Australian Government

MURRAY–DARLING BASIN AUTHORITY

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Water Audit Monitoring Report 2008–09

Report of the Murray-Darling Basin Authority on the Cap on Diversions

April 2010

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Acknowledgments

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FOREWORD

April 2010

Senator the Hon Penny Wong
Chairperson,
Murray-Darling Basin Ministerial Council
MF26, First Floor
Ministerial Wing
Parliament House
Canberra, Australian Capital Territory 2600

Dear Minister

I have great pleasure in submitting to you the *Water Audit Monitoring Report 2008–09*. The Murray Darling Basin Ministerial Council established the Cap on Diversion of Surface Water in 1995 and set the operating framework in 1996. The council formalised the operating rules for the Cap in the form of Schedule E (Former Schedule F) to the *Murray-Darling Basin Agreement* in 2000. The *Water Audit Monitoring Report 2008–09* is the thirteenth in a series of the reports on the Cap on Diversion and has been produced as a requirement of Schedule E to the *Murray-Darling Basin Agreement*.

The *Water Audit Monitoring Report 2008–09* complements the Independent Audit Group Report 2008–09. 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 E requires the authority 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 and environmental use and 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 2008–09.

The authority appreciates the co-operation received from the States and Territory Government officers in compiling this report.

Yours sincerely

Rob Freeman
Chief Executive

CONTENTS

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 2008–09 5

3. THE YEAR IN REVIEW 6

3.1 Water Diversions 6

3.2 Accuracy of Measurement 9

3.3 Climatic Overview 2008–09 11

3.3.1 Rainfall 11

3.3.2 Temperature 11

3.4 Definition of Cap 15

3.5 Comparison of 2008–09 Water Use with the Cap 16

3.5.1 New South Wales 16

3.5.2 Victoria 17

3.5.3 South Australia 17

3.5.4 Queensland 17

3.5.5 Australian Capital Territory 17

3.5.6 Basin comparison of actual Diversions with the annual Cap Targets 17

3.6 Measurement of Land-surface (Floodplain Harvesting) Diversions 18

4. REVIEW OF 2008–09 WATER USE IN NEW SOUTH WALES 21

4.1 Water Management Overview 21

4.2 Water Use Overview 21

4.3 Environmental Water Recovery 22

4.4 Border Rivers 22

4.5 Gwydir 23

4.6 Namoi/Peel 23

4.7 Macquarie/Castlereagh/Bogan 24

4.8 Barwon-Upper Darling 24

4.9 Lachlan 25

4.10 Murrumbidgee 25

4.11 Lower Darling 26

4.12 Murray 27

5. REVIEW OF 2008–09 WATER USE IN VICTORIA 28

5.1 Overview 28

5.1.1 Water Use Capping Measures 28

5.1.2 Volumes Diverted 28

5.1.3 Off-Quota 28

5.1.4 Final Deliveries and Historical comparison 28

5.1.5 Trading 29

5.1.6 Environmental Flows 29

5.2 Goulburn 30

5.3 Broken 30

5.4 Loddon 31

5.5 Campaspe 31

5.6 Wimmera-Mallee 32

5.7 Kiewa 32

5.8 Ovens 32

5.9 Murray (including Mitta Mitta) 32

6. REVIEW OF 2008–09 WATER USE IN SOUTH AUSTRALIA 33

6.1 Overview 33

6.1.1 Impact of low flows to South Australia 33

6.2 River Murray Water Management 2008–09 34

6.3 Irrigator reactions to the 2008–09 irrigation season 35

6.4 River Murray Water Use 35

6.5 Metropolitan Adelaide and Associated Country Areas 35

6.6 Country Towns 36

6.7 Lower Murray Swamps 36

6.8 All Other Purposes of water from the River Murray 36

6.9 Water Trade 37

6.10 Environmental water use 37

7. REVIEW OF 2008–09 WATER USE IN QUEENSLAND 39

7.1 Water Planning and Management Overview 39

7.1.1 Moonie, Warrego, and Paroo Rivers and Nebine Creek 39

7.1.2 Border Rivers 39

7.1.3 Condamine and Balonne 40

7.1.4 Metering 40

7.1.5 Water Use Efficiency (WUE) 40

7.2 Stream Flow and Water Use Overview 41

7.3 Warrego 43

7.4 Paroo 44

7.5 Nebine 44

7.6 Moonie 44

7.7 Queensland Border Rivers 45

7.8 Condamine-Balonne ... 46
7.8.1 Condamine ... 46
7.8.2 Balonne ... 47

8. REVIEW OF 2008–09 WATER USE IN THE AUSTRALIAN CAPITAL TERRITORY ... 48
8.1 Review of Water Use in the Australian Capital Territory ... 48
8.2 Progress of Water Reforms in the Australian Capital Territory ... 48

9. WATER TRADING IN THE MURRAY-DARLING BASIN ... 49
9.1 History of Water Trading ... 49

10. WATER AVAILABILITY FOR THE YEAR 2008–09 ... 51
10.1 Water Availability ... 51
10.1.1 Volumetric Allocations ... 51
10.1.2 Continuous Accounting ... 51
10.1.3 Allocation transferred into Valley ... 51
10.1.4 Carryover from the previous year ... 51
10.2 Allocated Water ... 52
10.3 Access to water Not in the Allocation System ... 52
10.3.1 Supplementary Access (off-allocation) and Water-Harvesting ... 52
10.3.2 Area licences on Unregulated Streams ... 52
10.3.3 Irrigation System Losses ... 52
10.4 Comparison of use of Allocated Water with the Allocated Volume ... 52

11. ENVIRONMENTAL WATER AND CAP ADJUSTMENTS ... 59

12. COMPARISON OF ACTUAL FLOWS WITH NATURAL FLOWS ... 64

13. IMPOUNDMENTS AND LOSSES IN MAJOR ON-STREAM STORAGES ... 72

14. GROUNDWATER USE IN THE BASIN ... 76
14.1 Context ... 76
14.2 Groundwater data for 2008–09 ... 76
14.3 Groundwater Use since 1999-2000 ... 76

CONCLUSION ... 79

GLOSSARY ... 80

APPENDICES

APPENDIX A: Cap Register – Annual Cap Adjustments for Trade (GL) ... 83
APPENDIX B: Cap Register – Annual Cap Targets (GL) and Environmental Allocations ... 85
APPENDIX C: Cap Register – Annual Diversions (GL) ... 87
APPENDIX D: Cap Register – Annual Cap Credits (GL) ... 89
APPENDIX E: Cap Register – Cumulative Cap Credits (GL) ... 91
APPENDIX F: Cap Register for Metropolitan Adelaide ... 93
APPENDIX G: Cap Register – Annual Cap Adjustments (GL) for Environmental Use ... 94

Tables and Figures

Tables

Table 1: 2008–09 Cap Compliance by State 2
Table 2: Murray-Darling Basin Diversions in 2008–09 7
Table 3: Accuracy of Diversion Estimates in 2008–09 10
Table 4: Comparison of Diversions with Cap Levels in 2008–09 19
Table 5: Comparison of Diversions with Cap Levels in 2008–09 for Metro-Adelaide and Associated Country Areas, South Australia 20
Table 6: Water Diversions in Queensland since 1993–94 47
Table 7: Net water Entitlement Transfers in 2008–09 50
Table 8: Water Allocated in 2008–09 55
Table 9: Carryovers for 2008–09 56
Table 10: Use of Allocated water in 2008–09 57
Table 11: Use of Valley Allocations in 2008–09 58
Table 12: Environmental Water Entitlements in 2008–09 60
Table 13: Environmental Water Allocations in 2008–09 61
Table 14: Environmental Water Use in 2008–09 62
Table 15: Cap Adjustment for Environmental Water Use in 2008–09 63
Table 16: Comparison of 2008–09 Actual and Natural Annual Flows for Key sites within the Murray-Darling Basin 65
Table 17: Impoundments and Losses in Major On-stream Storages (greater than 10 GL capacity) in 2008–09 73
Table 18: Basin-wide Groundwater Data for 2008–09 aligned along the designated Cap valleys 77

Figures

Figure 1: Murray-Darling Basin Diversions – 1983–84 to 2008–09 8
Figure 2: Murray-Darling Basin Diversions – 1983–84 to 2008–09 (usage under 1200 GL/yr) 8
Figure 3: Rainfall Deciles for the Murray-Darling Basin for the July 2008 to June 2009 period 13
Figure 4: Rainfall Deciles for the Murray-Darling Basin for the November 2008 to April 2009 period 13
Figure 5: Temperature anomaly for the 12-month period – July 2008 to June 2009 14
Figure 6: Temperature anomaly for the three-month period – December 2008 to February 2009 14
Figure 7: Utilisation of Allocated water as percentage of the allocated volume since 1997–98 54
Figure 8: Plots of flows at selected sites showing 2008–09 Actual and Natural (modelled) flows in Victoria 66
Figure 9: Plots of flows at selected sites showing 2008–09 Actual and Natural (modelled) flows in Murray River 69
Figure 10: Groundwater Use in the Basin since 1999–2000 78

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. This Cap on diversions of surface water (hereafter referred to as the Cap), is annually assessed to ensure that its development, management and the operation is an open and transparent process. The Ministerial Council agreed that a Water Audit Monitoring Report should be published with these results. Subsequently the Cap arrangements were formalised in the form of Schedule E (Former Schedule F[1]) to the *Murray-Darling Basin Agreement* in 2000 and this report has been produced as a requirement of that Schedule.

The water year for the Cap accounting in the Murray-Darling 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 its major activities occurring in 2008–09 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**); environmental water (**Section 11**); a comparison of actual and natural flows at key sites within the Basin (**Section 12**); and impoundments and losses in major on-stream storages (above 10 GL capacity) (**Section 13**).

Section 14 provides information on the use of groundwater in the Basin.

The Diversion Cap Register, which is, maintained in accordance with the requirements of Schedule E, is reported in **Appendix A–G**.

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.

1 In 2008, the amended *Murray-Darling Basin Agreement* was appended to the Commonwealth Water Act 2007. As part of the amendment, Schedule F was renamed as Schedule E.

Table 1: 2008–09 Cap Compliance by State

State/territory	2008–09 Cap compliance
New South Wales	
Intersecting streams	A Cap is yet to be defined. The valley is unregulated. The 2008–09 diversion was estimated to be 3 GL.
Border Rivers	An (interim) Integrated Quantity Quality Model (IQQM) yet to be audited and approved by the authority is available. The Independent Audit Group (IAG) could not audit the New South Wales Border Rivers Cap, as a Cap is yet to be defined. The IAG in its Cap Audit Report 2008–09 noted that New South Wales was expected to submit a Cap proposal during 2009–10. The 2008–09 diversion was 137 GL.
Gwydir	An IQQM Cap model audited and approved by the authority is available to determine the Cap compliance. The 2008–09 diversion of 154 GL was less than the annual Cap target of 196 GL. The valley has a cumulative Cap credit of 158 GL since 1997–98.
Namoi-Peel	An IQQM model audited and approved by the authority is available to determine the Cap compliance for the Namoi-Peel valley. The 2008–09 diversion of 188 GL was below the annual Cap target of 245 GL. The valley has a cumulative Cap credit of 153 GL since 1997–98.
Macquarie/Castlereagh/ Bogan	An IQQM (Interim) model yet to be audited is available to determine Cap compliance. The 2008–09 diversion of 106 GL was below the annual Cap target of 145 GL. The valley has a cumulative Cap credit of 335 GL since 1997–98.
Barwon-Darling/ Lower Darling	A 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 Murray Simulation Model (MSM) (Interim) for the Lower Darling, both of which are yet to be audited and approved by the authority, are available to determine the Cap compliance. The combined Barwon-Darling/Lower Darling valley diversion of 159 GL was above its annual Cap target of 156 GL. The combined valley's cumulative Cap debit of 186 GL at the end of 2008–09 exceeded the trigger of 62 GL for special audit. The combined Cap valley was declared in breach of the Cap in 2007–08. The authority vide its decision no. D10/5179–25 February 2010 declared that the combined Barwon-Darling/ Lower Darling valley continued to be in breach during 2008–09.
Lachlan	An IQQM model audited and approved by the authority is available to determine Cap compliance. The 2008–09 diversion of 40 GL was below the annual Cap target of 59 GL. The Lachlan valley has a cumulative Cap credit of 127 GL since 1997–98.
Murrumbidgee	An IQQM (Interim) model yet to be audited and approved by the authority is available to determine the Cap compliance. The 2008–09 diversion of 602 GL for the Murrumbidgee valley was below its Cap target of 642 GL. The valley has a cumulative Cap credit of 1,419 GL since 1997–98.
Murray	The MSM approved by the authority is available to determine Cap compliance. The 2008–09 diversion of 341 GL for the Murray valley was below its annual Cap of 354 GL. The valley has a cumulative Cap credit of 146 GL since 1997–98.
Victoria	
Goulburn/Broken/Loddon	An approved Cap model known as Goulburn Simulation Model (GSM REALM) is available to determine Cap compliance. The 2008–09 diversion of 628 GL for the Goulburn/Broken/Loddon system was below its Cap target of 664 GL. The valley has a cumulative Cap credit of 214 GL since 1997–98.
Campaspe	An approved Cap model, the GSM REALM, is available to determine the Cap compliance. The diversion of 26 GL for the Campaspe in 2008–09 was below its Cap target of 46 GL. The valley has a cumulative credit of 125 GL since 1997–98.
Wimmera-Mallee	A Cap Model (interim) yet to be audited and approved by the authority is available to determine Cap compliance. The diversion of 11 GL in 2008–09 was below its Cap target of 23 GL and the valley has a cumulative Cap credit of 111GL since 1997–98.
Murray/Kiewa/Ovens	The Murray Simulation Model (MSM) approved by the authority is available to determine Cap compliance. The 2008–09 diversion of 837 GL for the Murray/Kiewa/ Ovens Cap valley was above its Cap target of 799 GL but the valley has a cumulative credit of 657 GL since 1997–98.

State/territory	2008–09 Cap compliance
South Australia	
Metro-Adelaide and associated country areas	With the 2008–09 diversion of 150 GL, the Metro-Adelaide and associated country areas diversion was below the five-year rolling Cap up to and including 2008–09. Pending final decision, a separate 'First use license' has been created to accommodate growth in Metro-Adelaide diversions. The five-year total diversion under the 'First use license' was 25 GL. This left 563 GL of five-year rolling diversion to be accounted against five year rolling Cap of 650 GL.
Lower Murray Swamps	The 2008–09 diversion of 10 GL for the Lower Murray Swamps was above its Cap target of 8 GL for 2008–09. The valley has a cumulative debit of 8 GL which is below its trigger point of 19 GL for special audit.
Country Towns	The 2008–09 diversion of 37 GL for the Country Towns was equal to its Cap target of 37 GL. The Country Towns valley has a cumulative credit of 67 GL since 1997–98.
All Other Purposes from the Murray	A regression model approved by the authority is available to determine Cap compliance. The 2008–09 diversion of 288 GL for the All Other Purposes was below its Cap target of 425 GL. The valley has a cumulative credit of 616 GL.
Queensland	
Condamine and Balonne	The Cap to be applied to the Condamine and Balonne valley will be determined following the completion of the water planning process. A Cap model will be available then. The 2008–09 diversion was 190 GL.
Border Rivers/ Macintyre Brook	An IQQM (Interim) model yet to be audited and approved is available to determine the Cap compliance. The 2008–09 diversion of 157 GL was below its annual Cap target of 184 GL. This is the first year when cap compliance has been determined with a Cap model.
Moonie	An IQQM (Interim) model audited and recommended for approval is available to determine the Cap compliance. The 2008–09 diversion of 29 GL was below its annual Cap target of 36 GL. As per its Cap definition, the valley cannot accumulate Cap credit.
Nebine	An IQQM (Interim) model audited and recommended for approval is available to determine the Cap compliance. The 2008–09 diversion of 85 ML was below its annual Cap target of 5 GL. As per its Cap definition, the valley cannot accumulate Cap credit.
Warrego	An IQQM (Interim) model audited and recommended for approval is available to determine the Cap compliance. The 2008–09 diversion of 6 GL was below its annual Cap target of 19 GL. As per its Cap definition, the valley cannot accumulate Cap credit.
Paroo	An IQQM (Interim) model audited and recommended for approval is available to determine the Cap compliance. The 2008–09 diversion of 1 GL was equal to its annual Cap target of 1 GL. As per its Cap definition, the valley cannot accumulate Cap credit.
Australian Capital Territory	The Australian Capital Territory long-term Cap has been agreed, But a Cap model is not yet available to determine Cap compliance. The 2008–09 diversion was 19 GL.

2. BACKGROUND

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

In June 1995, the former Commission (now Authority) 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 10,800 GL/year.

This level of diversion had significantly reduced the flows in the bottom end of the Murray River. 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. The 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 (New South Wales) 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 when a state cap was imposed.

- 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.[2]

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 then Murray-Darling Basin Commission (MDBC), the IAG and other jurisdictions. The Australian Capital Territory is now a full member of *Murray-Darling Basin Initiative*.

Through Capping diversions at the 1993–94 levels of development in the two major water using states coupled with the Caps for South Australia, and Queensland and the Australian Capital Territory, the ministerial council 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 required an integrated reporting framework including significant improvements to the way that diversions are monitored and reported.

The council in 2000 formalised the Cap arrangements by adopting a new schedule (Schedule F) to the *Murray-Darling Basin Agreement*. Subsequently Schedule F was amended by the Council in 2008. Key amendments include:

- The elaboration of the purpose clause to enable all forms of consumptive surface water use including water from waterways and distributed surface waters (e.g. floodplain harvesting) to be included in the Cap.
- Adoption of a protocol authorising the former Commission (Authority) to adjust the Cap for recovery and use of environmental water.
- Formal inclusion of the Diversions Formula Register in the Schedule.
- Caps for Queensland and Australian Capital Territory defined.
- Updated definitions for the South Australian Caps.

Following an intergovernmental agreement reached in July 2008, the *Murray-Darling Basin Agreement* was amended and made part of the amended *Water Act 2007* (Commonwealth). Schedule F was renamed as Schedule E as part of the amendments to the *Murray-Darling Basin Agreement*.

This report is a part of the ongoing Cap monitoring process under Schedule E. 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 2008–09

As required by Schedule E, the IAG audited the performance of each state and territory in progressing the implementation of the Cap during 2008–09 (*Review of Cap Implementation 2008–09*, published by the Murray-Darling Basin Authority, November 2009, Canberra).

The present report represents the thirteenth in a series of annual reports and complements the report of the IAG. The data presented herein are the latest figures for the 2008–09 water year and supersede the data reported by the IAG. Most notably, the Murray-Darling Basin diversions in 2008–09 reported in this present report (**Table 2**) supersede those reported by the IAG in November 2009 (**Table 12** of that report).

2 Subsequently named as Water Resources Planning

3. THE YEAR IN REVIEW

3.1 Water Diversions

The data presented in this report has been collected by the relevant state agencies and collated by the Murray Darling Basin Authority. 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 diversion figures for the Basin in 2008–09.

The figures indicate that Basin water use in 2008–09 was 4,119 GL, representing the lowest on record (26 years of record since 1983–84). Water diversions in New South Wales was the second lowest on record; in Victoria the lowest; in South Australia the fourth lowest, in Queensland the tenth highest, while diversions in the Australian Capital Territory were the fourth lowest on record.

Figure 1 shows the water diversions (by state) for the period 1983–84 to 2008–09 which enables a comparison of 2008–09 water diversion 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 diversions 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 2008–09

System	Irrigation diversion (GL)	Other diversion[1] (GL)	Total diversion (GL)
New South Wales[2]			
Intersecting Streams	3	0	3
Border Rivers	137	0	137
Gwydir	150	3	154
Namoi/Peel	180	8	188
Macquarie/Castlereagh/Bogan	91	14	106
Barwon-Darling	149	0	149
Lachlan	28	12	40
Murrumbidgee[4]	541	61	602
Lower Darling	7	2	9
Murray	310	31	341
Total New South Wales[3]	**1,597**	**132**	**1,729**
Victoria[2]			
Goulburn	594	20	614
Broken	9	2	10
Loddon	2	2	4
Campaspe	2	24	26
Wimmera-Mallee	0	11	11
Kiewa	5	0	5
Ovens	20	6	25
Murray	765	42	807
Total Victoria	**1,396**	**107**	**1,503**
South Australia			
Metro-Adelaide and associated country areas	0	150	150
Lower Murray Swamps[5]	10	0	10
Country Towns	0	37	37
All Other Purposes	268	20	288
Total South Australia	**278**	**207**	**485**
Queensland[2]			
Condamine/Balonne	190	0	190
Border Rivers	143	0	143
Macintyre Brook	14	0	14
Moonie	29	0	29
Nebine	0	0	0
Warrego	6	0	6
Paroo	1	0	1
Total Queensland	**383**	**0**	**383**
Australian Capital Territory[6]	**2**	**17**	**19**
Total Basin	**3,655**	**463**	**4,119**

1. 'Other Diversion' includes domestic and stock, town and industrial uses (Queensland figures included with Irrigation Diversion).
2. New South Wales, Victoria and Queensland diversions include an estimate of unregulated stream diversions.
3. An estimate of New South Wales floodplain diversions is not available for 2008–09.
4. Lowbidgee diversions are included in the Murrumbidgee valley diversions.
5. Some water use by Lower Murray Swamps irrigators is based on an estimate of water use, while for farms that have meters the metered volume is used. The metering of diversions is currently being implemented.
6. Australian Capital Territory diversions are reported as a net figure. The primary usage in the Australian Capital Territory is for urban supply, which has a high return component (approximately 50%).

Figure 1: Murray-Darling Basin Diversions — 1983–84 to 2008–09

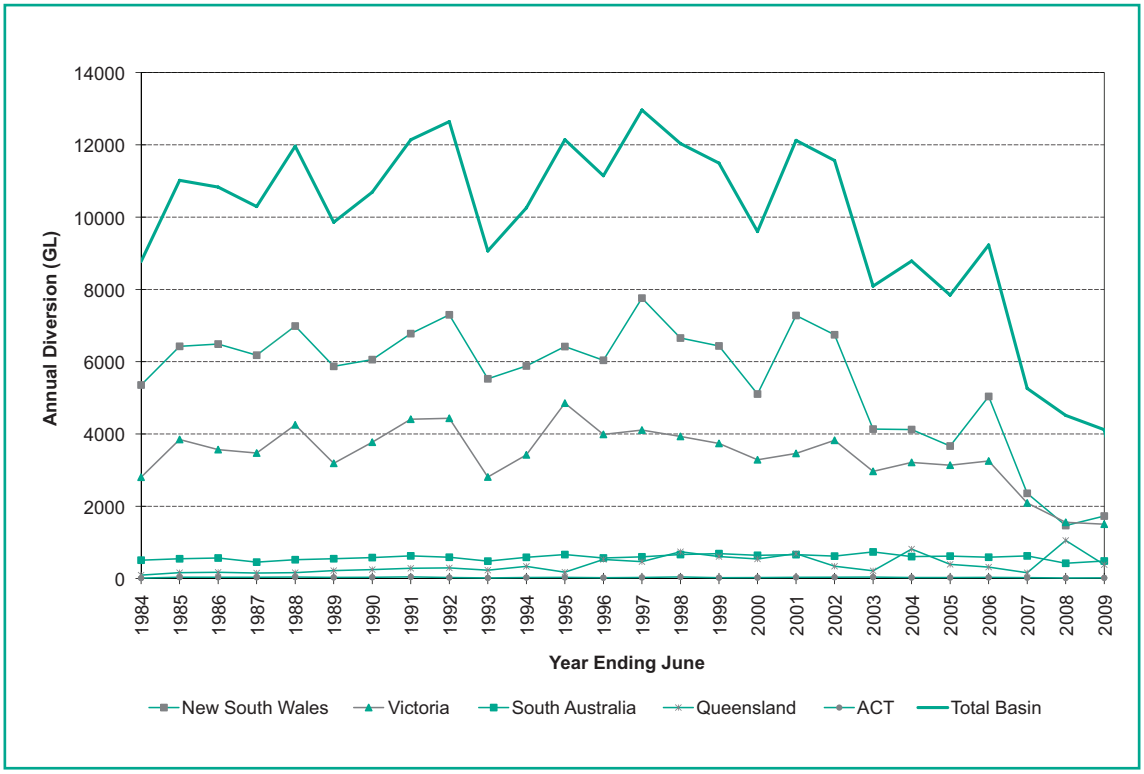
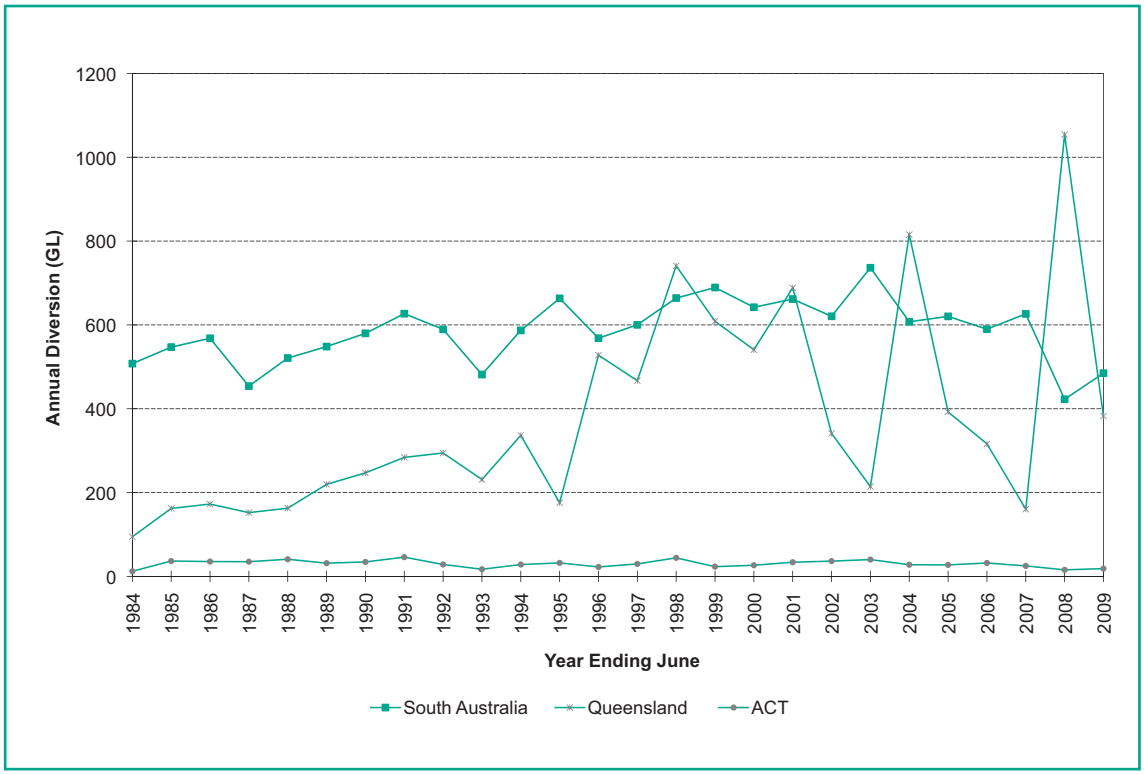


Figure 2: Murray-Darling Basin Diversions — 1983–84 to 2008–09 (usage under 1200 GL/yr)



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 is estimated from regional surveys of areas planted and a third category of estimates is based only on user returns which have proved to be very inaccurate.

