its Cap target of 1503 GL. However, the Valley has a cumulative Cap credit of 615 GL since 1997/98.
Murray	The MSM (Interim) model yet to be audited and approved by the Commission is available to determine Cap compliance. The 2004/05 diversion of 1241 GL for the Murray valley was below its annual Cap of 1624 GL. The Valley has a cumulative Cap credit of 638 GL since 1997/98.

Table 1. 2004/05 Cap Compliance by State (continued)

<i>State / Territory</i>	<i>2004/05 Cap Compliance</i>
Victoria	
Goulburn/Broken/Loddon	A computer model known as Goulburn Simulation model (GSM) submitted for audit and yet to be approved by the Commission is available to determine Cap compliance. The 2004/05 diversion of 1553 GL for the Goulburn/Broken/Loddon system was below its Cap target of 1651 GL. The Valley has a cumulative Cap credit of 106 GL.
Campaspe	The GSM, which is yet to be audited and approved by the Commission, is available to determine the Cap compliance. The diversion of 40 GL for the Campaspe in 2004/05 was below its Cap target of 80 GL. The Valley has a cumulative credit of 76 GL.
Wimmera-Mallee	An un-calibrated model is available. Though no Cap target for 2004/05 was available, the diversion of 53 GL was below the estimated long-term Cap of 162 GL.
Murray/Kiewa/Ovens	The MSM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2004/05 diversion of 1491 GL for the Murray/Kiewa/Ovens Cap valley was below its Cap target of 1649 GL. The Valley has a cumulative credit of 854 GL.
South Australia	
Metro-Adelaide & Associated Country Areas	With the 2004/05 diversion of 72 GL, the Metro-Adelaide & Associated Country Areas diversion was below the five-year rolling Cap up to and including 2004/05. Pending final decision, a separate 'first use license' has been created to accommodate growth in Metro Adelaide diversions. A temporary trade of 8.8 GL was affected to that license and was considered fully utilized. The Diversion of 8.8 GL is included in the total diversion of 72 GL.
Lower Murray Swamps	The 2004/05 diversion of 60 GL for the Lower Murray Swamp equalled its Cap of 60 GL for 2004/05. Diversions in the Lower Murray Swamps are determined to be equal to the licensed allocation held by a private irrigator and/or corporation.
Country Towns	The 2004/05 diversion of 39 GL for the Country Towns was below its Cap target of 50 GL. The Country Towns valley has a cumulative credit of 68 GL.
All Other Purposes	A regression model approved by the Commission is available to determine Cap compliance. The 2004/05 diversion of 453 GL for the <i>All Other Purposes</i> was below its Cap target of 468 GL. The Valley has a cumulative credit of 405 GL.
Queensland	
Condamine/Balonne	The Cap to be applied to the Condamine/Balonne valley will be determined following the completion of the water planning process. A Cap model will be available then. The 2004/05 diversion was 167 GL.
Border Rivers/Macintyre Brook	The Cap to be applied to the Border Rivers valley will be determined following the completion of the water planning process. A Cap model will be available then.. The 2004/05 diversion was 192 GL.
Moonie	Queensland is about to propose a Cap for the valley following the completion of a water planning process in early 2006. In anticipation of agreement on the Cap, a valley Cap model is being progressed for accreditation by the Commission. The 2004/05 diversion was 23 GL.
Warrego/Paroo	Queensland is about to propose a Cap for the valley following the completion of water planning process in early 2006. In anticipation of agreement on the Cap, a valley Cap model is being progressed for accreditation by the Commission. The 2004/05 diversion was 10 GL.
Australian Capital Territory	A Cap model is not yet available to determine Cap compliance. Work is continuing to establish a Cap for the ACT and to establish a framework for trade between the ACT and other jurisdictions. The 2004/05 diversion was 27 GL.

2. Background

2.1 Audit of Water Use in the Murray-Darling Basin, June 1995

In June 1995, the Commission completed an audit of water use in the Murray-Darling Basin (*An Audit of Water Use in the Murray-Darling Basin*, Murray-Darling Basin Ministerial Council, Canberra, 1995). This audit revealed that water diversions from the rivers within the Basin had increased by 8% in the previous six years and were averaging 10800 GL/year.

This level of diversion had significantly reduced the flows in the bottom end of the River Murray. It is currently estimated that median annual flow from the Basin to the sea is only 27% of the flow that would have occurred prior to development. The reduction in flow had occurred most significantly for the small to medium size flood events. Many of these events were completely harvested and the frequency of these flood events had been significantly reduced. It was also found that the end of the river system was experiencing severe drought-like flows in over 60% of years compared with 5% of years under natural conditions.

The change in flow regime has had a significant impact on river health. There has been a contraction in the areas of healthy wetland, native fish numbers have declined in response to the reduction in flow triggers for spawning, salinity levels have risen and algal blooms have increased in frequency in line with the increased frequency of periods of low flow. Further deterioration in river health could be expected if diversion levels were to increase.

The audit examined the scope for diversions to grow further under the water allocation system that existed prior to the Cap. The water allocation system evolved at a time when water managers were trying to encourage development of the water resources of the Basin. As such the system rationed water during periods of shortage but was not effective for controlling diversion during normal non-drought conditions. It was reported that, in the five years before the water audit, only 63% of the water that was permitted to be used

was used. The audit found that average diversions could increase by a further 15% if all existing water entitlements were fully developed. Such an increase would reduce the security of supply to existing water users as well as exacerbating river health problems.

2.2 The Cap

The water audit report was presented to the Murray-Darling Basin Ministerial Council in June 1995. The Council determined that a balance needed to be struck between the significant economic and social benefits that have been obtained from the development of the Basin's water resources on the one hand, and the in-stream uses of water in the rivers on the other. Council agreed that diversions in the Basin had to be capped. An Independent Audit Group (IAG) was appointed to report on the level at which diversions should be capped. In doing so, the Group took into account the equity issues between the States.

In December 1996, Council considered the Independent Audit Group's report and agreed that:

- For New South Wales and Victoria the Cap is the volume of water that would have been diverted under 1993/94 levels of development plus allowances in the Border Rivers for Pindari Dam (NSW) and in the Goulburn/Broken/Loddon system for Lake Mokoan (Victoria);
- For South Australia, *All Other Purposes* diversions were capped at 440.6 GL. This represents an increase in diversions over 1993/94 levels of development but they are below allocations which were established in 1969; and
- The Cap for Queensland would be determined after the independently audited Water Allocation and Management Planning (WAMP) and Water Management Planning (WMP) processes had been completed.

Subsequently, the Australian Capital Territory joined the *Murray-Darling Basin Initiative* under a Memorandum of Understanding (MoU) and agreed to participate in the Cap following the completion of discussions with the Murray-Darling Basin Commission (MDBC), the IAG and other jurisdictions.

Through capping diversions at the 1993/94 levels of development in the two major water using States coupled with the diversion measures planned for South Australia, and future Caps in Queensland and the ACT, the Ministerial Council has effectively established a new framework for water sharing in the Basin. Because of the value placed on water rights, it is important that each State is only using water in line with its Cap. For this reason, the implementation of the Cap requires an integrated reporting framework including significant improvements to the way that diversions are monitored and reported.

This report is a part of the ongoing Cap process. Given the major change in attitude to the allocation and use of water that has occurred as a result of the Cap there has been need for significant development of monitoring and reporting systems by the State agencies. In particular, some of the technology-based support systems (e.g. improved river modelling), are proving to be more involved, time consuming and labour intensive than originally anticipated.

Thus required outcomes, including water user and catchment community understanding and acceptance, are taking longer to be achieved. As such, this report does not present a complete and final picture, rather it presents information currently available, highlights areas where information is still unavailable and directions proposed to improve monitoring and reporting performance.

2.3 IAG Review of Cap Implementation 2004/05

At the request of the Ministerial Council, the IAG performed a review of the performance of each State and Territory in progressing the implementation of the Cap during 2004/05 (*Review of Cap Implementation 2004/05*, published by the Murray-Darling Basin Ministerial Council, March 2006, Canberra).

The present report represents the ninth in a series of annual reports and complements the report of the IAG, however the data presented herein are the final figures for the 2004/05 water year and supersede the data reported by the IAG. Most notably, the Murray-Darling Basin diversions in 2004/05 reported in this present report (**Table 2**) supersede those reported by the IAG in March 2006 (**Table 12** of that report).

3. The Year in Review

3.1 Water Use

The data presented in this report has been collected by the relevant State agencies and collated by the MDBC. Accurate diversion data is difficult to obtain, as it requires the collection and collation of thousands of individual water use figures. **Table 2** presents the overall water usage figures for the Basin in 2004/05.

The figures indicate that Basin water use in 2004/05 was 7846 GL, representing the lowest ever on record (since 1983/84). Water use in New South Wales was the lowest ever on record; in Victoria the fourth lowest; in South Australia the eighth highest, in Queensland the eighth highest, whilst diversions in the ACT were the sixth lowest on record.

Figure 1 shows the water use (by State) for the period 1983/84 – 2004/05 which enables a comparison of 2004/05 water use with that of previous years. **Figure 2** shows the same data as **Figure 1** but has the vertical axis rescaled so that the variation for States with lower overall usage is visible.

Not all diversions are metered and some diversions have to be estimated based on area irrigated or duration of diversion. Section 3.2 provides some indication as to the accuracy of the measurements.

Table 2. Murray-Darling Basin Diversions in 2004/05

<i>System</i>	<i>Irrigation Diversion (GL)</i>	<i>Other Diversion¹ (GL)</i>	<i>Total Diversion (GL)</i>
New South Wales²			
Intersecting streams	3	0	3
Border Rivers	123	2	125
Gwydir	164	1	165
Namoi/Peel	184	6	190
Macquarie/Castlereagh/Bogan	86	16	102
Barwon-Darling	157	0	157
Lower Darling	22	7	29
Lachlan	25	11	36
Murrumbidgee ⁴	1554	64	1618
Murray	1205	35	1241
Total New South Wales³	3524	142	3666
Victoria			
Goulburn	1447	30	1477
Broken	12	14	27
Loddon	42	8	49
Campaspe	16	24	40
Wimmera-Mallee	1	51	53
Kiewa	3	1	4
Ovens	12	9	21
Murray	1391	75	1466
Total Victoria	2925	212	3137
South Australia			
Metro-Adelaide & Associated Country Areas	0	72	72
Lower Murray Swamps ⁵	60	0	60
Country Towns	0	39	39
All Other Purposes	446	8	453
Total South Australia	506	118	623
Queensland²			
Condamine/Balonne	158	9	167
Border Rivers	173	4	177
Macintyre Brook	14	0	15
Moonie	23	0	23
Warrego	10	0	11
Paroo	0	0	0
Total Queensland⁶	379	13	392
Australian Capital Territory⁷	5	22	27
Total Basin	7339	508	7846

1. "Other Diversion" includes domestic & stock, town & industrial uses.
2. New South Wales, Victoria and Queensland diversions include an estimate of unregulated stream diversions.
3. An estimate of NSW floodplain diversions is not available for 2004/05.
4. Lowbidgee diversions are included in the Murrumbidgee valley diversions.
5. Water use by Lower Murray Swamp irrigators is based on an estimate of water use. The metering of diversions is currently being implemented.
6. Floodplain diversions in Queensland of 72 GL are not included in valley totals.
7. ACT diversions are reported as a net figure. The primary usage in the ACT is for urban supply, which has a high return component (approximately 50%).

Figure 1. Murray-Darling Basin Diversions – 1983/84 to 2004/05

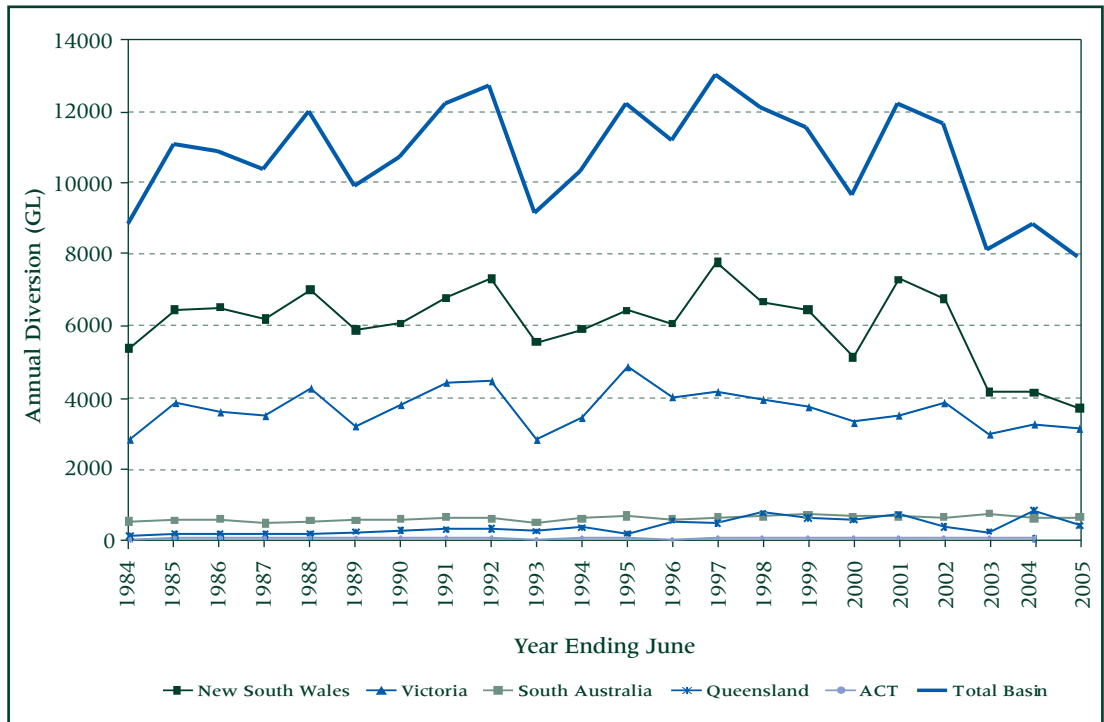
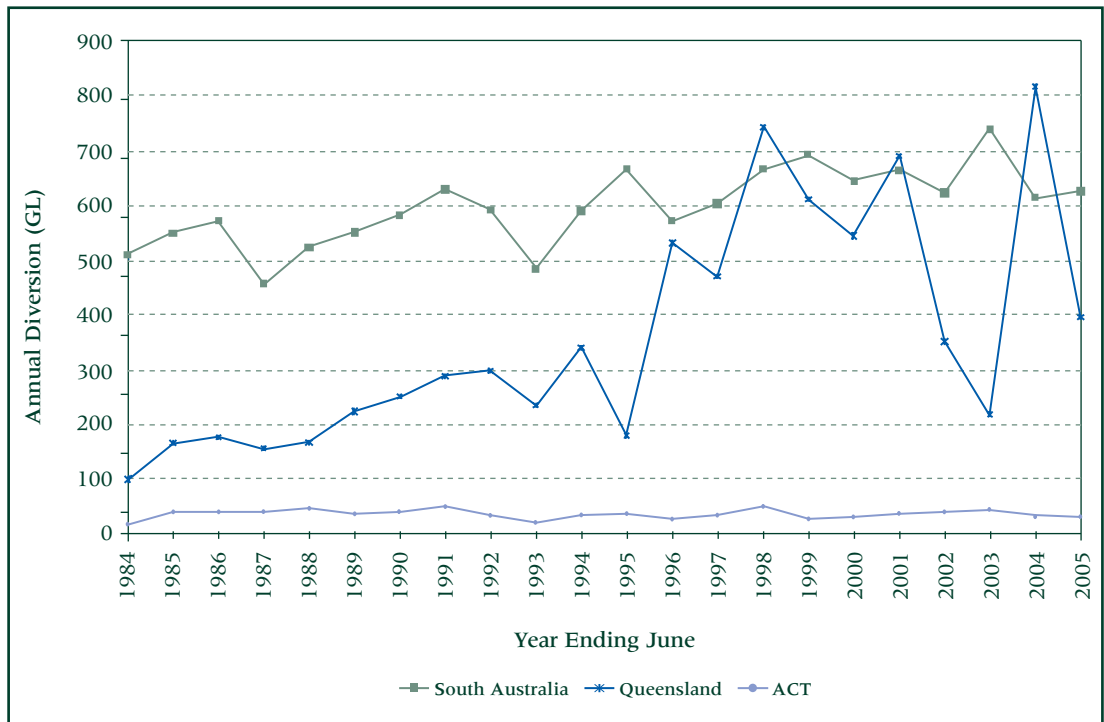


Figure 2. Murray-Darling Basin Diversions – 1983/84 to 2004/05 (usage under 1000 GL/yr)



3.2 Accuracy of Measurement

An attempt has been made to assess the accuracy of the diversion estimates in each river valley. Many of the diversions are measured reliably using either metered pumps or gauged off-take channels. However, a second category of diversions are estimated from regional surveys of areas planted and a third category of estimates are based only on user returns which have proved to be very inaccurate.

Table 3 outlines the confidence the States have in their diversion estimates as reported in **Table 2**.

To develop the figures in **Table 3**, metered diversions have been assumed to have an accuracy of $\pm 5\%$, regional surveys $\pm 20\%$ and user returns $\pm 40\%$.

Analysis of reported diversions for 1996/97 to 2004/05 indicates that the accuracy of measurement has remained at 7%.

It is expected that the accuracy of measurement will improve over time as volumetric licences and allowances are implemented in New South Wales and Queensland, in conjunction with the installation of metering in the Lower Murray Swamps, South Australia.

Table 3. Accuracy of Diversion Estimates in 2004/05

<i>System</i>	<i>Diversion (GL)</i>	<i>Accuracy \pm GL</i>	<i>Accuracy \pm %</i>
New South Wales			
Intersecting streams	3	1	40%
Border Rivers	125	10	8%
Gwydir	165	10	6%
Namoi/Peel	190	19	10%
Macquarie/Castlereagh/Bogan	102	8	8%
Barwon-Darling	157	16	10%
Lower Darling	29	1	5%
Lachlan	36	2	6%
Murrumbidgee	1618	106	7%
Murray	1241	61	5%
Total New South Wales	3666	234	6%
Victoria			
Goulburn	1477	79	5%
Broken	27	4	14%
Loddon	49	6	11%
Campaspe	40	2	6%
Wimmera-Mallee	53	5	10%
Kiewa	4	1	16%
Ovens	21	3	16%
Murray	1466	114	8%
Total Victoria	3137	214	7%
South Australia			
Metro-Adelaide & Associated Country Areas	72	4	5%
Lower Murray Swamps	60	24	40%
Country Towns	39	2	5%
All Other Purposes	453	32	7%
Total South Australia	623	61	10%
Queensland			
Condamine/Balonne	167	20	12%
Border Rivers	177	18	10%
Macintyre Brook	15	1	5%
Moonie	23	5	20%
Warrego	11	2	17%
Paroo	0	0	14%
Total Queensland	392	45	11%
Australian Capital Territory	27	3	11%
Total Basin	7846	557	7%

3.3 Climatic Overview 2004/05

- **Rainfall**

Figure 3 shows the rainfall deciles for July 2004 to June 2005 inclusive. Average rainfall was observed throughout most of the Basin. Very much above average rainfall was received in a sizeable area in Northeast NSW around the town of Moree. Above average rainfall was recorded in a large area in Northeast NSW and the border regions between NSW and Queensland encompassing several towns e.g. Gunnedah, Narrabri, Mungindi and Hebel, in the irrigation areas of NSW and Victoria on the either side of the River Murray downstream of Albury, and along the Murray river corridor downstream of Morgan covering some of the irrigation areas of SA and its major off-takes for town water supply. Below average rainfall was recorded in a very large area in NSW and Qld in the western part of the Basin, in two large areas in central NSW around the Yellow Mountain and Southwest NSW including the Northwest Victorian town of Mildura and in some isolated pockets in central and western NSW. Very much below average rainfall was recorded in the western part of the Basin in NSW and Qld in the catchments of the Warrego and Paroo rivers.

Figure 4 shows the rainfall deciles for the period of November 2004 to April 2005 inclusive. Very much above average rainfall was received along the mid reaches of the River Murray between the towns of Barmah and Swan Hill. Above average rainfall was observed in a large area in Northeast of the Basin between the towns of Moree and Mungindi, in a small area around Bathurst and an isolated pocket near Werris Creek in Central-east, and in a very large area in the Southeast of the Basin following almost the entire course of the River Murray from the Snowy Mountains in NSW/Victoria to SA and covering the catchments of the River Murray and all its major tributaries, the Murrumbidgee, Kiewa, Ovens, Goulburn, Broken and Loddon. Only a few hundred square kilometres of riverine area around Mildura

missed this sweep of above average rainfall in the Southeast of the Basin. Nearly one third of the Basin in the eastern and central areas and some isolated pockets in the northern and central areas received average rainfall. Nearly one third of the Basin in the North and Northwest recorded below average to very below average rainfall. Of this, the very below average rainfall areas were concentrated mostly in the catchment of Warrego, Paroo and Nebine Rivers in the northwest of the Basin. An isolated pocket around the town of Chinchilla in the Northeast of the Basin also received very below average rainfall.

- **Temperature**

Figure 5 shows the temperature anomaly (the difference between the recorded temperatures and the long-term average temperatures) for the period of July 2004 to June 2005 inclusive. With the exception of a small area around Albury in Southeast of the Basin, where mildly higher (between 0.0° to + 0.5°C) than average temperature condition were experienced, significantly higher (between 0.5° to + 1.0°C and +1.0° to +1.5°C) than average temperature conditions were observed throughout the Basin for this period. Some areas in northeast and northwest of the Basin experienced temperature anomaly between +1.5° to +2.0°C.

Figure 6 shows the temperature anomaly for the period of December 2004 to February 2005 inclusive (the primary irrigation season). The Basin area covering the entire River Murray system in the southeast and southwest experienced lower than average temperature (between 0.0° to -1.0°C and -1.0° to -2.0°C) with the irrigation areas in NSW and Victoria around Delinquin/Shepparton experiencing significantly lower than average temperature (between -1.0° to -2.0°C). Nearly two thirds of the Basin in the centre and north experienced mildly higher to significantly higher (between +0.0° to +1.0°C and +1.0° to +2.0°C) than average temperature conditions.

Figure 3. Rainfall Deciles for the Murray-Darling Basin for the July 2004 to June 2005 Period

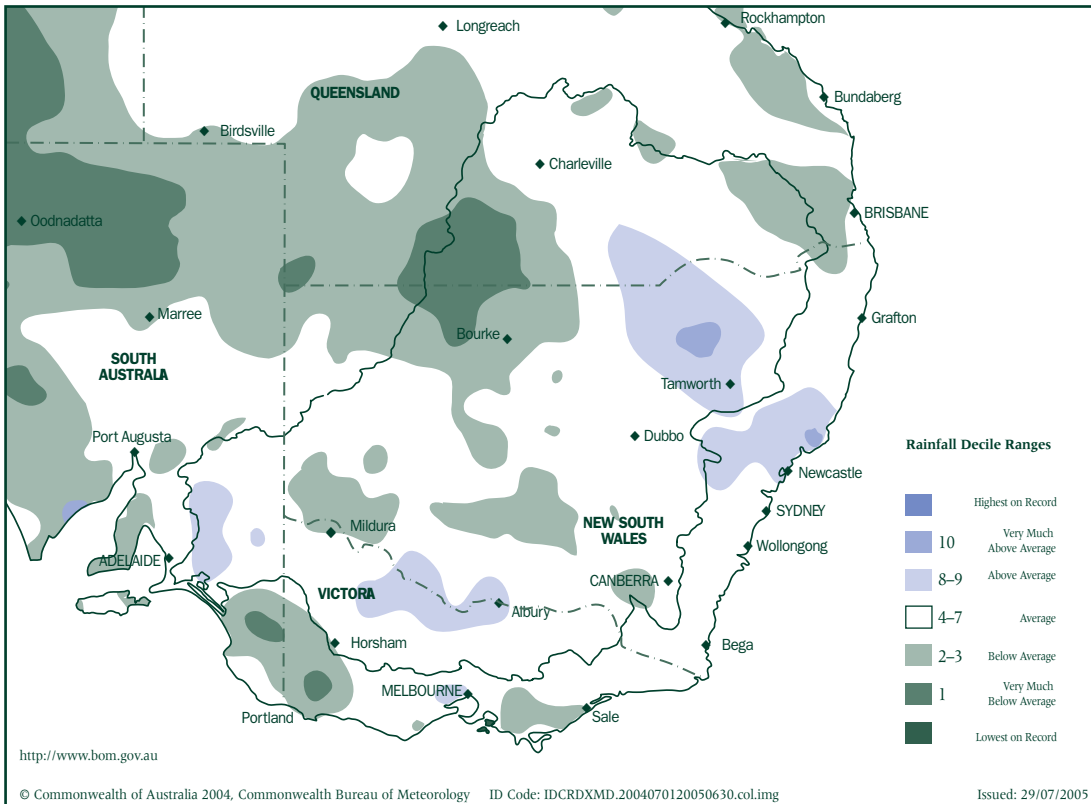


Figure 4. Rainfall Deciles for the Murray-Darling Basin for the November 2004 to April 2005 Period

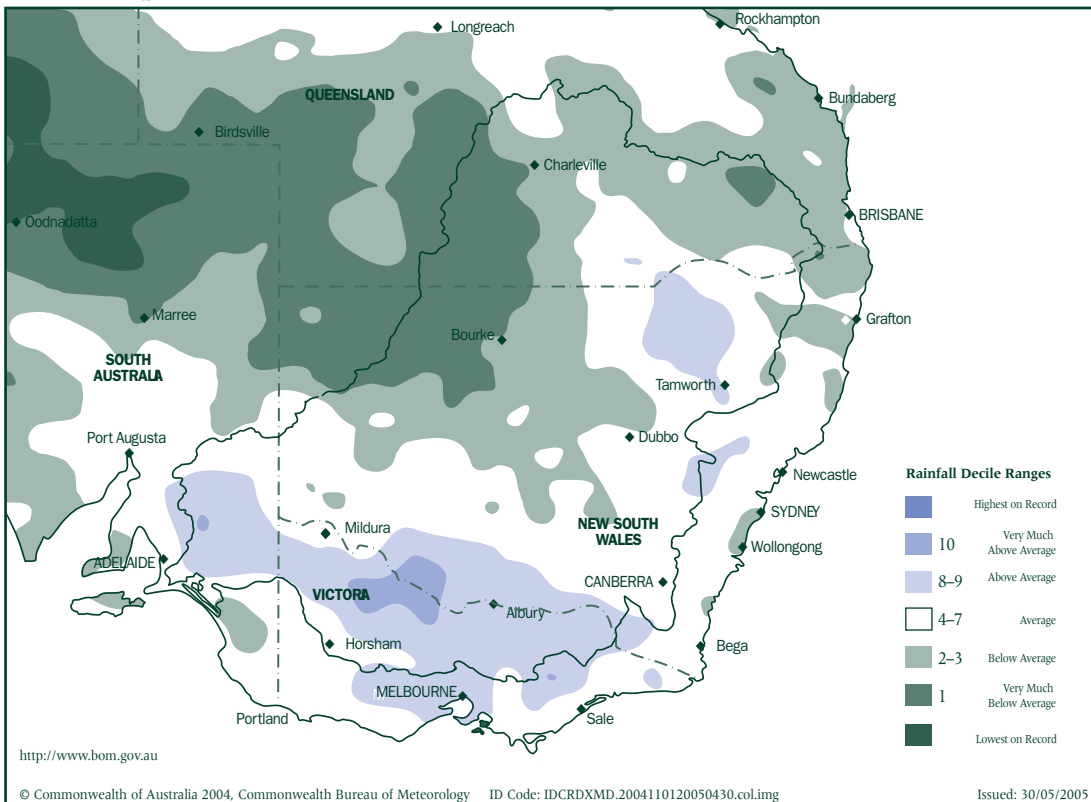


Figure 5. Temperature Anomaly for the 12 Month Period July 2004 to June 2005

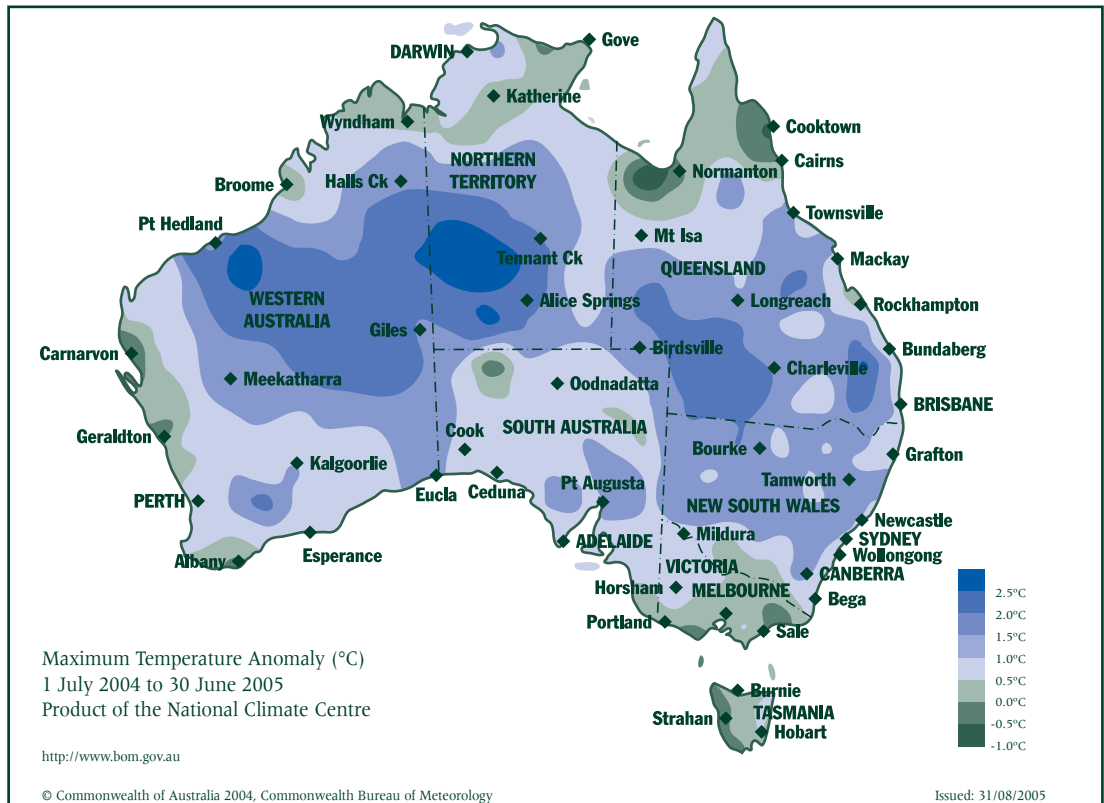
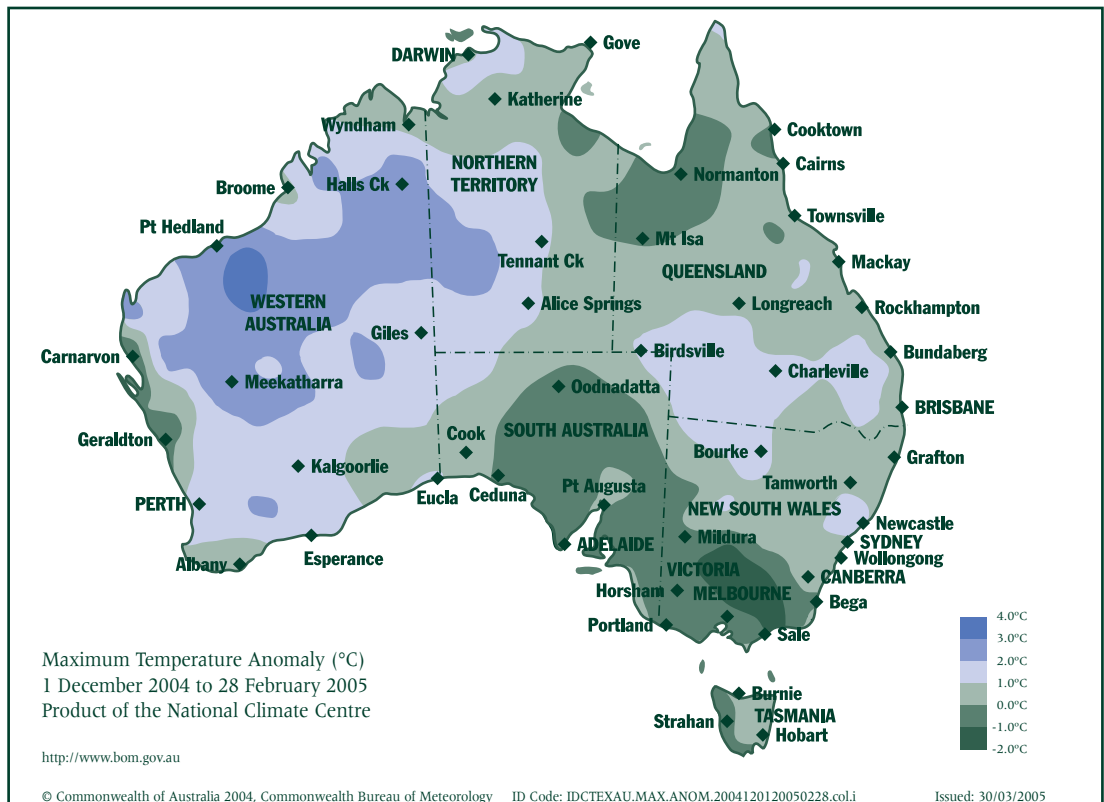


Figure 6. Temperature Anomaly for the 3 Month Period December 2004 to February 2005



3.4 Definition of Cap

The Murray-Darling Basin Ministerial Council has set the long-term diversion Caps for:

- New South Wales, at the volume of water that would have been diverted under 1993/94 levels of development plus an allowance in the Border Rivers for Pindari Dam;
- Victoria, at the volume of water that would have been diverted under 1993/94 levels of development plus an allowance (initially 22 GL/year) for Lake Mokoan in the Goulburn/Broken/Loddon system;
- South Australia at:
 - a total of 650 GL over any five-year period for urban water supply delivered to Metropolitan Adelaide and Associated Country Areas;
 - 50 GL/year to supply water to Country Towns;
 - 103.5 GL/year for the Lower Murray Swamps (the Council meeting 30 - 30 March 2001 increased the Cap for South Australian reclaimed swamps from 83.4 GL/year to 103.5 GL/year comprising (i) 9.3 GL/year for highlands with unrestricted trade, (ii) 72.0 GL/year for swamp use with unrestricted trade and (iii) 22.2 GL/year non-tradable environmental entitlement); and
 - a long-term average diversion of 440.6 GL/year for *All Other Purposes*.

The annual Cap targets are calculated with the help of models, which also take into account the climatic conditions. The annual Cap targets are then adjusted for water trades.

The Ministerial Council has agreed that the Queensland Cap will be determined following the completion of its water planning process. Queensland has finalised Water Resource Plans (WRP) in all its Murray-Darling Basin valleys and consequently has provided a framework with a strong legislative basis for the Cap. For the valleys where the water planning process has

been completed and implementation is occurring through finalised Resource Operations Plans, (viz Warrego, Paroo, Nebine and the Moonie valleys), Cap proposals are about to be submitted for the consideration of Commission and Council.

The ACT has agreed to participate in the Cap on diversions under a Memorandum of Understanding (MoU) and will do so following the establishment of a system of water trading between the ACT and the other States.

The Cap in NSW and Victoria is not the volume of water that was used in 1993/94. Rather, the Cap in any year is the water that would have been used with the infrastructure (pumps, dams, channels, areas developed for irrigation, management rules, etc.) that existed in 1993/94, taking into account the climatic and hydrologic conditions that were experienced during the year under consideration. A primary task in monitoring the Cap in these States is determining the size of the Cap target for each year. This calculation is done at the end of each year and uses the observed climatic and hydrologic data. In the south of the Basin this will tend to result in lower Cap targets in years when there is significant rainfall in the irrigation areas and larger Cap targets in years with less rainfall when demand is higher. However, the annual Cap target will also be affected by the availability of water. In very dry years in the south of the Basin, the annual Cap target will reflect the resource constraints. In the north of the Basin, the Cap target will be very much affected by the opportunities to harvest water into on-farm storages.

Because of these complexities, the calculation of the Cap targets is made by use of computer models with relationships for water use that include a range of climatic factors and detailed modelling of flows and storage behaviour. Auditing and approving these models is a major task. Although interim Cap models have been developed for most valleys, only six have been subject to independent audit and only three have been approved by the Commission.

The calculation for the Cap in South Australia is relatively straight forward; although the Cap for the fourth category of South Australian diversions described above is a long-term climate-adjusted annual average of 440.6 GL. A regression-based accredited model calculates the annual Cap target, which is then adjusted for trade. In the calculation of the Metro-Adelaide Cap, the allocation of 650 GL over 5 years is designed to provide a water supply with 99% security to a major urban city of over one million people. This allocation has been based on a 200-year simulation of the amount needed from the River Murray to supplement the primary source from the Mount Lofty Ranges. Actual demand will vary from between about 20 GL (or 10% of Adelaide's needs) to about 190 GL (or about 95% of demand).

Water diversions for 2004/05 are for the tenth water year to be covered by the Cap in the Murray-Darling Basin.

The Ministerial Council has agreed that a State's compliance with the Cap will be tested against the cumulative difference between actual diversions and the calculated Cap targets from 1 July 1997 onwards (**Appendix E**). If that difference exceeds the trigger provisions specified in Schedule F to the *Murray-Darling Basin Agreement*, the Commission must direct the IAG to conduct a special audit of the performance of that State Government in implementing the long-term diversion Cap in the relevant designated river valley. Upon receiving a special audit report from the IAG, which contains a determination that a State has exceeded the long-term diversion Cap in a designated river valley, the Commission must then declare that the State has exceeded the Murray-Darling Basin diversion Cap and must report the matter to the next meeting of the Ministerial Council.

3.5 Comparison of 2004/05 Water Use with the Cap

A comparison of 2004/05 water use with the Cap for each State is as follows:

- **New South Wales**

Cap compliance in 2004/05 within New South Wales varied between valleys (**Table 4**).

The interim Cap models for most of New South Wales valleys are available now. The Lachlan and Namoi models, after an independent audit, have been approved by the Commission under Schedule F. The Macquarie and Gwydir models are being audited and are expected to be accredited by the Commission during 2006/07.

The combined Barwon-Darling/Lower Darling Cap valley again exceeded the Schedule F trigger of 62 GL for a Special Audit. In fact the Cap debit grew by 70 GL to 154 GL. The Special Audit by the IAG conducted in February 2006, confirmed the Cap exceedance in the Valley. Subsequently, Commission Meeting 87 – 15 March 2006 declared that the combined Barwon-Darling/Lower Darling Cap valley continues to exceed the Cap. A Cap has not been defined for the Border Rivers, therefore the IAG was unable to audit the Cap in this valley.

Diversions in all other valleys were within the annual Cap target for 2004/05 and these valleys are in cumulative credit.

- **Victoria**

The 2004/05 diversions were within Cap targets for all Victorian designated Cap valleys. All Victorian valleys were also in cumulative credit.

Victoria has a Cap model developed for all its Cap valleys except the Wimmera-Mallee system. The Wimmera-Mallee system Cap model, though developed, has not been calibrated for 1993/94

conditions. Victoria's Goulburn Simulation Model (GSM) which covers its two Cap valleys, Goulburn/Broken/Loddon and Campaspe is currently being audited by an independent auditor for approval under Schedule F. Victoria remains committed to the ongoing development and improvement of Cap models and implementation of Bulk Entitlements to ensure compliance with the Cap.

- **South Australia**

South Australian diversions were within its Cap targets for 2004/05 for the Lower Murray Swamps, *All Other Purposes* the Country Towns (**Table 4**) and the Metro-Adelaide and Associated Country Areas (**Table 5**). The Country Towns and the *All Other Purposes* valleys have substantial cumulative Cap credits.

South Australia continues to undertake improvement programs and forward-moving management initiatives for the sustainability of River Murray water resources and to ensure long-term compliance with the Cap.

- **Queensland**

Cap definition in Queensland has yet to be completed and therefore it is not possible to provide a statement pertaining to Cap performance for the Queensland catchments for 2004/05.

Water Resource Plans (WRP) for all Queensland Murray-Darling Basin valleys are complete now. These Plans will be operationalised through Resource Operations Plans (ROP), which will determine the Caps. The Resource Operations Plans for the Moonie and Warrego/Paroo/Bulloo/Nebine were gazetted in January 2006. Valley Caps for these valleys are expected to be available in 2006/07.

The completion of the ROP for the Border Rivers is subject to the conclusion of the Inter-Governmental Agreement (IGA) between Queensland and NSW. Draft ROPs for the Border Rivers and Condamine-Balonne are expected to be released during 2005/06. Valley Caps for these two valleys are unlikely to be available before the end of 2006/07.

- **Australian Capital Territory**

Cap implementation in the ACT is yet to be completed.

Negotiations are underway to establish a Cap for the ACT and to establish a framework for trade between the ACT and other jurisdictions, which is considered to be a prerequisite to establish a Cap for the ACT.

Table 4 presents a comparison of actual diversions to the annual Cap targets for New South Wales, Victoria, South Australia (except Metropolitan Adelaide & Associated Country Areas), Queensland and the Australian Capital Territory. The last column in **Table 4** is the difference between the modelled storage at the end of 2004/05.

Usage below the Cap will typically result in the observed storage being greater than the modelled storage. If subsequent years are dry, it is likely that the observed usage will catch up with the Cap as this extra water in storage is allocated and used. If subsequent years are wet, storage may spill and the influence of under-use or overuse will be lost. The storage information therefore qualifies any conclusions that can be drawn on the degree of compliance with the Cap.

Table 5 presents a comparison of actual diversions with Cap target for Metro-Adelaide & Associated Country Areas, South Australia.

Table 4. Comparison of Diversions with Cap Levels in 2004/05

<i>System</i> ¹	<i>Cap Target from Cap Model (GL)</i>	<i>Adjustment to Cap Target for Trade¹ (GL)</i>	<i>Cap Target Adjusted for Trade (GL)</i>	<i>Annual Diversion (GL)</i>	<i>Cap Credit⁵ (GL)</i>	<i>Cumulative Cap Credit since 1997/98⁵ (GL)</i>	<i>Cap Target Exceedence Trigger (20 per cent Long-Term Diversion Cap)⁶ (GL)</i>	<i>(Modelled storage minus Observed) storage (GL)</i>
New South Wales								
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	-8	n/a	125	n/a	n/a	n/a	n/a
Gwydir	271	0	271	165	106	224	-69	9
Namoi/Peel	250	0	250	190	60	34	-68	9
Macquarie/ Castlereagh/Bogan	287	0	287	102	184	195	-94	80
Barwon-Darling/ Lower Darling	117	-1	116	186	-70	-154	-62	-81
Lachlan	60	0	60	36	24	6	-67	-85
Murrumbidgee	1471	8	1479	1618	-139	615	-472	-322
Murray	1625	-1	1624	1241	383	638	-385	-564
Victoria								
Goulburn/ Broken/Loddon ²	1738	-87	1651	1553	98	106	-417	-153
Campaspe	80	0	80	40	40	76	-24	20
Wimmera-Mallee ³	n/a	n/a	n/a	53	n/a	n/a	-32	n/a
Kiewa/Ovens/Murray	1584	65	1649	1491	158	854	-331	-512
South Australia								
Metro-Adelaide & Associated Country Areas ⁶								
Lower Murray Swamps	104	-43	60	60	0	0	-21	n/a
Country Towns	50	-5	45	39	6	68	-10	n/a
All Other Purposes	412	55	468	453	15	405	-88	n/a
Queensland								
Condamine/Balonne ³	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Border Rivers ³	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Macintyre Brook ³	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Moonie ³	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Warrego ³	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Paroo ³	n/a	n/a	n/a		n/a	n/a	n/a	n/a
Australian Capital Territory³								
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

1. Adjustment to Cap target for trade includes exchange rate adjustments to permanent interstate trade.

2. Excludes Cap Target for Lake Mokoan.

3. n/a denotes Cap model is not completed or Cap target has not been able to be determined.

4. The sign convention is that a negative Cap credit value denotes an exceedence of the Cap target adjusted for trade in 2004/05. A negative cumulative Cap credit value indicates an exceedence of the Cap target adjusted for trade on a cumulative basis (since 1997/98).

5. Cap target exceedence trigger values are reported as negative values.

6. See **Table 5**.

7. See previous page for explanation on the last column.

Table 5. Comparison of diversions with Cap levels in 2004/05 for Metro-Adelaide & Associated Country Areas, South Australia

<i>System</i>	<i>Total Diversion in 2004/05</i>	<i>Total Diversion – 5 Years to 2004/05</i>	<i>5 Year Cap Diversion Target</i>	<i>Difference between Diversion and Cap</i>
	(GL)	(GL)	(GL)	(GL)
South Australia				
Metro-Adelaide & Associated Country Areas	72	504	691 ¹	187

1. Temporary trades from the Country towns/'All Other Purposes' to the Metro-Adelaide of 12 GL during 2001/02, 11 GL during 2002/03, 9.4 GL during 2003/04 and 8.8 GL during 2004/05 were allowed as an interim measure increasing the 5-year rolling Cap from 650 GL to 691 GL. The rules for trade with Metro Adelaide are to be reviewed in 2005/06.



4. Review of 2004/05 Water Use in New South Wales

4.1 Water Management Overview

For most NSW major regulated rivers and some unregulated catchments, 2004/05 saw the commencement of Water Sharing Plans (Plans), which will apply for a period of 10 years.

The implementation of these Plans began on 1 July 2004. Each Plan includes a diversion management limit (the Plan limit) and rules for adjusting water-sharing rules should diversions grow beyond the limit set out in the Plan. In all major regulated rivers in the Basin, these Plan limits are below Cap. These Plans will align NSW with the national water reform program initiated by the Federal Government. However, the essential content of the Plans will not be renegotiated as a result of the national water reform program.

The Plan rules are not aimed at keeping diversions below 1993/94 levels in all years. Their primary focus is to produce environmental benefits, while also ensuring that long-term average diversions do not exceed those, which would result from 1993/94 development levels. Assessments of long-term diversions will be undertaken annually, and management actions will be undertaken whenever required to ensure that the Plan limit is not exceeded.

Current assessments using (in some cases, preliminary) computer simulation models indicate that 2003/04 diversions in all major NSW regulated valleys are below Cap levels, with the exception of the Barwon-Upper Darling valley, where licensed water entitlements are being restructured to ensure future diversions in the Barwon-Upper Darling River above Menindee are within Cap.