Table 3 outlines the indicative confidence the states have in their diversion estimates as reported in **Table 2**. To derive the accuracy figures in **Table 3**, metered diversions have been assumed to have an accuracy of ± 5%, regional surveys ± 20% and user returns ± 40%. Accuracy for individual valleys has been calculated by volumetrically weighting the accuracy of bulk off-takes (direct diversion points) in that valley.

Analysis of reported diversions for 2008–09 indicates that the accuracy of measurement is 10%. In comparison to 2007–08, it has gone down, but this is due to relatively higher volume of diversion in valleys, where an accuracy of diversion is lower.

Diversions in the Lower Murray Swamps, South Australia, were previously not metered; however a rehabilitation program was implemented by the state government in order to meter all properties. Ninety-eight per cent of these diversions are metered now. It is expected that the accuracy of measurement will improve over time as volumetric conversion is implemented in Queensland and metering is extended to areas in New South Wales (unregulated) and Queensland which are not currently metered.

It is to be noted that the estimates of accuracy in **Table 3** are indicative accuracy of bulk diversions only and do not in any way, indicate the accuracy of farm gate diversion measurement in an irrigation area. A Murray-Darling Basin Authority (former Commission) study (2006) found that accuracy data on the majority of individual bulk off-takes were not available. Accuracy estimates presented here are based on the assumptions mentioned above, rather than actual data. States are currently developing plans to implement new metering standards developed under the National Water Initiative. These state plans provide input to a national metering plan. Under the national metering plan developed by the Australian Government Department of the Environment, Water, Heritage and the Arts, the bulk–off-takes measurements get a priority. This will provide an opportunity to re-assess the accuracy figures in **Table 3** when new metering standards have been applied.

Table 3: Accuracy of Diversion Estimates in 2008–09

System	Diversion (GL)	Accuracy +/- GL	Accuracy +/- %
New South Wales			
Intersecting Streams	3	1	40%
Border Rivers	137	12	9%
Gwydir	154	12	8%
Namoi/Peel	188	37	20%
Macquarie/Castlereagh/Bogan	106	18	17%
Barwon-Darling	149	30	20%
Lachlan	40	9	22%
Murrumbidgee	602	55	9%
Lower Darling	9	1	7%
Murray	341	39	12%
Total New South Wales	**1,729**	**213**	**12%**
Victoria			
Goulburn	614	33	5%
Broken	10	1	10%
Loddon	4	0	5%
Campaspe	26	1	5%
Wimmera-Mallee	11	1	5%
Kiewa	5	1	14%
Ovens	25	4	14%
Murray	807	57	7%
Total Victoria	**1,503**	**98**	**7%**
South Australia			
Metro-Adelaide and associated country areas	150	8	5%
Lower Murray Swamps	10	1	5%
Country Towns	37	2	5%
All Other Purposes	288	18	6%
Total South Australia	**485**	**28**	**6%**
Queensland			
Condamine/Balonne	190	30	16%
Border Rivers	143	17	12%
Macintyre Brook	14	1	6%
Moonie	29	4	12%
Nebine	0	0	34%
Warrego	6	1	22%
Paroo	1	0	39%
Total Queensland	**383**	**53**	**14%**
Australian Capital Territory	**19**	**1**	**5%**
Total Basin	**4,119**	**393**	**10%**

3.3 Climatic Overview 2008–09

3.3.1 Rainfall

Figure 3 shows the rainfall deciles for July 2008 to June 2009 inclusive. Only an isolated pocket near the town of Coonamble in New South Wales received very much above average rainfall.

A wide, continuous irregular-shaped area in the centre of the Basin encompassing the towns of Tara, Goondiwindi and Toowoomba in Queensland and the towns of Glen Innes, Tamworth and Bourke in New South Wales received above average rainfall. Two continuous strips; one on the northeast periphery of the Basin extending from Glen Innes in New South Wales to north of the town of Chinchilla in Queensland and the other extending from the town of Surat to the northern edge of the Basin in Queensland also received above average rainfall.

Other than previously highlighted, average to below average rainfall was observed throughout the Basin.

More than half of the Basin (northern and central regions of the Basin) experienced average rainfall. Some isolated pockets near the towns of Narrabri and Wentworth in New South Wales, an area near Lake Dartmouth in Victoria and the towns of Burra and Goolwa in South Australia, experienced average rainfall.

Approximately one-fourth of the Basin in the south received below average rainfall. This encompassed almost whole of the catchments of the Murrumbidgee and Murray Rivers and South Australian part of the Basin, except the area encompassing the towns of Ouyen and Swan Hill that received average rainfall. Some isolated pockets near the town of White cliffs, Lake Tandou and Lake Ballyrogan in New South Wales also received below average rainfall.

Isolated pockets surrounding the town of Wagga Wagga in New South Wales, in Danggali Conservation Park in eastern Victoria and near the town of Nuriootpa in South Australia received very much below average rainfall. Two strips around the border of the Basin in southern Victoria encompassing the towns of Nhill, Seymour and Mansfield also received very much below average rainfall.

Figure 4 shows the rainfall deciles for the period of November 2008 to April 2009 inclusive (the primary irrigation season). Most of the Basin experienced average to above average rainfall, except for three isolated pockets encompassing the towns of Miles in Queensland, Horsham in Victoria and Goolwa in South Australia which experienced below average rainfall,

Two isolated pockets surrounding the towns of Coonamble and Moree in New South Wales received very much above average rainfall.

A large, continuous irregular-shaped area (in the centre of the Basin) encompassing the towns of Inverell and Tamworth in east and Bourke in the west of New South Wales received above average rainfall. A significantly large irregular-shaped area surrounding the towns of Wilcannia and Travellers Lake in western New South Wales, two isolated pockets near the towns of Mudgee and Lake Wylangla in eastern New South Wales, Toowoomba in Queensland and the area encompassing the town of Burra in South Australia also received above average rainfall.

3.3.2 Temperature

Figure 5 shows the temperature anomaly (the difference between the recorded temperatures and the long-term average temperatures) for the period of July 2008 to June 2009 inclusive. More than three-fourths of the Basin experienced significantly higher (+0.5 ^{0}C to +1.0^{0}C) than the average temperature.

A significantly large area surrounding the town of Coonabarabran in New South Wales and three wedge-shaped areas near the towns of Mildura in Victoria, Wilcannia and White Cliffs in New South Wales and Surat in Queensland experienced slightly higher (between 0.0^{0}C to + 0.5^{0}C) than average temperatures.

Three isolated pockets near the towns of Cunnamulla in Queensland, Leeton in Victoria and Mungindi at the border of Queensland and New South Wales, experienced quite higher (+1.0^{0}C to +1.5^{0}C) than the average temperature.

Figure 6 shows the temperature anomaly for the period of December 2008 to February 2009 inclusive (the primary irrigation season). The southern half of the Basin experienced higher than average temperature in comparison to the northern half of the Basin.

Most of southern half of the Basin experienced significantly higher (between +1^{0}C to +2^{0}C) than average temperature conditions. A continuous strip encompassing the towns of Horsham and Dartmouth and an isolated pocket near the town of Mildura in Victoria experienced slightly higher (between 0^{0}C to +1^{0}C) than average temperature.

The most of northern half of the Basin experienced slightly higher (between 0^{0}C to +1^{0}C) than average temperature. The north-west part of the Basin encompassing towns such as Cunnamulla in Queensland and Bourke in New South Wales experienced significantly higher (between +1^{0}C to +2^{0}C) than average temperature.

Warmer temperature in the southern Basin during the growing season increased the irrigation demand. On the other hand, due to ongoing drought and consequent lesser water in storages, irrigation supply was restricted in many areas.

Figure 3: Rainfall Deciles for the Murray-Darling Basin for the July 2008 to June 2009 period

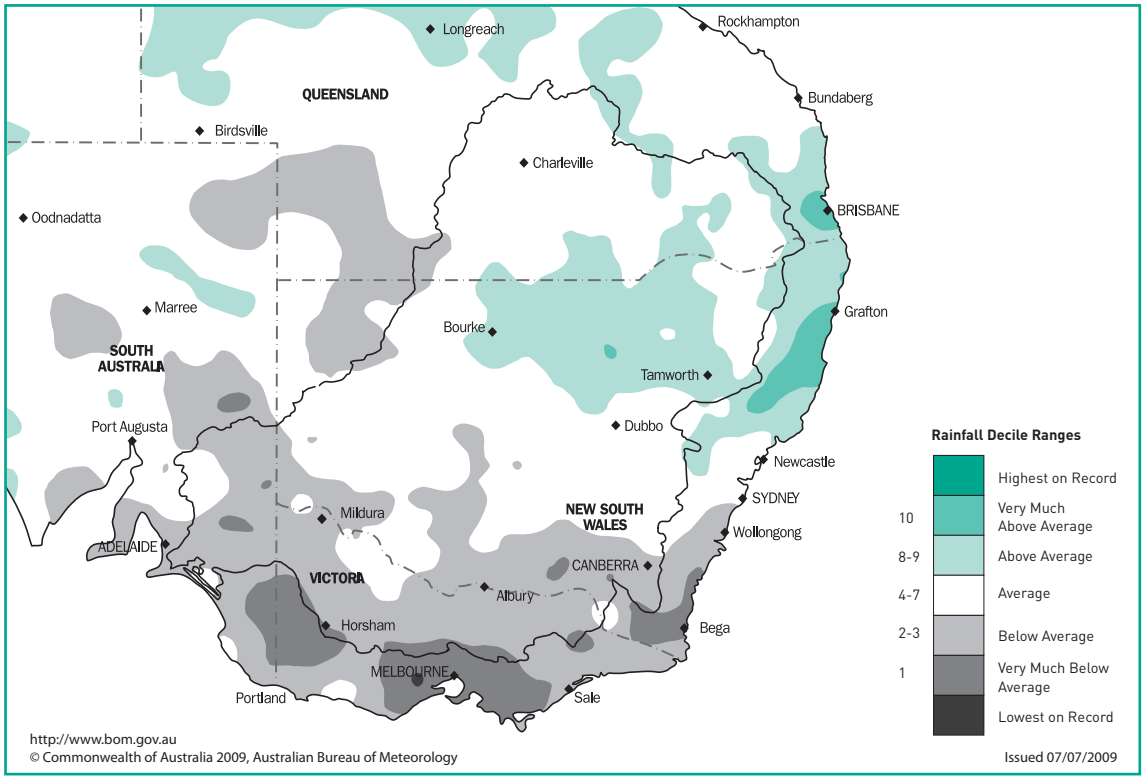


Figure 4: Rainfall Deciles for the Murray-Darling Basin for the November 2008 to April 2009 period

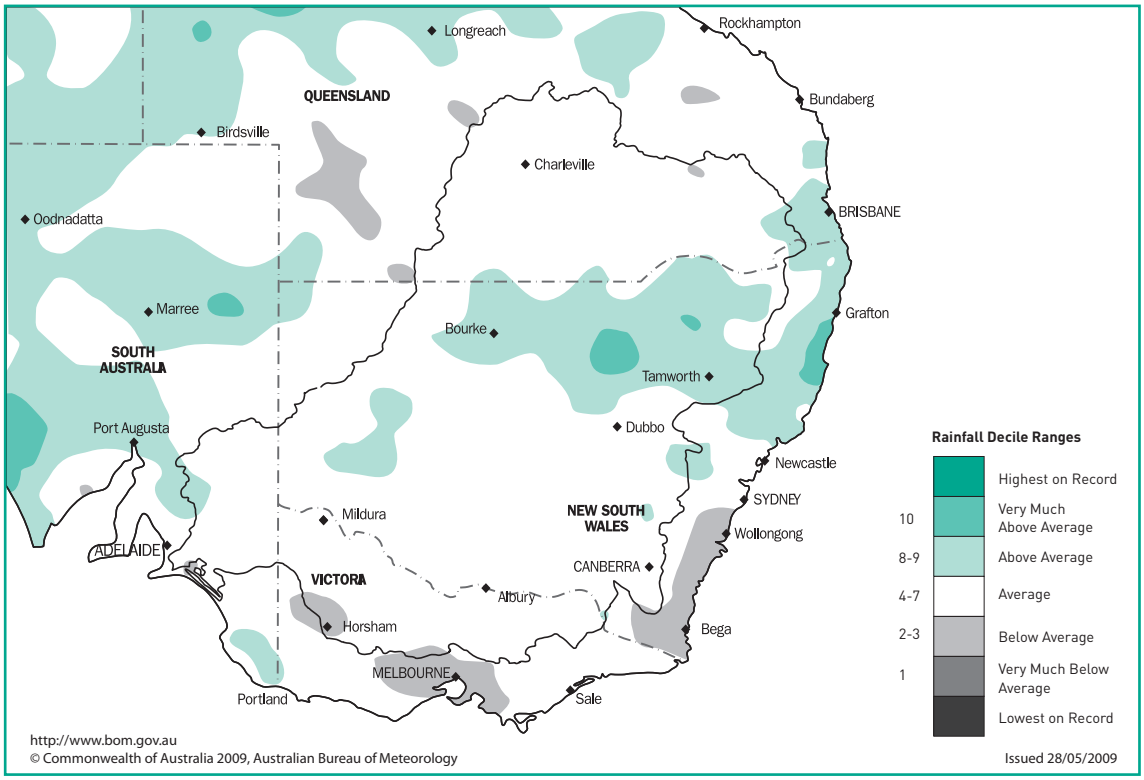


Figure 5: Temperature anomaly for the 12-month period July 2008 to June 2009

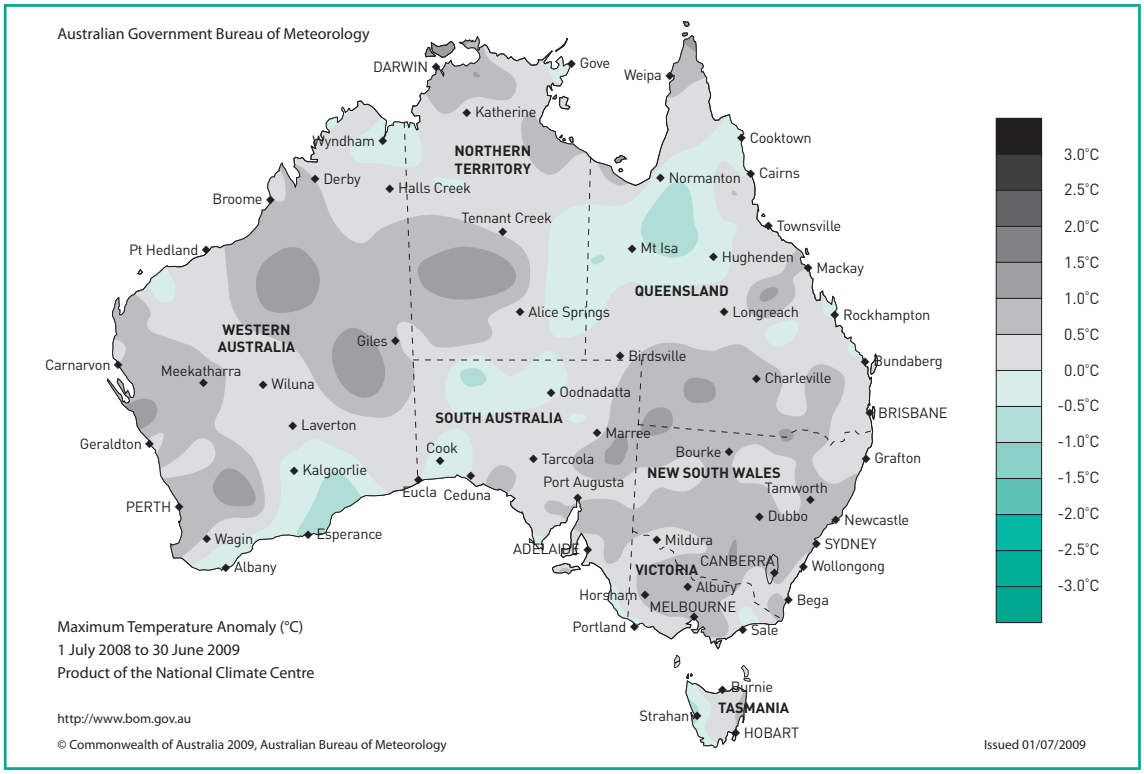
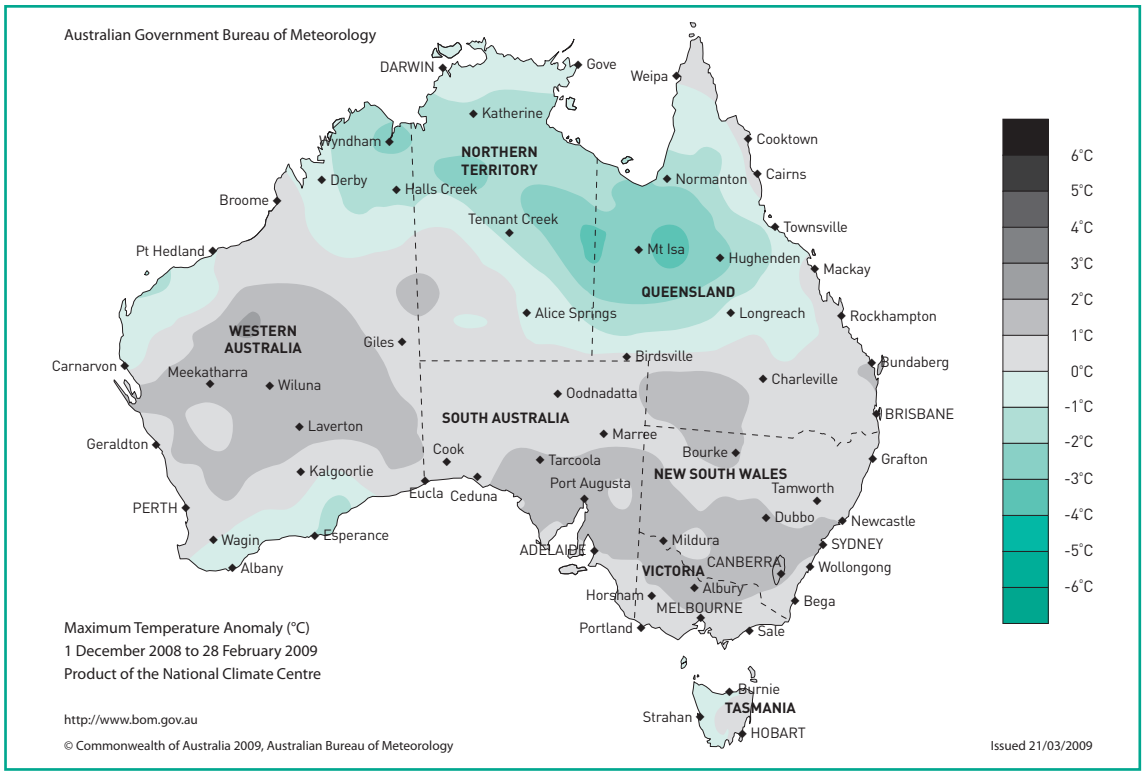


Figure 6: Temperature anomaly for the three-month period December 2008 to February 2009



3.4 Definition of Cap

The council formalised its 1996 decision to set the Cap by adopting in 2000 a new Schedule (Schedule F) to the *Murray-Darling Basin Agreement*. Schedule F was subsequently amended in 2008. Following an Intergovernmental Agreement reached in July 2008, the *Murray-Darling Basin Agreement* was amended and made part of the amended *Water Act 2007* (Commonwealth). Schedule F was renamed as Schedule E as part of the amendments to the *Murray-Darling Basin Agreement*.

Schedule E defines the states' long-term Cap in the following terms:

- New South Wales—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—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:
  - 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
  - 94.2 GL/year for the Lower Murray Swamps comprising:
    - (i) 72.0 GL/year for swamp use with unrestricted trade
    - (ii) 22.2 GL/year non-tradable environmental entitlement, and
  - a long-term average diversion for All Other Purposes of water from the River Murray of 449.9 GL/year.
- Queensland—the volume of water that would have been diverted under the conditions set out for each river valley in the Resource Operation Plan first adopted by the Government of Queensland in that river valley and published in the Queensland Government Gazette.
- The Australian Capital Territory—40 GL plus an allowance for population growth beyond 2006–07. The growth allowance is to be calculated by multiplying 0.75, the per capita consumption of 2006-07 and population growth beyond 2006–07 of the Australian Capital Territory and Queanbeyan. The Australian Capital Territory Cap was agreed by the council in May 2008.

Queensland finalised the Resource Operations Plans for the Warrego, Paroo, Nebine, and Moonie valleys in early 2006 and submitted Cap proposals for these valleys. Council in 2007 agreed to the Caps for these valleys to apply from 2007–08. Following the completion of the resource operation plan for the Border Rivers in March 2008, Queensland submitted a Cap proposal in October 2008, which was endorsed by the authority in April 2009. The Cap for Queensland Border Rivers applied from 2008–09. The Resource Operation Plan for the Condamine-Balonne system is yet to be finalised. This is likely to finalise during 2010. Queensland is committed to submit Cap proposal for its Cap valleys within six months of the gazettal of the respective Resource Operation Plan.

The Cap in New South Wales 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. Cap models have been developed for most of Cap valleys, for which Caps have been agreed. Out of 24 Cap valleys, Caps have not been defined in three valleys and three other valleys do not require a Cap model. Of the remaining 18 Cap valleys, Cap models have been approved for 12; and five Cap models are currently being audited. There is only one valley, Australian Capital Territory, where a Cap model has not yet been submitted for audit and accreditation. The Cap model for the Australian Capital Territory is in an advanced stage of development.

The annual Cap targets, calculated with the help of Cap models are adjusted for water trades and environmental use of water if applicable.

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 449.9 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 five 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 2008–09 are for the fourteenth 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 E to the *Murray-Darling Basin Agreement*, the authority 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 authority 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.

A slightly different approach for Queensland's Warrego, Paroo, Nebine and Moonie Cap valleys has been agreed by the council. A special audit will be triggered if the annual diversions exceed the calculated Cap target for the water year. This is in response to the different climatic conditions in the upper Murray–Darling Basin and the rules-based approach to Cap setting agreed to for Queensland.

3.5 Comparison of 2008–09 Water Use with the Cap

A comparison of 2008–09 water use with the Cap for each state is as follows:

3.5.1 New South Wales

Cap compliance in 2008–09 within New South Wales varied between valleys (**Table 4**).The interim Cap models for most of New South Wales valleys are now available. The Lachlan, Namoi, the New South Wales Murray (contained in the Murray Simulation Model (MSM) suite of Cap models) and Gwydir Cap models, after an independent audit, were approved by the authority under Schedule E. The Macquarie, Murrumbidgee and Lower Darling Cap models are being audited and are expected to be accredited by the authority during 2010.

Except for Barwon-Darling/Lower Darling the diversions in all New South Wales Cap valleys were within the annual Cap target for 2008–09. All New South Wales valleys except Barwon-Darling/Lower Darling are in cumulative credit. The cumulative debit of 186 GL in the combined Barwon-Darling/Lower

Darling Cap valley exceeded the trigger of 62 GL (20% of the long-term Cap) required for a special audit. The combined Cap valley was declared in breach of the Cap in 2007–08. The authority vide its decision no D10/5179 – 25 February 2010 declared that the combined Barwon-Darling/ Lower Darling valley continue to be in breach during 2008–09.

3.5.2 Victoria

The diversions in all Victorian Cap valleys were within their annual Cap target for 2008–09 (**Table 4**) except for Kiewa Ovens Murray which exceeded the target by 39 GL in 2008–09. All Cap valleys are in cumulative credit since 1997–98.

The Cap models for all designated Victorian valleys except Wimmera-Mallee have been audited and adopted by the MDBA. The Wimmera-Mallee REALM model has been completed and was submitted to MDBA for auditing and adoption in December 2009. The unaudited Cap model and Cap targets for the Wimmera-Mallee valley have been used in this report.

Victoria remains committed to the ongoing development and improvement of Cap models, and to the implementation of bulk entitlements to ensure compliance with the Cap.

3.5.3 South Australia

South Australian diversions were within their Cap targets for *All Other Purposes of water from River Murray*, the Country Towns (**Table 4**) and the Metro-Adelaide and associated country areas (**Table 5**). Diversion for Lower Murray Swamps exceeds its annual Cap credit but the cumulative debit is below its trigger point for special audit. All other Cap valleys in South Australia have substantial cumulative Cap credits.

Cap model for *Water use for All Other Purposes from River Murray within South Australia* has been approved by MDBA while Lower Murray Swamps and Country Towns do not require a Cap model. 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.

3.5.4 Queensland

Diversions in the Border Rivers, Warrego, Paroo, Moonie, and Nebine valleys of Queensland were within their annual Cap targets for 2008–09 (**Table 4**). This is the first year when cap compliance has been determined with a Cap model for Border Rivers. As per its Cap definition, Warrego, Paroo, Moonie, and Nebine valleys cannot accumulate Cap credit. The Cap has yet not been finalised for Condamine Balonne.

3.5.5 Australian Capital Territory

The Australian Capital Territory Cap has been agreed but a Cap model to determine its annual Cap target has not yet been developed. Diversion in Cap valley is within their long term cap of 40 GL.

3.5.6 Basin comparison of actual Diversions with the annual Cap Targets

Table 4 presents a comparison of actual diversions with the annual Cap targets for New South Wales, Victoria, South Australia (except Metropolitan Adelaide and associated country areas), Queensland and the Australian Capital Territory. The last column in **Table 4** is the difference between the modelled and the observed storage at the end of 2008–09.

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 over-use 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 and associated country areas, Cap Valley of South Australia.

3.6 Measurement of Land-surface (Floodplain Harvesting) Diversions

The council meeting 29–25 August 2000 agreed to the recommendations of *the Review of Operation of Cap*, which included that "diversions from floodplain and overland flows are included in Cap accounting arrangements as a matter of priority" **(Recommendation 14).**

The authority is committed to bringing the floodplain diversions within the Cap as per the council's above decision. It has taken several statutory and administrative measures to this end. These measures include amendments to Schedule E (former Schedule F) and Diversion Formula Register and establishment of two investigation projects to develop a method to estimate land-surface diversions. Significant progress was made and methods and models were developed to estimate the land-surface diversions (LSD). However due to the lack of suitable rainfall and the consequent lack of land-surface diversion events, sufficient data could not be collected to verify the methods and models developed. These projects were expected to be completed by March 2010. To better utilise the investment made in equipment, these projects have been extended for one year and are now expected to be completed by March 2011. After completion of these projects, the authority will have a tool developed to estimate LSD with reasonable accuracy.