NSW and Queensland are currently ratifying new water sharing arrangements for the Border Rivers that will share resources equitably between the states and provide for the environment through protection of end-of-system river flows. The new agreement will allow NSW and Queensland to formally set a Cap on regulated diversions in the Border River.

4.2 Water Use Overview

Very dry climatic conditions during the previous three water years resulted in most NSW regulated valleys in the Murray-Darling Basin receiving very low effective general security allocations at the commencement of 2004/05 season. Water availability for some valleys was again at record low levels, including the Lachlan Valley (0%), Lower Darling Valley (30%), Macquarie (12%), Gwydir (27%), and Murrumbidgee (47%) valleys. In the Lachlan Valley high security licences, which generally receive their full allocations, again received limited allocation in 2004/05. However, close to average rainfall across most valleys, and above average rainfall in the northern areas during the year, have helped to ease irrigation demand.

Assessment of Cap performance for the 2004/05 water year using preliminary computer simulation models indicated that diversions for five NSW valleys were below annual Cap, three valleys were above annual Cap, and one valley (NSW Border Rivers) did not have Cap targets to allow an assessment to be made. For the Barwon-Upper Darling Valley, the cumulated annual Cap performances from the 1997/98 water year remained above Cap by more than 20% of the long-term average, breaching the trigger for a Special Audit. During 2005, NSW announced a restructure of entitlements along the Barwon-Darling River that will ensure diversions are within Cap.

All diversions reported using a July to June water year, and are in accordance with the MDBC Register of Diversion Definitions to the extent that availability of information allows.

4.3 Border Rivers

A Continuous Accounting (CA) allocation system was introduced in the NSW Border Rivers in 2001/02. The new system provides general security licensees with an individual account, which can be credited with water up to 100% of entitlement and allows continuous carryover of any unused water. At any time, they may

receive a new allocation increment (dependent on resource availability) up to a maximum limit of 100%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 100%, which is equivalent to a diversion of 266 GL for the valley.

The NSW Border Rivers licensees commenced the season with an average of 49% of licensed entitlement in individual accounts, and received a further 17% of licensed entitlement as further resources became available during the water year. There was a net inter-valley transfer of allocated water out of the NSW Border Rivers to the Queensland Border Rivers of 6 GL. This provided a total resource availability of 169 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 106 GL was diverted during 2004/05, with regulated river licences diverting 47 GL, and supplementary access licences diverting 59 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered, and a volume of 3 GL was diverted. For the majority of unregulated users without meters, a volume of 14 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2004/05. This provided a total diversion of 125 GL from the regulated section of the NSW Border Rivers (**Table 2**).

Cap accounting was not performed for the 2004/05 water year, as the Cap for the NSW Border Rivers is currently being determined.

4.4 Gwydir

A Continuous Accounting (CA) allocation system is used for general security licences in the regulated section of the Gwydir valley which provides licensees with an individual account that can be credited with water up to 150% of entitlement and allows continuous carryover

of any unused water. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum limit of 150%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 100% of licensed entitlement, which is equivalent to a diversion of 531 GL for the valley (**Table 8**).

The Gwydir valley commenced the season with an average of 24% of licensed entitlement in individual accounts, and received a further 3% of allocation during the water year. This provided a total resource availability of 160 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 153 GL was diverted during 2004/05, with regulated river licences diverting 33 GL, and supplementary access licences diverting 120 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered, and a volume of 2 GL was diverted. For the majority of unregulated users without meters, a volume of 10 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2004/05. This provided a total diversion of 165 GL for the Gwydir valley (**Table 2**).

The Gwydir IQQM has recently been recalibrated to include new on-farm storage information from a major irrigator survey and remote sensing project, and the model has been submitted for audit by the MDBC-appointed independent auditor. The Cap target is estimated for the regulated system each year using the Gwydir Valley IQQM. This target is the diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2004/05 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year.

The preliminary combined Cap target for 2004/05 is 271 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight year period from 1997/98 this indicates a cumulative Cap credit of 224 GL (**Table 4**).

4.5 Namoi/Peel

A Continuous Accounting (CA) allocation system is used for general security licences in the regulated section of the Namoi valley, which provides licensees with an individual account that can be credited with up to 200% allocation and allows continuous carryover of any unused allocation. At any time they may receive a new allocation increment (dependent on resource availability) up to a maximum limit of 200%. In any particular season, the volume of water that each licensee can use from their account is limited to a maximum of 100% of licensed entitlement, which is equivalent to a diversion of 254 GL for the valley. All high security licences and general security licences in the regulated section of the Peel valley are managed using annual accounts, which are forfeited at the end of each water year. The maximum allocation is 100% of licensed entitlement, which is 56 GL. The total licensed entitlement in the Namoi/Peel Valley is 310 GL (**Table 8**).

In 2004/05 Namoi Valley licensees commenced the season with an average of 46% of licensed entitlement in individual accounts, and general security licensees received a further 14% of allocation during the water year. The Peel valley licensees commenced the season with zero allocation and received a further 65% of allocation through the water year. The Upper Namoi/Manilla valley started the season with 100% allocation. This provided a total resource availability of 202 GL (**Table 8**) for regulated river licences.

Within the regulated river systems a total of 77 GL was diverted during 2004/05, with regulated river licences diverting 57 GL in the Namoi Valley, 5 GL in the Manilla/Upper Namoi Valley, and

11 GL in the Peel Valley. Supplementary access licences across the regulated systems diverted a total of 35 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 78 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Namoi and Peel valleys. This provided a total diversion of 190 GL for the greater Namoi Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Namoi Valley IQQM, which has been approved for Cap purposes by the MDBC. This target is the estimated diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. An IQQM for the Peel Valley regulated system has also been developed and used to assess preliminary Cap performance. It is not currently possible to assess a 2004/05 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined Cap target for 2004/05 is 250 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight water years of Cap accounting, this indicates a cumulative Cap credit of 34 GL (**Table 4**).

4.6 Macquarie/Castlereagh/Bogan

In the 2004/05 water year general security licences within the regulated section of the Macquarie valley received an initial allocation of 0% of licensed entitlement, combined with 3% of licensed entitlement carried over from the 2003/04 water year. Further allocation announcements saw the announced allocation increase to 9% in March 2005. High security licences were allocated 100% of their licensed entitlements. These allocations combined to provide a total resource availability of 136 GL (**Table 8**) for regulated river licences.

Within the regulated river systems a total of 64 GL was diverted during 2004/05, with regulated river licences accounting for all of the diversions. There was no supplementary access in the regulated system during 2004/05.

Diversions in the unregulated sections of the catchment are not currently monitored in general. However, some users outside of the regulated system in the lower valley are metered, and a volume of 3 GL was diverted. For the majority of unregulated users without meters, a volume of 35 GL, representing estimated average use, has been included as an estimate of diversions in 2004/05. This provided a total diversion of 102 GL in the Macquarie valley (**Table 2**).

The Macquarie IQQM has recently been recalibrated to include new information arising from the extended drought in the valley during the past few years, and the model will be re-submitted for audit by the MDBC-appointed independent auditor. The Cap target is estimated for the regulated system each year using the Macquarie Valley IQQM. This target is the diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2004/05 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The preliminary combined Cap target for 2004/05 is 287 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight year period from 1997/98 this indicates a cumulative Cap credit of 195 GL (**Table 4**).

4.7 Barwon-Upper Darling

The Barwon-Darling system does not receive a formal allocation of resources, and only unregulated access is available. There is a system of annual quotas that operates within the valley, limiting the total annual extraction to 518 GL.

Since June 2001 the Barwon-Darling system experienced the worst drought and flow sequence

recorded in the past 150 years. The river at Wilcannia ceased to flow for long periods during the past few years, only broken by occasional flow events. However, during 2003/04 and 2004/05, there has been some relief from rainfall events in the north of the Murray-Darling Basin that have contributed to flows in the Barwon-Darling river system. Access to flows was early in the water year was again suspended to ensure additional supplies reached Menindee Lakes to be used for Broken Hill town water supplies. However, access was allowed during larger subsequent events. Diversions from the Barwon-Darling River system in the 2004/05 water year totalled 157 GL (**Table 2**).

The Cap target is estimated each year using the Barwon-Darling Valley IQQM, which has not yet been presented for accreditation by the MDBC-appointed independent auditor. This target is the diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2004/05 is 102 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight water years of Cap accounting, this indicates a cumulative Cap debit of 314 GL, which exceeds the trigger for Special Auditing of 35 GL.

For Cap auditing purposes, the Barwon-Darling and Lower Darling valleys are taken to be one valley, and the combined annual Cap performances are cumulated from the 1997/98 water year. For the eight-year period from 1997/98, this indicates a cumulative Cap debit of 154 GL, which also exceeds the trigger for Special Auditing of 62 GL (**Table 4**).

In recognition of above-Cap diversions, NSW has previously announced that it would act to bring diversions back within Cap. Whilst the extended drought conditions have delayed such action, NSW has recently outlined a revised system of licensed water access that will keep diversions within Cap.

4.8 Lachlan

In the 2004/05 water year, there was again insufficient water to make an allocation for general security licensed entitlement. Accounts remained frozen with the 1% of general security licensed entitlement carried over from two years previously (2002/03), although this was finally able to be made available during the 2004/05 water year. An allocation of only 30% for high security entitlement and 50% for town water supplies was possible. These allocations are again the lowest on record, and combined to provide a total resource availability of only 31 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 21 GL was diverted during 2004/05, with regulated river licences accounting for all of the diversions. There are no supplementary access licences in the Lachlan regulated system.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 15 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Lachlan Valley. This provided a total diversion of 36 GL for the Lachlan Valley (**Table 2**).

The Cap target for the year is estimated for the regulated system each year using the Lachlan Valley IQQM, which was the first model to be approved for Cap purposes by the MDBC. This target is the estimated diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2004/05 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined Cap target for 2004/05 is 60 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight water years of Cap accounting, this indicates a cumulative Cap credit of 6 GL (**Table 4**).

4.9 Murrumbidgee

In the 2004/05 water year general security licences within the regulated section of the Murrumbidgee Valley received an initial allocation of 9% of licensed entitlement, combined with 10% of licensed entitlement carried over from the 2003/04 water year. Further allocation announcements saw the announced allocation increase to 37% in February 2005. High security licences were allocated 95% of their licensed entitlements as required under the valley Water Sharing Plan, and 100% for other specific purpose high security licences. Due to the low level of water availability across the Murray-Darling Basin, inter-valley trade of allocated water resulted in only 8 GL of water traded into the Murrumbidgee Valley during 2004/05. These allocations combined to provide a total resource availability of 1528 GL (**Table 8**) for regulated river licences. Users also paid back most of the 180 GL of water advanced the previous year by the Snowy Scheme.

Within the regulated river system a total of 1498 GL was diverted during 2004/05, with regulated river licences diverting 1435 GL, and supplementary access licences diverting 63 GL during periods of high river flows. The Lowbidgee Flood Control and Irrigation District also diverted 77 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 42 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the Murrumbidgee Valley. This provided a total diversion of 1618 GL for the Murrumbidgee Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Murrumbidgee Valley IQQM, which has not yet been presented for accreditation by the MDBC-appointed independent auditor. This target is the diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2004/05 Cap target for the unregulated

sections of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined preliminary Cap target for 2004/05 is 1479 GL including 8 GL of net inward trade. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight water years of Cap accounting, this indicates a cumulative Cap credit of 615 GL (**Table 4**).

4.10 Lower Darling

The Barwon-Darling system has recorded the worst ever recorded drought inflows into Menindee Lakes since June 2001. The Lower Darling system, below Menindee Lakes, has a small entitlement of 48 GL which, until 2003/04, had received a full allocation every year since the volumetric allocation scheme commenced in 1981. However, inflows during 2004 provided sufficient resources to allow a starting allocation of 100% for high security licences, and 50% for general security licences, increasing to 100% early in the water year. These allocations combined to provide a total water resource availability of 47 GL in the Lower Darling, for regulated river licences.

Within the regulated river systems a total of 29 GL was diverted during 2004/05, with regulated river licences accounting for all of the diversions. There was no supplementary access in the regulated system during 2004/05. There is no unregulated usage in the Lower Darling Valley.

The Cap target is estimated for the regulated system each year using the Murray Simulation Model, which has not yet been presented for audit by the MDBC-appointed independent auditor. This target is the diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2004/05 is 15 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight water years of Cap accounting, this indicates a cumulative Cap credit of 160 GL.

For Cap auditing purposes, the Barwon-Darling and Lower Darling valleys are taken to be one valley, and the combined annual Cap performances are cumulated from the 1997/98 water year. For the eight-year period from 1997/98, this indicates a cumulative Cap debit of 154 GL, which also exceeds the trigger for Special Auditing of 62 GL (**Table 4**).

4.11 Murray

At the commencement of 2004/05, no allocation was possible for general security licences within the regulated section of the Murray Valley, and only 14% of licensed entitlement carried over from the 2003/04 water year was available. Further allocation announcements saw the announced allocation increase to 49% in March 2005. High security licences were allocated 97% of their licensed entitlements as required under the valley Water Sharing Plan, and 100% for other specific purpose high security licences. Due to the low level of water availability across the Murray-Darling Basin, inter-valley trade of allocated water resulted in only 3 GL of water traded into the Murray Valley during 2004/05. These allocations combined to provide a total resource availability of 1914 GL (**Table 8**) for regulated river licences. Users within the NSW Murray Valley again advanced water from future Snowy Scheme releases at commercial rates, with a total of 107 GL being advanced.

Within the regulated river system a total of 1213 GL was diverted during 2004/05, with regulated river licences diverting 1154 GL, and supplementary access licences diverting 59 GL during periods of high river flows.

Diversions in the unregulated sections of the catchment are not currently monitored and, a volume of 28 GL, representing estimated average use, has been included as an estimate of unregulated diversions in the NSW Murray valley. This provided a total diversion of 1241 GL for the NSW Murray valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Murray Simulation Model, which has not yet been presented for audit by the MDBC-appointed independent auditor. This target is the diversion that would have occurred during 2004/05 with management rules and irrigation development at 1993/94 levels. It is not currently possible to assess a 2004/05 Cap target for the unregulated sections

of the valley, and the estimated average annual unregulated diversion is also used to represent the unregulated Cap target each year. The combined preliminary Cap target for 2004/05 is 1625 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the eight water years of Cap accounting, this indicates a cumulative Cap credit of 638 GL (**Table 4**).

5. Review of 2004/05 Water Use in Victoria

5.1 Overview

Diversions of 1491 GL in the Murray/Kiewa/Ovens designated river valley were 158 GL less than the 2004/05 Cap target. The Murray/Kiewa/Ovens has a cumulative credit of 854 GL. The diversions of 1553 GL in the Goulburn/Broken/Loddon designated Valley were 98 GL below the Cap target and the valley maintained a cumulative Cap credit of 106 GL. The Campaspe valley diversions of 40 GL were 40 GL less than the Cap target and contributed to an overall cumulative credit of 76 GL.

Details of the factors influencing net water use in each of the Victorian river valleys during 2004/05 and proposed future water management activities are given below.

The 2004/05 season was characterised by low carryover storage volumes and below average inflows to all Goulburn Murray Water (GM-W) storages. This resulted in the opening allocation on the 1 July 2004 being zero for all systems except for the Murray and Broken River Systems. No Sales water was allocated for the major gravity irrigation systems. Some areas received very heavy rain during February 2005, notably in the North East of the State where Buffalo Reservoir recorded the highest ever February inflow.

Campaspe River private diverters received 39% of Licensed Volume, the lowest ever allocation on record. Broken Creek and Bullarook Creek private diverters received a Sales allocation of 70% and 90% of Licensed Volume respectively.

5.1.1 Water Use Capping Measures

Victoria has been implementing changes to water management policies under its water reform package since 1990/91. The effectiveness of the policies is continually monitored. Bulk Entitlements for the Goulburn, Murray, Ovens and Broken river systems are now in place. The Bulk Entitlement for the Ovens and Broken systems were introduced during 2004/05.

The Bulk Entitlement for the Loddon System will be implemented during the 2005/06 season.

Annual diversions are limited by Victoria's seasonal allocation process. The final allocation for supplies from the Goulburn, Murray and Loddon systems were all limited to 100% of high security entitlement. Maximum final allocations were made available for the Broken River and Bullarook Creek systems. The final allocation for the Campaspe System was severely limited at 39% of high security entitlement, the lowest on record.

5.1.2 Volumes Diverted

The volumes diverted during 2004/05 were below the Cap targets in the Murray/Kiewa/Ovens, Goulburn/Broken/Loddon and Campaspe designated river valleys. A Cap target has not been determined for the Wimmera-Mallee valley as the model is not yet calibrated.

Victorian systems diverted 3137 GL from the Murray-Darling Basin during 2004/05. The total volume allocated for use was 2671 GL (**Table 8**). The volume used was 2411 GL (**Table 10**).

The Victorian diversions equated to 90% utilisation of the total allocated volume (**Table 11**).

5.1.3 Off-Quota

Off-quota allocations were not declared at any time in Victorian river valleys during 2004/05. There was a small volume of spillage sales available in the Ovens Valley.

5.1.4 Deliveries

- **Final Deliveries & Historical Comparison**

Approximately 2401 GL was delivered by Victorian systems during 2004/05. Deliveries in the Murray system were 1466 GL in 2004/05, compared to 1463 GL the previous year.

5.1.5 Trading

Development of the water trading market continued under the influences of extremely limited water resources in the Goulburn and Campaspe systems and limited rainfall across much of northern Victoria.

Approximately 51.8 GL was permanently sold interstate and to other river systems by Victorian entitlement holders. Approximately 4.8 GL net was traded outward from Victoria to South Australia and approximately 0.7 GL net was traded outward to New South Wales. Further trading also occurred within systems.

Strong trading occurred on the temporary entitlement market, with 421.4 GL sold interstate and to other river systems within Victoria. Most interstate trading involved New South Wales, and resulted in an overall net outwards transfer from Victoria of water during 2004/05. There was a net transfer of water from Victoria to South Australia. The Goulburn system received a net outwards transfer of entitlement from the other Victorian systems.

5.1.6 Environmental Flows

The Barmah-Millewa Environmental Water Allocation was not utilised for watering the Barmah-Millewa forest during 2004/2005, however, flows were maintained through the forest to assist bird breeding following completion of overbank transfers past the Choke.

Approximately 28.3 GL of northern Victorian wetlands allocation was diverted to the northern Victorian wetlands during 2004/05 compared to an annual entitlement of 27.6 GL. Water supplied to McDonald Swamp and Lake Murphy during declared surplus flow periods was debited against the entitlement for the purposes of this report. There is currently a debate between agencies whether the supply to wetlands such as McDonald Swamp and Lake Murphy during surplus River Murray flows should be debited against the annual entitlement at such times.

The bulk of the environmental watering occurred in the Torrumbarry System but there was 7.8 GL used for watering of Lower Murray redgum forests and a further 1.7 GL used for Cardross Lakes in the Sunraysia area. Lower Campaspe flow losses associated with transfer of Goulburn Inter-valley Trade (IVT) water accounted for 0.33 GL and there was 0.13 GL supplied to Goulburn wetlands.

In addition to the volumes supplied during regulated flows to Gunbower Forest and Lower Murray redgums, a further 4.87 GL and 0.27 GL was supplied to these areas respectively. These volumes were not debited against the 27.6 GL wetland entitlement.

5.2 Goulburn

Gravity irrigation customers and private diverters in the Goulburn system of the Goulburn/Broken/Loddon designated river valley were given an initial allocation of 0% of Water Right or Licensed Volume in July 2004. The allocation reached a maximum of 100% of Water Right or Licensed Volume on 15 December 2004. Limited resources prevented the allocation of any Sales again for the seventh consecutive year in the Goulburn system.

Lake Eildon held 19% of capacity at the start of the Victorian irrigation season. The Goulburn system's primary storage peaked at 43% of capacity in mid December 2004, and by end June 2005 it had been drawn down to 28%. It held only 11% at the start of the previous irrigation season. Waranga Basin failed to fill to capacity in late spring by just 10 GL ML or about 2% of capacity. At the end of the irrigation season, Waranga Basin had been drawn down to 25% without recourse to pumping.

The volume allocated for use in the Goulburn was 661 GL (**Table 11**), which comprised the seasonal allocation for irrigation, urban, industrial and stock entitlement holders of 705 GL (**Table 8**), temporary trade -44 GL (**Table 8**). The irrigation entitlements referred to the Shepparton Irrigation Area, the Central Goulburn

Irrigation Area and private diverters. The total use in the valley of 656 GL was 99% of the allocated volume.

Approximately 559 GL was transferred to the Murray, Campaspe, Loddon and Wimmera-Mallee systems and the Melbourne Water supply system. Diversions during 2004/05 for the Goulburn system were 1477 GL, which was below the ten year average.

No off-quota allocations were available in the Goulburn system.

The Goulburn system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance. The total diversions of 1553 GL from this Cap valley were below the 2004/05 Cap target of 1651 GL. The Goulburn/Broken/Loddon Cap valley has a cumulative Cap credit of 106 GL.

Bulk Entitlements for the Goulburn system have been in force since 1995.

5.3 Broken

Private diverters in the Broken River system received an initial allocation at the start of July 2004 of 0% of Licensed Volume. The maximum allocation of 100% Licensed Volume plus 70% Sales was announced on the 15 September 2004.

After filling to capacity in the spring of 2004, Lake Nillahcootie was still 91% full just prior to spilling again in early February 2005. By the end of June 2005, the reservoir was holding 85% of capacity. Lake Mokoan peaked at 36% of capacity in early October 2004 and was drawn down to 24% by late May 2005. There were no serious problems with blue-green algae, and as a result, the reservoir remained available for releases all season.

The total use of 19 GL in the valley was equivalent to 33% of the water allocated for use (58 GL).

No off-quota allocations were announced for the Broken River.

The Broken system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance. The total diversions of 1553 GL from this Cap valley were below the 2004/05 Cap target of 1651 GL. The Goulburn/Broken/Loddon Cap valley has a cumulative Cap credit of 106 GL.

Bulk Entitlements for the Broken system was implemented in early 2005.

5.4 Loddon

Private diverters from the Loddon system were initially allocated 0% of Licensed Volume and reached a maximum of 100% of Licensed Volume on 15 November 2004.

A combination of very low carryover volumes and low inflows resulted in Cairn Curran and Tullaroop reservoirs reaching only 23% and 28% of capacity respectively in late spring. Newlyn and Hepburn's Lagoon reservoirs filled to capacity in the spring, which enabled maximum allocations to be announced for the Bullarook Creek System.

Pyramid-Boort Irrigation Area customers are located in the Loddon basin, but are predominantly supplied from the Goulburn system via the Waranga Western Channel. In view of the poor resource position, there was no planned supplement available from the Loddon storages to the Boort area, as was the case in 2003/04. This meant that the supply to this area was entirely from the Goulburn System.

Loddon system private diverter irrigation usage, extraction for domestic and stock, commercial, industrial and urban purposes, and approximately 282 GL diverted to the Pyramid-Boort Irrigation Area and the Wimmera Mallee system accounted for total Loddon system diversions of 339 GL. The total diversion passed to the Pyramid-Boort Irrigation Area from the Goulburn system in 2004/05 was 276 GL.

The water allocated for use in the Loddon system was 283 GL. This volume comprises entitlements for the Pyramid-Boort Irrigation Area gravity irrigators, private diverters, and urban, industrial

and stock purposes. Although supplied largely from the Goulburn system, the Pyramid-Boort Irrigation Area is included among the Loddon system entitlements. Use of 253 GL constituted 89% of allocated water (283 GL).

The Loddon system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance. The total diversions of 1553 GL from this Cap valley were below the 2004/05 Cap target of 1651 GL. The Goulburn/Broken/Loddon Cap valley has a cumulative Cap credit of 106 GL.

The bulk entitlements process for the Loddon system continued during 2004/05 and was completed November 2005.

5.5 Campaspe

The Campaspe River system supplies private diverters, the Campaspe Irrigation District and the Coliban Water supply system. Although physically located within the Campaspe catchment, the Rochester Irrigation Area receives its water from the Goulburn system via the Waranga Western Channel, and is part of the Goulburn/Broken/Loddon designated river valley for Cap compliance.

Allocations in the Campaspe system opened at 0% of Water Right or Licensed Volume and reached a maximum of only 39% on 17 January 2005, which is the lowest ever on record. Allocations for gravity irrigators in the Rochester Irrigation Area were aligned with the Goulburn system, and reached 100% of Water Right.

In the early part of the year, when there was no allocation for irrigators, the Minister qualified special rights to provide a limited supply to domestic and stock, urban and other special customers. An allocation of 5% Water Right/Licensed volume was announced on 15 September 2004. A significant volume of Goulburn water was traded to Campaspe Irrigation District customers who were supplied by a privately installed pump on the Waranga Western Channel. Operating the Campaspe Weir pool below full supply level assisted in the conservation of water.

Eppalock Reservoir reached only 13% of capacity in late November 2004. By early June 2005, the reservoir had been drawn down to 4.9% of capacity, only slightly more than the record low of 4.6% in June 2004.

The 2004/05 Campaspe system allocated volume was 250 GL (**Table 11**), which comprised gravity irrigation entitlements in the Rochester Irrigation Area and the Campaspe Irrigation District, private diverters, and urban, industrial and stock entitlements. The Rochester Irrigation Area is only included because of its physical location within the Campaspe system; diversions to the Irrigation Area are included in the Stuart Murray Canal and Cattanach Canal diversions reported for the Goulburn system (refer **Table 1**).

The total Campaspe system diversions were 40 GL. A total volume of 1 GL (excluding channel outfalls) was harvested from the Campaspe River to the Waranga Western Channel via the Campaspe Irrigation District channels. Including channel outfalls, the volume returned to the Waranga Western Channel was 2 GL. There was no harvesting of unregulated flows to the Waranga Western Channel using the Campaspe Pumps.

A net volume of 0.57 GL of temporary water was traded from the Campaspe River to the Campaspe Irrigation District. A volume of 0.42 GL was permanently traded from the Campaspe Irrigation District to the Campaspe River.

Unlike the previous year the volume of water harvested from the Campaspe River was relatively low.

Bulk Entitlements for the Campaspe system have been in force since May 2000. From the 1 July 2004, the Campaspe Bulk Entitlement was fully implemented. This required the provision of specified minimum flow requirements downstream of Eppalock Reservoir and Campaspe Siphon. Compliance with the Bulk Entitlement requires close monitoring of flows upstream and downstream of Eppalock Reservoir and taking action as required based on an assessment of these flows.

The Campaspe Bulk Entitlement Conversion Order authorises Goulburn-Murray Water to provide up to 24.7 GL and 4.0 GL of regulated and unregulated supplement annually respectively to the Goulburn system. The poor Campaspe resource position did not allow any regulated supplement to the Goulburn system during 2004/05 in accordance with the operating rules. The valley used 189 GL against an allocation of 283 GL. This gave a usage of 75%.

Diversions of 40 GL from the Campaspe designated river valley were below Cap target of 80 GL in 2004/05. The Campaspe valley has a cumulative Cap credit of 76 GL.

5.6 Wimmera-Mallee

The low inflows of the past eight years continued. However, late 2004 inflows were comparatively favourable and allowed the Valley to enter 2004/05 with a better water resource situation than at the same time in 2003/04.

In mid-June 2004, the storages were around 9% (compared to 7% for 2003), resulting in the winter channel run starting on 17 June 2004. This volume, combined with a high allocation from the Waranga system, allowed an allocation of one dam per 400 ha to be made (approximately one third of dams). This winter stock and domestic supply concluded in mid-November.

The 1 November 2004 saw the first allocations made under the Wimmera-Glenelg Bulk Entitlements. The initial available water for allocation was 88.3 GL. By the end of June this had increased to 91 GL. This volume allowed an easing of restrictions in the summer run area to one dam per 260 ha, which like the winter supply was equivalent to approximately one third of dams throughout the area. The irrigation area also received a minimal allocation of 5%. This volume allowed minimal deliveries to finish off some winter crops.

Initial total allocations to the environment under the bulk entitlement were 10 GL. By the end of June this increased to 12 GL. The Wimmera and MacKenzie River systems received 5.4 GL ML, of this total to the end of June 2005. Further releases were to be made to the lower MacKenzie in the spring of 2005.

By mid-June 2005 the storages were at 11%. This then allowed the winter stock and domestic customers to receive the same allocation as the previous year; one dam per 400 ha. While this was higher than for June 2004, we did not have access to a high allocation from the Waranga system.

Total diversions in the Wimmera-Mallee designated river valley for 2004/05 were 53 GL, which is well below the estimated long-term Cap of 162 GL.

Since development of the Cap model for the Wimmera-Mallee valley is still underway, an annual Cap target for this valley is not available. It has recently been proposed that the Bulk Entitlement model may be able to be used for this purpose. This proposal is currently under development. However, due to recent droughts and water saving measures (pipelining), diversions will be within the valley Cap.

5.7 Kiewa

Total diversions of 4 GL were 15% of the 18 GL allocated for use. The Kiewa system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance. The total diversions of 1491 GL from this Cap valley were below the 2004/05 Cap target of 1649 GL mainly because of the seasonal allocation. The Murray/Kiewa/Ovens Cap valley has a cumulative Cap credit of 854 GL.

A draft stream-flow management plan for the Kiewa system is in preparation.

5.8 Ovens

Inflows to Buffalo Reservoir were such that the spillway gates were not closed until early October 2004. By late October 2004, the reservoir was full and remained full or close to full until the end of February 2005.

William Hovell Reservoir filled to capacity by mid July 2004 and remained full or close to full until mid December 2004.

After the heavy rain in early February 2005, a strategy was put in place to draw the Buffalo and William Hovell reservoirs down at an accelerated rate to maximise the Ovens River tributary credit without compromising the interests of in-valley water users.

Total system diversions were 20 GL, which was 45% of the 45 GL allocated for use during 2004/05. A regression model has been developed to calculate Cap targets for the regulated Ovens system. The Ovens system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance. The total diversions of 1491 GL from this Cap valley were below the 2004/05 Cap target of 1649 GL mainly because of the seasonal allocation. The Murray/Kiewa/Ovens Cap valley has a cumulative Cap credit of 854 GL.

The Bulk Entitlement for the Ovens system was fully implemented in early 2005.

5.9 Murray (including Mitta Mitta)

The initial allocation at the start of July 2004 for Murray system gravity irrigation customers and Mitta private diverters was 48% of Water Right or Licensed Volume. By 15 September 2004, the allocation had increased to 100% of Water Right or Licensed Volume.

River Murray Water (RMW) commenced transferring water from Dartmouth Reservoir to Hume Reservoir in the second half of July 2004.

Dartmouth Reservoir filled to 50% of capacity in late September 2004 while Hume Reservoir reached 54% of capacity in late November 2004. By the end of June 2005, Dartmouth and Hume reservoirs were holding 45% and 30% of capacity respectively.

No regulated supplement to the River Murray was available from the Menindee Lakes for the third year in a row.

The Victorian component of the total River Murray valley allocated volume was 1290 GL (**Table 11**). Actual usage was 1225 GL, which constituted 95% of allocated water volume.

Bulk Entitlements for the Murray system have applied since July 1999.

For the purposes of Cap compliance, the Murray system is included in the Murray/Kiewa/Ovens designated river valley. The total diversions of 1491 GL from this Cap valley were below the 2004/05 Cap target of 1649 GL mainly because of the seasonal allocation. The Murray/Kiewa/Ovens Cap valley has a cumulative Cap credit of 854 GL.

6. Review of 2004/05 Water Use in South Australia

6.1 Overview

South Australia reports River Murray diversions under the following four Cap components:

- Metropolitan Adelaide and Associated Country Areas;
- Country Towns;
- Lower Murray Swamps; and
- *All Other Purposes* (Highland Irrigation).

All of the Cap valleys were within the trade-adjusted annual Cap targets and the total River Murray water diversion in South Australia for 2004/05 was 623.5 GL.

6.2 River Murray Water Management 2004/05

Low rainfall and subsequent low inflows from the Murray-Darling Basin tributaries into the River Murray and upper Murray catchment storages led to water restrictions being implemented by the South Australian Government to ensure equitable access to supplies for all South Australian River Murray water users including irrigators, SA Water and the environment.

The start of the water year in July 2004 was characterised by historically low levels in Murray-Darling Basin storages and modelling of the water resource availability provided by River Murray Water indicated a strong probability of below Entitlement Flows to South Australia for the duration of the water year.

In 2004/05 irrigators experienced a third year with less than full initial allocations. The initial level of allocation was set at 70% and was subsequently raised to 95% of licensed allocation in January 2005 due to an improvement in water resource availability across the Murray-Darling Basin and to South Australia.

SA Water voluntarily agreed to use no more than 136 GL for Metropolitan Adelaide and 40 GL for Country Towns. Only 72 GL was diverted for Metropolitan Adelaide and associated areas and 39 GL for Country Towns in 2004/05.

South Australia received a total flow of 1880 GL. This is significantly below the long-term median annual flow of 4800 GL/year and less than the 2051 GL received in 2003/04 when water restrictions were first implemented.

6.3 Impacts on River Murray Water Use

The 2004/05 water year was an average use year for South Australia. Weather conditions in South Australia were milder for the 2004/05 water year including above average rainfall particularly over the summer months in the Riverland district.

Irrigator behaviour in South Australia is largely influenced by days of high evaporation rather than rainfall. The days with high evaporation necessitate larger volumes of water to be applied to most citrus, stone fruits, nut trees and vegetable crops in order to compensate for the deficits in soil moisture.

Most irrigation areas supplied from the River Murray in South Australia receive annual average rainfall of less than 300 mm and most of this usually falls in the winter months. However, in 2004/05, summer rainfalls in the Riverland region exceeded the long-term average summer rainfall.

Adelaide and its surrounds are supplied with water from the Mount Lofty Ranges Catchment and the River Murray. The total amount of water that is diverted from the River from year to year is influenced by runoff from the Mount Lofty Ranges. Inflows to storages from local catchments in the Ranges were above average in 2004/05. As a result diversions from the River Murray for Metropolitan Adelaide were kept at lower levels.

6.4 Metropolitan Adelaide and Associated Country Areas

A total of 71.6 GL was diverted for Metropolitan Adelaide which is significantly below the long-term average diversion of approximately 100 GL and substantially less than in previous years, in particular 2002/03. The diversion of 71.6 GL included a diversion of 8.8 GL accounted for on a separate *First Use* licence.

For the previous four years River Murray water consumption for Metropolitan Adelaide was:

- 82 GL in 2003/04, including 9.4 GL of temporary trade accounted on the *First Use* licence,
- 165 GL in 2002/03, including 11 GL of temporary trade accounted on the *First Use* licence,
- 82 GL in 2001/02, including 12 GL of temporary trade accounted on the *First Use* licence, and
- 104 GL in 2000/01.

The cumulative total of diversions for the five years to 2004/05 is 504.4 GL. This volume of water supplied to Metropolitan Adelaide and associated country areas Cap through the Swan Reach-Stockwell, Mannum-Adelaide, and Murray-Bridge-Onkaparinga pipelines includes 41.2 GL accounted on the *First Use* licence.

The allocations for this 41.2 GL have been transferred to the *First Use* licence from other designated river valleys. This *First Use* licence is being maintained within the *All Other Purposes* Cap component for Cap accounting purposes as an interim measure until final arrangements are agreed with the MDBC.

6.5 Country Towns

Water use for Country Towns in 2004/05 was 38.5 GL that is 6.5 GL below the trade adjusted Cap of 45 GL. In 2004/05, 5 GL was transferred to the *First Use* licence.

6.6 Lower Murray Swamps

In 2004/05, the total allocation for the Lower Murray Swamps was 60 GL including the 22.2 GL Environmental Land Management Allocation (ELMA).

Improved modelling of the Lower Murray Swamps was completed in October 2000. This allowed the interim Swamps Cap to be reassessed and finalised. The revised Cap figure of 103.5 GL was established at the 1993/94 levels of development. This was made up of the following components:

- 72 GL/year for swamp use with unrestricted trade;
- 22.2 GL/year ELMA (non transferable); and
- 9.3 GL/year transferable “Highland” irrigation entitlement.

This Cap figure equates to best practice irrigation, which will be implemented progressively through a rehabilitation program over the 2004 to 2008 period.

The 9.3 GL/year “Highland” irrigation entitlement has now been transferred to the *All Other Purposes* Cap.

The rehabilitation process undertaken by the South Australian Government in collaboration with irrigators has seen a large amount of permanent and temporary trade out of the swamps.

River Murray water use in the Lower Murray Swamps zone is considered to be equal to licensed allocation but, as a result of the program of meter installation rollout as part of the rehabilitation process, all irrigation diversions are anticipated to be metered by 2007.

Trading from the Government Reclaimed Irrigation Districts did not officially commence until post June 2003, after the Minister for Environment and Conservation approved the process for trade. Private reclaimed-swamp irrigators were able to trade freely before June 2003 as their water entitlements were clearly defined in volumetric terms on their licence.

Trading started before the formal 13.8 ML/ha allocations were issued due to pressure applied by the irrigators who had to make critical decisions about their businesses. All initial trades were based on the previous rates of 9.5 ML/ha, if the district was downstream of Burdett (near Murray Bridge), or 11.5 ML/ha if upstream.

During 2004/05, there was again a significant amount of trade out of the Lower Murray Swamps. The following trades occurred all to *All Other Purposes* licences:

- Permanent net trade = 10.9 GL; and
- Temporary net trade = 6 GL

The 9.3 GL "Highland" entitlement associated with the Lower Murray Swamps has now been transferred to the *All Other Purposes* Cap resulting in a total of 20.2 GL being permanently traded from the Lower Murray Swamps during 2004/05.

A total of 37 GL has been permanently traded to the *All Other Purposes* Cap since 1997/98 when trading first commenced.

6.7 Lower Murray Swamps Rehabilitation Progress Update

The Lower Murray Reclaimed Irrigation Areas, (LMRIA) which lie between Wellington and Mannum, require improved management and rehabilitation in order to reduce their environmental impact on the River Murray, to monitor water use and on-farm efficiency and to improve farm productivity. A major 'Options Study' assessed the environmental sustainability and economic viability of flood irrigated dairying in these areas. It included an evaluation of the benefits and cost alternative management options for the LMRIA (e.g. abandonment, rehabilitation, and conversion to other use).

The restructuring aims to rearrange farms into more viable units, with the retirement of unviable farms from irrigation and the consolidation of smaller farms. Rehabilitation assistance aims to upgrade the water delivery infrastructure to include metering and introduce runoff-prevention works to prevent nutrient rich

irrigation and stormwater runoff returning to the River. The impact of the drought and extensive irrigator consultation, delayed the expected commencement date for on-ground works until the end of 2004.

Significant progress was made in 2004/05 converting the Government Irrigation Areas to self-management with six of the nine areas converting to self-managed private trusts. Two of the remaining areas are expected to be self-managed by the end of October 2005, with the remaining one retired from irrigation.

Funding has been approved for on-ground works for the rehabilitation of 3950 hectares. On-ground works have commenced in six districts with meters being installed, supply channels being formed and reuse systems commenced.

Over the last 12 months the conversion to self-management has been on schedule and on-ground rehabilitation engineering works are ahead of schedule.

Supporting programs including development approval are 100% complete, aboriginal heritage negotiation is 85% complete, the freeholding of land to irrigators is 70% complete, retirement/ exit packages are 70% complete, and assistance payments for land purchase to consolidate farms are 90% complete.

The environmental compliance program within the project commencing late 2004 has an operational on-farm Environmental Management Impact Plan (EIMP) system comprising an exemption regime administered by the Environment Protection Agency (EPA) pursuant to the Environmental Protection Policy (Water Quality). This accords the deadline of mid-2008 when irrigators require an operational re-use water system, which captures the first 5 ML of stormwater per 100 ha of irrigation bay.

6.8 All Other Purposes (Highland Irrigation)

Highland irrigators diverted 453 GL for the 2004/05 water year, which was 14.6 GL below the climate and trade (both permanent and temporary interstate and intrastate trade) adjusted annual Cap target of 467.9 GL. The 2004/05 water year saw the highest diversion by highland irrigators since the Cap was introduced in 1996. The *All Other Purposes* Cap has a cumulative Cap credit of 405 GL.

A total of 24 GL was permanently transferred to the *All Other Purposes* Cap in 2004/05 including an exchange-factor-adjusted permanent trade of 4.8 GL from Victoria, and 20.2 GL from the Lower Murray Swamps including the 9.3 GL "Highland" irrigation component.

The climate-adjusted Cap was significantly lower than in 2003/04 due to the milder conditions and above average rainfall experienced across much of the Riverland during the summer months. The model shows that for every 1 mm of rainfall, 0.2 GL is subtracted from the Cap. The rainfall for December 2004 recorded at Berri Post Office of 63 mm has only exceeded this level a few times in the past 100 years, leading to a significant impact on the *All Other Purposes* Climate Adjusted Annual Cap.

South Australia did not permanently trade any River Murray water interstate however Victoria permanently traded 4.8 GL to South Australia during 2004/05.

Temporary interstate trade to South Australia was 13.2 GL from Victoria and 11.3 GL from New South Wales. South Australia temporarily traded 2.4 GL to Victoria and 23.8 GL to New South Wales. The net temporary interstate trade was -1.63 GL.

Again in 2004/05 there was a significant amount of late season trade from South Australia to New South Wales. In total 76 trades covering 16 GL were transferred to New South Wales in May and June 2005. 67% of temporary trades to New South Wales occurred in the last two months of the 2004/05 water year. This is a result of the

different regulatory regimes as New South Wales allows 'carry-over' of any unused water. South Australia intends to address this issue of late season trade.

Temporary trading between the Lower Murray Swamps and the *All Other Purposes* irrigators was only 6 GL. There was a substantial amount of trading within the *All Other Purposes* Cap Valley.

6.9 River Murray Drought Water Allocation Policy

In response to the predicted outlook early in the season the Department of Water, Land and Biodiversity Conservation (DWLBC) implemented its drought response strategy. This involved using the draft *River Murray Drought Water Allocation Policy*, providing advice to the High Level Taskforce on the River Murray and River Murray Drought Liaison Committee to form recommendations to the Minister for the River Murray on the appropriate level of allocation for River Murray water users.

This *River Murray Drought Water Allocation Policy* puts into place strategies and policies to ensure that, during periods of drought and low flow, all water users in South Australia share the available resources equitably and the health of the river is protected.

The objectives of the *River Murray Drought Water Allocation Policy* are to:

- Ensure that any detrimental impacts associated with reduced water availability or impaired water quality are shared equitably across all water users (including the environment) by applying a *whole of system* approach to the management and use of the water resources of the River Murray within South Australia;
- Ensure that water users are provided with the best available information regarding the potential for restrictions on diversions to assist with their business planning and decision making by the provision of timely information and advice; and

- Establish a clear and transparent decision-making process to set water restrictions during periods of reduced water availability or impaired water quality and provide water users with an understanding of this process.

The final decision on whether management actions are required rests with the Minister for the River Murray and will be based on a comprehensive assessment of predicted flows to South Australia and resource conditions both within South Australia and across the whole Basin.

Key parameters defining resource condition as well as the current estimated flows to South Australia will be available on a dedicated website to assist water users to track and understand these decisions.

2004/05 was the second year in succession where the policy has been applied to River Murray water users. In applying the draft policy framework DWLBC engaged the community through the River Murray Drought Liaison Committee chaired by the River Murray Catchment Water Management Board, which met on approximately a monthly basis to discuss water resource availability and predicted outlook and provide advice to the Minister for the River Murray to determine the appropriate level of allocation.

6.10 Water Information Management in South Australia

The *Water Information and Licence Management Application (WILMA)* was implemented state-wide in July 2004. WILMA is a single system for the management of licensed water access entitlements, including environmental entitlements for all prescribed water resources. The system also manages activities that affect water across South Australia such as the construction of dams.

WILMA provides a robust auditable platform for licence and permit application processing, revenue collection, water trade, managing legal interests and water accounting of both water

access entitlements and use, to meet legislative requirements. Ongoing internal refinements to WILMA to meet business requirements and to improve customer service delivery, continued during 2004/05. Extensive entitlement data verification and a comprehensive audit of all meter management of consumptive use in WILMA was established.

During 2005/06 the preliminary focus for WILMA will be ongoing development and completion of Internet access to licence, permit, water allocation transfer and legal interest information via the Public Register, and finalising robust reporting arrangements for water access and use accounting, to meet the extensive reporting requirements at the State, Basin and National level.

6.11 Irrigators Response to the 2004/05 Water Year in South Australia

With the announcement of water restrictions in July 2004 irrigators received an initial allocation of 70% use of licensed entitlement. A generally more relaxed approach was adopted by irrigators, compared to the 2003/04 water year when water restrictions were first introduced. Irrigators adopted a varied range of management actions to deal with the impacts of water restrictions.

In the months following July 2004, water allocations were gradually raised to 95% allocation due to improvements in water resource availability to South Australia.

Industry groups representing irrigators were generally supportive of the South Australian Government's approach to the basis and implementation of water restrictions. The reasons could be attributed to:

- A better understanding of the water restriction process;
- The implementation and adoption of drought-proofing management techniques to their irrigation businesses; and
- A clearer understanding of the mechanisms of

water trading.

In general, the affect of water restrictions during the 2004/05 season on the 2005 winegrapes, citrus, almonds and stone fruit was minimal. This can be supported by the fact that;

- A record tonnage of winegrapes were harvested in the Riverland for the 2005 vintage;
- Valencia orange tonnage was at a five-year high of approximately 110,000 tonnes;
- The current navel season tonnage is at normal levels taken biannual bearing considerations into account;
- Record tonnage of almond kernel; and
- Normal yields with stonefruit.

6.12 Changes to Water and Natural Resources Legislation

All water resources in South Australia including the River Murray are now managed under the provisions of the *Natural Resources Management Act 2004*, which replaces the *Water Resources Act 1997*. There were no significant changes made to the provisions in relation to water resources management with the transfer of this legislation.

6.13 Environmental Management and Watering Opportunities in 2004/05

During 2004/05, asset environmental management plans were approved for Chowilla and the Coorong Lower Lakes areas. A significant amount of work was put into drafting the *South Australian Environmental Flows for the River Murray Strategy*. The strategy involves:

- Establishing the River Murray Environmental Manager to oversee the environmental management of the River Murray in South Australia;
- Proposes mechanisms for the delivery and management of environmental flows;

- Development of prioritisation framework;
- Encouraging water donations for the environment; and
- Development of transparent water-accounting processes (E-Water register).