Table 4: Comparison of Diversions with Cap Levels in 2008–09

System	Cap Target from Cap Model (GL)	Adjustment to Cap Target for Trade[1] (GL)	Adjustment to Cap Target for Environment (GL)	Cap Target Adjusted for Trade and Environment (GL)	Total Diversion (GL)	Cap Credit[4] (GL)	Cumulative Cap Credit since 1997–98[4] (GL)	Cap Target Exceedence Trigger (20% of Long-Term Diversion Cap)[5] (GL)	Cumulative Difference (Modelled minus Observed) Storage[7] (GL)
New South Wales									
Intersecting Streams[3]	n/a	n/a	n/a	n/a	3	n/a	n/a	n/a	n/a
Border Rivers[3]	n/a	-9	0	n/a	137	n/a	n/a	n/a	n/a
Gwydir	196	0	0	196	154	43	158	-69	23
Namoi/Peel	245	0	0	245	188	57	153	-68	66
Macquarie/ Castlereagh/Bogan	145	0	0	145	106	39	335	-94	169
Barwon Darling/ Lower Darling	195	-27	-11	156	159	-2	-186	-62	-40
Lachlan	59	0	0	59	40	19	127	-67	75
Murrumbidgee	1,045	-390	-13	642	602	40	1,419	-472	830
Murray	495	-138	-3	354	341	13	146	-376	234
Victoria									
Goulburn Broken Loddon[2]	778	-107	-7	664	628	35	214	-407	-82
Campaspe	17	29	0	46	26	20	125	-24	0
Wimmera-Mallee[3]	21	2	0	23	11	12	111	-32	-20
Kiewa/Ovens/Murray	565	258	-24	799	837	-39	657	-340	-45
South Australia									
Metro-Adelaide and associated country areas[6]									
Lower Murray Swamps	17	-9	0	8	10	-2	-8	-19	n/a
Country Towns	31	6	0	37	37	0	67	-10	n/a
All Other Purposes	103	372	-50	425	288	136	616	-90	n/a
Queensland									
Condamine/Balonne[3]	n/a	n/a	n/a	n/a	190	n/a	n/a	n/a	n/a
Border Rivers/ Macintyre Brook[3]	175	9	0	184	157	27	27	-50	n/a
Moonie[3]	36	0	0	36	29	7	n/a	AT	n/a
Nebine[3]	5	0	0	5	0	5	n/a	AT	n/a
Warrego[3]	19	0	0	19	6	13	n/a	AT	n/a
Paroo[3]	1	0	0	1	1	0	n/a	AT	n/a
Australian Capital Territory[3]	**n/a**	**n/a**	**n/a**	**n/a**	**19**	**n/a**	**107**	**n/a**	**n/a**

Note: The sign convention is that a negative Cap credit value denotes an exceedence of the Cap target adjusted for trade in 2008–09. A negative cumulative Cap credit value indicates an exceedence of the Cap target adjusted for trade on a cumulative basis (since 1997–98).

1. Adjustment to Cap target for trade includes exchange rate adjustments for permanent interstate trade and water recovered for environment.
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. Cap credit is reported as positive and debit as negative.
5. Cap target exceedence trigger values are reported as negative values. The 20% cumulative debit trigger for special audit does not apply to the Moonie, Nebine, Warrego and Paroo Cap valleys, where an annual trigger (AT) applies. In these valleys, whenever the annual diversions exceed the annual Cap targets by any amount, a special audit will be triggered.
6. See **Table 5**.
7. See previous page for explanation on the last column.

Table 5: Comparison of Diversions with Cap Levels in 2008–09 for Metro-Adelaide and Associated Country Areas, South Australia

	Total Diversion 2008–09 (GL)[1]	Total Diversion – five years up to and including 2008–09 (GL)	Five year Cap Diversion Target (GL)	Difference between Diversion and Cap (GL)
South Australia				
Gross Metro Adelaide and associated country areas	150	588		
First use license	0	25	25	0
Net Metro-Adelaide and associated country areas against 650 GL five-year rolling Cap	150	563	650	87

1. While 150 GL was diverted only 90 GL was used as the additional 60 GL was pumped because of water quality concerns as recommended by the Senior Officials' Group on Murray-Darling Basin (MDB) Dry Inflow Contingency Planning. The additional 60 GL diversion was for use in 2009–10.

4. REVIEW OF 2008–09 WATER USE IN NEW SOUTH WALES

4.1 Water Management Overview

There were further improvements in water availability during 2008–09 when compared with the previous two water years, but they were not enough to avoid the need for on-going drought contingency measures. For many New South Wales major regulated rivers, parts of the water sharing plan for each valley that impact on water sharing remains suspended. These valleys include the New South Wales Murray, Murrumbidgee, Lachlan, Macquarie, and Lower Darling. In the New South Wales Murray and Murrumbidgee valleys, the inflows have improved slightly, and a number of contingency measures were able to be lifted, such as rationing of water for towns, stock and domestic users, and permanent plantings. The small improvements in water availability in New South Wales, combined with continuing low allocations in other states, has resulted in record volumes of water being traded from New South Wales to Victoria and South Australia during the year.

Valley water sharing plans are the primary instrument for sharing and managing water resources in New South Wales. Each plan includes a long-term diversion management limit (the plan limit) and rules for adjusting water-sharing if diversions grow beyond the limit set out in the plan. In all major regulated rivers in the New South Wales portion of the Basin these plan limits are below Cap.

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.

New South Wales and Queensland have now ratified new water sharing arrangements on the Border Rivers that will share resources equitably between the states and provide for the environment through protection of end-of-system river flows.

4.2 Water Use Overview

Improved climatic conditions this year resulted in most New South Wales regulated valleys in the Murray-Darling Basin receiving very small general security allocations during the course of the year. While climatic conditions were generally improved from previous years, the general security allocations in most valleys became available only in small amounts through the year, and only minimal levels of irrigation occurred when compared with normal levels. General security effective allocations (announced allocation plus water carried over from the previous water year) reached the following levels: Lachlan (0%), Macquarie (17%), Gwydir (21%), Murray (19%), Namoi (37%) and Murrumbidgee (34%).

Assessment of Cap performance for the 2008–09 water year using (in some cases, preliminary) computer simulation models indicated that diversions for seven New South Wales valleys were below Cap, one valley was above Cap, and two valleys (New South Wales Border Rivers and Intersecting Streams) did not yet have Cap targets to allow an assessment to be made. For the combined Lower Darling and Barwon-Upper Darling Valleys, the cumulated annual Cap performances from the 1997–98 water year remained above Cap and were also greater than 20% of the long-term average, which is the trigger for a special audit.

Current assessments using computer simulation models indicate that 2008–09 diversions in all major New South Wales regulated valleys are below Cap levels, with the exception of the Barwon-Upper Darling Valley,

where licensed water entitlements have been restructured to ensure future diversions in the Barwon-Upper Darling River above Menindee are within Cap.

Effective from 1 July 2007, New South Wales has restructured entitlements along the Barwon-Darling River, reducing the previous annual volumetric limit of 524 GL to a new volumetric limit equal to the long-term Cap (173 GL), which is able to be carried over from one year to the next. This ensures that diversions will be within Cap over the longer-term.

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

4.3 Environmental Water Recovery

This report now includes information on water recovered for the environment from either water savings measures or the purchase of water entitlements. Over the last few years substantial volumes of water entitlements have been recovered through The Living Murray (TLM) initiative, New South Wales's Riverbank program, projects undertaken by Water for Rivers for the Snowy River, and the Commonwealth entitlement purchase program. The entitlements reported here are those that are formally owned by government for environmental use. There are further entitlement purchases not reported here where contracts have been exchanged, but the process to list the changed ownership on the New South Wales Water Access Licence Register (which can be found at www.lands.nsw.gov.au) is not yet complete.

However, there is additional water made available for environmental purposes through the rules of water sharing plans within New South Wales. These significant volumes of water are not included in this report, as they do not relate to entitlements and are not accountable under Cap. While work is underway to appropriately reflect these volumes of water for the environment in future reporting, readers need to be aware that this reporting does not yet represent all water committed to environmental purposes.

4.4 Border Rivers

A Continuous Accounting (CA) allocation system was introduced in the New South Wales 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 New South Wales Border Rivers licensees commenced the season with an average of 25% of licensed entitlement in individual accounts, and received a further 14% of licensed entitlement as further resources became available during the water year. There was a net inter-valley transfer of 9.5 GL out of the New South Wales Border Rivers to the Queensland Border Rivers. This provided a total resource availability of 98 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 118 GL was diverted during 2008–09 in the Border Rivers regulated system, including 64 GL of diversions by supplementary access licences.

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 5 GL was diverted. For the majority of unregulated users without meters, a volume of 19 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2008–09. This provided a total diversion of 137 GL from the regulated section of the New South Wales Border Rivers (**Table 2**).

Cap accounting was not performed for the 2008–09 water year, as the Cap for the New South Wales Border Rivers is currently being determined.

4.5 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 125% of licensed entitlement with no more than 300% over any three years. This is equivalent to a maximum diversion of 531 GL for the valley.

The Gwydir Valley commenced the season with an average of 21% of licensed entitlement in individual accounts, and received a further 16% of licensed entitlement during the water year. This provided a total resource availability of 130 GL (**Table 8**) for regulated river licences.

Within the regulated river system a total of 143.2 GL was diverted during 2008–09, including 52 GL of diversions by supplementary access licences.

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, but there were no diversions during 2008–09. For the majority of unregulated users without meters, a volume of 10.3 GL, representing estimated average use, has been included as an estimate of unregulated diversions in 2008–09. This provided a total diversion of 153.5 GL for the Gwydir Valley (**Table 2**).

The Gwydir IQQM model has been accredited following independent review of the model. 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 2008–09 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2008–09 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 2008–09 is 196 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12-year period from 1997–98 this indicates a cumulative Cap credit of 158 GL (**Table 4**).

4.6 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 125% of licensed entitlement with a maximum of 300% over any three years. This is equivalent to a maximum diversion of 313 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 48 GL.

In 2008–09 Namoi Valley licensees commenced with an average of 13% of licensed entitlement in individual accounts, but received 24% of licensed entitlement during the water year. The Peel Valley licensees commenced the season with an allocation of 30%, and received additional allocation of 50% through the water year. The Upper Namoi/Manilla Valley licensees commenced the season with an allocation of 50% and received no further allocations during the water year. This provided a total resource availability of 142 GL (**Table 8**) for regulated river licences.

Within the regulated river systems a total of 110 GL was diverted during 2008–09, with regulated river licences diverting 94 GL in the Namoi Valley, 3 GL in the Manilla/Upper Namoi Valley, and 13 GL in the Peel Valley. This includes supplementary access licence diversions of 63 GL in the Namoi Valley during periods of

high river flows. There were no diversions by supplementary access licences in the Manilla/upper Namoi Valley and the Peel Valley.

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 188 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 accredited for Cap purposes by the MDBA-appointed independent auditor. This target is the estimated diversion that would have occurred during 2008–09 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. The Peel Valley IQQM has also been accredited following independent review of the model. It is not currently possible to assess a 2008–09 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is used to represent the unregulated Cap target each year. The combined Cap target for 2008–09 is 245 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12 water years of Cap accounting, this indicates a cumulative Cap credit of 153 GL (**Table 4**).

4.7 Macquarie/Castlereagh/Bogan

Licensees in the regulated section of the Macquarie Valley commenced the season with no allocation, but received an allocation of 10% through the water year. This combined with a carryover of 7% (Macquarie) and 50% (Cudgegong) of licensed entitlement from the 2007–08 water year. High security licences were allocated 100% of their licensed entitlements. These allocations combined to provide a total resource availability of 674 GL for regulated river licences.

Within the regulated river systems a total of 40 GL was diverted during 2008–09 during periods of high river flow. There were no diversions by supplementary access licences in the Macquarie Valley.

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 4 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 2008–09. This provided a total diversion of 106 GL in the Macquarie Valley (**Table 2**).

The Macquarie IQQM was previously submitted for accreditation, and was been recommended for accreditation by the independent reviewer. However, as a result of the continuing drought, the Macquarie IQQM has been further reviewed, and has now been resubmitted for accreditation.

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 2008–09 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2008–09 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is used to represent the unregulated Cap target each year. The preliminary combined Cap target for 2008–09 is 145 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12-year period from 1997–98 this indicates a cumulative Cap credit of 335 GL (**Table 4**).

4.8 Barwon-Upper Darling

The Barwon-Darling system does not receive a formal allocation of resources, and only unregulated access is available. The previous system of annual quotas that operated within the valley for the last time during 2006–07, has been restructured so that only 173 GL of access is allocated to users each year, and may be carried over from one year to the next. This is a significant reduction from the 524 GL of annual access provided by the previous quota system.

The Barwon Darling system again received good inflows from December 2008 to March 2009, following significant inflows from the Namoi Valley in particular. Diversions from the Barwon-Darling River system in the 2008–09 water year totalled 149 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 independent auditor. This target is the diversion that would have occurred during 2008–09 with management rules and irrigation development at 1993–94 levels. The preliminary Cap target for 2008–09 is 142 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12 water years of Cap accounting, this indicates a cumulative Cap debit of 346 GL, which exceeds the trigger for special auditing of 35 GL.

However, 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 12-year period from 1997–98, this indicates a cumulative Cap debit of 186 GL, which exceeds the trigger for special auditing of 62 GL (**Table 4**).

In recognition of above-Cap diversions in previous years, New South Wales announced that it would act to bring diversions back within Cap. While the extended drought conditions have delayed such action, New South Wales announced a restructure of licensed water access licences such that entitlements will be limited to the long-term average diversion allowed under the Cap. The restructuring of licences became effective on 1 July 2007.

4.9 Lachlan

In the 2008–09 water year there was continuation of the extreme dry conditions and there were insufficient inflows to make any allocation for general security licensed entitlement. An allocation of only 30% for high security entitlement and 70% for town water supplies was possible. These allocations continue to be at critically low levels, and they combined to provide a total resource availability of only 693 GL for regulated river licences.

Within the regulated river system a total of 25 GL was diverted during 2008–09 including supplementary access licence diversions of 0.4 GL 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 40 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 accredited for Cap purposes by the independent auditor. This target is the estimated diversion that would have occurred during 2008–09 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2008–09 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is used to represent the unregulated Cap target each year. The combined Cap target for 2008–09 is 59 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12 water years of Cap accounting, this indicates a cumulative Cap credit of 127 GL (**Table 4**).

4.10 Murrumbidgee

The 2008–09 water year commenced with critically low water availability. Licensees in the regulated section of the Murrumbidgee Valley commenced the season with no allocation, but received an allocation of 21% through the water year. This combined with a carryover of 13% of licensed entitlement from the 2007–08 water year. Local water utility, towns and domestic and stock categories each received an allocation of 50%, and conveyance entitlements carried over 35.5 GL from the previous water year.

However, improvements in water availability early in 2008–09 enabled towns, domestic and stock, and high security allocations to return to normal levels, and modest allocations were made available to general security users.

Due to the continuing record low level of water availability across the southern Murray-Darling Basin, inter-valley trade of allocated water resulted in a record net trade of 390 GL from the Murrumbidgee Valley during 2008–09. This combined to provide a total resource availability of 2,701 GL for regulated river licences.

For the regulated river system a total of 560 GL was diverted during 2008–09 including supplementary access licence diversions of 1.6 GL. There are no diversions in the Lowbidgee Flood Control and Irrigation District regulated system.

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 602 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 been presented for accreditation by the MDBA-appointed independent auditor. This target is the diversion that would have occurred during 2008–09 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2008–09 Cap target for the unregulated sections of the valley, and the estimated average annual unregulated diversion is used to represent the unregulated Cap target each year. The combined preliminary Cap target from the model for 2008–09 is 1045 GL, which excludes adjustments for inter-valley trade and licences purchased for the environment. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12 water years of Cap accounting, this indicates a cumulative Cap credit of 1419 GL (**Table 4**).

4.11 Lower Darling

2008–09 commenced with critically low allocations of 50% of licensed entitlements for towns and stock and domestic users, but 100% for high security entitlements. General security entitlements commenced the year with no allocation. High and general security users carried over a volume equivalent to 63% of licensed entitlement from the previous water year. Significant inflows during the spring and summer period from rainfall in the northern Basin provided sufficient resources to allow an allocation of 100% for towns, and stock and domestic users, and a 50% allocation to general security users. These allocations, together with water carried over from last year combined to provide a total water resource availability of 97 GL in the Lower Darling, for regulated river licences.

Within the regulated river systems a total of 9.2 GL was diverted during 2008–09, with regulated river licences accounting for all of the diversions. There was no supplementary access in the regulated system during 2008–09. 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 that is currently being reviewed prior to being resubmitted for accreditation by the independent reviewer. This target is the diversion that would have occurred during 2008–09 with management rules and irrigation development at 1993–94 levels. The preliminary Cap target for 2008–09 is 53 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12 water years of Cap accounting, this indicates a cumulative Cap credit of 162 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 12-year period from 1997–98, this indicates a cumulative Cap debit of 186 GL, which exceeds the trigger for special auditing of 62 GL (**Table 4**).

4.12 Murray

At the commencement of 2008–09, no allocation was possible for general security licences within the regulated section of the Murray Valley, and only 10% of licensed entitlement carried over from the 2007–08 water year was available. An allocation of 95% for towns, stock and domestic users, and high security licence categories were possible by middle of October 2008. These allocations combined to provide a total resource availability of 2,210 GL for regulated river licences.

Within the regulated river system a total of 313 GL was diverted during 2008–09. There was no supplementary access in the regulated system during 2008–09.

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 New South Wales Murray Valley. This provided a total diversion of 341 GL for the New South Wales Murray Valley (**Table 2**).

The Cap target is estimated for the regulated system each year using the Murray Simulation Model that has been accredited following the independent review of the model. This target is the diversion that would have occurred during 2008–09 with management rules and irrigation development at 1993–94 levels. It is not currently possible to assess a 2008–09 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 2008–09 is 495 GL. Under the Murray-Darling Basin agreement, annual Cap performances are cumulated from the 1997–98 water year. For the 12 water years of Cap accounting, this indicates a cumulative Cap credit of 146 GL (**Table 4**).

5. REVIEW OF 2008–09 WATER USE IN VICTORIA

5.1 Overview

The 2008–09 season was influenced by low carryover storage volumes and below average inflows to all northern Victorian storages. All storages recorded less than 50% of the total annual average inflow. All systems in the Goulburn-Murray Water region had an opening allocation of zero at 1 July 2008.

The Goulburn and Murray allocations increased in small increments to reach final allocations of 33% and 35% of high-reliability water shares respectively.

All other systems remained without an allocation for the entire season. Irrigation areas in the Wimmera Mallee system also received no allocation during the 2008–09 bulk entitlement year.

The opportunity for irrigators to carryover unused water from one year to the next was widely utilised where it was available. Carryover has allowed irrigators to use water in a season where an allocation to high-reliability water shares in their particular system is not possible. Water has been allocated in the Broken, Loddon and Campaspe valleys in 2008–09 due to the water carried over from the 2007–08 season.

The Minister for Water qualified rights to provide a limited supply to domestic and stock, urban and other commercial customers while allocations to high-reliability water shares are low. Qualifications also reduce or remove the obligations to meet minimum environmental flows in some cases. Qualifications were in place for all systems except the Ovens, Kiewa and Wimmera-Mallee on 1 July 2008. The qualification of rights expired in the Goulburn and Murray systems when the allocation exceeded 20% but remained in place for the entire season in the Broken, Campaspe, Loddon and Bullarook systems.

Only the months of July, November and December recorded widespread rain above monthly averages. The months of November and December were particularly wet, especially in irrigation areas where monthly totals were more than two and three times average in some cases.

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, Broken, Campaspe, Loddon and Wimmera-Glenelg river systems are now in place. The bulk entitlement for the Bullarook system will be in place for the 2009–10 season.

5.1.2 Volumes Diverted

The volumes diverted during 2008–09 in the Murray/Kiewa/Ovens valley were 837.4 GL. In the Goulburn/Broken/Loddon designated river valley and the Campaspe river valley, diversions were 628.3 GL and 26.3 GL respectively. Wimmera-Mallee valley diversions were 11.5 GL.

Victorian systems diverted 1,503.4 GL from the Murray-Darling Basin during 2008–09.

The total Cap target adjusted for trade and environmental allocations was 1,531.5 GL.

5.1.3 Off-Quota

Off-quota allocations are not available in Victorian river valleys.

5.1.4 Final Deliveries and Historical comparison

The total volume delivered to northern Victorian regulated systems during 2008–09 was 1,061 GL. The total Victorian usage was 70% of the total volume allocated.

Deliveries in the Murray/Kiewa/Ovens designated valley were 648.6 GL in 2008–09, compared with 601.2 GL for the previous year. Goulburn/Broken/ Loddon valley deliveries were 314.1 in 2008–09, 17 GL lower than the 331.1 GL delivered in 2007–08.

Deliveries in the Campaspe valley were also lower in 2008–09, 80.8 GL, compared with 94.2 GL delivered in 2007–08.

Total Wimmera-Mallee deliveries including from water diverted from other valleys were 17.5 GL in 2008–09, 4.9 GL higher than the 12.6 GL delivered in 2007–08.

5.1.5 Trading

The allocation trade market in Victoria was very active during 2008–09 with a net volume of 216.5 GL traded into Victoria.

Interstate allocation trading with New South Wales resulted in an overall net inwards transfer to Victoria of 235.7 GL during 2008–09. This volume includes net inwards allocation trade of 162.4 GL from the Murrumbidgee River Basin, 67.4 GL from New South Wales Murray and the balance of 6 GL from the Darling.

Trade with South Australia was a net allocation trade of 19.2 GL from Victoria to South Australia, compared with 45.4 GL from Victoria to South Australia in the 2007–08 season.

There was 259.3 GL of allocation trade into the Kiewa/Ovens/Murray valley from other valleys and the reverse trade was 83.9 GL resulting in a net allocation trade into the Kiewa/Ovens/ Murray valley of 175.4 GL. The very high demand for water influenced by a record low allocation on the Murray system drove this water movement.

There was a net volume of allocation trade into the Goulburn/Broken/Loddon valley of 7.6 GL. A total of 93.7 GL was traded in while 86 GL was traded out. The net allocation trade from the Murrumbidgee into the Goulburn/Broken/ Loddon valley was 37.8 GL. Net allocation trade to South Australia was 10.5 GL from the Goulburn/Broken/Loddon valley.

As was the case for the past four irrigation seasons, water was traded (2.1 GL) to Campaspe Irrigation District customers who were supplied by a privately installed pump on the Waranga Western Channel.

The supply of water to Bendigo and Ballarat from the Goulburn System via the Goldfields superpipe was supported by 18.9 GL of allocation trade, including 6.9 GL from the Murrumbidgee. An additional allocation of 9.8 GL by the Minister for Water from the Goulburn Water Quality Reserve was utilised for supply to these regional centres.

5.1.6 Environmental Flows

No water was supplied to the Barmah-Millewa Forest from the Victoria and New South Wales Environmental Water Allocations (EWA) during the year. However, 0.3 GL from the Snowy River Murray Improved Flows (RMIF) account was used to supply water to wetlands within the Barmah Forest.

At 30 June 2009, there was a zero balance in both the Victorian and New South Wales EWA accounts. The volumes borrowed against the EWA were 80.5 GL and 131 GL by Victoria and New South Wales respectively.

No surplus River Murray flows were available to water Barmah, Gunbower and lower River Murray red gum forests or wetlands within the Torrumbarry system.

There was 16 ML of donated water that was used for environmental purposes during 2008–09. This water was delivered to Chalka Creek and the Hattah Lakes.

The total volume of water used for environmental purposes was 23 GL, of which 21.2 GL was for Murray system wetlands and forests. In the Loddon valley, 0.6 GL was supplied to Little Lake Boort.

The major uses on the Murray system were lower River Murray red gums and wetlands (12.5 GL) and Gunbower Forest (3.5 GL). Smaller volumes of 0.8 GL and 0.4 GL were delivered to McDonald's Swamp and Round Lake respectively in the Torrumbarry Irrigation Area and 0.14 GL was supplied to Cardross Lakes in the Sunraysia area.

Reedy and Black swamps were supplied with 0.5 GL and 0.04 GL respectively from the Goulburn system. A total of 0.45 GL was supplied to the lower Campaspe River.

The total environmental delivery included 3 GL from The Living Murray account and 3.12 GL from Commonwealth-held water. Water from both these accounts was used to irrigate lower River Murray red gums.

There was 0.79 GL of environmental water delivered downstream of the Rufus River junction. There was also 0.19 GL delivered downstream on the Lindsay River downstream of the Mullaroo Creek off take. Both these deliveries necessitated an adjustment to the recorded flow to South Australia, as the deliveries occurred downstream of the South Australian border.

Environmental managers reported beneficial results from the use of this environmental water, particularly encouraging the nesting of aquatic birds in remnant wetlands in the Shepparton area.

As was the case in 2007–08, most of the environmental water use occurred during the months of May and June 2009, when 13.83 GL was delivered.

At 30 June 2009 there was 5.36 GL and 0.4 GL remaining in the flora and fauna, and Snowy RMIF accounts respectively.

There was no water used in wetlands in the Wimmera-Mallee System. However, small environmental releases were made for the Mackenzie and Glenelg rivers.

In addition to the volumes supplied to forests and wetlands, 7.7 GL from the Snowy Environmental Water Reserve (EWR) and 2.8 GL from the Goulburn Water Quality Reserve were used to improve the health of Broken Creek via diversions at Goulburn Weir. The Snowy EWR was delivered to the Murray system via Rice's Weir on Broken Creek.

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 high-reliability water shares in July 2008. The allocation reached a maximum of 33% of high-reliability water shares on 1 April 2009. There has been no allocation of low-reliability water shares since 1997–98.

Lake Eildon, the main storage on the Goulburn System peaked in early October 2008 at 23.6% of capacity. Waranga Basin reached 35.3% of capacity in early February 2009. Temporary pump stations at the Major and Minor outlets enabled Waranga Basin to be drawn down to 13% of capacity at the end of the irrigation season.

The total volume allocated for use in the Goulburn Valley was 301 GL. Usage in the Goulburn Valley was 230.4 GL, or 76.6 % utilisation of the total allocated volume.

Approximately 259.7 GL was transferred to the Murray, Campaspe, Loddon and Wimmera-Mallee systems. The total diversion during 2008–09 to the Goulburn Valley was 614 GL which was well below the 10-year average. An additional 1.07 GL was transferred from north to south of the Great Dividing Range to Melbourne Water from the Silver and Wallaby Creeks which are tributaries of the Goulburn River.

The Goulburn/Broken/Loddon valley is within Cap and maintains a cumulative Cap credit of 214.2 GL.

5.3 Broken

Private diverters in the Broken River system received an initial zero allocation at the start of July 2008. This did not change during the year. This was the first season that Broken system did not receive an allocation.

Lake Nillahcootie reached a maximum of 33.2% of capacity in late September 2008 and was drawn down to 11.9% of capacity by the end of June. Lake Mokoan peaked at 6.7% full in early September 2008, but by early February 2009 had effectively emptied because of evaporation.

There were no major blue-green algae (BGA) events at Lake Mokoan during the year.

The Broken usage equated to 5.9 GL, or 72.9% utilisation of the total allocated volume, which comprised only the volume carried over from the 2007–08 season.

The Broken system is included in the Goulburn/Broken/Loddon designated river valley, which is within Cap and has a cumulative Cap credit.