In the absence of a *Living Murray* Account in South Australia, a number of key environmental watering projects were undertaken using water from Ministerial, wetland and environmental allocations, and irrigator donations. 2.1 GL was made available for watering projects at Chowilla and in addition 1.5 GL was provided by the New South Wales Murray Wetlands Working Group. Lock 6 weir pool was also raised in September 2004 to provide for watering of stressed River Red Gums.

Water was also released through the barrages and fishways at the Lower Lakes. A total of approximately 100 GL was discharged providing ecological benefits for the Coorong Ramsar area. The fishways were opened in early August to mid October and again in December 2004 allowing some fish species to migrate between the lakes and the Coorong.

6.14 Future Water Management Activities

South Australia is committed to improvement programs and progressive management initiatives contributing to the sustainability of River Murray water resources through:

- Application of the *River Murray Water Allocation Plan* including a review of the document;
- Establishment of the South Australian Murray-Darling Basin Natural Resources Management Board;
- Establishing the *River Murray Environmental Manager* to oversee the sustainable management and use of River Murray water resources in South Australia;
- Development and enhancement of WILMA;
- Continued rehabilitation of the Lower Murray Swamps;
- Development of transparent environmental water accounting processes (E-Water Register);
- Completion and Cabinet approval of the draft *River Murray Drought Water Allocation Policy* to ensure that future decisions on water allocations during periods of reduced water resource availability are consistent and transparent to all water users;
- Application of the *Lower Lakes, Coorong and Murray Mouth Asset Environmental Management Plan*;
- Implementation and application of salinity zoning measures and policies. A consultation workbook has been developed introducing the package of measures being developed to manage salinity problems including;
- Salt interception infrastructure to ensure local saline groundwater can be diverted away from the River and floodplain;
- Zoning for new irrigation development to minimise future salinity increases. Three types of zones have been nominated high and low salinity impact zones and salt interception zones;
- Implementing the *River Murray Salinity Zoning Policy* in 2005/06 to apply the salinity management provisions in the *Water Allocation Plan for the River Murray Prescribed Watercourse*. This policy affects water allocation transfers, conversions from water (holding) to water (taking) allocations and variations to licences to change land on which water can be used. The policy is working towards ensuring that South Australia's salinity management is in line with the *Murray-Darling Basin Agreement* salinity provisions; and
- Implementing the *Environmental Flows for the River Murray Strategy* – South Australia's framework for the collective action to restore river health in 2005-2010. The strategy is primarily concerned with the delivery and management of flows to priority ecological assets in South Australia, as one critical input to the overall management of river health.

7. Review of 2004/05 Water Use in Queensland

7.1 Water Planning and Management Overview

Queensland has now finalised Water Resource Plans (WRPs) in all its Murray-Darling Basin valleys, and consequently has provided a framework with a strong legislative basis, that limits diversions from water courses, lakes, springs and overland flows. Water Resource Plans for the Border Rivers, Moonie, Nebine, Warrego and Paroo valleys were gazetted as subordinate legislation on 5 December 2003 and the final plan for the Condamine-Balonne was gazetted on 12 August 2004. The WRPs aim to achieve a balance between consumptive use and the environment, giving security of entitlement for water users whilst providing for the health of the river system. The plans provide a consistent approach to management across the catchments, while taking the specific issues of each catchment into account. The focus of these plans is initially on surface water, but will extend in the future to consider and incorporate groundwater in priority areas, as additional information and improved methods to address its sustainability become available.

The WRPs include the identification of unallocated water to address critical future water requirements and the management of the take of overland flow water. In addition, the Plans provide for monitoring and reporting on achieving the plan outcomes and for a water trading system to be established.

Resource Operations Plans (ROPs) will implement the provisions of the WRPs. Draft ROPs for the Moonie and the Warrego, Paroo, Bulloo and Nebine catchments were released for public submission in February 2005. Following consideration of the issues raised in the submissions by an independent Resource Operations Plan Referral Panel, Queensland has now finalised the ROPs for the Warrego, Paroo, Bulloo, Nebine and the Moonie catchments. Draft ROPs for the Border Rivers and Condamine-Balonne will be progressively released over the next one to two years. While the finalised WRPs provide the legislative framework that limits water diversions,

the long-term diversion Cap figure for each river valley will be determined once ROPs are finalised. Accordingly, Cap figures for all valleys in the Queensland part of the Murray-Darling Basin are expected to be progressively available over the next two years.

ROPs define individual water entitlements and outline detailed water sharing rules that provide for day-to-day management of diversions within agreed limits. They also include management arrangements for water trading, the operation of water infrastructure, the release of unallocated water, environmental provisions, and monitoring and assessment programs.

The consultative process that was an integral part of development of the WRPs is continued in ROPs development with community, water users and stakeholder groups in each catchment engaged both through consultative groups and individually to work through various issues. These discussions, including supporting technical work, are at various stages in different Plan areas.

A moratorium on new works has existed in all Queensland Murray-Darling valleys since 20 September 2000. The WRPs continue the moratorium on the development of infrastructure related to water-harvesting licenses until the ROPs are finalised. The WRPs also continued the moratorium on works that would increase the take of overland flow. Works that allow taking of overland flow water are now managed as assessable developments under the *Integrated Planning Act* and any growth in take by those works is prohibited under the Border Rivers and the Condamine/Balonne WRPs. When implemented, the management rules under the corresponding ROPs will ensure that there will be no increase in the average volume of water available to be taken.

More detailed information on management planning in each of the Queensland Murray-Darling catchments is summarised as follows.

Condamine-Balonne

On the 12 August 2004, the Water Resource Plan for the Condamine-Balonne catchment was released. The Plan was finalised after a long period of community consultation and incorporates advice from advisory committees, reference groups, community organisations, irrigators, graziers, members of the local community, industry groups, local councils and government agencies as well as independent scientists.

The Plan seeks to provide a framework for the sustainable management and use of water in the Condamine-Balonne catchment and allocates water to support the social, economic and environmental requirements of the catchment and downstream parts of the catchment which is part of the Murray-Darling Basin.

The Condamine-Balonne Water Resource Plan makes provisions for:

- Event-based flow management rules to enhance low and medium flow events in the Lower Balonne with benefits for the Narran Lakes and Culgoa floodplains;
- The continuation of the moratorium on new works to take water from a watercourse pending finalisation of the Resource Operations Plan for the catchment;
- The regulation of the take of overland flow water throughout the catchment, ensuring more water for the environment and downstream users;
- Performance indicators to ensure that decisions made under the Resource Operations Plan do not further adversely affect the amount of water available to the environment or existing water users including stock and domestic users; and

- The Plan specifically provides for a special five-year assessment and report (over and above the normal annual reporting required for plans) that will enable any significant developments in scientific knowledge relating to the region to be identified and taken into account in reviewing the effectiveness of the Plan. For example, the Narran Lakes research project and the Lower Balonne floodplain study outcomes will provide input to the five-year report.

Lower Balonne Ministerial Water Resources Advisory Council (‘the Council’)

The Council has been established by the Queensland Minister for Natural Resources and Mines under the provisions of the Condamine-Balonne Water Resource Plan and the *Water Act 2000*.

Its purpose is to advise the Queensland Minister and the Department of Natural Resources and Mines on Water Resource Planning issues in the Lower Balonne. One of the immediate roles of the Council is to provide advice to the Department about development and implementation of the ROP. It will also provide advice to the Minister on the outcomes of the five-year report of the WRP.

The Queensland Minister of Natural Resources and Mines appointed members including the Chair of the Council on 1 September 2005 for a term of four years.

The Council has been established with 21 members and a Chair and a Deputy Chair. It comprises of Queensland and New South Wales stakeholders with experience across the environment, irrigation, pastoral, farming, local government, indigenous and business sectors. It is anticipated that the Council provides the appropriate means for advancing improved water management approaches across the Lower Balonne.

The draft ROP will be developed with community input particularly from the Lower Balonne Ministerial Water Resources Advisory Council and the Upper and Middle Reaches ROP groups. Community engagement on the draft ROP has commenced. A final ROP is proposed to be completed by June 2007. It is anticipated that a draft ROP will be released for public submissions by late 2006.

Border Rivers

In the Border Rivers Catchment, an Intergovernmental Agreement (IGA) is being developed jointly with New South Wales and in consultation with stakeholders. It is intended that implementation of the NSW Water Sharing Plan and the Queensland Resource Operations Plan will be consistent with the development and agreement by all parties on the IGA. The development of the IGA has been broken down to discrete elements, including:

- Sustainable Management of Water;
- Water Sharing and Access;
- Water Accounting;
- Interstate Trading;
- Institutional Arrangements;
- Water Pricing;
- Measurement and Monitoring;
- Auditing and Reporting; and
- Schedules.

A draft of the first three elements has been completed and has been endorsed by the Border Catchments Standing Committee. These three elements will form an interim IGA that will be signed off by the Border Catchments Ministerial Forum. The interim IGA sets out how water will be shared between the States, and its endorsement will enable development of the Resource Operations Plan to proceed.

The Border Catchments Standing Committee have also asked the Border Rivers Commission (BRC) to investigate alternative institutional arrangements for ongoing management of the jointly owned infrastructure and water supply schemes in the Border Rivers. The BRC is fully aware of the need to expedite the development of a full IGA and work is progressing on this matter.

The States will give effect to the IGA through their respective water-resource-planning processes. In Queensland, the interim IGA is consistent with the finalised Border Rivers WRP. For example, the final Plan provisions include environmental flow objectives including end-of-system flow targets, strategies for achieving Plan outcomes, extraction Caps on all water entitlements, dealing with unallocated water, tight control of overland flow extractions, and monitoring and reporting requirements.

The ROP will default to the IGA in relation to joint management of the water resources of the shared streams of the Border Rivers (including, for example, environmental flow rules, water sharing or access rules) but will provide the framework for allocation and management of water in Queensland to achieve agreed IGA outcomes.

Work has commenced on the draft ROP for the Border Rivers with initial planning and policy being developed. Consultation has taken place with the stakeholder groups such as the Stanthorpe Community Reference Panel, Border Rivers Food and Fibre, and Border ROP sub groups.

It is expected that a draft ROP will be released for community consultation by mid-2006 with completion by early 2007.

Moonie River and Warrego, Paroo, Bulloo and Nebine Rivers

Draft ROPs for the Warrego, Paroo, Bulloo and Nebine and Moonie catchments were released in February 2005 with submissions closing in April 2005. Following consideration of the issues raised in these submissions by an independent Resource Operations Plan Referral Panel and further development of the ROPs by the Department of Natural Resources and Mines, these ROPs were gazetted on 20 January 2006.

These ROPs implement the strategic directions of the WRPs and include:

- The conversion of existing water authorisations to tradable water allocations;
- Water sharing rules for management of water allocations;
- Water trading rules;
- The release of 8000 ML of unallocated water in the Warrego River catchment under a market-driven process;
- The reservation of 1100 ML of unallocated water in the Moonie, 1000 ML in the Nebine, and 500 ML in the Bulloo for future use;
- The availability of 100 ML for town water supply or ecotourism in each of the Moonie, Warrego, Paroo, Bulloo and Nebine catchments; and
- Arrangements for water and ecosystem monitoring.

Metering

Following the release of the *Queensland Government Metering Water Extractions Policy* in May 2005, a state wide metering project has commenced. In brief, The Department of Natural Resources, Mines and Water (NRM&W) will organise the supply, installation, reading and maintenance of water meters in accordance with departmentally developed procedures and standards. Ownership of meters remains with NRM&W; all costs associated with metering will be recovered from water users through an annual Meter Service Charge.

To date the project has completed pilots in the Weir and Boyne Rivers and full-scale metering projects have commenced in the Barron, Fitzroy, Moonie, Warrego, Paroo, Bulloo and Nebine River Catchments. The Weir, Moonie, and Warrego, Paroo and Nebine River Catchments are within the Queensland section of the Murray-Darling Basin.

Metering of the Moonie River catchment and the Warrego, Paroo, Bulloo and Nebine River catchments has been triggered by the development of ROPs that will provide water users with tradable volumetric allocations. Community consultation, site inspections, technical assessment of metering requirements and meter selection is completed in these catchments with orders placed for meters in the Moonie Catchment. Installations are expected to commence in both project areas during early 2006. A combined total of approximately 40 meters will be installed in the two project areas.

Experience and lessons from the two initial project areas will provide valuable knowledge for next year's meter installation program. The 2006 works program will see a significant increase in the number of projects initiated and an escalation in the number of meters being installed. Surface-water metering projects to be initiated in 2006 include the Lower Balonne Water Management Area (approx 75 meters), Middle Condamine River (approx 250 meters) and the Granite Belt section of the Border Rivers Catchment (approx 85 water-harvesting works). Metering of groundwater areas will also commence in 2006 with the installation of approximately 110 meters in the Toowoomba City Basalts, and metering of water extracted from the Great Artesian Basin for commercial purposes.

Water Use Efficiency (WUE)

Queensland continues to advance efficient use of water in both rural and urban water sectors via a number of Government, industry and community initiatives. In addition to targeted programs to improve efficiency in water use and delivery systems, measures such as water recycling and reuse, and demand management are promoted as part of regional water resource strategies.

The second stage of the *Rural Water Use Efficiency Initiative* is nearly finished with funds made available by the Queensland Government for a continuation into a third stage through until mid-2007. This new phase will continue the improvements in on-farm water resource management and within the context of broader catchment issues such as sediment and nutrient control, salinity and protection of the environment. Broader natural resource and environmental management outcomes, such as the *National Action Plan for Salinity and Water Quality*, and Queensland's commitment to the Murray-Darling Basin are included in this third phase.

Funds continue to be provided to the sugar, fruit and vegetable, dairy-lucerne-pasture, and cotton and grains industries to support agreed industry proposals. The third stage will see the introduction of three new industry groups including production nurseries, turf and cut flowers. The industry proposals are presently being devised but will concentrate mainly on development, extension and adoption of farm management systems, further research and development and limited financial incentives to be made available to water users by some of the industries.

The Initiative will continue to invest in an Industry Development Officer employed by the Irrigation Association of Australia and is aiming to improve the standards of service delivery by irrigation consultants, contractors, suppliers and installers in Queensland.

For further information the RWUE Web site is <http://www.nrm.qld.gov.au/rwue/>

7.2 Stream-flow and Water Use Overview

Queensland has reported on water use and stream flow performance based on a 'water year' extending from 1 October to 30 September. There is some complexity involved in this reporting timeframe as there are a number of differing 'water years' in use across the Queensland section of the Murray-Darling Basin. Queensland will be working toward a consistent 1 July to 30 June water year in the development of ROPs.

Rainfall received in the period 1 October 2004 to 30 September 2005 for the Queensland section of the Murray-Darling Basin was well below average for all areas, with the eastern areas (Darling Downs area) particularly low. Good widespread general rainfall of a volume and intensity sufficient to generate runoff was received in late December 2004 and in late June/early July 2005, and resulted in reasonable stream-flows in the western and southern areas of the basin. In the period between these two rainfall events, only light and scattered rainfall was received. It varied from next-to-nothing in the eastern areas (lowest accumulative for these months in recorded history) to moderately below average in the NW area of the basin (though not sufficient to result in runoff). Overall, the traditional dry winter/wet summer rainfall pattern failed to eventuate, with well below average summer rainfall received, and, what would have otherwise been an extremely dry winter period, revived with the moderate June/July 2005 rainfall.

This area of Queensland is now in the fifth consecutive year of substantially below average rainfall and runoff. Replenishment of storages during this (2004/05) water year has not differed greatly from the past few years and has in fact nearly mirrored last years performance. The two largest storages (Glenlyon and Leslie dams) entered the year at critical levels with storage capacities of around 20% and 10% respectively. The next two largest storages (Beardmore and Coolmunda dams) along with the other (relatively) smaller dams and weirs, entered the year at various levels between 35% and 50%, excluding Jack Taylor weir (about 90%)

whose level is influenced by releases from Beardmore dam.

Despite reasonable water-harvesting opportunity in 2004/05, off-stream storages (ring tanks) in all catchments, started the year at around 33% capacity on average and finished the year in a near empty state despite the moderate late year (June/July) rainfall.

The primary December and June rainfall events did result in stream-flows in all catchments. Overall, the Border, Condamine-Balonne and Paroo catchments were well below average for the year with only the Moonie approaching average levels.

- Flows in the Border Rivers at Goondiwindi (167 GL) were around 20% of the long-term average of 852 GL. Total flows out of the Border Rivers into New South Wales were boosted by a 123 GL contribution by the Weir River downstream of the Goondiwindi gauging station. Average annual contribution from the Weir River is in the order of 160 GL.
- Flows in the Condamine-Balonne catchment were markedly below average with total flows through St George around 10% of the long-term average of 1152 GL. There was no flow recorded passing Chinchilla against a long-term average of 587 GL.
- The Moonie catchment again benefited from summer rainfall (December 2004) with 146 GL (around 90%) flowing past Fenton just upstream of the NSW border. Long-term average annual flow through Fenton is 166 GL.
- Flows in the Warrego River catchment at Cunnamulla (177 GL) were around 50% of the long-term average of 375 GL.
- Paroo River flows were markedly below average with 76 GL (15%) recorded past Caiwarro against an average annual volume of flow of 538 GL. This is in contrast to the above average flows recorded for the 2003/04 year.

Flows and related water-harvesting are described in detail for the various valleys as follows.

7.3 Condamine-Balonne

7.3.1 Condamine

Conditions were extremely dry throughout the year across the Condamine River catchment area. Only two flows passed Cecil Plains at the end of the upper section (about 250 ML in December and 60 ML passed in October) and there was no flow recorded passing Chinchilla Weir at the bottom of the central section. Flow was recorded into Chinchilla Weir in June/July with the level rising from 24% to over 70%. In the lower section of the Condamine a number of small flow events were recorded (at the Cotswold gauging station) over the summer period (2 in November and 2 in December) with a moderate flow recorded in July. Ironically this means the Condamine River has flowed throughout (both upstream and downstream of the Chinchilla weir) despite no flow passing this point.

Total water-harvesting diversion in the Condamine catchment was around 16 GL, which is markedly down on last year's total of 99 GL.

The major storage for the Upper Condamine Water Supply Scheme, Leslie Dam, fluctuated between 10% and 15% over this period. Despite the lack of storage, allocation water was made available from flows in the system during the summer and winter events with approximately 3 GL of allocation water used. The usage for the year from the Chinchilla Weir Water Supply Scheme was just over 1.5 GL. The scheme started the year with a 30% announced allocation which was revised to 65% after the June/July inflow.

Area-based irrigation totalled nearly 15 GL, with nearly 50% of this relating to access to Toowoomba's effluent water, some of which is currently discharged to watercourses and used downstream by licensed irrigators. The remainder relies on available water from naturally flowing streams and waterholes principally on the western slopes of the Great Dividing Range. The prolonged drought conditions have continued to affect flows in these streams. Most streams

were subject to total irrigation bans through to the June 2005 rainfall events to try and preserve baseflow. These bans were replaced by limited-opportunity restrictions in some catchments after the winter rains though most catchments were still under total irrigation bans at the end of the reporting period – 30 September 2005.

Urban, industrial and stock use totalled nearly 5 GL.

7.3.2 Balonne

There were two low flow events in the Balonne during the year. Good rainfall in the Maranoa and Bungil areas in December 2004 resulted in Beardmore Dam filling with limited water-harvesting allowed downstream. Some 46 GL passed St George with the flow peaking at nearly 9 GL/day. Water-harvesting extractions totalled 24 GL including 5 GL taken upstream of Beardmore, with over 20 GL passed downstream for stock, domestic and environmental needs.

Storm rainfall in the Bungil to Chinchilla areas in June resulted in Beardmore Dam filling again and a further 27 GL of water-harvesting extractions, 10 GL of which was taken upstream of Beardmore. The total volume of flow through St George was 59 GL (peak of 7.5 GL/day) with some 31 GL protected for stock, domestic and environmental requirements.

Total diversion for water-harvesting for the year was 51 GL; 15 GL between Chinchilla and Beardmore storage, and 36 GL from Beardmore storage downstream.

Total flow through St George was 106 GL for the year. Long-term average annual volume of flow at St George is 1152 GL.

The majority of the storage in Beardmore Dam is managed on an individual-capacity share basis where users hold individual accounts with only smaller allocation holders managed on an announced allocation basis. Water availability was high for the year with total supplemented diversions of 74 GL, 54 GL of which was taken through the channel system.

There is very little area-based irrigation in the Balonne and diversions were limited to around 1 GL upstream of Beardmore Dam. Urban, industrial and stock usage is estimated at nearly 4 GL. No estimate is available for floodplain harvesting in the Balonne for this period.

The total 2004/05 diversion in the Condamine-Balonne was 167 GL.

7.4 Border Rivers/Macintyre Brook

There was one major flow event in the Macintyre River during this period, peaking at about 22 GL/day at Goondiwindi in December/January 2004/05. An event earlier in December 2004, peaked at just over 5 GL/day and there were a number of smaller events peaking at less than 1 GL/day throughout the remainder of the reporting year. A total of 14.5 days of water-harvesting access was provided over the duration of the December/January events. A further flow in the Weir River in July 2005 resulted in an additional 3.5 days of access for water-harvesting in the lower section of the Border Rivers.

Total water-harvesting within the Queensland section of the Border catchment was 157 GL. Approximately 50 GL of this was diverted from the Weir River. The Weir River sub-catchment has performed well over the last two years, in common with the Moonie catchment with which it shares nearly half of its boundary.

The Dumaresq Water Management Area operates on a continuous accounting arrangement rather than announced allocations. The major storage for this scheme, Glenlyon Dam near Stanthorpe, started the year at 21% capacity with 19 GL available for Queensland irrigators. Capacity increased to nearly 29% following inflow in December. The storage finished the year at 23% capacity. Approximately 40 GL or 45% of allocation was available for use during the year. Total water use by Queensland irrigators for the year was 26 GL including 4 GL transferred in from the Macintyre Brook system and an additional 12 GL of temporarily transferred water from NSW.

The major storage for the Macintyre Brook Water Supply Scheme, Coolmunda Dam near Inglewood, started the year at 42% capacity and 40% announced allocation. The situation improved with dam capacity reaching over 70% and announced allocation revised to 100% following the inflows up to early January. Water use for the Macintyre Brook Scheme was 19 GL for the year.

The balance of diversions for the combined Border Rivers and Macintyre Brook catchments were made up of approximately 4.5 GL for area-based irrigation and nearly 4 GL for urban, industrial and stock. Use for area-based irrigation, while double that of last year, continues to be low as a result of ongoing below average flows. The majority of this use is in the Granite Belt at the upstream end of the catchment.

It is estimated that floodplain harvesting in Border Rivers/Macintyre Brook was approximately 16.5 GL, the majority of this (16 GL) occurring in the Border Rivers.

The total 2004/05 diversion for the Border Rivers and Macintyre Brook was 192 GL.

7.5 Moonie

Moonie River flows also reflect the two main rainfall events for this period with flows recorded in December 2004 and July 2005. The December flow peaked at around 20 GL/day and the July flow was minor at around 3 GL/day. Three other smaller flows (less than 1 GL/day) were also recorded. Flow past the Fenton gauge, just upstream of the Queensland – New South Wales border, totalled some 146 GL. The long-term average flow is 166 GL. This is the second year running that this catchment has been the best performing of the Queensland M-DB catchments. Ironically this follows a run of very poor performing years.

The good flows in the Moonie resulted in off-stream storages filling in the December event with most 'topped up' in the July event. Water-harvesting diversions for the 2004/05 water year were again around 23 GL.

There are no supplemented water supply schemes in the Moonie. Area-based irrigation, and urban, industrial and stock use in the catchment is less than 1 GL.

The total 2004/05 diversion in the Moonie was 23 GL.

7.6 Warrego

The mid-summer and mid-winter rainfall pattern in the eastern part of the catchment this year was mirrored in the western areas. The flow in the Warrego River (at Cunnamulla) in late December peaked at nearly 15 GL/day with the flow in late June/early July peaking at close to 10 GL/day. An additional flow in late May brought the total flow recorded passing Cunnamulla to 177 GL for the year. The average flow at this site is 375 GL - based on the 13 years of data records available.

Water-harvesting diversion is estimated at nearly 8 GL for the year into an estimated 13 GL of off-stream storage.

The Cunnamulla Water Supply Scheme started the year with an announced allocation of 65% and this was revised to 100% following the flows in December 2004. Total diversion from the scheme was just under 2 GL out of a total entitlement of 2.6 GL.

Area-based irrigation, and urban, industrial and stock use in the catchment is less than 1 GL.

The total 2004/05 diversion in the Warrego was 11 GL.

7.7 Paroo

As with the other catchments, flows occurred in November/December 2004 and June/July 2005, the latter peaking at about 7 GL/day at Caiwarro, approximately 60 km upstream of the Queensland – New South Wales border. The November/December 2004 rainfall resulted in a number of small flows rather than a single flow as was recorded in the catchments to the east. A flow of about 2 GL/day in late May contributed to a total flow through Caiwarro of 76 GL for the year – against an average annual flow of 538 GL. This was in contrast to the better than average flows recorded for the previous year.

There is negligible development for irrigation in the Paroo catchment.

Diversions since 1993/94 are given in **Table 6**.

Table 6: Water diversions in Queensland since 1993/94

<i>Year</i>	<i>Diversion (GL)</i>
2004/05	392
2003/04	815
2002/03	214
2001/02	341
2000/01	688
1999/00	541
1998/99	608
1997/98	741
1996/97	467
1995/96	520
1994/95	176
1993/94	338

8. Review of 2004/05 Water Use in ACT

8.1 Review of Water Use in the ACT

Water storages supplying the Canberra and Queanbeyan urban water supply remained at close to 45% of capacity as at 30 June 2005. Demand-management measures imposed by regulations to conserve the security of future supply since 2002/03 were maintained throughout 2004/05. Level two restrictions, with a target demand reduction of 25%, were applied during the cooler months and level three restrictions, with a target demand reduction of 40%, were applied during the warmer months of September to February. As a result of the restrictions, water use in the ACT was below average during 2004/05 and the lowest level of use since 1984. Extractions from storages for the urban supply were just under 52 GL, some 20% less than recent years and significantly below the long-term average. Returns from sewage treatment plants to the river system were also less than past years at just under 30 GL. Net urban consumption was slightly below 23 GL and non-urban consumption continues to be estimated at 5 GL giving a total net consumption of just over 27 GL. Consumption was significantly lower than would have been expected for the climatic conditions due to the continuing imposition of demand-management arrangements. In addition, the urban water provider ACTEW has negotiated demand-management agreements with significant non-domestic water users. Overall demand from the urban water supply has been significantly reduced as a result of the water restrictions and voluntary agreements.

8.2 Progress of Water Reforms in the ACT

Water management in the ACT is implemented through the *Water Resources Act 1998*. The *Water Resources Act* was drafted as part of the implementation of the 1994 COAG water reforms and effectively implements the intent of 1994 COAG water reforms. The Act has been fully implemented except for the finalisation of interim allocations based on historic use. Interim rural allocations were made based on crop/area relationships and estimates, with accuracy to be tested against metered use before confirmation. The continuing drought has delayed the finalisations of interim allocations.

The *Water Resources Act 1998* is to be reviewed during 2005-06.

8.3 ACT Water Resources Strategy

The ACT Water Resources Strategy, *Think water, Act water* provides for a reduction in water consumption by 12% by 2013 and 25% by 2023. The Strategy which commenced in April 2004 is now being implemented. The Strategy provides for a water efficiency program which aims to improve the efficiency of water use in residences both in the home and garden. The Program includes a number of incentive measures to reduce water use as well as an awareness campaign such as rebates for showerheads and rainwater tanks. There is also a component dealing with commercial, government and institutional users to assist in ensuring a more efficient water consumption. The *Think water, Act water* program is evaluated annually and ongoing adjustments are made to the incentive program.

Permanent water conservation measures are scheduled to be introduced in March 2006.

9. Water Trading in the Murray-Darling Basin

9.1 History of Water Trading

In recent years there has been considerable growth in water trading in the Murray-Darling Basin. Water trading has been encouraged by Governments as a means of moving irrigation from those uses which produce low returns to others which can generate greater economic returns. It is also expected to have environmental benefits, since increased profits from irrigation will make it easier for managers to invest in more efficient water delivery systems, which will produce better returns for the volume of water used and reduce accessions to groundwater.

Initially water trading was confined to trades within irrigation systems. However, over time, changes have been made to the trading rules, which have permitted inter-valley and more recently interstate trade to take place. In recent years, Australian Governments have been working together to reduce the differences in water entitlements, in preparation for the introduction of increased interstate water trading. These changes are part of the water market reform package, which was endorsed by the Council of Australian Governments (COAG) in 1994.

Trade has an impact on the implementation of the Cap. The trade in previously unused entitlements affects the size of the allocation that can be announced by the water managers, whilst inter-valley and interstate trade affects the Cap targets for the individual river valleys. It is therefore important that data on water trading be collected and published in the *Water Audit Monitoring Report*.

Table 7 details the total volume of intra-valley water trades and the net inter-valley and interstate water trades that occurred during the 2004/05 water year.

The sign convention used in **Table 7** is that a negative value indicates a trade out of the valley and a positive value indicates a trade into the valley. It can be seen from this that compared to the total volumes of water traded, the inter-valley trades in 2004/05 were small and the interstate trades were smaller. Permanent inter-valley trades will result in permanent changes to the valley Caps, usually calculated as the volume of entitlement traded multiplied by an agreed transfer factor. Temporary trades will alter the annual Cap targets, usually on a one for one basis. Trade will therefore affect the Caps for individual valleys but will not result in an increase in the overall Cap for the Basin.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2004/05. However, resource constraints in the New South Wales and Victorian sections of the Murray Valley restricted the supply of available water for trade.

Table 7. Intra-Valley, Net Inter-Valley and Net Interstate Water Entitlement Transfers in 2004/05

System	Permanent Entitlement Transfer				Temporary Entitlement Transfer				Adjustment to 2004/05 Cap Target for Temporary and Unused Permanent Trade ² (ML)
	Total Permanent Entitlement Sold (ML)	Net Inter-valley Trade Excluding Inter-State Trade ³ (ML)	Net Interstate Trade Inwards ³ (ML)	Future Adjustment to Cap from this year's Permanent Trade ¹ (ML)	Total Temporary Allocation Sold (ML)	Net Inter-valley trade Excluding Inter-state Trade ³ (ML)	Net Interstate Inwards ³ (ML)	Adjustment to 2004/05 Cap Target for Temporary Trade (ML)	
New South Wales									
Border Rivers	435	0	0	0	14160	0	-6368	-6368	-6368
Gwydir	n/a	0	0	0	31753	0	0	0	0
Namoi/Peel	n/a	0	0	0	7291	0	0	0	0
Macquarie/ Castlereagh/Bogan	n/a	0	0	0	13196	0	0	0	0
Barwon-Darling	n/a	0	0	0	0	0	0	0	0
Lower Darling	n/a	0	0	0	31583	-1139	0	-1139	-1139
Lachlan	n/a	0	0	0	5140	0	0	0	0
Murrumbidgee	n/a	0	0	0	86368	8734	-708	8026	8026
Murray	n/a	0	523	471	130193	-7595	10300	2705	3228
Total NSW	n/a	0	523	471	319684	0	3224	3224	3747
Victoria⁴									
Goulburn	28269	-18146	0	-23408	262012	-25967	-219	-26186	n/a
Broken	199	0	0	0	1212	0	0	0	n/a
Loddon	247	5	0	6	5635	-3860	0	-3860	n/a
Goulburn/Broken/Loddon	28715	-18141	0	-23402	268859	-29827	-219	-30046	-47005
Campaspe ⁵	760	8	0	10	3658	1174	0	1174	0
Wimmera-Mallee	0	0	0	0	350	-350	0	-350	-350
Kiewa	32	-32	0	-41	552	0	0	0	n/a
Ovens	51	53	0	68	757	0	0	0	n/a
Murray	22233	18112	-5445	18464	147180	29003	-8132	20871	n/a
Kiewa/Ovens/Murray	22316	18133	-5445	18491	148488	29003	-8132	20871	33559
Total Victoria	51791	0	-5445	-4900	421356	0	-8351	-8351	-13795
South Australia									
Metro-Adelaide & Associated Country Areas ⁶	0	0	0	0	0	8800	0	8800	8800
Lower Murray Swamps	10932	-20232	0	-20742	6009	-6009	0	-6009	-26751
Country Towns	0	0	0	0	5000	-5000	0	-5000	-5000
All Other Purposes	12933	20232	4778	24500	34120	2209	-1630	579	25557
Total South Australia	23865	0	4778	3758	45129	0	-1630	-1630	2606
Queensland									
Condamine/Balonne	0	0	0	0	35121	0	0	n/a	n/a
Border Rivers	0	0	0	0	2838	4557	6368	n/a	n/a
Macintyre Brook	0	0	0	0	6890	-4557	0	n/a	n/a
Moonie	0	0	0	0	0	0	0	n/a	n/a
Warrego	0	0	0	0	250	0	0	n/a	n/a
Paroo	0	0	0	0	0	0	0	n/a	n/a
Total Queensland	0	0	0	0	45099	0	6368	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	n/a	0	-144	-672	831268	0	0	-845	-1531

1. The total Cap adjustment for permanent trade (including exchange rate adjustments to permanent interstate trade) is comprised of the sum of net inter-valley and net interstate trade for each designated river valley.
2. The total Cap adjustment for temporary trade is comprised of the sum of net inter-valley and interstate temporary trade and unused component of permanent trade this year for each designated river valley.
3. The sign convention used is that a negative value indicates a trade out of the valley and a positive value indicates a trade into the valley.
4. Temporary entitlement transfers in Victoria, includes temporary trade in both water right and sales entitlement.
5. Cap adjustment for trade with Campaspe is done to the Goulburn/Broken/Loddon valley.
6. The Metro-Adelaide & Associated Country Areas Cap component is non-tradable, unless the Ministerial Council determines otherwise.

10. Water Availability for the Year 2004/05

10.1 Water Availability

The 1995 report to the Ministerial Council: *An Audit of Water Use in the Murray-Darling Basin*, found that water users had only diverted 63% of the water that they had been authorised to use in the previous 5 years (the amount allocated was not restricted to the quantity available and in some years exceeded it). This highlights the fact that the States' allocation systems evolved to encourage development of the Basin's water resources and were not well suited to being used to impose a Cap on diversions.

A key step in the process to implement the Cap is adjusting the States' allocation systems. To make Cap implementation more transparent, the water used in each valley has been compared with the quantity of water that has been allocated for use in that valley in 2004/05 (see **Table 11**).

Water is allocated in many different ways across the Basin and there are differences between States, valleys and regions depending upon the reliability of supply and the degree of regulation. These types of allocations are summarised below.

10.1.1 Volumetric Allocations

Water users in regulated streams and in some unregulated systems are issued with volumetric entitlements (see **Table 8**). These entitlements specify a base volume of water that can be diverted each year and come in three main categories:

- High security entitlements which are available every year;
- Volumetric entitlements on unregulated streams which are available, provided there is flow in the stream; and
- Normal security entitlements, which are subject to allocation announcements, made at intervals throughout the season. These entitlements, which include Victorian water right and sales, are the largest category of volumetric entitlement in the Basin. For these entitlements, the volume allocated is the base entitlement multiplied by the announced percentage allocation at the end of the season.

10.1.2 Continuous Accounting

In the Border, Gwydir and Namoi valleys in NSW and Condamine-Balonne in Queensland, continuous accounting is in operation. Under this system, water users have individual accounts, which may build up to a specified percentage of the entitlement. The account increases when allocations are made and decreases as water is used. The usage in any season is limited to a specified percentage of the entitlement. Water available under continuous accounting is reported in the fourth column of **Table 8**.

10.1.3 Allocation Transferred into Valley

A temporary inter-valley transfer will increase the allocation in the purchasing valley and reduce the allocation in the selling valley. The net transfer into each valley has been copied from **Table 7** to the fifth column in **Table 8**.

10.1.4 Carryover from the Previous Year

Carryover is available in a number of valleys in NSW. This enables unused allocation in one season to be carried over to the next, up to specified limits. Carryover differs from continuous accounting in that accounts are kept on an annual basis rather than a continuous one. In some valleys, carryover is cancelled as allocations approach 100%. **Table 9** shows the carryover added to the valley allocation. The net carryover from the previous season is included as column 3 in **Table 8**.

10.2 Allocated Water

The total volume of allocated water under annual accounting equals the sum of allocated water this year, carry-over from previous year and water transferred into valley. Under the continuous accounting, the total volume of allocated water equals balance of accounts at the end year plus the water transferred into the valley, although this may be subject to overall usage limits. The total volume of allocated water is listed in the last column of **Table 8**.

10.3 Access to Water Not in the Allocation System

10.3.1 Supplementary Access (Off-allocation) and Water-Harvesting

Water is made available to irrigators in regulated streams during periods when storages are spilling or there are unregulated flows by declarations of periods of off-allocation. Water diverted in these periods does not count against an irrigator's allocation for the rest of the season. Historically there were no controls over the size of these diversions other than the duration of the event and the licensed pump capacity. However, in recent years, quotas have been established in some systems and annual limits have been imposed. Access to off-allocation has been discontinued in South Australia. In NSW, the off-allocation has been redesignated as Supplementary access and requires a separate licence

Water-harvesting licences have been issued in some Queensland streams. Irrigators with these licences are limited by their diversion capacity and by the flow at which they can commence to pump, but not by the volume of water they can divert or by the area they can plant. In September 2000, Queensland placed a moratorium on the construction of storages and other works to divert water from streams. The moratorium on the construction of further infrastructure effectively caps the volume of water-harvest water able to be taken in any particular event.

10.3.2 Area Licences on Unregulated Streams

Some entitlements on unregulated streams specify an area that can be irrigated but not the volume of water which can be diverted. It is possible to estimate the volume of water made available to these licences by multiplying the licensed area by an assumed usage based on crop type.

10.3.3 Irrigation System Losses

In some irrigation distribution systems, water entitlements specify the rights to water delivered at the farm gate. The losses incurred by the water authority in delivering water from the diversion point on the river to the farm-gate are therefore not covered by the announced allocation and need to be added to the allocation to determine the authorised diversion. These losses are included in the fifth column of **Table 10**. For other irrigation distribution systems such as the privatised districts in the New South Wales Murray, an allowance for system losses has been included in the water entitlement.

10.4 Comparison of Use of Allocated Water with the Allocated Volume

The final column in **Table 10** lists the total use of allocated water. This is worked out by subtracting from the total diversions, the sum of supplementary access/water-harvesting (third column), unregulated stream use (fourth column) and system losses (fifth column). In calculating the water used in Victorian river valleys, the volumes diverted from each stream have to be adjusted for the water diverted from other valleys (second column of **Table 10**). For example, in the Victorian river valleys, water is physically transferred from the Goulburn Valley into the Campaspe and Loddon Valleys via the Waranga Western Channel.

In **Table 11**, allocated volumes are compared with the water used in each valley and the percentage use of the water allocated by the water authorities for diversion is presented.

Until 2003/04, efficiency of allocation system was measured by comparing diversions with water authorised for use. In theory, it would have been possible to assess the maximum volume of water that could have been diverted under the rules that existed for the water-harvesting, unregulated flow and system losses and comparing this with the volume of water used under these rules. In practice, working out this volume was too

difficult, and an assumption was made that usage under these three categories equalled the volume authorised for use. This led to an overestimation of the utilisation of authorised water. This system has now been replaced with a new system of comparison of the use of allocated water with the volume of allocation. This gives a better measure of the degree of utilisation but covers only three quarters of the total diversion. The use percentages from 1997/98 to 2003/04 have been recalculated according to the new system.

Figure 7 shows the utilisation of allocations in the Basin since 1997/98.

The 2004/05 utilisation of 72% is fourth highest since Cap accounting started in 1997/98. This

is partly due to very dry conditions continuing during 2004/05 and partly due to tightening of allocation system.

It is expected that diversion as a percentage of the water allocated will fluctuate from year to year, depending upon the climatic conditions and the degree to which the diversions are constrained by the physical resources available. Typically the utilisation of the allocations will be higher in the drier years and lower in the wetter years, especially in the south of the Basin. It is also expected that allocations would reduce and utilisation increase if the allocation system was tightened to prevent growth in diversions under the Cap.

Figure 7. Utilisation (%) of allocated water since 1997/98



Table 8. Water Allocated in 2004/05

<i>System</i>	<i>Base Valley Water Entitlement¹</i> (GL)	<i>Announced Allocation²</i> (GL)	<i>Net Carryover from 2003/04</i> (GL)	<i>Water Available under Continuous Accounting³</i> (GL)	<i>Allocation Transferred into Valley⁴</i> (GL)	<i>Total Allocated Water in Valley⁶</i> (GL)
New South Wales						
Intersecting Streams	0	0	0	0	0	0
Border Rivers ³	266	47	129	175	-6	169
Gwydir ³	531	37	124	160	0	160
Namoi/Peel ³	310	88	114	202	0	202
Macquarie/Castlereagh/Bogan	674	99	37	—	0	136
Barwon-Darling	0	0	0	—	0	0
Lower Darling	48	48	0	—	-1	47
Lachlan	683	25	6	—	0	31
Murrumbidgee	2764	1461	58	—	8	1528
Murray	2233	1666	245	—	3	1914
Total New South Wales	7509	3471	712	538	4	4187
Victoria						
Goulburn	705	705	0	—	-44	661
Broken	40	58	0	—	0	58
Loddon	286	286	0	—	-4	283
Campaspe	288	249	0	—	1	250
Wimmera-Mallee	94	67	0	—	0	67
Kiewa	18	18	0	—	0	18
Ovens	44	44	0	—	0	44
Murray	1257	1257	0	—	34	1290
Total Victoria	2733	2685	0	0	-14	2671
South Australia						
Metro-Adelaide & Associated Country Areas ^{7, 8}	130	149	0	—	9	158
Lower Murray Swamps	87	87	0	—	-26	61
Country Towns	50	50	0	—	-5	45
All Other Purposes	526	526	0	—	26	551
Total South Australia	793	812	0	0	3	815
Queensland						
Condamine/Balonne	127	21	0	98	0	119
Border Rivers	87	4	0	40	11	55
Macintyre Brook	19	19	1	0	-5	15
Moonie	0	0	0	0	0	0
Warrego	3	3	0	0	0	3
Paroo	0	0	0	0	0	0
Total Queensland	235	47	1	137	6	191
Aust. Capital Territory⁹	0	0	0	0	0	0
Total Basin	11271	7014	873	675	-1	8562

1. Sum of the volumetric entitlements in valley (in NSW this is the sum of general and high security entitlements). Includes unregulated stream entitlements where these are expressed volumetrically (e.g. in Victoria).
2. The base entitlements multiplied, where appropriate, by the largest announced percentage allocation in the season. In NSW this includes high security entitlements (Includes allocation for high security entitlement).
3. In continuous accounting, individual accounts can accumulate up to a specified percentage of entitlements but use can be limited to a specified percentage of entitlements during a season.
4. Net temporary inter-valley entitlement transfer from Table 7.
5. Net Carryover from Previous Year (see Table 9).
6. Allocated water = announced allocation or permitted use under continuous accounting + inter-valley trade + net carryover from last season (in NSW the addition of high security entitlements are also included).
7. Indicative average annual allocation from 5-year rolling total of 650 GL.
8. Volume that could be diverted before the 5-year Cap would be exceeded in 2004/05.
9. There is no formal entitlement in ACT to date.

Table 9. Carryovers for 2004/05

<i>System</i>	<i>Carryover from 2003/04 (GL)</i>	<i>Less Carryover Cancelled in 2004/05¹ (GL)</i>	<i>Less Overdraw Used in 2003/04 (GL)</i>	<i>Plus Overdraw Cancelled in 2004/05 (GL)</i>	<i>Plus Overdraw from 2005/06 (GL)</i>	<i>Net Carryover² for 2004/05 (GL)</i>
New South Wales						
Border Rivers	129	0	0	0	0	129
Gwydir	124	0	0	0	0	124
Namoi/Peel	114	0	0	0	0	114
Macquarie/Castlereagh/Bogan	37	0	0	0	0	37
Barwon-Darling	0	0	0	0	0	0
Lower Darling	0	0	0	0	0	0
Lachlan	6	0	0	0	0	6
Murrumbidgee	218	0	160 ³	0	0	58
Murray	245	0	0	0	0	245
Total New South Wales	872	0	160	0	0	712
Victoria						
Goulburn	0	0	0	0	0	0
Broken	0	0	0	0	0	0
Loddon	0	0	0	0	0	0
Campaspe	0	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0	0
Kiewa	0	0	0	0	0	0
Ovens	0	0	0	0	0	0
Murray	0	0	0	0	0	0
Total Victoria	0	0	0	0	0	0
South Australia						
Metro-Adelaide & Associated Country Areas	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	0	0	0
Country Towns	0	0	0	0	0	0
All Other Purposes	0	0	0	0	0	0
Total South Australia	0	0	0	0	0	0
Queensland						
Condamine/Balonne	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0
Macintyre Brook	1	0	0	0	0	1
Moonie	0	0	0	0	0	0
Warrego	0	0	0	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	1	0	0	0	0	1
Australian Capital Territory						
	0	0	0	0	0	0
Total Basin	873	0	160	0	0	713

1. Under certain conditions (such as storage spills), carryovers from the previous season can be cancelled.
2. Net carryover is defined as: carryover less cancelled carryover less overdraw used during last year plus overdraw permitted this year.
3. Impact of deals made by irrigators with the Snowy Hydro Limited.