5.4 Loddon

No allocation was available to customers on the Loddon system throughout 2008–09. Historically, this along with 2006-07 is the lowest final allocation of record.

A combination of very low carryover volumes and extremely low inflows resulted in Cairn Curran and Tullaroop reservoirs both reaching only 6.2% and 6.8% of capacity respectively. Newlyn reservoir only reached a maximum capacity of 22.3%. Hepburns Lagoon was effectively empty all year.

Diversions from the Loddon River and tributaries for private irrigation use, domestic and stock, commercial, industrial and urban purposes was very low, amounting to only 2.1 GL. Most of the usage within the Loddon designated valley occurred within the Pyramid-Boort Irrigation Area where 69.8 GL was used for irrigation.

A bulk supply of 115.8 GL was diverted from the Goulburn valley to the Pyramid-Boort Irrigation Area and the Wimmera-Mallee system.

For the sixth successive year, the supply to the Boort region of the Pyramid-Boort Irrigation Area was solely reliant on the Goulburn system. In years of higher allocations on the Loddon system, the bulk of the supply to Boort is met from the Loddon storages.

The Loddon valley is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance which is within Cap and has a cumulative Cap credit. Loddon valley usage was 77.8 GL, or 87.7% of the allocated volume. Irrigation usage within the Pyramid-Hill Irrigation Area accounted for 69.8 GL of the total Loddon valley usage.

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 Campaspe designated river valley for Cap compliance. Allocations to irrigators in the Rochester Irrigation Area are the same as those in the Goulburn system.

Allocations in the Campaspe system opened at 0% of high-reliability water shares and did not increase during the year. This, together with 2006–07, is the lowest allocation on record.

Lake Eppalock reached only 7.0% in late September 2008. By the end of June 2009, the Lake Eppalock had been drawn down to 6.0% of capacity. The Goldfields superpipe transferred 19 GL from the Goulburn system to Sandhurst reservoir at Bendigo which in turn supplied 11.4 GL to Ballarat. A further 6.5 GL was transferred from the Goulburn System to Lake Eppalock. The total volume diverted from the Goulburn system to the Goldfields superpipe was 25.5 GL. From Lake Eppalock, 1.7 GL was pumped to Bendigo.

The 2008–09 Campaspe valley allocation volume was 107.9 GL of which 74.9% was utilised. The Campaspe system comprises gravity irrigation entitlements in the Rochester Irrigation Area and the Campaspe Irrigation District, private diverters, and urban, industrial, domestic and stock entitlements.

There was no water harvested from the Campaspe River to the Waranga Western Channel via the Campaspe Irrigation District channels or the Campaspe Pumps during the year. No regulated supplement to the Waranga Western Channel was made available because of the very low Campaspe allocation.

Woodend was supplied with 0.31 GL from the Campaspe system.

Diversions from the Campaspe designated river valley were 19.8 GL less than the Cap target in 2008–2009. The Campaspe valley has a cumulative Cap credit of 125.4 GL.

5.6 Wimmera-Mallee

Inflows for 2008–09 were well below average resulting in the combine storage volume recovering to only 6.5% of capacity in September 2009. This is the twelfth consecutive year of below average inflows. By mid-May 2009 storages had fallen to 3.6% of capacity.

The initial allocation for the Wimmera-Glenelg Bulk Entitlements on 1 November 2008 was based on available water of 25.6 GL. By August 2009 following good rainfalls the allocation had increased to 46.2 GL. The water year in the Wimmera-Mallee system runs from 1 November to 31 October. For the year ending June 2009, diversions from water sourced within the Wimmera-Mallee valley totalled 11.5 GL

5.7 Kiewa

Total Kiewa usage was 0.5 GL or 42.8% of the urban entitlement volume. A further 4.8 GL was used in the unregulated system. The Kiewa system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance which is within Cap and has a cumulative Cap credit.

5.8 Ovens

Lake Buffalo filled to capacity in early spring and remained full until mid-January 2009. Lake William Hovell recovered quickly early in winter and good inflows ensured the storage remained full well into the summer. While both storages were spilling, customers had access to low-reliability water shares.

Total Ovens Valley usage was 17.9 GL or 47.3% of the allocated volume. A further 7.6 GL was used in the unregulated system. The Ovens Valley is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance which is within Cap and has a cumulative Cap credit.

5.9 Murray (including Mitta Mitta)

There was zero allocation at the start of July 2008 for Murray system gravity irrigation customers and Mitta private diverters. By mid January 2009, the maximum allocation of 35% of high-reliability water shares had been reached. This is lowest ever for the Victorian Murray system.

Dartmouth reservoir filled to a maximum of only 22.8% of capacity in late December 2008 while Hume reservoir reached 35.2% of capacity in early October 2008. Victoria's share of water held in Dartmouth and Hume reservoirs as of 30 June 2009 was 52.3% and 54.2% respectively.

The total diversion, excluding all environmental diversions, was 806.7 GL for the Victorian component of the River Murray valley. The allocated volume was 819 GL, of which 630.2 GL or 77.2% was used.

For the purposes of Cap compliance, the Murray Valley is included in the Murray/Kiewa/Ovens designated river valley. Diversions from this valley were 38.6 GL above the 2008–09 Cap target and the accumulated Cap credit for the Murray/Kiewa/Ovens designated river valley is 656.5 GL.

6. REVIEW OF 2008–09 WATER USE IN SOUTH AUSTRALIA

6.1 Overview

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

- Metropolitan Adelaide and associated country areas
- Country Towns
- Lower Murray Swamps, and
- All Other Purposes of water from the River Murray (including irrigation, industrial, recreation, environmental, stock and domestic water use).

The drought continued to impact water resource availability throughout the southern Murray-Darling Basin and to South Australia. Restrictions on River Murray water use were again applied to Metropolitan Adelaide, Country Towns, irrigation and other allocations. This was the sixth consecutive year when entitlements have been restricted.

As a result of the restrictions South Australia diverted a total of 485 GL from the River Murray, which was the second lowest level since the implementation of the Cap and diversions were within the annual Cap targets for 2008–09.

The All Other Purposes and Lower Murray Swamps annual Cap targets were adjusted to take into account restrictions on water use. This is the first year where restrictions have been applied and this methodology is still to be formally approved by the Murray-Darling Basin Authority (MDBA). The methodology was developed with input from the MDBA.

South Australia commenced the water year with an opening allocation of 2% and low inflows, combined with the need to secure Critical Human Water Needs (CHWN), resulted in the lowest allocation of 18% to irrigation entitlements. This allocation was the lowest percentage announced in South Australia's history and is reflective of South Australia receiving a smaller share of River Murray water for diversions than compared with New South Wales and Victoria.

In response to the prospect of low seasonal allocations, South Australia implemented a Critical Water Allocation Scheme (CWAS) to support viable permanent plantings along the River Murray in South Australia. The CWAS provided 61 GL for over 1,300 irrigators and the volume of water allocated was based on crop survival requirements only.

If the CWAS were not available, then irrigation diversions would have been significantly lower and the resultant regional economic impact would have been considerably higher through lost production and flow effects to regional communities.

South Australia secured 201 GL for the CHWN reserve for 2009–10. This reserve is a requirement of First Ministers and the *Water Act 2007* (Commonwealth). The CHWN reserve was accumulated through purchase of water and withholding other water available to South Australia in the upstream storages. The 201 GL supplies include 150 GL for Metropolitan Adelaide and associated country areas, 31 GL for Country Towns and 20 GL for stock and domestic allocations.

South Australia received a total flow across the border (including trade) of 1,175 GL, which is significantly below the normal minimum entitlement flow of 1,850 GL/year. This was the third lowest flow across the border since 1902–03 and is well below the long-term median flow across the border of approximately 4,600 GL/year.

6.1.1 Impact of low flows to South Australia

The environment continues to suffer major ecological decline, particularly at icon sites such as the Riverland (Chowilla), Lower Lakes and Coorong. There have been no freshwater

releases from the barrages into the Coorong since early March 2007 when only small flows were directed through the barrage fishways.

Water levels below Lock 1 were minus 0.4m Australian Height Datum (AHD) at the start of July 2008 and had fallen to minus 0.9m AHD at the end of June 2009. This compares with a normal pool variation of between plus 0.75m AHD to plus 0.55m AHD. The environment below Lock 1 has been significantly impacted by low water availability and other major threats such as acid sulfate soils, and salinity, particularly around the lower lakes.

Irrigation below Lock 1 remained low due to limited water access and quality issues. The dairy and wine grape industries have been severely impacted by these issues particularly around Lakes Alexandrina and Albert. A new stock and domestic pipeline was constructed from the Tailem Bend off-take to service the Meningie and Narrung Peninsula communities.

Construction also commenced on a federal/state-funded pipeline (known as the Lower Lakes Irrigation Pipeline) to provide stock, domestic and irrigation water from Jervois to service customers in Langhorne and Currency Creeks. Irrigators in these areas have had limited access to water in 2008–09 and in most situations the water available was too saline for irrigation purposes. The pipeline is scheduled for completion in October 2009.

Low water levels have also adversely impacted irrigation water use within the Lower Murray Reclaimed Irrigation Areas (LMRIA). Gravity irrigation is the primary delivery mechanism and the water level declined to the point whereby the majority of irrigators could not access water without substantial modification to the inlet channels. In some circumstances pumps were installed to deliver water into the channels.

The LMRIA has experienced a gradual 'drying out' of irrigation bays due to low allocations and water levels. This drying out, along with low water levels, has caused major cracking to both irrigation bays and infrastructure such as levee banks and is primarily a result of a continued period of low water levels. Cracking of levee banks and irrigation bays has also forced irrigators to change irrigation methods and/or locate water use to the adjacent highland areas. Travelling irrigators are being used in some of the swamps where the farmers have undertaken their own remedial works to address soil cracking issues. Increased water levels below Lock 1 will help to address such issues however a significant amount of time and money will need to be spent on rehabilitating affected areas.

The lack of freshwater flows to South Australia has resulted in another year of declining water levels and no flows over the barrages. Consequently, a number of management actions were undertaken around Lakes Alexandrina and Albert including emergency pumping of water from Lake Alexandrina into Lake Albert to prevent acidification. A range of different treatment and remediation options are being undertaken in both lakes to prevent acidification, including bioremediation and liming.

6.2 River Murray water management 2008–09

Water resource availability conditions across the Murray-Darling Basin remained low throughout 2008–09, in particular across the River Murray catchment area. The low water availability at the start of 2008–09 resulted in the sixth consecutive year of restricted allocations. River Murray irrigators received an initial opening allocation of only 2% and this was increased as improvements were received. Allocations reached a maximum of 18% in February 2009, which was 56% of the previously lowest announced allocation of 32% in 2007–08.

South Australia received a total of 1180 GL and 201 GL was set aside to meet 2009–10 CHWN commitments. In addition, 100 GL was set aside for private irrigation carryover, along with 50 GL for lower lakes management in 2009–10 and 39 GL for 2010-11 CHWN requirements.

There was a significant amount of temporary trade as a result of low allocations and water purchases by the South Australian Government for a variety of purposes including meeting its CHWN requirements and the Critical Water Allocation Scheme (CWAS).

6.3 Irrigator reactions to the 2008–09 irrigation season

The 2008–09 irrigation season was extremely challenging for the majority of irrigators due to low allocations (18%); reduced availability to purchase temporary water as a result of paying record high prices for temporary water in 2007–08; failure to secure contracts for products; and low commodity prices.

In response to the prospect of low seasonal allocations, South Australia implemented a Critical Water Allocation Scheme (CWAS) to support viable permanent plantings along the River Murray in South Australia.

The program was well received by irrigators, particularly in the Riverland and above Lock 1 who had access to water. A number of growers below Lock 1 would have been eligible however due to low water levels were unable to access any water. The majority of growers in this region did not have access to water for the entire year.

Again in 2008–09, alternative water sharing rules provided an opportunity for South Australia to provide water for diversion earlier than what would have occurred under normal sharing arrangements. This arrangement involved the payback of water advanced to South Australia from New South Wales and Victoria as water resource conditions improved.

The River Murray Water Allocation Framework (developed for the sharing of River Murray water resource improvements to South Australia) was revised in 2008–09 taking into account information provided at a number of meetings with key community based groups. The review included how water would be shared between the different consumptive users, environmental assets, and the process for accumulating Critical Human Water Needs.

6.4 River Murray Water Use

South Australian diversions from the River Murray for 2008–09 were only 485 GL, which is the second lowest diversion figure since the implementation of the Cap. The diversions comprised:

- 149.5 GL for Metropolitan Adelaide and associated country areas
- 37 GL for Country Towns
- 10.2 GL for the Lower Murray Swamps (including environmental land management allocation (ELMA) water, which is restricted to the same percentage as irrigation allocations), and
- 288.2 GL for metered consumption under the All Other Purposes Cap component.

Diversions during 2008–09 were only about 77% of the long-term average annual diversion.

6.5 Metropolitan Adelaide and Associated Country Areas

The Metropolitan Adelaide water supply system utilises two major water resources:

- natural catchment inflows into the Mount Lofty Ranges storages, and
- the River Murray.

Normally the Mount Lofty Ranges is the primary source of water because of the significant costs associated with pumping River Murray water. The Mount Lofty Ranges storage volume is the major factor influencing the pumping demand profile from the River Murray.

Natural inflows into local reservoirs were again low at 47.6 GL during 2008–09 and as a result 149.5 GL was diverted from the River Murray to supply both Metropolitan Adelaide and other water users located above the reservoirs.

Table I shows the five-year rolling total (excluding the 'First Use Licence' component) diversion for Metropolitan Adelaide is 562.7 GL leaving an unused portion of 87.3 GL.

Table I: Five-year rolling total (excluding 'First Use Licence') Diversion for Metropolitan Adelaide

	2004–05	2005–06	2006–07	2007–08	2008–09	Total
Gross Diversion	71.6	73.9	203.1	89.4	149.5	587.5
First Use Licence	8.8	16.0	0.0	0.0	0.0	24.8
Rolling diversion against 650 GL Cap	63.2	57.9	203.1	89.4	149.5	562.7
Five year Cap						650.0
Credit						87.3

6.6 Country Towns

Country Towns were provided a base allocation of 31 GL, which is an insufficient volume under Level 3a enhanced water restrictions. An additional 6 GL was leased to cover the shortfall. Many Country Towns along the River Murray do not have an alternative supply and are therefore totally reliant on River Murray water supplies.

6.7 Lower Murray Swamps

Water allocations within the LMRIA have been treated in the same manner as all other irrigation licences, and were set at 18% for 2008–09. Over the last four years a substantial amount of water has been permanently traded out of the Lower Murray Swamps Cap, with the majority of this water going to the All Other Purposes Cap.

Until recently, the irrigated areas were non-metered, with a specific number of waterings being permitted each year. If water was transferred out, the appropriate portion of irrigated land was retired. Metering was completed during 2008–09 however during late 2008–09 riverbank collapse prevented access to some meters and some meters (along with pumping infrastructure) fell into the River Murray. Consequently, metered usage was not available for all licences and in these cases where meter readings were not available 18% authorised use has been used as an estimate for diversions. A total of 10.2 GL was diverted for irrigation and ELMA use in 2008–09.

6.8 All Other Purposes of water from the River Murray

Included in the All Other Purposes category are stock, domestic, environmental, industrial and recreation entitlements. Annual water restrictions apply to all purposes with the exception of industrial, stock and domestic which is equivalent to approximately 20 GL.

Total usage under the All Other Purposes component of the Cap during 2008–09 was 288.2 GL, or 72% of the long-term average diversion for the All Other Purposes. In addition to the 18% allocation, a total of 92 GL was carried over from 2007–08 and a CWAS of 61 GL was provided to over 1,300 irrigators.

The climate and restriction adjusted Cap for 2008–09 is 94.9 GL. In addition, there was an adjustment of 373.1 GL to allow for temporary and permanent trade adjustments (from the Lower Murray Swamps) and a -50 GL adjustment for the fact that 50 GL of the traded water was for maintaining water levels in the Lower Lakes. **Table II** outlines the revised All Other Purposes Cap taking into account restrictions and the impact on annual and cumulative Cap credits.*

Table II: All Other Purposes Cap 1997–98 to 2008–09, South Australia

	1997 –98	1998 –99	1999 –2000	2000 –01	2001 –02	2002 –03	2003 –04	2004 –05	2005 –06	2006 –07	2007 –08	2008 –09
Annual climate, trade and restriction adjusted Cap	412	445	450	473	457	488	495	452	448	392	354	425
Recorded diversion	384	409	377	431	413	443	423	453	417	355	282	288
Annual Cap credit	28	36	73	43	44	45	72	-2	31	37	72	136
Cumulative Cap credit	28	64	137	180	224	269	341	339	370	407	479	616

*Method to be formally approved by the MDBA.

6.9 Water Trade

Significant trading of interstate temporary allocations into South Australia occurred during 2008–09. This trade was generated from the ongoing drought conditions resulting in a final allocation of only 18%, the need to purchase of water for 2009–10 Critical Human Water Needs, CWAS and the Lower Lakes, and the ability to purchase water to carry-over for use in 2009–10.

This resulted in 339.9 GL of water being traded to South Australia's bulk water account from interstate. Only 3.6 GL was traded out of the state.

Table III below provides details on the temporary trades including the sources for the 2008–09 water year.

Table III: Temporary trades including sources for the 2008–09 water year, South Australia

Interstate trade	Temporary trade (GL)
From South Australia to Victoria	3.3 GL
From South Australia to New South Wales	0.35 GL
Total out of South Australia	**3.65 GL**
Into South Australia from Victoria	22.5 GL
Into South Australia from New South Wales	317.4 GL
Total into South Australia	**339. 9 GL**

The majority of temporary water purchases occurred from the Murrumbidgee Valley in New South Wales.

Permanent (allocation) trade continues to occur from the Lower Murray Swamps and a total of 2.0 GL was permanently traded to the All Other Purposes Cap.

A total of 408.8 GL of temporary trade was recorded within South Australia including 2.9 GL from the Lower Murray Swamps Cap valley. The temporary trade figure also includes water traded by irrigation trusts managed by Central Irrigation Trust (CIT).

6.10 Environmental water use

Environmental watering projects undertaken at both icon and non-icon sites during 2008–09 comprised a total of 34 GL, consisting of water from:

- The Living Murray 2.15 GL, 15 sites watered
- Commonwealth Environmental Water Holder (CEWH) 6.52 GL, 11 sites watered
- donations 0.048 GL, three sites watered, and
- evaporative savings 25.4 GL, 17 sites watered.

Water available for environmental purposes from the TLM program was allocated under the TLM Environmental Watering Plan. Use of TLM water was prioritised and based on the following principles (proposed actions had to meet at least one of the following):

- sustain small, critical refuge areas for native plants and animals
- maintain critical connectivity between sites, and
- protect previous investments in environmental watering.

The CEWH made water available to South Australia to water a number of key sites including Carpark Lagoons at Katarapko, Markaranka, Murbpook Lagoon, Overland Corner, Paiwalla and Rocky Gully.

Water previously saved from reduced evaporative losses due to the closure of some regulated wetlands (25 GL) was used at a number of key sites in the Riverland including Banrock Station, Brenda Park Lagoon, Causeway Lagoon, Hart Lagoon, Jaeschke Lagoon, Lake Bonney, Lake Merreti, Morgan Conservation Park, Murbko, Mussel Lagoon Complex, Nelwart Swamp, Ngak Indau, Schillers Lagoon, Spectacle Lakes, Winding Creek and Yatco Lagoon.

The total volume used at non-icon site wetlands was approximately 29.8 GL (of 30.1 GL allocated), of which 15 GL was allocated from the shared resources through the disconnection of Euston Lakes.

Water was delivered to a number of sites that were regulated wetlands but temporarily disconnected from the River Murray to achieve evaporative water savings, six above normal pool level wetlands located above Lock 1 and 2 wetlands below Lock 1 that could not be inundated due to historically low water levels.

Sixteen disconnected wetlands received a rewetting and this included Lake Bonney and Jaeschke Lagoon. Many disconnected wetlands require longer periods of inundation to address groundwater risks, support vegetation communities and replenish seedbanks. The limited rewetting opportunities achieved:

- improved water quality conditions within the acceptable limits for aquatic flora and fauna
- improved groundwater conditions including freshwater lens replacement at Mussel Lagoon
- positive response from River Red Gums, and
- identification of the nationally-listed as vulnerable Southern Bell Frog at Schiller's Lagoon, Mussel Lagoons, Yatco Lagoon and Spectacle Lakes.

The Chowilla icon site is an extremely important ecological asset containing a mosaic of highly diverse aquatic and terrestrial habitats, supports the largest River Red Gum woodland in South Australia, increasingly recognised as an important Murray Cod refuge and supports 30 state and four nationally threatened species.

The total volume of water used in Chowilla across 19 sites was 4.3 GL and this water was sourced from the CEWH, TLM, New South Wales water and evaporative savings. A total of 523 hectares was watered, which is only 2.95% of the total Chowilla floodplain of 17,700 hectares (including 5,000 hectares in New South Wales).

A small amount of environmental water was used in the Coorong, Lower Lakes and Murray mouth icon site. A total of 8.1 ML was used to water two sites that support both Murray Hardyhead and Southern Pygmy Perch. Both species are threatened in South Australia. The watering provided improved water quality and connection with fringing vegetation.

7. REVIEW OF 2008–09 WATER USE IN QUEENSLAND

7.1 Water Planning and Management Overview

Queensland has Water Resource Plans (WRPs) in place in all its Murray-Darling Basin valleys, and consequently has provided a framework with a strong legislative basis, that limits diversions from watercourses, lakes, springs and overland flows. The focus of these plans has been 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 Water Resource Plans originally included, where available, the identification of unallocated water to address critical future water requirements and the regulation and management of the take of overland flow water. In September 2008, Queensland announced the gifting of 10.6 GL of this unallocated water to the Australian Government leaving only 5.5 GL held in reserve. Water allocations will be formally granted to the Commonwealth in the near future.

Water Resource Plans also provide for a water trading system to be established and outline the monitoring and reporting requirements for the plan outcomes.

Resource Operations Plans (ROPs) implement the provisions of the Water Resource Plans and have been in place for the Moonie catchment and Warrego, Paroo, and Nebine catchments since January 2006, with a resource operations plan for the Queensland section of the Border Rivers catchment finalised on 14 March 2008. The Condamine and Balonne Resource Operations Plan was finalised for the upper and middle parts of the plan area, excluding the Oakey-Gowrie Creek sub-catchment, on 12 December 2008. Water resources in the lower Balonne area, including the St George Water Supply Scheme, will continue to be managed under the interim water sharing arrangements currently in force. A moratorium notice was published concurrently with the release of the Condamine and Balonne Resource Operations Plan continuing the hold on the construction of works associated with surface water entitlement in the catchment that had not been converted to water allocations. The moratorium does not apply to water for stock and domestic purposes.

The take of water from watercourses in the Queensland Murray Darling Basin is now largely managed by limits on entitlements and water sharing rules. Works that increase the take of overland flow are also managed as assessable developments under the *Integrated Planning Act 1997*, and any increase in take by those works is prohibited unless it is for stock, domestic or environmental containment purposes.

7.1.1 Moonie, Warrego, and Paroo Rivers and Nebine Creek

This is the third year in which Cap arrangements have been in place for the Moonie, Warrego, Paroo, and Nebine catchments. Cap models have been submitted for accreditation and are currently being reviewed by the independent auditor. It is anticipated that accreditation of Cap models for the Moonie, Warrego, Paroo and Nebine catchments will be finalised in 2009–10.

Diversions reached 81% of the Cap target for the Moonie catchment, 32% for the Warrego, 86% for the Paroo and less than 2% for the Nebine catchment for the 2008–09 water year.

7.1.2 Border Rivers

A Cap proposal for the Queensland Border Rivers was noted by the Murray-Darling Basin Authority (Chief Executive acting as the Authority) on 26 March 2009 and further noted by the Murray-Darling Basin Ministerial Council at meeting one on 29 May, 2009. Queensland has reported on their compliance with the Cap

for the Queensland Border Rivers valley for 2008–09 with diversions reaching 85% of the approved Cap target. A Cap model for the Border Rivers has been submitted for accreditation and is currently being reviewed by the independent auditor. It is anticipated that accreditation of the Cap model for the Border Rivers catchment will be finalised in 2009–10.

An intergovernmental agreement that deals with interstate water sharing and access arrangements has been negotiated between Queensland and New South Wales. The access and sharing arrangements outlined in an interim agreement for the shared border watercourses were introduced on a trial basis in 2005–06 and have been continued with some modification under the New South Wales-Queensland Border Rivers Intergovernmental Agreement 2008, which was formally finalised by the two state governments early in 2009.

7.1.3 Condamine and Balonne

The Condamine and Balonne Resource Operations Plan was finalised for the upper and middle parts of the Condamine and Balonne Water Resource Plan (WRP) area, excluding the Oakey-Gowrie Creek sub-catchment, on 12 December 2008. Arrangements for the Oakey-Gowrie Creek sub-catchment have been excluded due to complexities associated with the re-use of water released from Toowoomba's waste water treatment plant. It will be included in the ROP through a later amendment.

The Lower Balonne area has been excluded from the ROP due to a legal action which may alter the provisions proposed for the Lower Balonne section of the Condamine and Balonne WRP area. A Cap proposal for the Condamine and Balonne valley will be submitted within six months of the completion of the water planning process, presently expected to be completed by mid 2010. Once the Cap figure has been determined, water use in the plan area will be audited annually to monitor compliance with the Cap. The Cap model will be submitted for review by the independent auditor following approval of the Cap submission.

Water sharing rules described in the WRP have been implemented in the Lower Balonne prior to the ROP being finalised. These rules provide for water harvesting access to be reduced under certain antecedent conditions to enhance flows for stock, domestic, environmental purposes and inundation of floodplains.

7.1.4 Metering

Queensland released a policy on metering water extractions in May 2005 providing a framework for metering across the state. This policy includes metering standards, details of ownership, maintenance and reading of meters, and proposed charging arrangements. The metering project will see the staged introduction of water metering for all unsupplemented water extractions across Queensland over the coming years.

Queensland has commenced metering projects in the Moonie and Warrego, Paroo, and Nebine ROP areas. About 60% of sites within these areas have been metered, with larger installations deferred pending resolution of issues associated with the national standards for metering. These installations will be completed in the 2009–10 year using pattern approved meters where possible.

7.1.5 Water Use Efficiency (WUE)

The third stage of the Rural Water Use Efficiency Initiative (RWUEI) continued through 2008–09 until its completion in June 2009, with funds available from the Queensland Government. Negotiations with rural industry are currently underway to implement the fourth stage of the RWUEI.

The RWUEI makes funds available to the major rural industry groups involved in irrigation to provide extension services to irrigators. Limited financial incentives are also available in certain cases to help irrigators improve their on-farm water management. Funding of industry programmes is on the basis of agreed milestones and targets being achieved. Industry programmes focus on water use and energy efficiency.