Table 10. Use of Allocated Water in 2004/05

<i>System</i>	<i>Diversion from Valley (GL)</i>	<i>Diverted from Other Valleys (GL)</i>	<i>Less Supplementary Access & Water Harvesting Use (GL)</i>	<i>Less Unregulated Stream Use not in Allocation (GL)</i>	<i>Less System Losses not in Allocation (GL)</i>	<i>Use of Allocated Water in Valley (GL)</i>
New South Wales						
Intersecting Streams	3	0	0	3	0	0
Border Rivers	125	0	59	17	0	48
Gwydir	165	0	120	10	0	34
Namoi/Peel	190	0	35	78	0	77
Macquarie/Castlereagh/Bogan	102	0	0	37	0	65
Barwon-Darling	157	0	157	0	0	0
Lower Darling	29	0	0	0	0	29
Lachlan	36	0	0	15	0	21
Murrumbidgee	1618	0	141	42	0	1435
Murray	1241	0	59	28	0	1154
Total NSW	3666	0	571	231	0	2864
Victoria						
Goulburn	1477	-559	0	0	262	656
Broken	27	0	0	0	7	19
Loddon	49	267	0	0	64	253
Campaspe	40	240	0	0	92	189
Wimmera-Mallee	53	9	0	0	16	45
Kiewa	4	0	0	0	0	4
Ovens	21	0	1	0	0	20
Murray	1466	38	0	0	278	1225
Total Victoria	3137	-5	1	0	720	2411
South Australia						
Metro-Adelaide & Associated Country Areas	72	0	0	0	0	72
Lower Murray Swamps	60	0	0	0	0	60
Country Towns	39	0	0	0	0	39
All Other Purposes	453	0	0	0	0	453
Total South Australia	623	0	0	0	0	623
Queensland						
Condamine/Balonne	167	0	63	16	0	88
Border Rivers	177	0	151	4	0	21
Macintyre Brook	15	0	0	0	0	15
Moonie	23	0	23	0	0	0
Warrego	11	0	8	1	0	2
Paroo	0	0	0	0	0	0
Total Queensland	392	0	244	22	0	126
Aust. Capital Territory	27	0	0	0	0	0
Total Basin	7846	-5	817	253	720	6052

1. The volume of off-allocation water used and water harvested has been reported for NSW, Queensland and Victoria.
2. Unregulated stream entitlement in Victoria is included in the base entitlement.
3. 'System Losses not in Allocation' are losses in those irrigation systems where the entitlement is defined at the farm gate and losses in the distribution system are not covered by an entitlement.
4. The water allocated for Metro-Adelaide & Associated Country Areas in 2004/05 is based upon the usage in the previous four years against the five-year rolling total of 650 GL.

Table 11. Use of Valley Allocations in 2004/05

<i>System</i>	<i>Total Allocated Water in Valley³ (GL)</i>	<i>Use of Allocated Water in Valley (GL)</i>	<i>Use as a Percentage of Total Allocation (%)</i>
New South Wales			
Intersecting Streams ¹	0	0	n/a
Border Rivers ¹	169	48	29%
Gwydir ¹	160	34	21%
Namoi/Peel ¹	202	77	38%
Macquarie/Castlereagh/Bogan	136	65	48%
Barwon-Darling ¹	0	0	n/a
Lower Darling ¹	47	29	61%
Lachlan	31	21	68%
Murrumbidgee	1528	1435	94%
Murray	1914	1154	60%
Total NSW	4187	2864	68%
Victoria			
Goulburn	661	656	99%
Broken	58	19	33%
Loddon	283	253	89%
Campaspe	250	189	75%
Wimmera-Mallee	67	45	68%
Kiewa	18	4	25%
Ovens	44	20	45%
Murray	1290	1225	95%
Total Victoria	2671	2411	90%
South Australia			
Metro-Adelaide & Associated Country Areas ²	158	72	45%
Lower Murray Swamps	61	60	99%
Country Towns	45	39	86%
All Other Purposes	551	453	82%
Total South Australia	815	623	77%
Queensland			
Condamine/Balonne ¹	119	88	74%
Border Rivers ¹	55	21	39%
Macintyre Brook ¹	15	15	94%
Moonie ¹	0	0	82%
Warrego ¹	3	2	81%
Paroo ¹	0	0	100%
Total Queensland	191	126	66%
Aust. Capital Territory	0	0	n/a
Total Basin	8402	6052	72%

1. The use of water not covered by allocations (e.g. water-harvesting, off-allocations/ supplementary water, unregulated stream licenses) constitutes a large percentage of the use in these valleys.
2. The volume authorised for use for Metro-Adelaide & Associated Country Areas for 2004/05 is the amount that could be used before the 5-year Cap of 650 GL would be exceeded.
3. Allocated water from **Table 8**.

11. Comparison of Actual Flows with Natural Flows

A key factor in the Ministerial Council's decision to implement the Cap was the major changes that had occurred to the flow regime in many of the Basin's rivers. This either presents itself as a change in the seasonality of flow (as occurs below major dams) or a reduction in the total flow volume (as occurs at the bottom end of many of the river valleys). As part of the Cap monitoring process, the States have agreed to report on the way the natural flows in each river have been altered.

The natural flows are estimated from computer modelling studies. Many of the river models are incomplete or not yet modified, to allow these numbers to be readily calculated for 2004/05. **Table 12** presents the 2004/05 annual flow volumes recorded and the natural flows at a number of selected key sites within the Murray-Darling Basin, whilst the impact of development can be seen graphically in **Figure 8**.

Table 12. Comparison of 2004/05 Actual and Natural Annual Flows for Key Sites within the Murray-Darling Basin

<i>System</i>	<i>Actual Flow (GL)</i>	<i>Natural Flow (GL)</i>	<i>Actual/Natural (%)</i>
Inter-Basin Transfers			
Snowy Mountain Scheme to Murrumbidgee River	81	0	—
Snowy Mountain Scheme to Murray River	481	0	—
Glenelg River Catchment to Wimmera-Mallee	n/a	n/a	—
Wannon River Catchment to Wimmera-Mallee	n/a	n/a	—
New South Wales Tributaries²			
Barwon River at Mungindi + Boomi River	132	n/a	n/a
Inflows to Gwydir Wetland	239	n/a	n/a
Gwydir System Outflows to Barwon River	158	n/a	n/a
Namoi System Outflows to Barwon River	297	n/a	n/a
Inflows to Macquarie Marshes	29	n/a	n/a
Macquarie/Castlereagh/Bogan Outflows	3	n/a	n/a
Darling River Inflows to Menindee Lakes	352	n/a	n/a
Lachlan River at Corrong	7	n/a	n/a
Lachlan River at Booligal	16	n/a	n/a
Murrumbidgee River at Balranald	184	n/a	n/a
Lower Darling River at Burtundy	40	n/a	n/a
Victorian Tributaries			
Kiewa River at Bandiana	569	573	99%
Ovens River at Wangaratta	355	372	95%
Goulburn River at McCoys Bridge	411	2223	18%
Campaspe River at Rochester	10	80	12%
Loddon River at Appin South	4	87	5%
Wimmera River at Horsham	n/a	n/a	n/a
Queensland Tributaries			
Condamine/Balonne/Culgoa Flows at NSW Border	94	n/a	n/a
Macintyre River at Goondiwindi	167	n/a	n/a
Moonie River at Fenton	146	n/a	n/a
Warrego River at Cunnamulla	177	n/a	n/a
Paroo River at Caiwarro	76	n/a	n/a
River Murray			
Albury (Doctors Point)	3525	n/a	n/a
Downstream of Yarrawonga Weir	3329	n/a	n/a
Euston	2691	n/a	n/a
South Australian Border	1879	n/a	n/a
Barrages	110	n/a	n/a

1. n/a indicates data not available.
2. Operational data, which may be subject to change.

Figure 8. Plots of Flows at Selected Sites Showing 2004/05 Actual and Natural (Modelled) Flows in Victoria

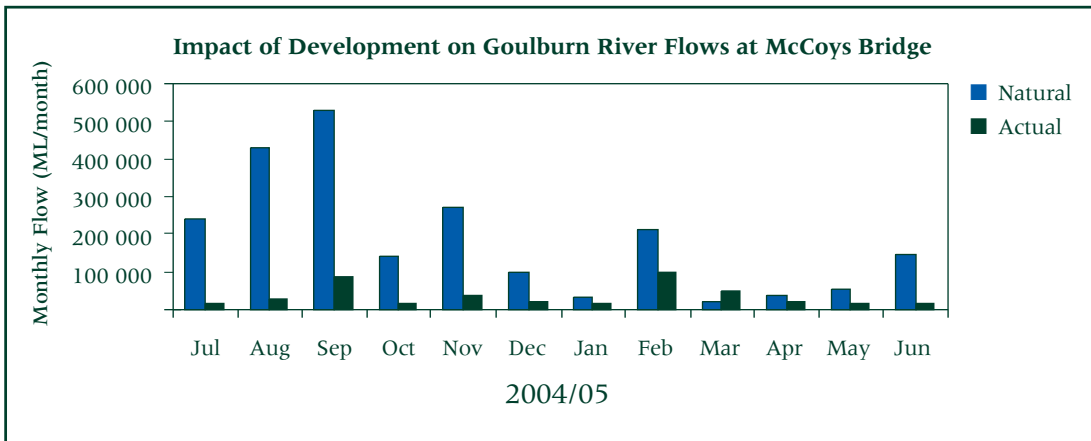
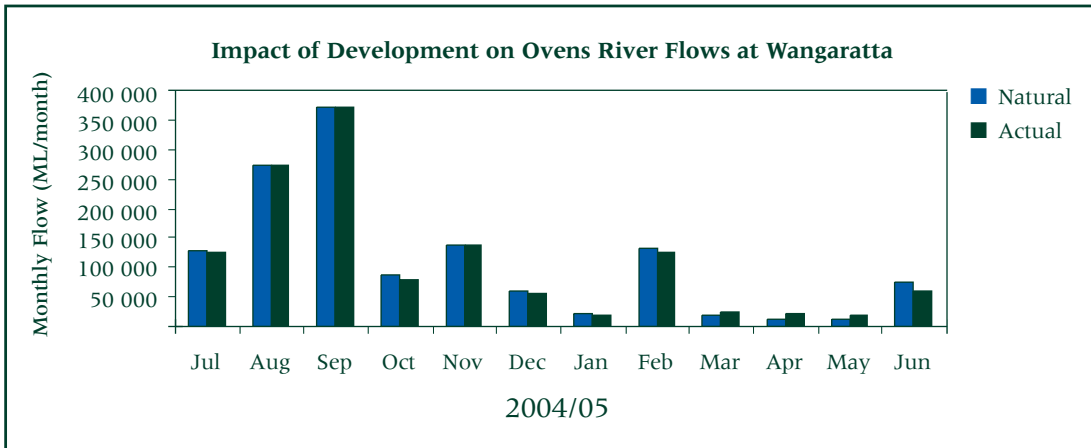
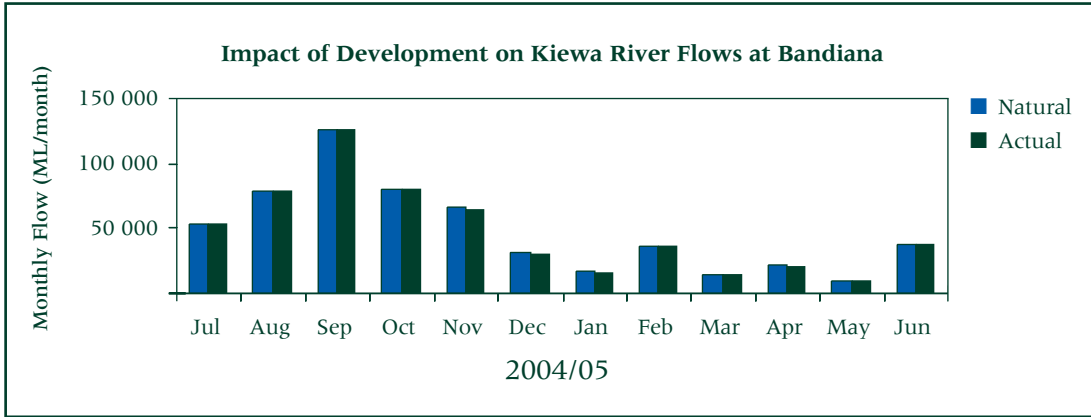
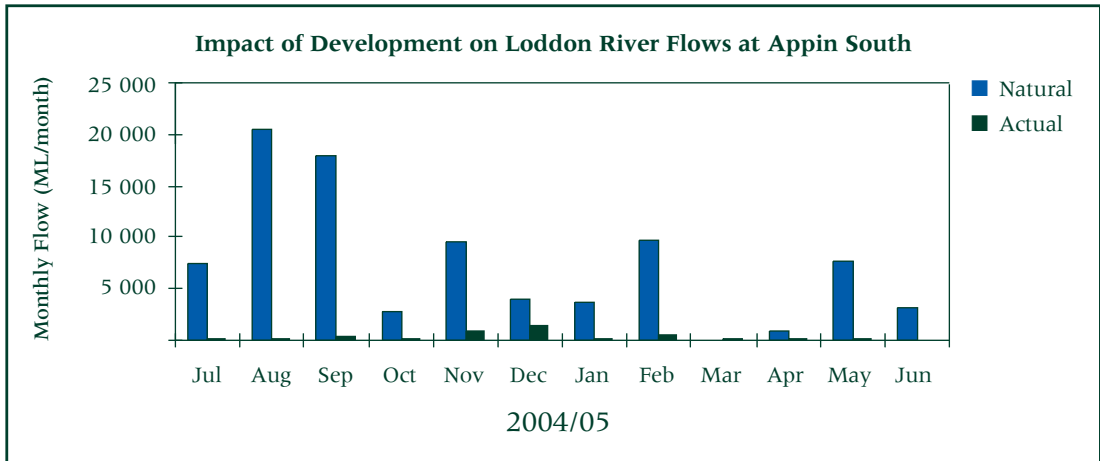
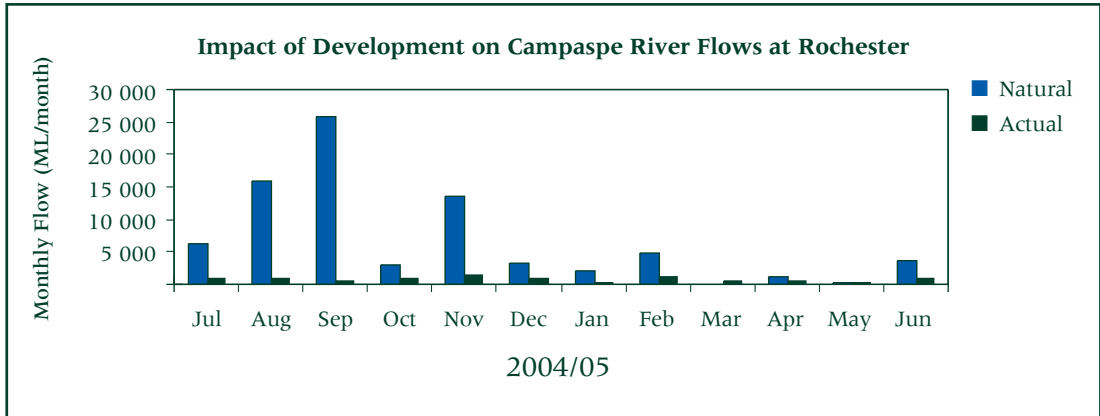


Figure 8. Plots of Flows at Selected Sites Showing 2004/05 Actual and Natural (Modelled) Flows in Victoria (continued)



12. Impoundments and Losses in Major On-Stream Storages

The diversion and impoundment of water into major on-stream storage infrastructure provides security and reliability of supply to water users, particularly during periods of adverse climatic conditions.

Typically in periods of high rainfall and high riverine flow conditions, moderate to average volumes of water are diverted for irrigation use, whilst relatively moderate to large volumes are diverted for impoundment into on-stream storages. In contrast, during periods of low rainfall and low riverine flow conditions, generally large volumes of water are required to satisfy irrigation demand. It is during these periods of low rainfall that the volumes

impounded in on-stream storages are used to supplement riverine flows.

The impoundments and losses in major on-stream storages (above 10 GL capacity) within the Basin are reported in **Table 13**. The volumes reported indicate that the total volume in storage in the Basin in 2004/05 has increased from 6720 GL to 7562 GL (30% full). Total evaporative losses for major storages within the Basin were calculated by the respective States and are reported at 549 GL, representing 2% of total storage capacity and 7% of total diversion from the Basin. The total decrease in flow of 1390 GL due to impoundment and evaporative losses was 18% of total Basin diversion.

Table 13. Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2004/05

Major On-Stream Storage	Completion Date	Storage Capacity (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	Percentage of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evaporation Losses (GL)	Net Reduction in Flow due to Storage (GL)	
Murray-Darling Basin Commission									
Lower Darling	Menindee Lakes ¹	1960	2050	332	330	16%	-2	170	168
Murray	Dartmouth Reservoir	1979	3906	1889	1748	45%	-141	2	-139
	Hume Reservoir	1936-61	3038	307	913	30%	606	51	657
	Lake Victoria	1928	677	256	345	51%	89	135	224
Total Murray-Darling Basin Commission			9671	2784	3336	34%	552	358	910
Snowy Mountains Scheme in Murray-Darling Basin									
Murrumbidgee	Jounama Pondage	1968	44	39	20	46%	-19	0	-19
River Valley	Talbingo Reservoir	1971	921	875	916	99%	41	6	47
	Tantangara Reservoir	1960	254	16	17	7%	1	1	2
	Tumut Pondage	1958	53	27	12	23%	-15	0	-15
Murray River Valley	Geehi Reservoir	1966	21	12	18	85%	6	0	6
	Tooma Reservoir	1961	28	4	4	14%	0	0	0
	Khancoban Pondage	1965	22	12	9	42%	-3	0	-3
Total Snowy Mountains Scheme			1342	985	996	74%	11	7	18
Borders Rivers Commission									
Border Rivers	Glenlyon Dam	1976	254	58	61	24%	4	4	8
Total Border Rivers Commission			254	58	61	24%	4	4	8
New South Wales									
Border Rivers	Pindari Reservoir	1962-96	312	207	203	65%	-4	6	1
Gwydir	Copeton Reservoir	1976	1364	340	324	24%	-15	6	-9
Namoi/Peel	Chaffey Reservoir	1979	62	30	27	43%	-3	2	-1
	Keepit Reservoir	1960	423	159	109	26%	-50	11	-40
	Split Rock Reservoir	1987	397	99	108	27%	10	6	15

Table 13. Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2004/05 (continued)

Major On-Stream Storage		Completion Date	Storage Capacity (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	Percentage of Storage Filled at End of Year (%)	Increase in Volume of Storage (GL)	Evaporation Losses (GL)	Net Reduction in Flow due to Storage (GL)
New South Wales (continued)									
<i>Macquarie/</i>	Burrendong Reservoir	1967	1678	147	182	11%	35	15	50
<i>Castlereagh/Bogan</i>	Windamere Reservoir	1984	368	164	128	35%	-37	4	-33
<i>Lachlan</i>	Carcoar Reservoir	1970	36	3	3	10%	1	0	1
	Lake Brewster	1952	153	0	0	0%	0	0	0
	Lake Cargelligo	1902	36	13	6	15%	-8	0	-8
	Wyangala Reservoir	1936-71	1220	108	86	7%	-22	8	-13
<i>Murrumbidgee</i>	Blowering Reservoir	1968	1631	88	286	18%	197	-1	196
	Burrinjuck Dam	1907-56	1028	403	249	24%	-155	-1	-156
	Tombullen Off-River Storage	1980	11	0	4	34%	4	n/a	4
	Hay Weir	1981	14	1	13	95%	12	n/a	12
Total New South Wales			8733	1762	1726	20%	-37	56	20
Victoria									
<i>Goulburn/Broken/Loddon</i>	Eildon Reservoir	1956	3390	677	940	28%	263	3	266
	Lake Mokoan	1971	365	82	87	24%	6	31	37
	Lake Nillahcootie	1967	40	28	34	85%	6	1	7
	Caim Curran Reservoir	1956	148	6	21	14%	15	4	19
	Tullaroop Reservoir	1959	74	8	13	18%	5	3	8
<i>Campaspe</i>	Lake Eppalock	1964	312	14	17	5%	3	4	7
	Lauriston Reservoir	1941	20	12	14	70%	2	0	2
	Malmsbury Reservoir	1870	18	2	4	23%	2	0	2
	Upper Coliban Reservoir	1903	37	2	6	17%	5	0	5
<i>Wimmera-Mallee</i>	Lake Bellfield	1966	79	13	12	16%	-1	2	0
	Lake Fyans	1916	18	5	4	24%	-1	3	2
	Lake Lonsdale	1903	65	0	0	0%	0	0	0
	Lake Taylor	1923	34	22	20	60%	-2	4	2
	Pine Lake	1928	62	0	0	0%	0	0	0
	Tooloondo Reservoir	1953	92	0	0	0%	0	0	0
	Wartook Reservoir	1887	29	21	19	66%	-1	8	7
<i>Murray/Kiewa/Ovens</i>	Rocky Valley Reservoir	1959	28	8	6	20%	-2	2	0
	Lake Buffalo	1965	24	15	14	60%	-1	0	-1
	Lake William Hovell	1973	14	11	14	100%	3	0	2
Total Victoria			4850	926	1227	25%	301	65	366
Queensland									
<i>Condamine/Balonne</i>	Beardmore Dam	1972	82	46	65	79%	19	25	44
	Chinchilla Weir	1974	10	5	5	48%	0	2	2
	Cooby Dam	1942	21	8	6	30%	-2	2	1
	Jack Taylor Weir	1953-59	10	9	9	89%	0	4	3
	Leslie Dam	1985	106	11	13	12%	2	4	6
<i>Macintyre Brook</i>	Coolmunda Dam	1968	75	31	25	33%	-6	17	11
Total Queensland			304	111	123	40%	12	55	67
Australian Capital Territory									
<i>Murrumbidgee</i>	Bendora Reservoir	1961	12	9	8	68%	-1	0	-1
	Corin Reservoir	1968	71	41	45	64%	4	0	5
	Googong Reservoir	1979	125	44	39	32%	-5	3	-2
Total Australian Capital Territory			207	94	92	45%	-2	3	1
Total Basin			25362	6720	7562	30%	842	549	1390

1. Menindee Lakes capacity revised based upon 2003 survey.

13. Groundwater Use in the Basin

13.1 Context

Based on the findings from the Review of the Operation of Cap, the Ministerial Council in August 2000, agreed to the following recommendations of the Commission related to groundwater:

- *Groundwater be managed on an integrated basis with surface water within the spirit of Cap (Recommendation 20); and*
- *A Murray-Darling Basin Groundwater Management Strategy be developed by the Groundwater Technical Reference Group (GTRG) that is based on jurisdictional management of groundwater through sustainable yields and include investigations clarifying how groundwater management practices may impact upon the integrity of Cap in future (Recommendation 21).*

The GTRG is currently undertaking many projects aimed at implementing the above recommendations. This section on groundwater is aimed at establishing an integrated reporting framework for surface and groundwater in line with Recommendation 20.

13.2 Groundwater Data for 2004/05

The GTRG supplied the estimated data for sustainable yield (SY), allocation and usage of groundwater in 2004/05 for each Groundwater Management Unit (GMU) in the Basin. The data was further supplemented and analysed using Geographical Information System (GIS) techniques to assign the groundwater data to the

designated Cap valleys. Some errors are inevitable in the groundwater data because of the absence of precise information to apportion the aquifers to Cap valleys. However, the analysis presented in **Table 14** is valuable in itself, as it gives a snapshot of the Basin-wide status of groundwater.

The estimated sustainable yields in Groundwater Management Units (GMU) of the Basin are reported to be 1534 GL (note Victorian SY values are not available). Out of this, 2950 GL was already allocated in 2004/05, which constituted 192% of SY. The total usage of groundwater in the Basin was 1490 GL, which was 51% of allocation and 97% of SY. The groundwater usage was 19% of surface water diversion in the Basin. This reinforces the fact that groundwater is an important resource in which there is a considerable scope for future development within the current allocation. A recent report by Sinclair Knight Merz (2003) has estimated that there is strong linkage between groundwater use and surface water flows, with an average reduction in surface water flow of 600 ML for every 1000 ML of groundwater use. This highlights the importance of management of groundwater to the Cap on diversions.

13.3 Groundwater Use since 1999/00

Figure 9 shows the use of groundwater in the Basin since 1999/00, when groundwater reporting started. It is evident from this figure that groundwater use has been steadily rising.