The activities and strategies adopted to achieve these outcomes include:

- one-on-one extension services
- on-farm evaluations of irrigation systems
- in-field trial work to investigate and demonstrate better practice
- assistance to irrigators through financial incentives schemes
- assistance with training of industry consultants, and
- a range of communication strategies

The initiative continues to invest in an industry development officer employed by Irrigation Australia Limited and is aiming to improve the standards of service delivery by irrigation consultants, contractors, suppliers and installers in Queensland.

The Department of Environment and Resource Management and QRAA provide financial support for water efficiency programmes aimed at innovative measures for water savings and water efficiency outcomes. Incentives for water efficiency projects are also provided by natural resource management groups in the Queensland section of the Basin.

Further information is available on the RWUE web site at http://www.derm.qld.gov.au/rwue/

7.2 Stream Flow and Water Use Overview

Queensland has traditionally reported on water use and stream flow performance based on a 'water year' extending from 1 October to 30 September. However, since 2008, the water year has been changed to run from 1 July to 30 June.

The summer rainfall period (November 2008 to March 2009) began with above-average rainfalls and subsequent small flows across the Queensland section of the Murray-Darling Basin in what was a promising start to the 2008–09 season. Isolated follow-up rainfall saw some smaller flows occur through until February 2009. Widespread rainfall in May and June 2009 resulted in a relatively unusual winter flow in most major streams to finish the year off much as it started – promisingly.

Flows in the lower Balonne were the exception for the year. Beardmore Dam overtopped in November 2007 for the first time since 2005, but in the 2008–09 year the storage again failed to fill, peaking at 78% in December 2008. However, significant stock domestic and environmental flows (58.6 GL) were passed to downstream reaches.

Overall rainfall across the Queensland valleys was about average, but falls were of uncharacteristically low intensity, with only infrequent sporadic heavy events resulting in stream flow.

A feature of the 2008–09 summer was a continuity of flow that occurred due to multiple rainfall events occurring over November, December and January across the area. This pattern of continuity was essentially a repeat of the 2007–08 experience, although the volumes were significantly lower and not interspersed with any major events.

The continuity in the 2007–08 and 2008–09 years was a marked contrast to the pattern of the preceding few years which were characterised by enduring drought conditions and no flow for long periods in a number of instances.

Table IV summarises the diversions from the Queensland catchments and the annual flow volumes for 2008–09 as measured at key sites. Flows were generally well below the long-term means despite near average rainfall. A lack of stream flow has resulted in well below average diversion figures.

Table IV: Summary for Queensland catchments 2008–09, excluding overland flow

Valley (gauging stations in brackets)	Flow 2008–09 (GL)	Mean annual flow (GL)	Diversion 2008–09 (GL)
Condamine Balonne			
Condamine upstream of Chinchilla Weir (Chinchilla)	88	519	74
Condamine and Balonne Chinchilla Weir to Beardmore (Weribone)	168	1,000	22
Maranoa (Cashmere)	<1	112	<1
Lower Balonne (St George)	60	979	76
Border			
Granite Belt (Farnbro)	30	74	8
Macintyre/Barwon (Goondiwindi)	261	970	100
Weir (Talwood)	43	140	39
Moonie (Fenton)	64	139	23
Nebine (Roseleigh)	8	only recently gauged	<1
Warrego (Cunnamulla)	44	305	3
Paroo (Caiwarro)	138	516	<1

Total end of system flows from Queensland valleys for the year was 391 GL, compared with more than 3,200 GL in 2007–08 (**Table V**).

Table V: Cross-Border flows — 2008–09 water year (GL), Queensland

Valley	Cross-Border flow
Paroo	138
Warrego	24
Nebine	8
Condamine-Balonne	51
Moonie	64
Border Rivers	106
Total	**391**

In-stream diversion across all valleys is estimated to be 345 GL, made up of a combination of supplemented diversion (allocation taken from regulated flow associated with public storages) and unsupplemented diversion (taken primarily from water harvesting practices).

Overland flow, in the form of upland flow capture, on-farm runoff and floodplain diversions are not included in the above figures. Where this has been assessed, either from modelling or regional appraisal in the key areas where water harvesting and floodplain diversion operate together, it is estimated that a further 38 GL of diversion has occurred.

Diversions in Queensland are highly variable owing to the ephemeral nature of flow in its streams. For example, the 2008–09 diversion contrasts distinctly from the record 876 GL diversion for 2007–08 and is more like the 2004–05 and 2005–06 water years.

Table VI shows diversion levels for the total Queensland valleys over the past 16 years. Diversions reflect the inherently variable nature of stream flow in the Queensland valleys.

Table VI: Queensland Basin diversions (excluding overland flow)

Report	Year	Diversions (GL)
1	1993–94	336
2	1994–95	176
3	1995–96	528
4	1996–97	467
5	1997–98	741
6	1998–99	609
7	1999–2000	541
8	2000–01	688
9	2001–02	341
10	2002–03	214
11	2003–04	815
12	2004–05	392
13	2005–06	306
14	2006–07	149
15	2007–08[3]	876
16	2008–09	345

3. Reporting for the Border Rivers and Condamine/Balonne catchments is for the period 1 October 2007 to 30 June 2008.

Remainder of catchments reported as per previous year (1 July to 30 June).

Notes: Water year reported prior to 2006 was 1 October to 30 September.

Water year reported post-2008 is 1 July to 30 June.

Public storages are comparatively few in both volume and number across the Queensland Basin valleys. Around one-third of these storages are used solely for urban supplies, with many of the other storages also used in part to supply urban needs. Despite an unusually late (June 2009) stream flow event boosting levels in most catchments, storage volumes in the larger storages generally finished the year at comparatively low levels, reflecting low average stream flows in the catchment over the 2008–09 period.

7.3 Warrego

Although some monthly rainfalls were significantly above average, total rainfall for the year was about average with 374 mm recorded at Cunnamulla for the 2008–09 year against an average annual rainfall of 368 mm. The characteristic spring and summer rainfall occurred, although it was low intensity and did not result in significant stream flow.

Average annual flow at Cunnamulla is 305 GL. Stream flow for the Warrego River at Cunnamulla for the 2008–09 water year was just 44 GL. This is significantly less than the record 1,765 GL that passed in 2007–08 and is amongst the lowest annual volumes recorded at this station since measurement began in 1992.

The relatively reliable summer flow pattern in the Warrego River continued though volumes were significantly below average. A flow late in the year (June) provided some relief in terms of stream flow volume.

Supplemented water diversion in this valley is limited to a small water supply scheme based on a 4.8 GL weir on the Warrego River at Cunnamulla. The announced allocation for the year was again 100%. Supplemented diversion was 1.8 GL out of a total entitlement of 2.6 GL.

There were three releases for stock domestic and environmental purposes at Alan Tannock Weir in September and October 2008. The weir usually overtops during a flow event so it is unusual for pass-flow provisions to be triggered in this system.

The majority of take is associated with unsupplemented water allocations with flow conditions (water harvesting). Diversion for 2008–09 was 1.2 GL.

There were two water harvesting events announced in the Lower Warrego Water Management Area for 2008–09. Take is measured by metered works; however, metering of some of the larger works has been deferred until national standards have been finalised. Queensland is intending to complete metering on these works during the latter part of the 2009–10 water year. Meters will be installed in accordance with manufacturer's specifications if pattern approvals are not available. Water use assessments are currently completed for each of these works.

Annual diversion of 6 GL (including an estimated additional 3 GL of overland flow harvesting) was only 32% of the Cap target of 19 GL.

Water entitlement holders did not fully avail themselves of access opportunities provided during the year for a number of reasons, including property development works and entitlements not fully developed.

7.4 Paroo

Rainfall recorded for 2008–09 at Hungerford in the southern part of the Paroo catchment was 207 mm. This was significantly below the total recorded last year and slightly below the long-term average of 292 mm. The peak monthly rainfall received was again in December with 51 mm falling – against the long-term median for December of 15 mm.

Stream flow at Caiwarro, the last gauged location on the Paroo in Queensland, was 138 GL for 2008–09. This is well below the average annual flow at Caiwarro of 516 GL (1968 to 2009) and significantly below the 1,449 GL recorded in 2007–08. Nevertheless, a number of small flows spread throughout the year resulted in stream flow being recorded for 235 days, comparing favourably with the average of 216 days per year.

No supplemented water supply exists in this catchment. There are only two unsupplemented water allocations in the Paroo catchment. Diversion was 16 ML with 10 ML of that taken for town water supply at Hungerford.

There was an estimated additional 1 GL of overland flow taken.

Total annual diversion of 1 GL was 83% of the 2008–09 Cap target of 1.2 GL.

7.5 Nebine

Rainfall was above average in the Nebine catchment with 466 mm recorded at Mulga Downs for the 2008–09 water year against a long-term average of 397 mm. The peak monthly total of 85 mm was recorded in June 2009 and was the highest recorded June fall since 1948.

Mean annual flow from the Nebine catchment (including the Noorama and Widgeegoara creeks) is estimated at 33 GL per year. Flows discharge into the Culgoa River in New South Wales.

The new gauging station installed at Roseleigh Crossing (on Nebine Creek) now has two full years of recording. This gauging station is 10.5 km upstream of the Queensland/ New South Wales border. A number of small flow events occurred primarily in the summer period (January-February, plus the unusual June event), at the Roseleigh Crossing station. The events in Wallam Creek at Cardiff (upstream of Bollon) were in November 2008 and February 2009.

Flows in Wallam Creek at Cardiff and Nebine Creek at Roseleigh for 2008–09 totalled around 5 GL and 8 GL respectively. Records for the Nebine catchment are relatively recent, so recorded averages are not discussed as the figures are not indicative of long-term values.

No supplemented water supply exists in this catchment. There are only four unsupplemented water allocations in the Nebine catchment. Diversion was 15 ML with 10 ML of this volume taken for the town water supply at Bollon.

Overland flow take for the catchment is estimated at 70 ML based on a broad assessment of development and opportunity.

Annual diversion of 85 ML (including overland flow take) was 2% of the Cap target of 5 GL.

7.6 Moonie

Rainfall was above average across the catchment during 2008–09. Rainfall in Nindigully, located on the Moonie River in the south west of the catchment, was 572 mm for the year, compared with the long-term average of 501 mm. The peak monthly total of 124 mm recorded in May 2009 was the third highest total for that month since recording began in 1889.

Stream flow for the Moonie River at Fenton, the most downstream gauge in Queensland, was 64 GL in 2008–09. This was less than half the recorded annual average at this site of 139 GL.

There were a number of small flows throughout the December 2008 to March 2009 period with a subsequent moderate flow peaking at nearly 12 GL a day in late May 2009.

No supplemented water supply exists in this catchment. The majority of the 32 water

allocations in this catchment have flow conditions that relate to the take from watercourses (water harvesting). The summer flow period provided some water harvesting opportunity, although take was primarily in the May/June period. In-stream diversion for 2008–09 has been estimated at 23 GL.

Take is measured by metered works. However, metering of some of the larger works has been deferred until national standards have been finalised. Queensland is intending to complete metering on these works during the later part of the 2009–10 water year. Meters will be installed in accordance with manufacturer's specifications if pattern approvals are not available. Water use assessments are currently completed for each of these works.

Overland flow-take from floodplain flows for the catchment is estimated at 6 GL based on a broad assessment of infrastructure development and opportunity. Overland flow take is included in the Cap volume for the Moonie catchment.

The 2008–09 annual diversion for the Moonie Valley was 29 GL (including the floodplain component of overland flow), which is 81% of the Cap target of 36 GL.

7.7 Queensland Border Rivers

Rainfall was generally slightly above average across the Border Rivers area over the year with well above average rainfall recorded across the catchment in November 2008 and May 2009. Records at Stanthorpe, Inglewood and Goondiwindi all show November 2008 as the peak month with around double the long-term average rainfall recorded.

Goondiwindi, located centrally in the catchment, recorded 634 mm rainfall for the year against a long-term average of 615 mm. Stanthorpe recorded 757 mm against an average of 754 mm, while Inglewood recorded below average falls of 546 mm against an average of 644 mm.

Flows in the 'Granite Belt' area (the upper catchment) occurred primarily during November/December 2008 with a large subsequent flow in May/June 2009. The latter flow peaked at over 9.5 GL a day.

Nearly 40 GL passed through the Macintyre Brook catchment this year, while the average flow is 36 GL. The majority of this volume passed through in a large event in November 2008, when the 11 GL a day peak was the second highest on record, with the remainder passing in numerous small flows well spread throughout the year.

The Weir River performed below average with only 43 GL passing Talwood in one moderate and five small flows spread evenly over the year. Mean annual flow at Talwood is 140 GL.

The trunk stream (Dumaresq/Macintyre/Barwon) recorded three small and two minor events in November 2008 to February 2009 and in May 2009. The maximum flow peak recorded was just under 16 GL a day. Over the 2008–09 year, 261 GL passed Goondiwindi in total. These flows include supplemented releases from the dam storages in the catchment which kept the stream 'wetted up' over the period. While the total is a little more than last year it is still well below the annual average of 970 GL.

Flow over Mungindi Weir totalled about 106 GL, a similar figure to that recorded over the last four years.

There are two major water supply storages in the Queensland part of the Border Rivers catchment. At 1 July 2008, Glenlyon Dam, the major storage for the Borders Rivers Water Supply Scheme (BRWSS), was at 35% capacity with around 27 GL available for general use from the Queensland share of the storage. Despite small inflows in December 2008 and May 2009, the storage finished the year at 24% capacity with around 15 GL available for use from the Queensland share.

Coolmunda Dam on Macintyre Brook is the major storage for the Macintyre Brook Water Supply Scheme. This scheme now operates on continuous accounting. Coolmunda Dam started the year at 71% capacity (49 GL) with 24.9 GL in storage accounts and, despite small inflows in November 2008 and May 2009, finished the year just under 40% capacity with 13.5 GL in storage accounts (excluding the 7.6 GL in the BRWSS account).

In the 12 months to 30 June 2009, 32.3 GL of supplemented water was diverted within the Border Rivers Water Supply Scheme. This included supplemented take from releases from Glenlyon Dam, run of the river flows and 3.8 GL provided from the Macintyre Brook Water Supply Scheme. The take of water transferred from New South Wales (9.2 GL net) is also included in the total.

A total of 13.1 GL of supplemented water was diverted in the Macintyre Brook Water Supply Scheme.

The minor flows predominately over summer triggered water harvesting (unsupplemented water) access under the water sharing rules on the Border Rivers with 54.4 GL diverted over five events. Water harvesting thresholds were also triggered in the Weir River with 38.6 GL diverted in this catchment over a number of events. A further 8.4 GL was diverted for both water harvesting and irrigation purposes in the Granite Belt area, taking the total unsupplemented diversions in the Border Rivers to 101.3 GL for 2008–09.

The majority of diversion in this catchment is metered. Essentially all take under water allocations is metered and take under water licences is primarily unmetered.

The Cap target for the Border Rivers has been calculated on an interim basis at this time as the hydrologic model for the valley has not been accredited.

The 2008–09 annual diversion for the Border Rivers valley was 157 GL (including 10 GL from overland flow harvesting), which is 86% of the trade adjusted Cap target of 183 GL. This Cap target has also been increased by the observed overland flow harvesting in the valley of 10 GL.

7.8 Condamine-Balonne

7.8.1 Condamine

Rainfall was generally slightly below average across the Condamine area. Annual rainfall across the area varied from 550-650 mm against a long-term average of 670 mm. The summer rainfall was significantly below average, though heavy falls in November 2008 generated moderate stream flow.

The highest monthly total for the upper and middle areas was received in November 2008, with nearly double the long-term average recorded. The records indicate a more even spread of rain across the year at Chinchilla, representative of conditions in the lower part of the Condamine catchment.

The flow event in November 2008 along with the subsequent December event passed along the entire Condamine system, with the later May and June events not passing into the middle catchment area. A small event occurred in the lower catchment at this time, though this was generated primarily by tributary inflow. All events were sufficient to provide access to water harvesting.

A total of 103 GL passed Cotswold at the end of the Condamine system in 2008–09, compared with the long-term average of 620 GL. The flow past Chinchilla (located upstream) for the same period totalled 88 GL.

The major storage for the Upper Condamine Water Supply Scheme, Leslie Dam, started the year at 15% capacity and, with only minor inflow recorded in November 2008 and May 2009, it finished at 13%. No irrigation water was supplied from the storage during the year.

Chinchilla Weir started the year at 65% capacity and filled in the November 2008 flow events. The weir over topped again in February 2009 and finished the year at 70%. Announced allocation for the Chinchilla Weir Water Supply Scheme was 100%. This water supply scheme operates on a 1 October to 30 September water year.

A total of 23.7 GL of supplemented water was diverted in the Condamine catchment in 2008–09, with 20.9 GL diverted in the Upper Condamine Water Supply Scheme and 2.8 GL at Chinchilla.

Two moderate flows occurred over the summer period which triggered water harvesting access along the trunk stream, with access also occurring in most tributaries over this period. Subsequent flows in May 2009 and June 2009 did not extend along the entire trunk system though they also provided access in tributaries in the upper and lower sections of the Condamine. There were six water harvesting events announced over the period in the Upper Condamine Water Management Area.

The volume of unsupplemented water taken over 2008–09 is estimated at 60.7 GL with the total split relatively evenly between the upper, middle and lower sections of the Condamine. About 10 GL of this total was diverted for direct irrigation with 5.3 GL taken from flows supplemented by treated waste water discharged from Toowoomba into the Gowrie-Oakey Creek system.

About 50% by volume of water harvesting diversion in the Condamine catchment area is metered.

7.8.2 Balonne

Rainfall in the Balonne and Maranoa was slightly below average at both St George and Mitchell with recorded rainfall in the order of 450 mm and long-term averages in the range 500-550 mm. St George recorded the wettest September since 1970 with a peak monthly total of 80 mm. Conversely, March 2009, with just 0.3 mm, was very dry.

The well above-average rainfall recorded in September 2008 resulted in only a small flow with a moderate flow occurring in the upper Balonne (comprising flow from the Condamine plus tributary inflow) in late November/early December 2008. This flow essentially carried on until mid-January 2009. Subsequent flows in February and May 2009 maintained much of the trunk stream in good condition with most waterholes full at the end of the year. This was not the case in the Maranoa which recorded its lowest year since 1978 with 88 ML passing compared with an average of 112 GL.

Beardmore Dam started the year at 42% and had a very small inflow in September 2008 followed by good inflows from November 2008 to February 2009 with storage reaching 75% before falling to finish the year at 53%.

Inflows up to 730 ML a day may be passed downstream for stock and domestic supplies, or are sometimes held in storage for later release to maximise benefit to downstream water users. A total of 58.6 GL of stock and domestic pass flow was released downstream over four release events, with significant environmental benefits in this otherwise very dry year.

A total of 75.9 GL (including 55 ML from the Maranoa Water Supply Scheme) was diverted from water supply schemes as supplemented water.

Flows in the upper Balonne (and tributary) area resulted in the triggering of a small number of flow condition based water allocations upstream of Beardmore Dam. Total estimated take of unsupplemented water is 11.6 GL, of which about 70% was taken from the trunk stream.

Diversion did not occur in the areas downstream of St George and there was also very little opportunity in the Maranoa catchment.

The water planning process has not yet been completed for this valley; therefore it was not possible to provide Cap target comparisons for 2008–09.

Table 6: Water Diversions in Queensland since 1993–94

Years	Diversion (GL)
2008–09	383
2007–08	1054
2006–07	160
2005–06	316
2004–05	392
2003–04	815
2002–03	214
2001–02	341
2000–01	688
1999–2000	541
1998–99	609
1997–98	741
1996–97	467
1995–96	520
1994–95	176
1993–94	338

8. REVIEW OF 2008–09 WATER USE IN THE AUSTRALIAN CAPITAL TERRITORY

8.1 Review of Water Use in the Australian Capital Territory

The Australian Capital Territory experienced again significantly lower than average rainfall during 2008–09. Stage 3 water restrictions continued to be in place throughout the reporting period. The maintenance of these restrictions on water use and the Australian Capital Territory Government's demand management programs contributed to the Australian Capital Territory's very low net diversions of 19 GL for the year 2008–09 (second lowest on record from 1989–90) and related low gross urban diversions of 45 GL. Metered non-urban consumption was 1.5 GL. Total returns were 28 GL.

Water storages supplying the Canberra and Queanbeyan urban water supply have been over 40%.

8.2 Progress of Water Reforms in the Australian Capital Territory

Water management in the Australian Capital Territory is administered through the *Water Resources Act 2007*. The *Water Resources Act 2007* replaced the *Water Resources Act 1998* and in doing so implemented a number of reforms relevant to the implementation of the National Water Initiative. The Act and its related instruments incorporate the Australian Capital Territory's water plan.

At the May 2008 Murray–Darling Basin Ministerial Council there was agreement for a Cap for the Australian Capital Territory. The agreed Cap position also allows the Australian Capital Territory to retain its accumulated Cap credits.

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 and subsequently in 2004 as the *National Water Initiative*.

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, while 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 2008–09 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. Permanent trade now occurs as tagged trade, where the entitlement remains with the originating (selling) valley, but the water use takes place in the destination valley. The Cap target in the originating valley is reduced and that in the destination valley is increased by the volume of water used in the destination valley. 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 2008–09. 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: Net water Entitlement Transfers in 2008–09

System	Trade data not affecting Cap		Trade data affecting Cap			
	Total Intra-valley Entitlement (Permanent) Sold[1] (GL)	Total Allocation (Temporary) Sold[2] (GL)	Net Tagged Trade Inwards[3] (GL)	Net Temporary Trade Inwards[3] (GL)	Adjustment to this year's Cap for previous Permanent Trade (GL)	Total Trade Adjustment to this year's Cap Target (GL)
New South Wales						
Border Rivers	0	9.9	0	-9.5	0	-9.5
Gwydir	24.6	58.3	0	0	0	0
Namoi/Peel	4.8	13.2	0	0	0	0
Macquarie/Castlereagh/Bogan	11.3	16.3	0	0	0	0
Barwon-Darling	0	0	0	0	0	0
Lower Darling	0.5	36.3	0	-27.1	0	-27.1
Lachlan	20.7	8.2	0	0	0	0
Murrumbidgee	130.7	630.6	0	-390.0	0	-390.0
Murray	44.4	256.1	0	-135.7	-2.4	-138.1
Total New South Wales	**237.1**	**1,028.9**	**0**	**-562.3**	**-2.4**	**-564.7**
Victoria[4]						
Goulburn	67.8	133.4	-5.7	9.5	0	-
Broken	0.8	4.4	0	-1.1	0	-
Loddon	13.5	31.6	-1.1	-0.7	0	-
Total Goulburn/Broken/Loddon[7]	**82.2**	**169.4**	**-6.8**	**7.6**	**-109.4**	**-106.9**
Campaspe[6]	18.1	27.7	-1.6	32.0	0	28.7
Wimmera-Mallee	1.9	0	0	1.6	0	1.6
Kiewa	0	0.9	0	0	0	-
Ovens	0.8	1.4	0	0	0	-
Murray	154.6	187.2	8.4	175.4	0	-
Total Kiewa/Ovens/Murray	**155.4**	**189.5**	**8.4**	**175.4**	**74.4**	**258.2**
Total Victoria	**257.5**	**386.5**	**0**	**216.5**	**-35.0**	**181.6**
South Australia						
Metro-Adelaide and associated country areas[5]	0	0	0	0	0	0
Lower Murray Swamps	2.0	2.2	0	-1.5	-7.6	-9.1
Country Towns	0	0	0	6.1	0	6.1
All Other Purposes	0.4	3.6	0	331.8	40.0	371.7
Total South Australia	**2.5**	**5.9**	**0**	**336.3**	**32.4**	**368.7**
Queensland						
Condamine/Balonne	3.0	13.0	0	0	0	0
Border Rivers	14.4	5.1	0	14.1	0	14.1
Macintyre Brook	7.5	3.0	0	-4.6	0	-4.6
Moonie	0	0	0	0	0	0
Nebine	0	0	0	0	0	0
Warrego	13.6	0.8	0	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	**38.5**	**21.9**	**0**	**9.5**	**0**	**9.5**
Australian Capital Territory	**0**	**0**	**0**	**0**	**0**	**0**
Total Basin	**535.6**	**1,443.3**	**0**	**0**	**-5.0**	**-5.0**

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. The Metro-Adelaide and associated country areas Cap component is non-tradable, unless the ministerial council determines otherwise.
6. Adjustment for Campaspe equals water transferred via Goldfields superpipe. All other trades are effected by changing the Rochester pumped diversions.
7. Goulburn/Broken/Loddon Cap adjustment reduces by the total water transferred via the Goldfields superpipe.

10. WATER AVAILABILITY FOR THE YEAR 2008–09

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 used 63% of the water that they had been authorised to use in the previous five 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 2008–09 (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 Rivers, Gwydir and Namoi valleys in New South Wales 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 New South Wales, Victoria and South Australia. 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% or if a storage spills and carryover

can also be reduced to allow for increased evaporations. **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, carryover 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 some regulated streams during periods when storages are spilling or there are unregulated flows by declarations of off-allocation periods. 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 New South Wales, the off-allocation has been redesignated as supplementary access and requires separate licence

Water harvesting licences have been issued in most Queensland streams and are presently being converted into tradable water allocations. Irrigators with these licences are limited by their diversion capacity (pump size) and by the flow at which they can commence to pump. The total volume able to be pumped is also limited in those areas where a resource operations plan has been finalised. 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. However this availability can be limited by the low flows in the stream.

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 subtracted from the diversions to determine the use of allocated water. 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, a separate allocation has been made to a conveyance entitlement to provide 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 Victoria, 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 an 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 2008–09 utilisation of 70% is sixth lowest since Cap accounting started in 1997–98. This appears quite surprising given dry conditions continuing during 2008–09. But this also reflects the nature of allocation management which is inherently uncertain. If resource situation improves, improvements in allocation are progressively announced during the irrigations; but planting decisions which determine the water resources utilisation, have to be taken early in the irrigation season. The improvement in the resource availability may have come too late to be utilised. Due to the continuing dry spell, irrigators may be reluctant to take risk and unwilling to plant in anticipation of improvement in water availability. This may partly explain comparatively low utilisation.

It is expected that diversion, as a percentage of the water allocated, will fluctuate from year to year. This depends 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 as percentage of the allocated volume since 1997–98.

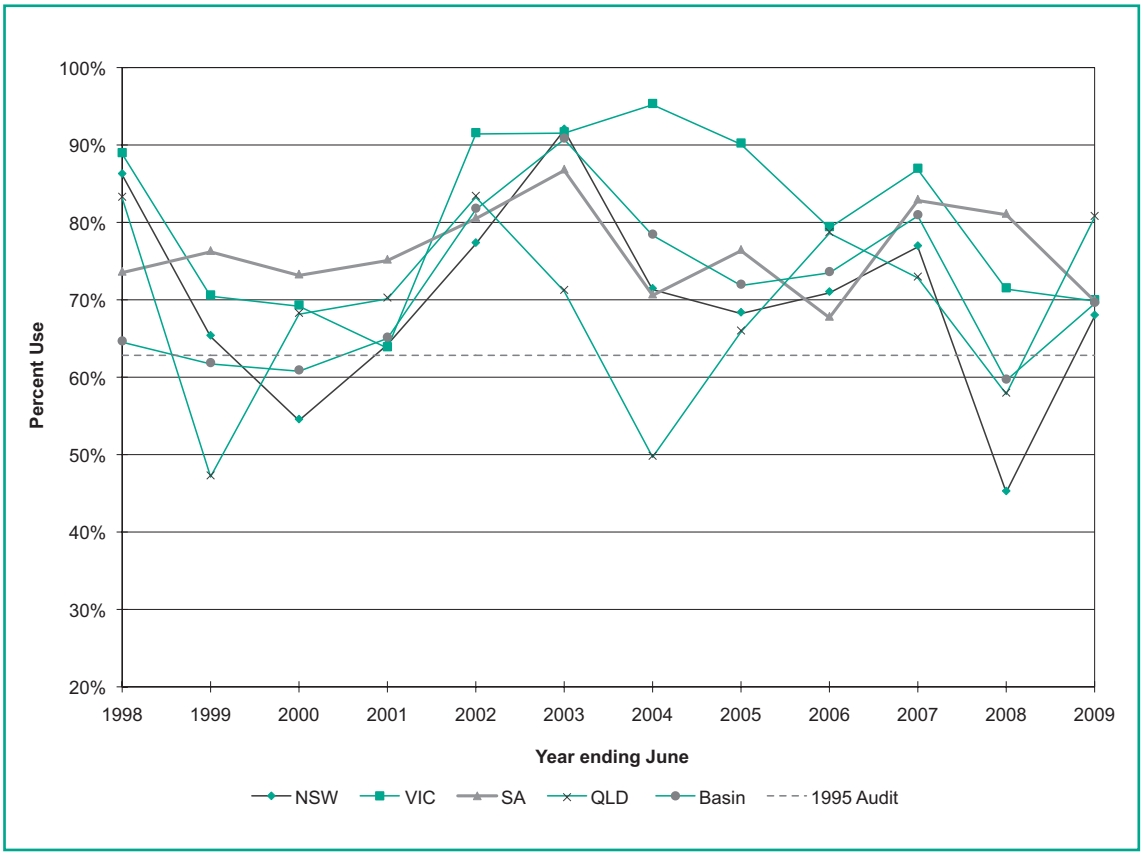


Table 8: Water Allocated in 2008–09

System	Base valley water Entitlement (GL)[1]	Announced Allocation (GL)[2]	Net Carryover/ Overdraw from 2007–08 (GL)[5]	Water available under Continuous Accounting (GL)[3]	Allocation Transferred into Valley (GL)[4]	Net Trade in from Environment (GL)	Total Allocated water in Valley (GL)[6]
New South Wales							
Intersecting Streams	18	0	0	0	0	0	0
Border Rivers[3]	413	38	70	108	-9	0	98
Gwydir[3]	754	21	109	130	0	0	130
Namoi/Peel[3]	551	114	28	142	0	0	142
Macquarie/Castlereagh/ Bogan	793	106	53	-	0	0	159
Barwon-Darling	173	0	0	-	0	0	0
Lower Darling	347	52	18	-	-27	0	43
Lachlan	720	29	5	-	0	0	34
Murrumbidgee	2,959	816	258	-	-390	2	686
Murray	2,367	380	159	-	-136	8	412
Total New South Wales	**9,096**	**1,556**	**700**	**380**	**-562**	**11**	**1,705**
Victoria							
Goulburn	909	235	62	-	4	0	301
Broken	43	2	7	-	-1	0	8
Loddon	365	75	16	-	-2	0	89
Campaspe	371	60	18	-	30	0	108
Wimmera-Mallee	182	150	0	-	2	0	152
Kiewa	20	1	0	-	0	0	1
Ovens	63	38	0	-	0	0	38
Murray	1,548	468	168	-	184	0	819
Total Victoria	**3,501**	**1,028**	**271**	**0**	**217**	**0**	**1,515**
South Australia							
Metro-Adelaide and associated country areas	150	150	0	-	0	0	150
Lower Murray Swamps	52	9	4	-	-2	0	12
Country Towns	50	31	0	-	6	0	37
All Other Purposes	621	120	92	-	332	-50	494
Total South Australia	**873**	**310**	**96**	**0**	**336**	**-50**	**693**
Queensland							
Condamine/Balonne	126	120	0	0	0	n/a	120
Border Rivers	85	30	0	0	14	n/a	45
Macintyre Brook	19	19	0	0	-5	n/a	14
Moonie	0	0	0	0	0	n/a	0
Warrego	3	3	0	0	0	n/a	3
Paroo	0	0	0	0	0	n/a	0
Total Queensland	**233**	**172**	**0**	**0**	**9**	**n/a**	**182**
Australian Capital Territory[8]	**0**	**0**	**0**	**0**	**0**	**n/a**	**0**
Total Basin	**13,702**	**3,067**	**1,067**	**380**	**0**	**-39**	**4,094**

1. Sum of the volumetric entitlements in valley (in New South Wales 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 New South Wales this includes high security entitlements.
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.

Net temporary inter-valley entitlement transfer from **Table 7**.

4. Net Carryover from Previous Year (see **Table 9**).
5. Allocated water = announced allocation or permitted use under continuous accounting + inter-valley trade + net carryover from last season (in New South Wales the addition of high security entitlements are also included).
6. The gazetted allocation for metro Adelaide and associated country areas and Country Towns.
7. There is no formal entitlement in the Australian Capital Territory to date.
8. There is no formal entitlement in ACT to date.

Table 9: Carryovers for 2008–09

System	Carryover from 2007–08 (GL)	Less Carryover cancelled in 2008–09 (GL)	Less Overdraw used in 2007–08 (GL)	Plus Overdraw cancelled in 2008–09 (GL)	Plus Overdraw from 2009–10 (GL)	Net Carryover for 2008–09 (GL)
New South Wales						
Intersecting Streams	0	0	0	0	0	0
Border Rivers	70	0	0	0	0	70
Gwydir	109	0	0	0	0	109
Namoi/Peel	28	0	0	0	0	28
Macquarie/Castlereagh/Bogan	53	0	0	0	0	53
Barwon-Darling	0	0	0	0	0	0
Lachlan	5	0	0	0	0	5
Murrumbidgee	258	0	0	0	0	258
Lower Darling	18	0	0	0	0	18
Murray	159	0	0	0	0	159
Total New South Wales	**700**	**0**	**0**	**0**	**0**	**700**
Victoria						
Goulburn	63	0	0	0	0	62
Broken	7	0	0	0	0	7
Loddon	16	0	0	0	0	16
Campaspe	18	0	0	0	0	18
Wimmera-Mallee	0	0	0	0	0	0
Kiewa	0	0	0	0	0	0
Ovens	0	0	0	0	0	0
Murray	168	0	0	0	0	168
Total Victoria	**271**	**1**	**0**	**0**	**0**	**271**
South Australia						
Metro-Adelaide and associated country areas	0	0	0	0	0	0
Lower Murray Swamps	4	0	0	0	0	4
Country Towns	0	0	0	0	0	0
All Other Purposes	92	0	0	0	0	92
Total South Australian	**96**	**0**	**0**	**0**	**0**	**96**
Queensland						
Condamine/Balonne	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0
Macintyre Brook	0	0	0	0	0	0
Moonie	0	0	0	0	0	0
Warrego	0	0	0	0	0	0
Paroo	0	0	0	0	0	0
Total Queensland	**0**	**0**	**0**	**0**	**0**	**0**
Australian Capital Territory	**0**	**0**	**0**	**0**	**0**	**0**
Total Basin	**1,067**	**1**	**0**	**0**	**0**	**1,067**

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 overdraws used during last year plus overdraw permitted this year.

Table 10: Use of Allocated water in 2008–09

System	Diversion from Valley (GL)	Diverted from other Valleys (GL)	Less supplementary Access, water-Harvesting use and Land Surface Diversions (GL)	Less Unregulated Stream Use (GL)	Less Diversions not in Allocation (GL)	Use of Allocated water in Valley (GL)
New South Wales						
Intersecting Streams	3	0	0	3	0	0
Border Rivers	137	0	64	19	0	54
Gwydir	154	0	52	10	0	91
Namoi/Peel	188	0	65	78	0	45
Macquarie/Castlereagh/Bogan	106	0	0	40	0	66
Barwon-Darling	149	0	0	149	0	0
Lower Darling	9	0	0	0	0	9
Lachlan	40	0	0	15	0	24
Murrumbidgee	602	0	2	42	0	558
Murray	341	0	0	28	0	313
Total New South Wales	**1,729**	**0**	**184**	**385**	**0**	**1,160**
Victoria						
Goulburn	614	-260	0	5	119	230
Broken	10	0	0	2	3	6
Loddon	4	106	0	0	32	78
Campaspe	26	101	0	0	46	81
Wimmera-Mallee	11	10	0	0	4	17
Kiewa	5	0	0	5	0	0
Ovens	25	0	0	8	0	18
Murray	807	41	0	4	214	630
Total Victoria	**1,503**	**-1**	**0**	**23**	**418**	**1,061**
South Australia						
Metro-Adelaide and associated country areas	150	0	0	0	0	150
Lower Murray Swamps	10	0	0	0	0	10
Country Towns	37	0	0	0	0	37
All Other Purposes	288	0	0	0	0	288
Total South Australia	**485**	**0**	**0**	**0**	**0**	**485**
Queensland						
Condamine/Balonne	190	0	79	11	0	100
Border Rivers	143	0	96	15	0	32
Macintyre Brook	14	0	1	0	0	13
Moonie	29	0	29	0	0	0
Warrego	6	0	4	0	0	2
Paroo	1	0	1	0	0	0
Total Queensland	**383**	**0**	**209**	**27**	**0**	**147**
Australian Capital Territory	**19**	**0**	**0**	**0**	**0**	**n/a**
Total Basin	**4,119**	**-1**	**393**	**435**	**418**	**2,853**

1. 'Diversion 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.

Table 11: Use of Valley Allocations in 2008–09

	Total Allocated Water in Valley[3] (GL)	Use of Allocated Water in Valley (GL)	Use as a % of Authorised Valley Use (%)
New South Wales			
Intersecting Streams[1]	0	0	n/a
Border Rivers[1]	98	54	54%
Gwydir[1]	130	91	70%
Namoi/Peel[1]	142	45	31%
Macquarie/Castlereagh/Bogan	159	66	41%
Barwon-Darling[1]	0	0	n/a
Lower Darling[1]	43	9	21%
Lachlan	34	24	71%
Murrumbidgee	686	558	81%
Murray	412	313	76%
Total New South Wales	**1,705**	**1,160**	**68%**
Victoria			
Goulburn	301	230	77%
Broken	8	6	73%
Loddon	89	78	88%
Campaspe	108	81	75%
Wimmera-Mallee	152	17	12%
Kiewa	1	0	43%
Ovens	38	18	47%
Murray	819	630	77%
Total Victoria	**1,515**	**1,061**	**70%**
South Australia			
Metro-Adelaide and associated country areas[1]	150	150	100%
Lower Murray Swamps	12	10	87%
Country Towns	37	37	100%
All Other Purposes	494	288	58%
Total South Australia	**693**	**485**	**70%**
Queensland			
Condamine/Balonne[1]	120	100	83%
Border Rivers[1]	45	32	72%
Macintyre Brook[1]	14	13	92%
Moonie[1]	0	0	n/a
Warrego[1]	3	2	68%
Paroo[1]	0	0	n/a
Total Queensland	**182**	**147**	**81%**
Australian Capital Territory	**0**	**0**	**n/a**
Total Basin	**4,094**	**2,853**	**70%**

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 and associated country areas for 2008–09 is the amount that could be used before the five-year Cap of 650 GL would be exceeded.
3. Allocated water from **Table 8**.

11. ENVIRONMENTAL WATER AND CAP ADJUSTMENTS

Environmental water is the water used for environmental purposes. Protecting, maintaining and/or enhancing the riverine or terrestrial environment are all considered environmental purposes. Environmental water may be provided without creating any legal right or entitlement to water for the environment. However, providing environmental water by way of creating legally recognised right to water for the environment, called environmental entitlement, is preferred. Environmental entitlements are created through relevant State/Commonwealth legislation as continuing entitlements to water to be used for environmental purposes. Environmental water may be created by several means, for example, through purchase of non-environmental entitlements and water savings.

Environmental water that is recovered through savings or other mechanisms for the Snowy and River Murray system, in some cases, require adjustment to the Cap in valleys where this water is recovered or used. Different states treat environmental allocations and environmental uses differently. This affects the timing and manner of Cap adjustment. Ministerial council meeting 45 – 23 May, 2008 adopted a protocol for adjusting Caps for environmental entitlements and uses. The protocol provides for different methods for adjusting the Cap. However, a state must seek approval of the Murray-Darling Basin Authority of its proposed method of adjusting the Cap for environmental water. The protocol requires the authority to receive data from the states on environmental entitlements created, allocations for environment use, trade in environmental entitlements and allocations, and Cap adjustments for environmental use to be reported and report the information in the *Water Audit Monitoring Report*. The collated data received from the states related to these matters given in **Table 12 – Table 15**. Total water available for environmental use was 110 GL and total environmental use was 35 GL, total net consumptive environmental use was 61 GL. The Cap adjustment for environmental use was 109 GL.

Table 12: Environmental Water Entitlements in 2008–09

System	Total Environmental Entitlements			Entitlements created from savings made outside the Cap		
	High Reliability Entitlement (GL)	Low Reliability Entitlement (GL)	Environmental Supplementary Access Entitlement (GL)	High Reliability Entitlements (GL)	Low Reliability Entitlements (GL)	Environmental Supplementary Access Entitlements (GL)
New South Wales						
Intersecting Streams	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0
Gwydir	0	31	2	0	0	0
Namoi/Peel	0	0	0	0	0	0
Macquarie/Castlereagh/ Bogan	0	27	2	0	0	0
Barwon-Darling	0	8	0	0	0	0
Lachlan	0	50	0	0	12	0
Murrumbidgee	58	74	23	35	0	0
Lower Darling	1	48	250	0	0	0
Murray	37	45	100	4	0	0
Total New South Wales	**95**	**284**	**378**	**38**	**12**	**0**
Victoria						
Goulburn	16	141	0	0	-5	0
Broken	1	0	0	0	0	0
Loddon	2	2	0	0	0	0
Campaspe	0	6	0	0	0	0
Wimmera-Mallee	41	0	0	0	0	0
Kiewa	0	0	0	0	0	0
Ovens	0	0	0	0	0	0
Murray	93	276	0	0	-3	0
Total Victoria	**152**	**425**	**0**	**0**	**-8**	**0**
South Australia						
Metro-Adelaide and 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	35	0	0	0	0	0
Total South Australia	**35**	**0**	**0**	**0**	**0**	**0**
Queensland						
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a
Macintyre Brook	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
Warrego	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
Total Queensland	**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**
Total Basin	**283**	**708**	**378**	**38**	**4**	**0**

Table 13: Environmental Water Allocations in 2008–09

System	Environmental Allocation (GL)	Net availability of Carryover (GL)	Environmental Allocation borrowed by Non environmental Users (GL)	Use of Environmental Supplementary Access Entitlements (GL)	Net Trade in from Non-environmental Allocations (GL)	Net Transfer in from Environmental Allocations in other Valleys (GL)	Water Available for Environmental Use (GL)	Water made available to Environment as the result of savings outside the Cap (GL)
New South Wales[1]								
Intersecting Streams	0	0	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0	0	0
Gwydir	0	1	0	0	0	0	2	0
Namoi/Peel	0	0	0	0	0	0	0	0
Macquarie/Castlereagh/ Bogan	2	3	0	0	0	0	5	0
Barwon-Darling	0	0	0	11	0	-11	0	0
Lachlan	0	0	0	0	0	0	0	0
Murrumbidgee	48	4	0	0	-2	-44	6	35
Lower Darling	0	0	0	0	0	0	0	0
Murray	18	3	0	0	-8	-5	7	4
Total New South Wales	**68**	**11**	**0**	**12**	**-11**	**-60**	**20**	**38**
Victoria								
Goulburn	14	0	0	0	0	-5	9	0
Broken	0	0	0	0	0	0	0	0
Loddon	0	0	0	0	0	0	0	0
Campaspe	0	0	0	0	0	0	0	0
Wimmera-Mallee	1	0	0	0	0	0	1	0
Kiewa	0	0	0	0	0	0	0	0
Ovens	0	0	0	0	0	0	0	0
Murray	34	71	-81	0	0	-3	21	4
Total Victoria	**49**	**71**	**-81**	**0**	**0**	**-8**	**31**	**4**
South Australia								
Metro-Adelaide and associated country areas	0	0	0	0	0	0	0	0
Lower Murray Swamps	0	0	0	0	0	0	0	0
Country Towns	0	0	0	0	0	0	0	0
All Other Purposes	2	0	0	0	50	6	59	0
Total South Australia	**2**	**0**	**0**	**0**	**50**	**6**	**59**	**0**
Queensland								
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
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	**119**	**82**	**-81**	**12**	**39**	**-62**	**110**	**42**

1. New South Wales currently not reporting rules based entitlements, water including Barmah Millewa Forest allocation.

Table 14: Environmental Water Use in 2008–09

System	Total Use of Environmental Allocations (GL)	Consumptive Use of Environmental Allocations (GL)	Consumptive Environmental Use not covered by an Entitlement (GL)	Total Consumptive Environmental Use (GL)
New South Wales				
Intersecting Streams	0	0	0	0
Border Rivers	0	0	0	0
Gwydir	0	0	0	0
Namoi/Peel	0	0	0	0
Macquarie/Castlereagh/Bogan	0	0	0	0
Barwon-Darling	0	0	0	0
Lachlan	0	0	0	0
Murrumbidgee	2	2	0	2
Lower Darling	0	0	0	0
Murray	2	2	0	2
Total New South Wales	**4**	**4**	**0**	**4**
Victoria				
Goulburn	4	1	0	1
Broken	0	0	0	0
Loddon	0	0	1	1
Campaspe	0	0	0	0
Wimmera-Mallee	0	0	0	0
Kiewa	0	0	0	0
Ovens	0	0	0	0
Murray	18	21	0	21
Total Victoria	**22**	**22**	**1**	**23**
South Australia				
Metro-Adelaide and associated country areas	0	0	0	0
Lower Murray Swamps	0	0	0	0
Country Towns	0	0	0	0
All Other Purposes	9	9	25	34
Total South Australia	**9**	**9**	**25**	**34**
Queensland				
Condamine/Balonne	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a
Macintyre Brook	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a
Total Queensland	**n/a**	**n/a**	**n/a**	**n/a**
Australian Capital Territory	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**35**	**35**	**26**	**61**

Table 15: Cap Adjustment for Environmental Water Use in 2008–09

System	Component of calculated Annual Diversion Target			Environmental use of an Non-environmental Allocation (Trade to Environment) (GL)	Non-environmental use of an Environmental allocation (Trade from Environment) (GL)	Volume by which Cap is reduced for Environmental Entitlements and Use (GL)
	That was used for Environment under baseline conditions (GL)	Relating to an Entitlement that has been transferred to Environmental Use (GL)	Relating to a water savings that has been transferred to Environmental Use (GL)			
New South Wales						
Intersecting Streams	0	0	0	0	0	0
Border Rivers	0	0	0	0	0	0
Gwydir	0	0	0	0	0	0
Namoi/Peel	0	0	0	0	0	0
Macquarie/Castlereagh/ Bogan	0	0	0	0	0	0
Barwon-Darling	0	11	0	0	0	11
Lachlan	0	0	0	0	0	0
Murrumbidgee	0	15	0	0	2	13
Lower Darling	0	0	0	0	0	0
Murray	0	12	0	0	9	3
Total New South Wales	**0**	**39**	**0**	**0**	**11**	**28**
Victoria						
Goulburn Broken Loddon	1	6	0	0	0	7
Campaspe	0	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0	0
Kiewa Ovens Murray	21	3	0	0	0	24
Total Victoria	**22**	**9**	**0**	**0**	**0**	**31**
South Australia[1]						
Metro-Adelaide and 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[1]	0	0	0	50	0	50
Total South Australia	**0**	**0**	**0**	**50**	**0**	**50**
Queensland						
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a
Macintyre Brook	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
Warrego	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
Total Queensland	**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**
Total Basin	**22**	**48**	**0**	**50**	**11**	**109**

1. No Adjustment to diversions and Cap target as result of TLM and other environmental use.

12. 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.

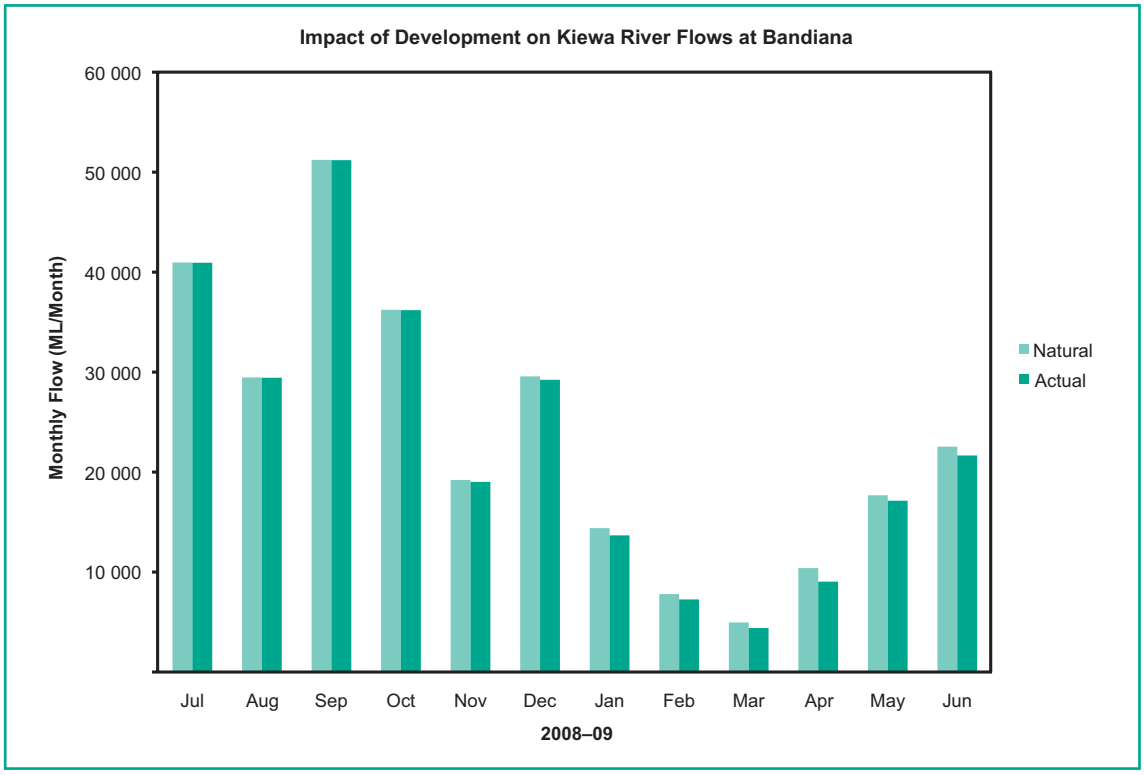
The natural flows are estimated from computer modelling studies. Many of the river models are incomplete, or not yet modified, to allow these numbers to be readily calculated for 2008–09. **Table 16** presents the 2008–09 annual flow volumes recorded and the natural flows at a number of selected key sites within the Murray-Darling Basin, while the impact of development can be seen graphically in **Figure 8** and **Figure 9**.