Figure 9. Groundwater use in the Basin since 1999/00

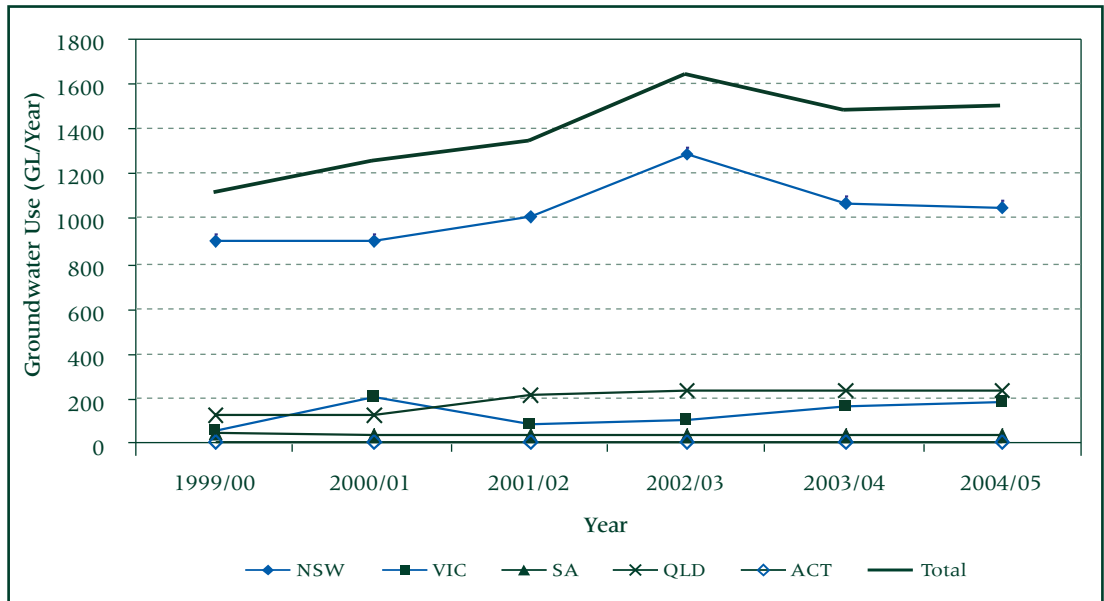


Table 14. Basin-wide groundwater data for 2004/05 aligned along the designated Cap valleys

<i>Designated River Valley System</i>	<i>Estimated Sustainable Yield (GL/yr)</i>	<i>2004/05 Allocation (GL)</i>	<i>2004/05 Use (GL)</i>	<i>Surface Water Use (GL)¹</i>
New South Wales				
Intersecting Streams	n/a	n/a	n/a	3
Border Rivers	17	14	14	125
Moonie	25	7	35	n/a
Gwydir	71	134	75	165
Namoi/Peel	224	512	183	190
Macquarie/Castlereagh/Bogan	156	242	100	102
Barwon-Darling	9	3	12	157
Lower Darling	n/a	n/a	n/a	29
Lachlan	315	534	261	36
Murrumbidgee	311	506	276	1618
Murray	101	289	91	1241
Total NSW	1229	2241	1047	3666
Victoria				
Goulburn/Broken/Loddon	n/a	277	115	1553
Campaspe	n/a	46	26	40
Wimmera-Mallee	n/a	19	9	53
Kiewa/Ovens/Murray	n/a	58	31	1491
Total Victoria	n/a	400	181	3137
South Australia				
South Australian Murray Basin ²	53	52	31	624
Total South Australia Murray	53	52	31	624
Queensland				
Condamine/Balonne	220	232	218	167
Border Rivers	19	21	10	177
Macintyre Brook	n/a	1	1	15
Moonie	1	0	0	23
Warrego	5	2	1	11
Paroo	n/a	0	0	0
Total Queensland	245	256	230	392
Australian Capital Territory	7	1	1	27
Total Basin	n/a	2950	1490	7846

1. Refer **Table 2**.
2. It is not sensible to divide SA Groundwater use into designated valleys.
3. Sustainable yield figures for Queensland are conservative as they do not include all the groundwater systems within the Cap valley (not all groundwater systems are within a recognised GMU boundary).

14. Conclusion

The information and data contained within this report provides a comprehensive review of consumptive water use and management for the 2004/05 water year for the Murray-Darling Basin, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

Total surface water use in the Murray-Darling Basin in 2004/05 was 7846 GL and groundwater use was 1490 GL.

Information on groundwater usage has been presented for the sixth time in this report.

Resource availability was tightened in most valleys throughout the Basin with the implementation of water management policies in each of the States, in conjunction with the Cap.

The use of allocated water in the 2004/05 water year represents an utilisation of 72% of the water allocated throughout the Basin. This was fourth highest utilisation since 1997/98.

The accuracy of diversion measurements remained static at $\pm 7\%$ in the 2004/05 water year in comparison to previous years.

It is expected that the accuracy of measurement will improve over time as volumetric licences and allowances are implemented in New South Wales, Queensland and the ACT, in conjunction with the installation of metering in the Lower Murray Swamps, South Australia.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2004/05.

It is envisaged that with the completion of Cap models for New South Wales (IQQM models) and Queensland WRP processes, the calculation and reporting of natural flows throughout the Basin will be more complete in future reports.

The total volume of water in major storages within the Basin in 2004/05 increased from 6720 GL to 7562 GL (30% full). Total evaporative losses for major storages within the Basin were 549 GL, representing 2% of total storage capacity and 7% of total Basin diversion.

The Cap was exceeded in NSW Barwon-Darling/Lower Darling combined Cap valley. However there was large Basin-wide Cap credit.

The estimate of sustainable yield of aquifers in GMU in 2004/05 was not completely available. The allocation of groundwater in the Basin was 2950 GL and usage was 1490 GL.

No environmental releases were diverted to the Barmah-Millewa Forest in 2004/05.

The monitoring of water use relative to Cap compliance within the Murray-Darling Basin is a large, complex and difficult task, which has required substantial resources, cooperation and management from all the Governments involved in the *Murray-Darling Basin Initiative*.

It is evident from the progress to date of Cap implementation and the development towards more sustainable water use practices throughout the Murray-Darling Basin, that the continuation of a pro-active water management role by all Governments within the Murray-Darling Basin Initiative is required. This is to ensure a balance is maintained between the significant economic and social benefits that are derived from the development of the Basin's water resources on the one hand, and the environmental uses of water in the rivers on the other.

Glossary

<i>announced allocation</i>	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
<i>annual allocation</i>	The annual volume of water available for diversion from a regulated stream by an entitlement holder.
<i>authorised use</i>	Total of the water allocated in the valley plus off-allocation and water-harvesting use plus unregulated stream use not in allocation and system losses not in allocation.
<i>Border rivers</i>	The rivers and tributaries forming, or intersecting the border between NSW and Queensland.
<i>bulk entitlement</i>	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the Water Act 1989.
<i>carryover</i>	An unused entitlement from one season that can be used in the next year.
<i>channel capacity</i>	The maximum rate at which water can be delivered through a river reach or an artificial channel.
<i>COAG</i>	Council of Australian Governments.
<i>diversion</i>	The movement of water from a river system by means of pumping or gravity channels.
<i>diversion licence</i>	Specified licences issued for a specified annual volume and diversion rate.
<i>DNR</i>	The Department of Natural Resources (of NSW).
<i>DNRM</i>	The Department of Natural Resources and Mines (of Queensland).
<i>DSE</i>	The Department of Sustainability and Environment (of Victoria).
<i>dozer allocation</i>	An allocation that is not fully utilised.
<i>DWLBC</i>	The Department for Water, Land and Bio-diversity Conservation (of South Australia).
<i>EC (unit)</i>	Electrical conductivity unit 1 EC = 1 micro-Siemen per centimetre measurement at 25° Celsius. Commonly used to indicate the salinity of water.
<i>end-of-valley flows</i>	The flow regime at the end of a valley.
<i>floodplain harvesting</i>	The diversion of water from a floodplain into storage(s).
<i>FMIT</i>	First Mildura Irrigation Trust.
<i>Giga litre (GL)</i>	One thousand million or 109 litres.
<i>GL</i>	Gigalitre: one thousand million or 109 litres.
<i>G-MW</i>	Goulburn-Murray Water (of Victoria).
<i>gravity districts</i>	Districts which use gravity to divert the flow of water from the river.
<i>high security entitlement</i>	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
<i>IAG</i>	Independent Audit Group.

<i>LV</i>	Licensed Volume.
<i>impoundment</i>	The storage of water diverted from a water course.
<i>irrigation</i>	Supplying land or crops with water by means of streams, channels or pipes.
<i>MDBC</i>	Murray-Darling Basin Commission.
<i>MDBMC</i>	Murray-Darling Basin Ministerial Council.
<i>Mega litre (ML)</i>	One million or 10 ⁶ litres.
<i>ML (ML)</i>	One Mega (million) litres. One ML is approximately the volume of an Olympic swimming pool.
<i>Ministerial Council, the</i>	Murray-Darling Basin Ministerial Council.
<i>Murray-Darling Basin Agreement</i>	The Agreement between the Governments of the four Basin States and the Commonwealth. The current Agreement is the 1992 Agreement.
<i>off-allocation</i>	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.
<i>on-farm storage</i>	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
<i>overdraw</i>	Water diverted in one season against a prospective allocation in the subsequent year.
<i>overland flow</i>	Water that runs off the land following rainfall, before it enters a watercourse, and floodwater that erupts from a watercourse or lake onto a floodplain.
<i>permanent transfer</i>	The transfer of water entitlements on a permanent basis. The right to permanent transfers allows irrigators to make long-term adjustments to their enterprise and enables new operators to enter the industry.
<i>private diverters</i>	Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.
<i>property right</i>	In this context, the right to ownership of allocated volumes of water.
<i>RAMSAR wetland</i>	A wetland listed on the register of internationally significant wetlands established by the Convention at Ramsar.
<i>regulated streams/ waterways</i>	Streams where users are supplied by releases from a storage. A water licence for a regulated stream specifies a base water entitlement defining the licence holder's share of the resources from a stream.
<i>riparian</i>	Of, inhabiting or situated on the bank and floodplain of a river.
<i>RIT</i>	Renmark Irrigation Trust.
<i>ROP</i>	Resource Operation Plan.

<i>sales water</i>	In Victoria, water that may be purchased by an irrigator in addition to the basic water right. Access to sales water is announced each season as a percentage of water right, depending on the available resource.
<i>salinity</i>	The concentration of dissolved salts in groundwater or river water usually expressed in EC units.
<i>sleepers allocation</i>	An allocation that does not have a history of water usage.
<i>temporary transfer</i>	Water entitlements transferred on an annual basis.
<i>unregulated streams</i>	Streams that are not controlled or regulated by releases from major storages.
<i>utilisation</i>	The amount of water available for diversion that is actually diverted.
<i>water entitlement</i>	The legal right of a user to access a specified amount of water in a given period.
<i>water-harvesting</i>	The diversion of water from an unregulated stream in Queensland in which the access to water is defined only by a diversion rate and a starting flow in the stream.
WRP	Water Resources Planning. It is a process currently underway in Queensland to enable the acceptable level of allocatable water to be determined for a river system. This methodology will determine what part of the flow regime should be preserved for environmental flows, and what part can be made available for consumptive use.
WMRWG	Water Market Reform Working Group.
WR	Water Right.
WUE	Water Use Efficiency.

Appendix A: Cap Register – Annual Cap Adjustments for Trade (ML)

<i>System</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>
New South Wales								
Intersecting Streams	0	0	0	0	0	0	0	0
Border Rivers	0	-1593	-3505	-8474	-8695	-13499	-3403	-6368
Gwydir	0	0	0	0	0	0	0	0
Namoi/Peel	0	0	0	0	0	0	0	0
Macquarie/Castlereagh/ Bogan	0	0	0	0	0	0	0	0
Barwon-Darling/ Lower Darling	5393	13017	8986	21934	7816	0	0	-1139
Lachlan	0	0	0	0	0	0	0	0
Murrumbidgee	-33444	-38022	-113650	-21416	31487	-14489	-34708	8026
Murray	30207	6782	105811	-12898	-33387	30768	34678	-1130
Total New South Wales	2156	-19816	-2358	-20854	-2779	2780	-3433	-611
Victoria								
Goulburn/Broken/ Loddon Cap valley	-2957	3456	-6531	-2101	-1036	-8243	-63323	-87232
Campaspe	0	0	0	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0	750	700	-350
Murray/Kiewa/ Ovens Cap valley	17572	11736	-572	-303	-8553	-13492	38626	65216
Total Victoria	14615	15192	-7103	-2404	-9589	-20985	-23997	-22367
South Australia								
Metro-Adelaide & Associated Country Areas	0	0	0	0	12000	11000	9900	8800
Lower Murray Swamps	-2596	-3136	-4213	-4577	-4300	-5000	-22627	-43458
Country Towns	0	0	0	0	-12000	-11000	-9900	-5000
All Other Purposes	-14175	6717	11436	19802	10041	9696	41747	55966
Total South Australia	-16771	3581	7223	15225	5741	4696	19120	16308
Queensland¹								
Condamine/Balonne	0	0	0	0	0	0	0	0
Border Rivers/ Macintyre Brook	0	1593	3505	8474	8695	13499	3495	6368
Moonie	0	0	0	0	0	0	0	0
Warrego	0	0	0	0	0	0	0	0
Paroo	0	0	0	0	0	0	0	0
Total Queensland¹	0	1593	3505	8474	8695	13499	3495	6368
Australian Capital Territory¹	0	0	0	0	0	0	0	0
Total Basin	0	550	1267	441	2069	-9	-4816	-302

1. No Cap has yet been set for Queensland and the ACT.

Appendix B: Cap Register – Trade-Adjusted Annual Cap Targets (GL)

System	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
New South Wales								
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	166	181	146	n/a	n/a	n/a	n/a	n/a
Gwydir	625	274	500	316	445	408	127	271
Namoi/Peel	328	313	340	334	329	269	201	250
Macquarie/Castlereagh/ Bogan	379	585	424	571	580	206	290	287
Barwon-Darling/ Lower Darling	265	475	290	446	186	113	203	116
Lachlan	424	324	270	397	448	243	91	60
Murrumbidgee	2491	2493	2019	2731	2583	2102	1965	1479
Murray	1886	1965	1987	2085	1704	553	1568	1624
Total New South Wales	6564	6610	5977	6879	6275	3895	4444	4088
Victoria								
Goulburn/Broken/ Loddon Cap valley	1983	1653	1591	1677	1586	1001	1618	1651
Campaspe	133	81	77	102	106	85	80	80
Wimmera-Mallee	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/ Ovens Cap valley	1928	1847	1517	1793	1982	2054	1522	1649
Total Victoria	4043	3582	3185	3573	3674	3139	3221	3379
South Australia								
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	100	99	98	98	99	98	80	60
Country Towns	50	50	50	50	38	39	40	45
All Other Purposes	416	450	444	465	448	479	509	468
Total South Australia²	566	599	592	613	585	616	629	574
Queensland¹								
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/ Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	11174	10792	9754	11065	10534	7650	8294	8041

1. See Appendix E.

2. Excludes Metro Adelaide.

Appendix C: Cap Register – Annual Diversions (GL)

<i>System</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>
New South Wales								
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3
Border Rivers	202	182	197	247	198	137	119	125
Gwydir	532	306	448	424	462	238	170	165
Namoi/Peel	301	317	343	353	359	294	173	190
Macquarie/Castlereagh/ Bogan	442	396	437	522	597	411	219	102
Barwon-Darling/ Lower Darling	266	428	260	487	202	127	293	186
Lachlan	429	293	301	423	457	253	59	36
Murrumbidgee	2585	2505	1875	2747	2348	1793	1776	1618
Murray	1886	2000	1234	2070	2113	879	1311	1241
Total New South Wales	6644	6427	5095	7274	6737	4132	4120	3666
Victoria								
Goulburn/Broken/ Loddon Cap valley	1909	1699	1553	1569	1700	1076	1596	1553
Campaspe	96	76	73	113	124	74	73	40
Wimmera-Mallee Murray/Kiewa/ Ovens Cap valley	1743	1804	1555	1712	1916	1744	1472	1491
Total Victoria	3932	3731	3299	3491	3834	2957	3210	3137
South Australia								
Metro-Adelaide & Associated Country Areas	153	153	139	104	82	165	82	72
Lower Murray Swamps	100	99	98	99	99	98	80	60
Country Towns	35	36	37	38	36	39	35	39
All Other Purposes	375	400	368	421	403	434	413	453
Total South Australia²	663	689	642	661	620	736	611	623
Queensland¹								
Condamine/Balonne Border Rivers/ Macintyre Brook	186	123	163	288	170	78	204	192
Moonie	8	8	8	31	6	6	26	23
Warrego	2	10	3	9	10	7	11	11
Paroo	0	0	0	0	0	0	0	0
Total Queensland	741	609	541	688	348	214	815	392
Australian Capital Territory	44	23	27	34	36	40	28	27
Total Basin	12024	11479	9603	12148	11575	8080	8784	7846

Appendix D: Cap Register – Annual Cap Credits (GL)

System	Long Term Cap	Schedule F Trigger	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
New South Wales										
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	-36	-1	-51	n/a	n/a	n/a	n/a	n/a
Gwydir	344	-69	93	-32	53	-108	-17	170	-42	106
Namoi/Peel	338	-68	27	-4	-3	-19	-30	-24	27	60
Macquarie/ Castlereagh/Bogan	468	-94	-63	189	-14	49	-17	-205	71	185
Barwon-Darling/ Lower Darling	310	-62	-1	47	30	-41	-16	-13	-90	-70
Lachlan	334	-67	-5	31	-30	-27	-9	-10	32	24
Murrumbidgee	2358	-472	-95	-12	144	-16	235	309	189	-139
Murray	1926	-385	0	-35	753	15	-409	-326	256	383
Total New South Wales	6281	-1256	-79	183	882	-147	-263	-100	444	550
Victoria										
Goulburn/Broken/ Loddon Cap valley	2034	-407	74	-45	38	109	-115	-75	23	98
Campaspe	122	-24	37	5	4	-10	-18	10	8	40
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/ Ovens Cap valley	1656	-331	185	44	-39	81	66	309	50	158
Total Victoria	3974	-795	296	4	2	180	-67	245	80	295
South Australia										
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	104	-21	0	0	0	0	0	0	0	0
Country Towns	50	-10	15	14	13	12	3	0	5	6
All Other Purposes	441	-88	41	50	76	43	45	44	95	15
Total South Australia	594	-119	56	64	89	56	47	44	100	22
Queensland										
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/ Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory										
Total Basin	10849	-2170	272	251	973	88	-282	189	624	866

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.

Appendix E: Cap Register – Cumulative Cap Credits (GL)

<i>System</i>	<i>Long Term Cap</i>	<i>Schedule F Trigger</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>	<i>2002/03</i>	<i>2003/04</i>	<i>2004/05</i>
New South Wales										
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	-36	-38	-89	n/a	n/a	n/a	n/a	n/a
Gwydir	344	-69	93	62	114	6	-10	160	118	224
Namoi/Peel	338	-68	27	23	20	1	-29	-53	-26	34
Macquarie/ Castlereagh/Bogan	468	-94	-63	126	112	162	145	-61	10	195
Barwon-Darling/ Lower Darling	310	-62	-1	46	76	35	19	5	-85	-154
Lachlan	334	-67	-5	26	-5	-31	-41	-50	-18	6
Murrumbidgee	2358	-472	-95	-107	37	21	256	565	753	615
Murray	1926	-385	0	-35	719	734	325	-1	255	638
Total New South Wales	6281	-1256	-79	104	986	927	664	565	1008	1558
Victoria										
Goulburn/Broken/ Loddon Cap valley	2034	-407	74	29	66	175	60	-15	8	106
Campaspe	122	-24	37	43	46	36	18	28	36	76
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/ Ovens Cap valley	1656	-331	185	229	190	271	337	647	697	854
Total Victoria	3974	-795	296	300	302	482	415	660	741	1036
South Australia										
Metro-Adelaide & Associated Country Areas ¹	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	104	-21	0	0	0	0	0	0	0	0
Country Towns	50	-10	15	28	42	54	56	56	61	67
All Other Purposes	441	-88	41	91	167	210	255	299	395	410
Total South Australia	594	-119	56	119	209	264	312	356	456	477
Queensland										
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/ Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Australian Capital Territory										
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Basin	10849	-2170	272	523	1497	1673	1391	1581	2205	3071

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.

Appendix F: Cap Register for Metropolitan Adelaide

<i>Designated River Valley and Cap</i>	1997/98		1998/99		1999/00		2000/01		2001/02		2002/03		2003/04		2004/05	
	Annual Diversion	Diversion – 5 Years to 1997/98	Annual Diversion	Diversion – 5 Years to 1998/99	Annual Diversion	Diversion – 5 Years to 1999/00	Annual Diversion	Diversion – 5 Years to 2000/01	Annual Diversion	Diversion – 5 Years to 2001/02	Annual Diversion	Diversion – 5 Years to 2002/03	Annual Diversion	Diversion – 5 Years to 2003/04	Annual Diversion	Diversion – 5 Years to 2004/05
South Australia Metro-Adelaide & Associated Country Areas ¹ (rolling 5-year Cap is 650 GL)	153	522	153	566	139	576	104	541	82	631	165	642	82	572	72	504

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate credit. Temporary trades of 12 GL in 2001/02, 11 GL during 2002/03, 9.4 GL in 2003/04 and 8.8 GL in 2004/05 were allowed as an interim measure to maintain diversions within Cap increasing the 5-year rolling Cap to 691 GL.

Appendix G: Barmah-Millewa Forest Environmental Account

The Murray-Darling Basin Ministerial Council Meeting 12 - 25 June 1993 approved in principle the annual allocation of 100 GL of River Murray water (50 GL provided by NSW and Victoria respectively) to be used to meet the water needs of the Barmah Millewa-Forest ecosystem.

Rules for operating Barmah-Millewa Forest environmental account were agreed by the Ministerial Council in March 2001. These rules allow for borrowing, payback and additional allocation to this account by the States of NSW and Victoria. The account for the 2004/05 is shown in the following table.

<i>State</i>	<i>Opening Account Balance¹ (GL)</i>	<i>Opening Borrow by Water Users (GL)</i>	<i>New Allocation this year² (GL)</i>	<i>Account Spills³ (GL)</i>	<i>Usage of Allocation this Year (GL)</i>	<i>Closing Borrow by Water Users (GL)</i>	<i>Closing Account Balance⁴ (GL)</i>	<i>Additional Release this Year⁵ (GL)</i>	<i>Total Release this Year (GL)</i>
NSW	0	175	50	0	0	225	0	0	0
Victoria	125	0	50	0	0	0	175	0	0
TOTAL	125	175	100	0	0	225	175	0	0

- As at 1 July this volume has been reduced by the amount of water previously borrowed by water users and not yet paid back.
- Comprises 50 GL high security plus 25 GL low security when Victorian irrigation allocations reaching 100% water right plus 30% sales.
- When Hume physically spills the first water spilt is the B-M kitty, though up to 200 GL, if the kitty contains that much, will be retained.
- Each State is permitted to overdraw their B-M account by 50 GL, subject to "sufficient water" being in storage, borrowed water can't spill.
- From other allocations e.g. NSW Murray Environmental Allocation and Victorian Murray Wetlands Environmental Allocation.

Lined area for handwritten notes or data.