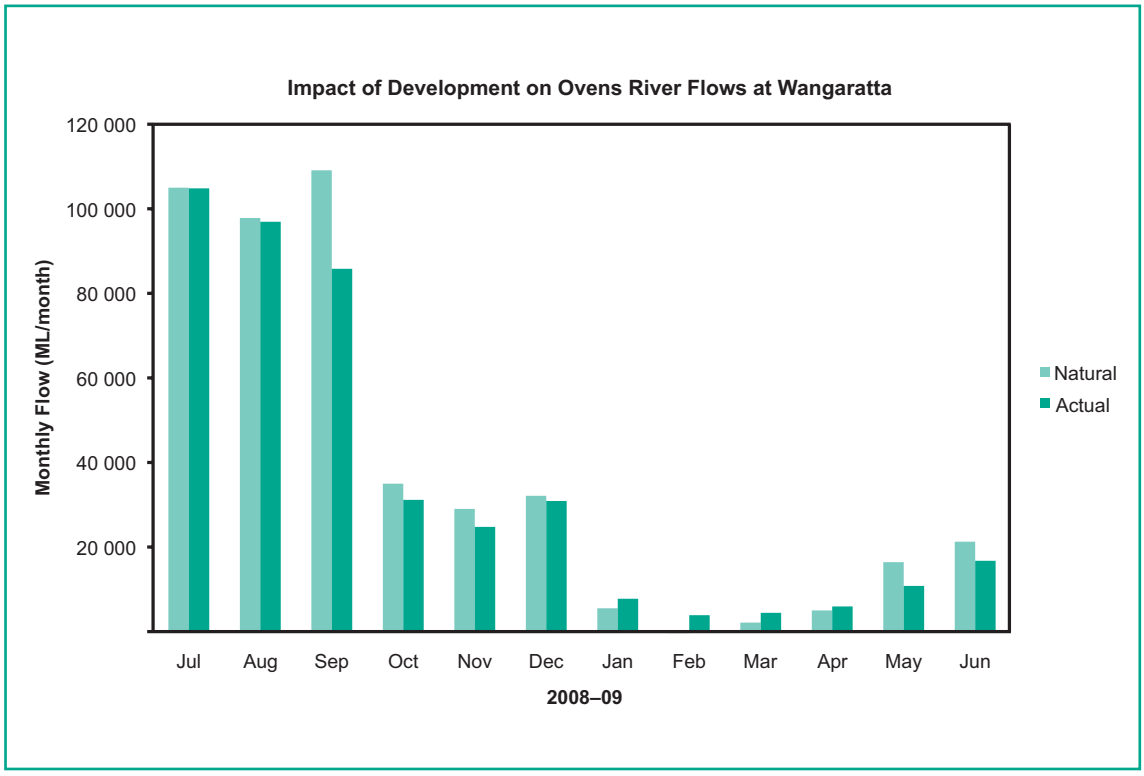
Table 16: Comparison of 2008–09 Actual and Natural Annual Flows for Key sites within the Murray-Darling Basin

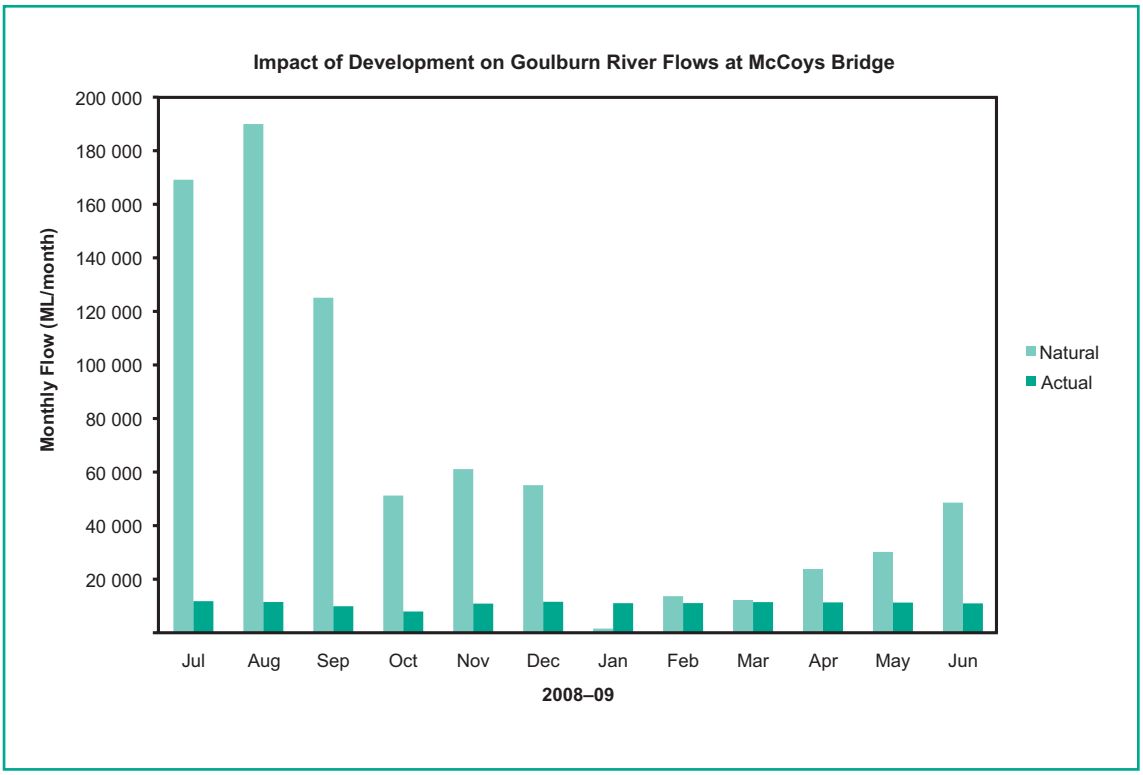
System	Actual Flow (GL)	Natural Flow (GL)	Actual/Natural (%)
Inter-Basin Transfers			
Snowy Mountain Scheme to Murrumbidgee River	-58	0	-
Snowy Mountain Scheme to Murray River	376	0	-
Glenelg River Catchment to Wimmera-Mallee	0	0	-
Wannon River Catchment to Wimmera-Mallee	2	0	-
New South Wales Tributaries			
Barwon River at Mungindi + Boomi River	124	n/a	n/a
Inflows to Gwydir Wetland	69	n/a	n/a
Gwydir System outflows to Barwon River	48	n/a	n/a
Namoi System outflows to Barwon River	116	n/a	n/a
Inflows to Macquarie Marshes	45	n/a	n/a
Macquarie/Castlereagh/Bogan outflows	13	n/a	n/a
Darling River inflows to Menindee Lakes	185	n/a	n/a
Lachlan River at Coorong	8	n/a	n/a
Lachlan River at Booligal	16	n/a	n/a
Murrumbidgee River at Balranald	105	n/a	n/a
Lower Darling River at Burtundy	276	n/a	n/a
Victorian Tributaries			
Kiewa River at Bandiana	279	284	98%
Ovens River at Wangaratta	424	458	93%
Goulburn River at McCoys Bridge	131	782	17%
Campaspe River at Rochester	4	19	18%
Loddon River at Appin South	0	5	0%
Wimmera River at Horsham	0	22	0%
Queensland Tributaries			
Condamine/Balonne/Culgoa flows at New South Wales Border	26	n/a	n/a
Macintyre River at Goondiwindi	261	n/a	n/a
Moonie River at Fenton	64	n/a	n/a
Warrego River at Cunnamulla	44	n/a	n/a
Paroo River at Caiwarro	139	n/a	n/a
River Murray			
Albury (Doctors Point)	2,051	1,721	118%
Yarrawonga	1,954	2,182	89%
Euston	1,479	3,678	38%
South Australian Border[3]	1,175	3,934	30%
Barrages	0	2,987	0%

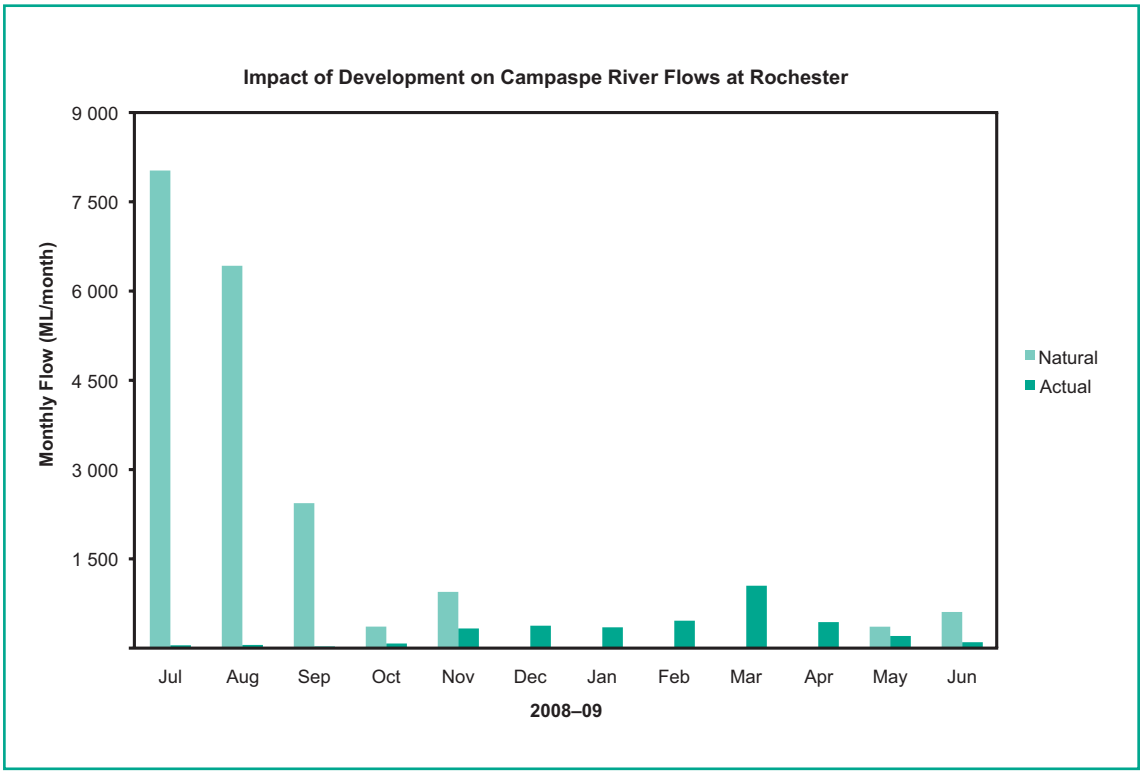
1. n/a indicates data not available.
2. Operational data, which may be subject to change.
3. Includes interstate trade.

Figure 8: Plots of flows at selected sites showing 2008–09 Actual and Natural (modelled) flows in Victoria






Impact of Development on Goulburn River Flows at McCoys Bridge
Monthly Flow (ML/month)
200 000
180 000
160 000
140 000
120 000
100 000
80 000
60 000
40 000
20 000
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual


Impact of Development on Campaspe River Flows at Rochester
Monthly Flow (ML/month)
9 000
7 500
6 000
4 500
3 000
1 500
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual


Impact of Development on Loddon River Flows at Appin South
Monthly Flow (ML/month)
3 000
2 500
2 000
1 500
1 000
500
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual

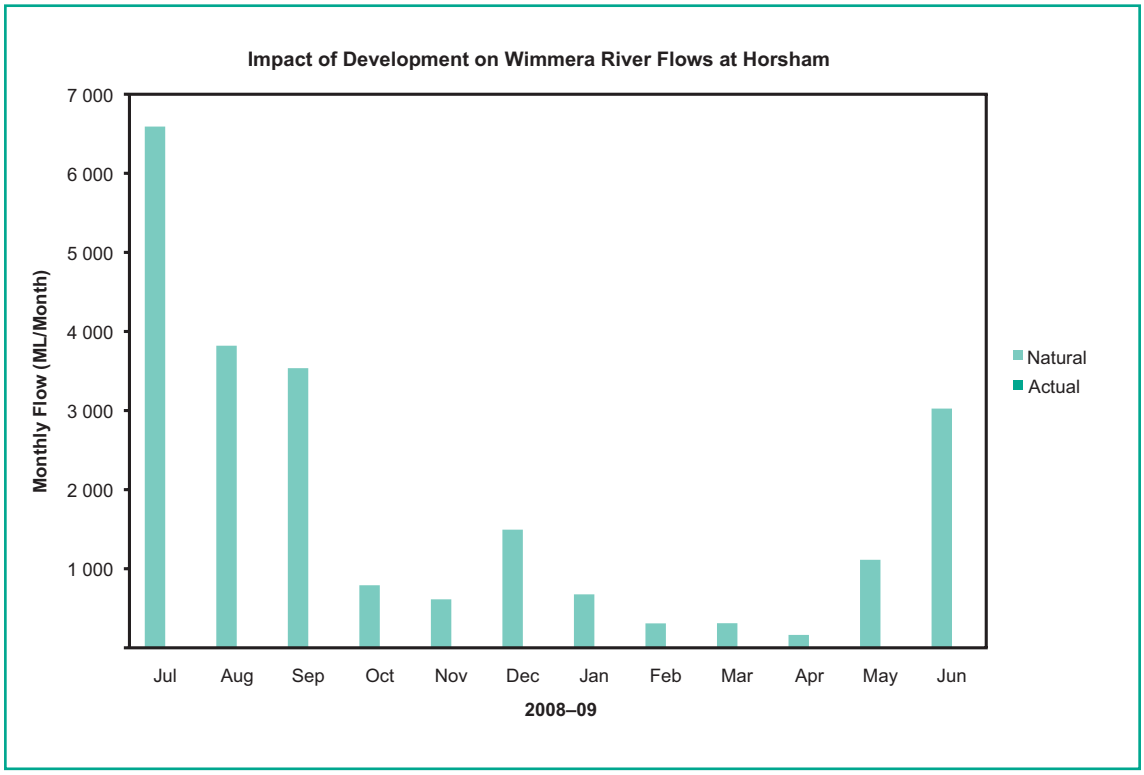
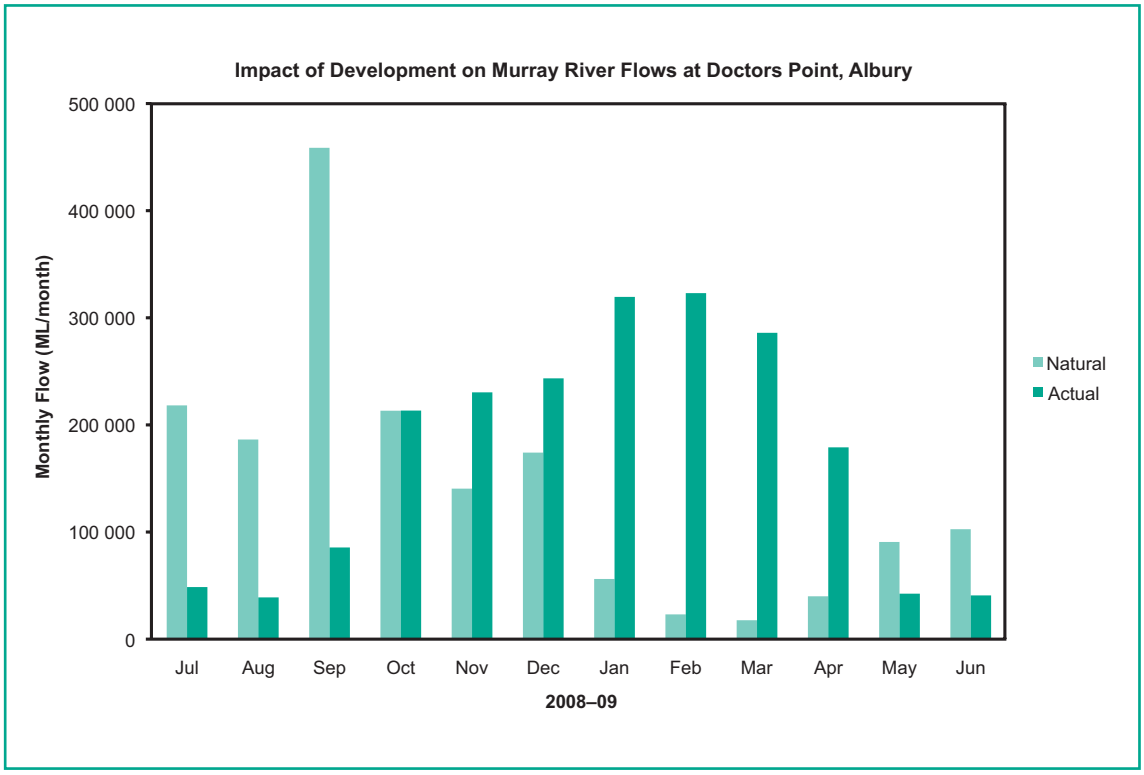
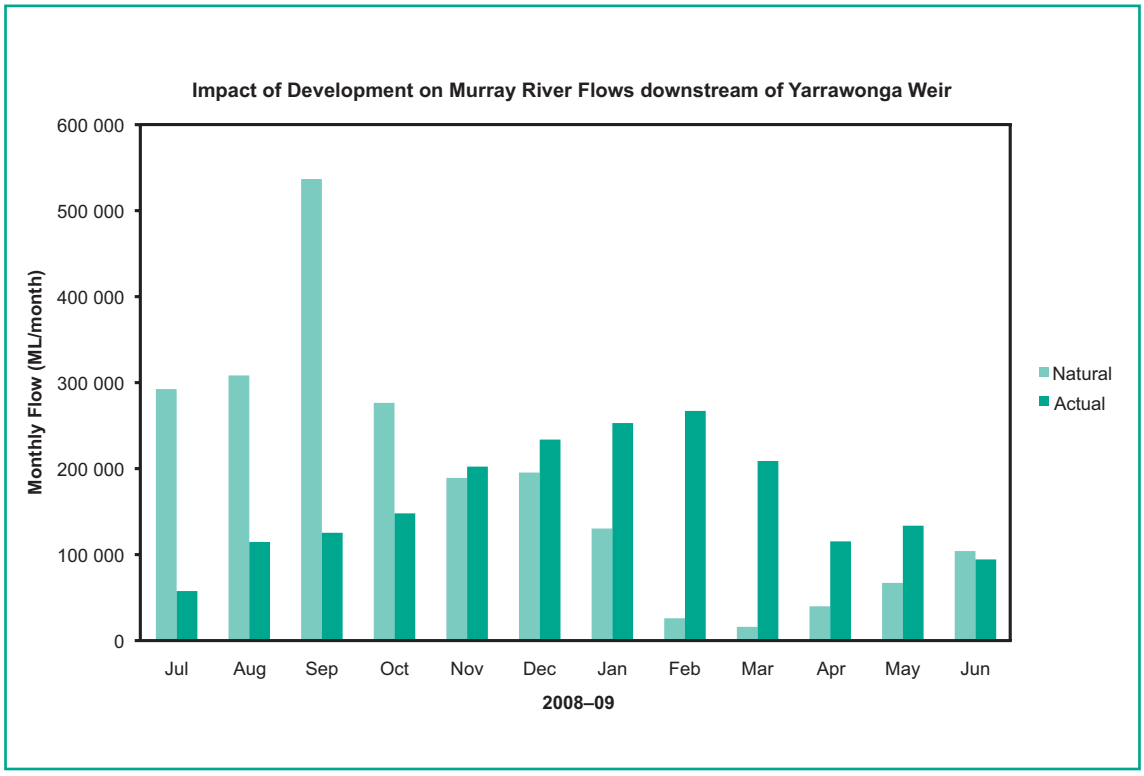
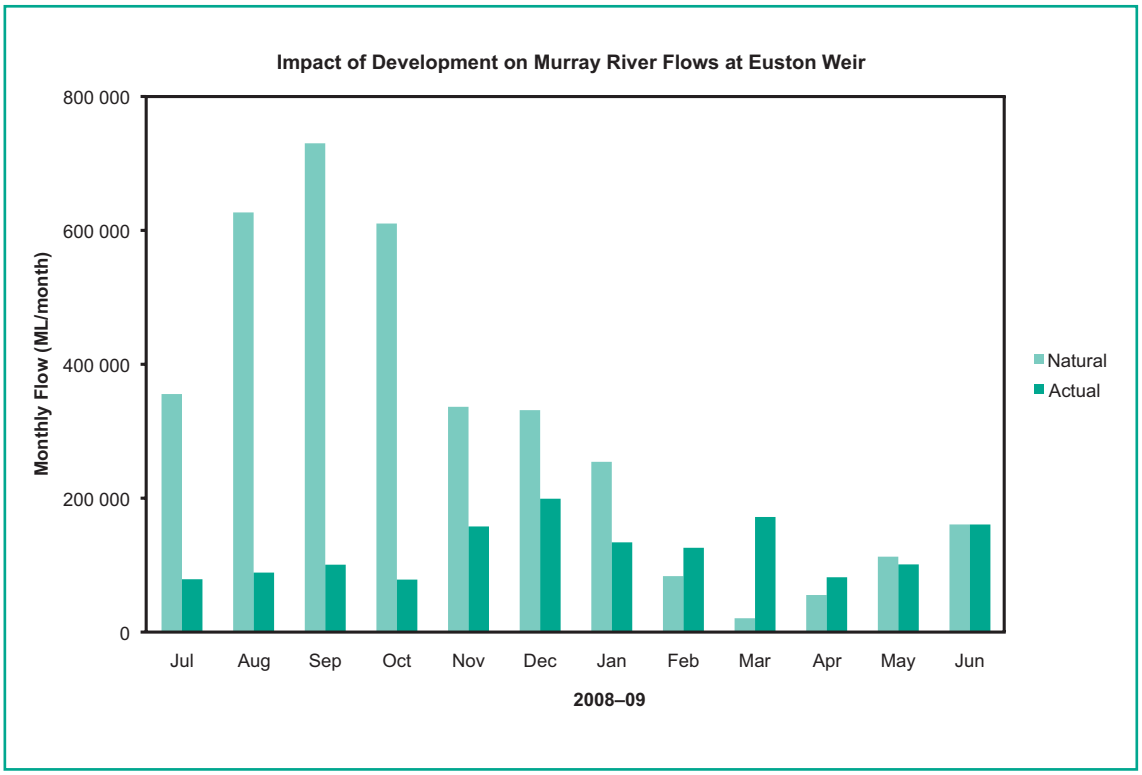
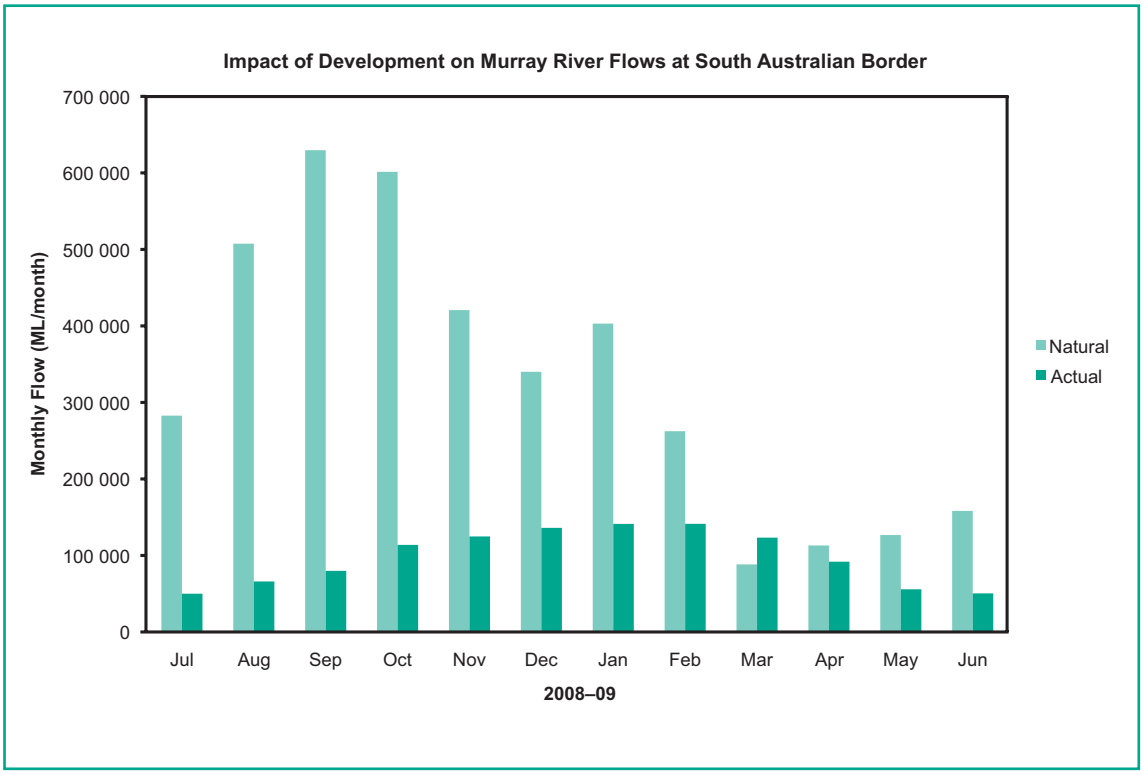

Impact of Development on Wimmera River Flows at Horsham
Monthly Flow (ML/Month)
7 000
6 000
5 000
4 000
3 000
2 000
1 000
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual

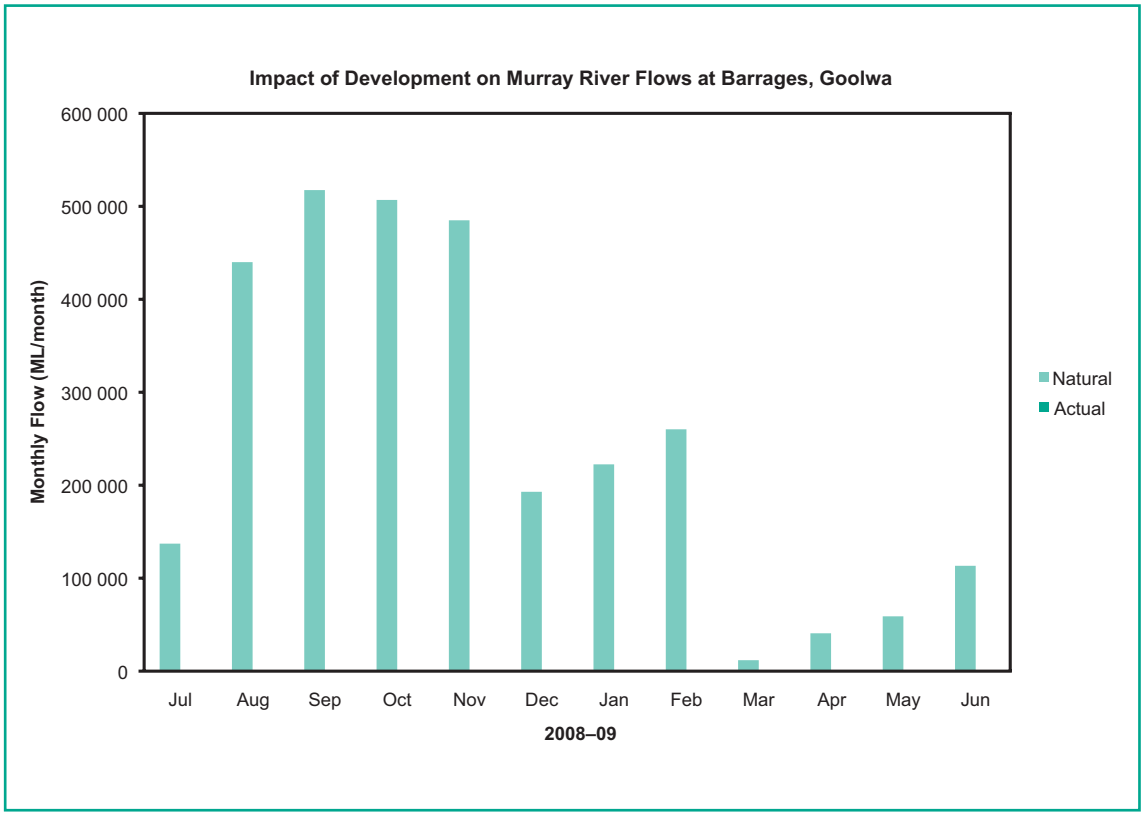
Figure 9: Plots of flows at selected sites showing 2008–09 Actual and Natural (modelled) flows in Murray River






Impact of Development on Murray River Flows at Euston Weir
800 000
600 000
400 000
200 000
0
Monthly Flow (ML/month)
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual


Impact of Development on Murray River Flows at South Australian Border
700 000
600 000
500 000
400 000
300 000
200 000
100 000
0
Monthly Flow (ML/month)
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual


Impact of Development on Murray River Flows at Barrages, Goolwa
Monthly Flow (ML/month)
600 000
500 000
400 000
300 000
200 000
100 000
0
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
2008–09
Natural
Actual

13. 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, while 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 17**. The volumes reported indicate that the total volume in storage in the Basin in 2008–09 has decreased from 5992 GL to 5342 GL (21% full). Total evaporative losses for major storages within the Basin were calculated by the respective states and are reported at 587 GL, representing 2.3% of total storage capacity and equal to 21% of total diversion from the Basin. The net increase in flow of 63 GL due to releases from storages and evaporative losses was equal to 2% of total Basin diversion.

Table 17: Impoundments and Losses in Major On-stream Storages (greater than 10 GL capacity) in 2008–09

System	Major on-stream storage	Comple-tion date	Storage Capacity (GL)	Volume of storage at Beginning of water year (GL)	Volume of storage at End of water year (GL)	% of storage full at end of year (%)	Increase in volume of storage (GL)	Evapo-ration Losses (GL)	Net Reduction in flow due to storage (GL)
Murray-Darling Basin Authority									
Lower Darling	Menindee Lakes[1]	1960	2,050	540	228	11%	-312	169	-144
Murray	Dartmouth Reservoir	1979	3906	696	835	21%	140	11	151
	Hume Reservoir	1936-61	3038	485	328	11%	-157	109	-49
	Lake Victoria	1928	677	304	239	35%	-65	118	53
Total Murray-Darling Basin Authority[2]			**9671**	**2026**	**1631**	**17%**	**-395**	**407**	**12**
Snowy Mountains Scheme in Murray-Darling Basin									
Murrumbidgee River Valley	Jounama Pondage	1968	44	30	19	44%	-11	0	-11
	Talbingo Reservoir	1971	921	901	916	99%	15	6	22
	Tantangara Reservoir	1960	254	19	19	7%	0	1	1
	Tumut Pondage	1958	53	7	21	40%	14	0	14
Murray River Valley	Geehi Reservoir	1966	21	13	16	76%	3	0	3
	Tooma Reservoir	1961	28	20	14	52%	-5	0	-5
	Khancoban Pondage	1965	22	12	14	67%	2	0	2
Total Snowy Mountains Scheme			**1342**	**1001**	**1020**	**76%**	**19**	**7**	**27**
Borders Rivers Commission									
Border Rivers	Glenlyon Dam	1976	254	88	60	24%	-28	0	-28
Total Border Rivers Commission			**254**	**88**	**60**	**24%**	**-28**	**0**	**-28**
New South Wales									
Border Rivers	Pindari Reservoir	1962-96	312	98	134	43%	36	0	36
Gwydir	Copeton Reservoir	1976	1364	299	174	13%	-125	4	-120
Namoi/Peel	Chaffey Reservoir	1979	62	48	60	97%	12	9	20
	Keepit Reservoir	1960	423	95	155	37%	60	0	60
	Split Rock Reservoir	1987	397	25	21	5%	-3	0	-3
Macquarie/ Castlereagh/ Bogan	Burrendong Reservoir	1967	1678	237	253	15%	16	23	38
	Windamere Reservoir	1984	368	89	83	22%	-7	0	-7
Lachlan	Carcoar Reservoir	1970	36	3	3	7%	0	28	27
	Lake Brewster	1952	153	0	0	0%	0	0	0
	Lake Cargelligo	1902	36	17	6	17%	-10	0	-10
	Wyangala Reservoir	1936-71	1220	122	75	6%	-46	0	-46

System	Major on-stream storage	Comple-tion date	Storage Capacity (GL)	Volume of storage at Beginning of water year (GL)	Volume of storage at End of water year (GL)	% of storage full at end of year (%)	Increase in volume of storage (GL)	Evapo-ration Losses (GL)	Net Reduction in flow due to storage (GL)
Murrumbidgee	Blowering Reservoir	1968	1631	609	542	33%	-66	6	-60
	Burrinjuck Dam	1907-56	1028	426	382	37%	-44	0	-44
	Tombullen Off-River Storage	1980	11	0	0	0%	0	0	0
	Hay Weir	1981	14	0	0	0%	0	0	0
Total New South Wales			**8733**	**2067**	**1889**	**22%**	**-179**	**70**	**-109**
Victoria									
Goulburn/ Broken/ Loddon	Eildon Reservoir	1956	3334	475	435	13%	-40	10	-31
	Lake Mokoan	1971	365	14	3	1%	-11	15	5
	Lake Nillahcootie	1967	40	9	5	12%	-4	1	-4
	Cairn Curran Reservoir	1956	147	7	3	2%	-4	1	-3
	Tullaroop Reservoir	1959	73	4	3	4%	-1	1	1
Campaspe	Lake Eppalock	1964	305	20	18	6%	-2	3	2
	Lauriston Reservoir	1941	20	8	6	31%	-2	1	-1
	Malmsbury Reservoir	1870	18	0	0	2%	0	0	0
	Upper Coliban Reservoir	1903	37	0	0	0%	0	0	0
Wimmera-Mallee	Lake Bellfield	1966	79	7	13	17%	6	2	8
	Lake Fyans	1916	18	4	4	20%	0	3	3
	Lake Lonsdale	1903	65	0	0	0%	0	0	0
	Lake Taylor	1923	34	5	4	11%	-1	3	1
	Pine Lake	1928	62	0	0	0%	0	0	0
	Tooloondo Reservoir	1953	92	0	0	0%	0	0	0
	Wartook Reservoir	1887	29	8	10	34%	2	6	9
Murray/Kiewa/ Ovens	Rocky Valley Reservoir	1959	28	13	21	76%	8	0	8
	Lake Buffalo	1965	24	12	15	64%	4	0	4
	Lake William Hovell	1973	14	12	8	62%	-3	0	-3
Total Victoria			**4785**	**598**	**550**	**11%**	**-48**	**47**	**-1**

System	Major on-stream storage	Comple-tion date	Storage Capacity (GL)	Volume of storage at Beginning of water year (GL)	Volume of storage at End of water year (GL)	% of storage full at end of year (%)	Increase in volume of storage (GL)	Evapo-ration Losses (GL)	Net Reduction in flow due to storage (GL)
Queensland									
Condamine/ Balonne	Beardmore Dam	1972	82	35	43	53%	9	23	32
	Chinchilla Weir	1974	10	6	7	76%	1	4	5
	Cooby Dam	1942	23	2	3	11%	1	1	2
	Jack Taylor Weir	1953-59	10	10	7	74%	-3	3	1
	Leslie Dam	1985	106	16	14	14%	-2	5	3
Macintyre Brook	Coolmunda Dam	1968	69	49	27	40%	-22	16	-6
Total Queensland			**300**	**118**	**103**	**34%**	**-15**	**52**	**37**
Australian Capital Territory									
Murrumbidgee	Bendora Reservoir	1961	12	7	8	70%	1	0	1
	Corin Reservoir	1968	71	19	25	36%	6	0	7
	Googong Reservoir	1979	121	65	53	44%	-12	4	-8
	Cotter	1912	4	3	3	75%	0	0	0
Total Australian Capital Territory			**207**	**94**	**89**	**43%**	**-5**	**5**	**0**
Total Basin			**25292**	**5992**	**5342**	**21%**	**-650**	**587**	**-63**

1. Menindee Lakes capacity revised based upon 2003 survey.
2. The data is from MDBA database as on 15 January 2010. Operational data, which may be subject to change.

14. GROUNDWATER USE IN THE BASIN

14.1 Context

Based on the findings from the review of the operation of Cap, the council in August 2000, agreed to the following recommendations of the former Commission (Authority) 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 is developed by the Groundwater Technical Reference Group (GTRG) that is based on jurisdictional management of groundwater through sustainable yields and includes 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.

14.2 Groundwater data for 2008–09

The GTRG supplied the estimated data for sustainable yield (SY), allocation and usage of groundwater in 2008–09 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 18** is valuable in itself, as it gives a snapshot of the Basin-wide status of groundwater.

The estimated sustainable yields in GMUs of the Basin are reported to be 1870 GL. Out of this, 1914 GL was already allocated in 2008–09, which constituted 102% of SY. The total usage of groundwater in the Basin was 1273 GL, which was 68% of allocation and 66% of SY. The groundwater usage was 31% 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 report by Sinclair Knight Merz (2003) 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.

14.3 Groundwater Use since 1999-2000

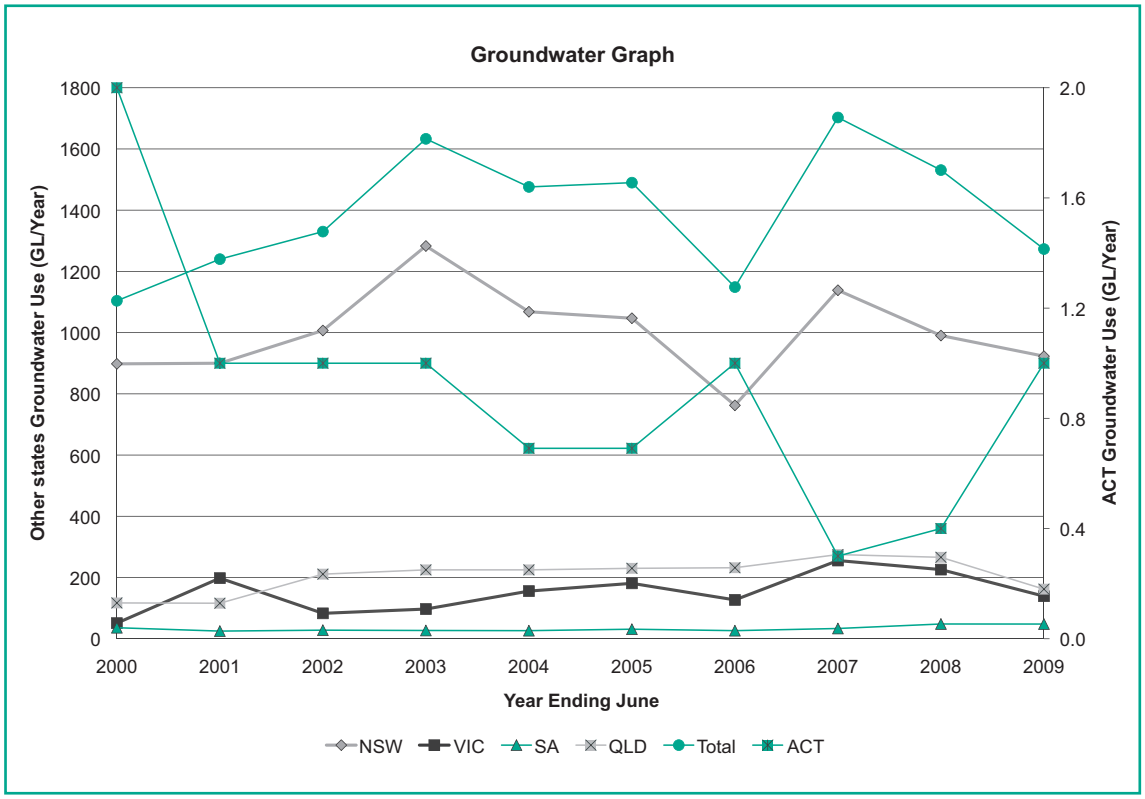
Figure 10 shows the use of groundwater in the Basin since 1999–00, when groundwater reporting started. It is evident from this figure that the groundwater use has been steadily rising. However, deficiency in groundwater data must be noted. Several factors account for this deficiency in data: including changes in groundwater systems, names, their boundaries and policies for determining sustainable yield. The translation factors for converting groundwater data based upon GMUs to that based upon Cap valleys were worked out in 1999–00 based upon the GMU layer analysis facilitated by the data provided by National Land and Water Resources Audit that year. However, these translational factors have not been able to cope with the changes since then. So the groundwater data depicted in **Table 18** and **Figure 10** need to be viewed with extreme caution.

Table 18: Basin-wide Groundwater Data for 2008–09 aligned along the designated Cap valleys

Designated river valley system	Sustainable Yield estimate (GL)	Groundwater Allocation (GL)	Groundwater Use (GL)	Surface water Use (GL)
New South Wales				
Intersecting Streams[4]	37	2	0	3
Border Rivers	37	6	1	137
Gwydir	74	80	57	154
Namoi/Peel	199	269	123	188
Macquarie/Castlereagh/Bogan	164	148	63	106
Barwon-Darling	13	1	0	149
Lachlan	360	390	260	40
Murrumbidgee	323	336	298	602
Lower Darling	0	0	0	9
Murray	137	167	120	341
Total New South Wales	**1344**	**1400**	**923**	**1729**
Victoria[5]				
Goulburn Broken Loddon	68	66	34	628
Campaspe	54	38	28	26
Wimmera-Mallee	77	77	36	11
Kiewa Ovens Murray	82	65	42	837
Total Victoria	**282**	**246**	**139**	**1503**
South Australia				
Total South Australia[3]	**53**	**52**	**48**	**485**
Queensland				
Condamine/Balonne	171	202	158	190
Border Rivers	7	7	4	143
Macintyre Brook	0	0	0	14
Moonie	0	0	0	29
Warrego	5	5	1	6
Paroo	0	0	0	1
Total Queensland	**184**	**214**	**162**	**383**
Australian Capital Territory	**7**	**2**	**1**	**19**
Total Basin	**1870**	**1914**	**1273**	**4119**

1. Refer **Table 2**.
2. Groundwater figures for New South Wales and Queensland are approximate as they do not include all the groundwater systems within the Cap valley (not all groundwater systems are within a recognised GMU boundary).
3. It is not sensible to divide South Australian groundwater use into designated valleys.
4. Intersecting streams include New South Wales Moonie Valley groundwater data.
5. Victoria refer the term 'Sustainable Yield Estimate' as 'Permissible consumptive Volume (PCV)'.

Figure 10: Groundwater Use in the Basin since 1999–2000



CONCLUSION

The information and data contained within this report provide a comprehensive review of consumptive water use and management for the 2008–09 water year for the Murray-Darling Basin, as per the requirements of Schedule E (former Schedule F) to the *Murray-Darling Basin Agreement*. Significant progress have made in developing and accrediting the Cap models, which are used for Cap compliance. Out of 24 Cap valleys, Caps have not been defined in three valleys and three other valleys do not require a Cap model. Of the remaining 18 Cap valleys, Cap models have been approved for 12; and five Cap models are currently being audited. There is only one valley—Australian Capital Territory—where a Cap model has not yet been submitted for audit and accreditation. Cap model for the Australian Capital Territory valley is in advance stage of development.

Total surface water use in the Murray-Darling Basin in 2008–09 was 4119 GL and groundwater use was 1273 GL.

Information on groundwater usage has been presented for the tenth time in this format.

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 resource availability during 2008–09 was very tight due to continuing dry conditions

The use of allocated water in the 2008–09 water year represents an utilisation of 70% of the water allocated throughout the Basin. This was sixth lowest utilisation since 1997–98.

The accuracy of diversion measurements is ±10% in the 2008–09 water year.

It is expected that the accuracy of measurement will improve over time as volumetric conversion is implemented in Queensland, and metering is extended to areas in New South Wales (unregulated) and Queensland, which are currently un-metered.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2008–09.

It is envisaged that with the completion of Cap models for New South Wales (IQQM models) and Queensland Water Resource Plan 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 2008–09 decreased from 5992 GL to 5342 GL (21% full). Total evaporative losses for major storages within the Basin were 587 GL, representing 2.3% of total storage capacity and 21% of total Basin diversion.

Except for New South Wales's Barwon-Darling/Lower Darling combined Cap valley, all valleys for which Cap have been defined were within their Cap. The Barwon-Darling/Lower Darling was declared in breach of the Cap. There was large Basin-wide Cap credit.

The groundwater information in 2008–09 was not completely available. Based upon the limited information, the allocation of groundwater in the Basin was 1914 GL and usage was 1273 GL.

Total water made available for environmental use was 110 GL and total net consumptive environmental use was 61 GL. Total Cap adjustments for environmental water use was 109 GL.

The monitoring of water use relative to Cap compliance within the Murray-Darling Basin is a large, complex, and challenging 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

AHD	Australian Height Datum
Announced allocation	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
AT	Annual trigger
Authorised use	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.
BGA	Blue-green algae
Border Rivers	The rivers and tributaries forming, or intersecting the border between New South Wales and Queensland.
BRWSS	Border Rivers Water Supply Scheme
Bulk entitlement	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the *Water Act 1989*.
CA	Continuous accounting.
Carryover	An unused entitlement from one season that can be used in the next year.
CEWH	Commonwealth environmental water holder
CIT	Central Irrigation Trust
COAG	Council of Australian Governments.
CWAS	Critical Water Allocation Scheme
DERM	The Department of Environment and Resource Management (of Queensland)
Diversion	The movement of water from a river system by means of pumping or gravity channels.
Diversion Cap Register	The formal record of diversions and Cap compliance in the Murray Darling Basin.
ELMA	Environmental land management allocation
EWA	Environmental water allocation
Floodplain harvesting	The diversion of water from a floodplain into storage(s).
Gigalitre (GL)	One thousand million or 109 litres.
GIS	Geographical Information System
GL	Gigalitre: one thousand million or 109 litres.
GMU	Groundwater Management Unit
GSM	Goulburn Simulation Model
GTRG	Groundwater Technical Reference Group
High security entitlement	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.

IAG	Independent Audit Group.
Impoundment	The storage of water diverted from a water course.
IQQM	Integrated Quantity Quality Model
Irrigation	Supplying land or crops with water by means of streams, channels or pipes.
LMRIA	Lower Murray Reclaimed Irrigation Areas
LSD	Land-surface diversions
MDB	Murray Darling Basin
MDBA	Murray-Darling Basin Authority.
MDBC	Former Murray-Darling Basin Commission.
Megalitre (ML)	One million or 106 litres.
Ministerial council, the	Murray-Darling Basin Ministerial Council.
ML (ML)	One Mega (million) litres. One ML is approximately the volume of an Olympic swimming pool.
MoU	Memorandum of Understanding
MSM	Murray Simulation MOdel
Murray-Darling Basin Agreement	The Agreement between the Governments of the four Basin states and the Commonwealth. The current Agreement is the 2008 Agreement.
Off-allocation	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.
On-farm storage	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
Overdraw	Water diverted in one season against a prospective allocation in the subsequent year.
Overland flow	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.
Private diverters	Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.
REALM	Resource Allocation Model
Regulated streams/ waterways	Streams where users are supplied by releases from 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.
RMIF	River Murray Improved Flows
ROP	Resource operation plans
RWUEI	Rural Water Use Efficiency Initiative
Salinity	The concentration of dissolved salts in groundwater or river water usually expressed in EC units.
SY	Sustainable yield
TLM	The Living Murray

Unregulated streams	Streams that are not controlled or regulated by releases from major storages.
Utilisation	The amount of water available for diversion that is actually diverted.
WAMP	Water Allocation and Management Planning
Water entitlement	The legal right of a user to access a specified amount of water in a given period.
Water-harvesting	The diversion of water from an unregulated stream in Queensland in which the access to water is defined by a diversion rate and a starting flow in the stream; and also a volumetric limit where Resource Operations Plans have been implemented.
WMP	Water Management Planning
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.
WUE	Water use efficiency.

APPENDIX A: Cap Register – Annual Cap Adjustments for Trade (GL)

System	1997–98	1998–99	1999–2000	2000–01	2001–02
New South Wales					
Intersecting Streams[1]	0.0	0.0	0.0	0.0	0.0
Border Rivers[1]	0.0	-1.6	-3.5	-8.5	-8.7
Gwydir	0.0	0.0	0.0	0.0	0.0
Namoi/Peel	0.0	0.0	0.0	0.0	0.0
Macquarie/Castlereagh/Bogan	0.0	0.0	0.0	0.0	0.0
Barwon-Darling/Lower Darling	5.4	13.0	9.0	21.9	7.8
Lachlan	0.0	0.0	0.0	0.0	0.0
Murrumbidgee	-33.4	-38.0	-113.7	-21.4	31.5
Murray	30.2	6.8	105.8	-12.9	-33.3
Total New South Wales	**2.2**	**-19.8**	**-2.4**	**-20.9**	**-2.7**
Victoria					
Goulburn/Broken/Loddon Cap valley	-3.1	3.3	-7.8	-0.8	0.8
Campaspe	0.0	0.0	0.0	0.0	0.0
Wimmera-Mallee	0.0	0.0	0.0	0.0	0.0
Murray/Kiewa/Ovens Cap valley	17.7	11.9	0.7	-1.6	-10.4
Total Victoria	**14.6**	**15.2**	**-7.1**	**-2.4**	**-9.7**
South Australia					
Metro-Adelaide and associated country areas	0.0	0.0	0.0	0.0	12.0
Lower Murray Swamps	-2.6	-3.4	-4.5	-4.7	-4.1
Country Towns	0.0	0.0	0.0	0.0	-12.0
All Other Purposes	-14.1	7.0	10.8	20.0	9.9
Total South Australia	**-16.8**	**3.6**	**6.3**	**15.2**	**5.8**
Queensland					
Condamine/Balonne[1]	0.0	0.0	0.0	0.0	0.0
Border Rivers/Macintyre Brook[1]	0.0	1.6	3.5	8.5	8.7
Moonie	0.0	0.0	0.0	0.0	0.0
Nebine	0.0	0.0	0.0	0.0	0.0
Warrego	0.0	0.0	0.0	0.0	0.0
Paroo	0.0	0.0	0.0	0.0	0.0
Total Queensland[1]	**0.0**	**1.6**	**3.5**	**8.5**	**8.7**
Australian Capital Territory[1]	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Basin	**0.0**	**0.6**	**0.4**	**0.4**	**2.1**

1. No Cap yet has been set for these valleys.

APPENDIX A: Cap Register – Annual Cap Adjustments for Trade (GL) *continued*

System	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
New South Wales							
Intersecting Streams[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Border Rivers[1]	-13.5	-3.4	-6.4	-11.6	-6.7	-14.8	-9.5
Gwydir	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Namoi/Peel	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Macquarie/Castlereagh/Bogan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barwon-Darling/Lower Darling	0.0	0.0	-1.1	0.0	0.0	0.0	-27.1
Lachlan	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Murrumbidgee	-14.5	-34.7	8.0	-5.9	-96.8	-139.1	-390.0
Murray	30.8	34.9	-0.8	0.1	44.2	-19.9	-138.1
Total New South Wales	**2.8**	**-3.2**	**-0.2**	**-17.4**	**-59.3**	**-173.7**	**-564.7**
Victoria							
Goulburn/Broken/Loddon Cap valley	-4.4	-59.7	-76.6	19.3	-62.3	-218.1	-106.9
Campaspe	0.0	0.0	0.0	0.0	0.0	21.9	28.7
Wimmera-Mallee	0.8	0.7	-0.4	0.0	1.3	1.1	1.6
Murray/Kiewa/Ovens Cap valley	-17.4	34.3	53.8	-9.0	36.1	171.7	258.2
Total Victoria	**-21.1**	**-24.7**	**-23.1**	**10.3**	**-24.9**	**-23.5**	**181.6**
South Australia							
Metro-Adelaide and associated country areas	11.0	9.4	8.8	16.0	0.0	0.0	0.0
Lower Murray Swamps	-5.0	-22.1	-32.6	-35.5	-29.4	-21.4	-9.1
Country Towns	-11.0	-9.4	-5.0	-8.0	10.7	6.1	6.1
All Other Purposes	9.7	41.4	45.2	22.9	91.3	192.1	371.7
Total South Australia	**4.7**	**19.3**	**16.4**	**-4.6**	**72.6**	**176.8**	**368.7**
Queensland							
Condamine/Balonne[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Border Rivers/Macintyre Brook[1]	13.5	3.5	6.4	11.6	6.7	14.8	9.5
Moonie	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nebine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Warrego	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paroo	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Queensland	**13.5**	**3.5**	**6.4**	**11.6**	**6.7**	**14.8**	**9.5**
Australian Capital Territory[1]	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total Basin	**0.0**	**-5.1**	**-0.6**	**-0.1**	**-5.0**	**-5.7**	**-5.0**

1. No Cap yet has been set for these valleys.

APPENDIX B: Cap Register– Annual Cap Targets (GL) Adjusted for Trade and Environmental Allocations

System	1997–98	1998–99	1999–2000	2000–01	2001–02
New South Wales					
Intersecting Streams	n/a	n/a	n/a	n/a	n/a
Border Rivers	166	181	146	n/a	n/a
Gwydir	603	271	489	316	432
Namoi/Peel	332	316	345	338	334
Macquarie/Castlereagh/Bogan	386	592	412	575	577
Barwon-Darling/Lower Darling	217	463	295	458	192
Lachlan	424	324	270	397	448
Murrumbidgee	2557	2550	2022	2721	2673
Murray	1825	2159	1762	2005	1887
Total New South Wales	**6510**	**6855**	**5740**	**6811**	**6542**
Victoria					
Goulburn/Broken/Loddon Cap valley	1980	1653	1590	1678	1587
Campaspe	130	81	76	103	106
Wimmera-Mallee	183	190	138	75	88
Murray/Kiewa/Ovens Cap valley	1849	1737	1610	1758	1827
Total Victoria	**4141**	**3662**	**3414**	**3614**	**3609**
South Australia					
Metro-Adelaide and associated country areas[1]	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	92	91	90	89	90
Country Towns	50	50	50	50	38
All Other Purposes	412	445	450	473	457
Total South Australia	**554**	**586**	**590**	**613**	**585**
Queensland					
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a
Total Queensland	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Australian Capital Territory[2]	**53**	**41**	**37**	**34**	**37**
Total Basin	**11257**	**11144**	**9780**	**11072**	**10772**

1. See Appendix F.
2. Australian Capital Territory has yet to develop a Cap model. No model target was available for 2008–09.The past targets worked out from an authority model have been recognised as part of the Cap agreement for the Australian Capital Territory.

APPENDIX B: Cap Register – Annual Cap Targets (GL) Adjusted for Trade and Environmental Allocations *continued*

System	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
New South Wales							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gwydir	433	151	163	310	74	77	196
Namoi/Peel	275	212	253	293	130	164	245
Macquarie/Castlereagh/Bogan	272	267	166	388	120	218	145
Barwon-Darling/Lower Darling	122	210	134	217	14	180	156
Lachlan	243	91	60	167	86	95	59
Murrumbidgee	2116	1884	1410	2479	1089	801	642
Murray	393	1577	1428	1709	163	475	354
Total New South Wales	**3854**	**4393**	**3614**	**5564**	**1675**	**2010**	**1798**
Victoria							
Goulburn/Broken/Loddon Cap valley	1004	1622	1660	1589	620	776	664
Campaspe	85	80	70	41	19	45	46
Wimmera-Mallee	71	66	78	46	22	42	23
Murray/Kiewa/Ovens Cap valley	1910	1550	1588	1714	1444	948	799
Total Victoria	**3070**	**3316**	**3397**	**3390**	**2106**	**1811**	**1532**
South Australia							
Metro-Adelaide and associated country areas[1]	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	89	67	57	59	27	9	8
Country Towns	39	41	43	42	41	37	37
All Other Purposes	488	495	452	448	392	354	425
Total South Australia	**616**	**603**	**551**	**549**	**460**	**399**	**470**
Queensland							
Condamine/Balonne	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	184
Moonie	n/a	n/a	n/a	n/a	12	85	36
Nebine	n/a	n/a	n/a	n/a	2	6	5
Warrego	n/a	n/a	n/a	n/a	46	77	19
Paroo	n/a	n/a	n/a	n/a	2	4	1
Total Queensland	**n/a**	**n/a**	**n/a**	**n/a**	**63**	**172**	**245**
Australian Capital Territory[2]	**51**	**43**	**38**	**40**	**51**	**27**	**30**
Total Basin	**7591**	**8356**	**7599**	**9542**	**4355**	**4419**	**4073**

1. See Appendix F.
2. Australian Capital Territory has yet to develop a Cap model. No model target was available for 2008–09.The past targets worked out from an authority model have been recognised as part of the Cap agreement for the Australian Capital Territory.

APPENDIX C: Cap Register – Annual Diversions (GL)

System	1997–98	1998–99	1999–2000	2000–01	2001–02
New South Wales					
Intersecting streams	3	3	3	3	3
Border Rivers	202	182	197	247	198
Gwydir	532	306	448	424	462
Namoi/Peel	305	322	350	355	363
Macquarie/Castlereagh/Bogan	442	396	437	522	597
Barwon-Darling/Lower Darling	266	428	260	487	202
Lachlan	429	293	301	423	457
Murrumbidgee	2585	2505	1875	2747	2348
Murray	1890	2000	1234	2070	2113
Total New South Wales	**6655**	**6435**	**5105**	**7279**	**6745**
Victoria					
Goulburn/Broken/Loddon Cap valley	1909	1699	1553	1569	1700
Campaspe	96	76	73	113	124
Wimmera-Mallee	184	159	103	68	84
Murray/Kiewa/Ovens Cap valley	1743	1804	1555	1712	1916
Total Victoria	**3932**	**3738**	**3285**	**3461**	**3824**
South Australia					
Metro-Adelaide and associated country areas	153	153	139	104	82
Lower Murray swamps	92	91	90	89	90
Country Towns	35	36	37	38	36
All Other Purposes	384	409	377	431	413
Total South Australia	**664**	**689**	**642**	**662**	**621**
Queensland					
Condamine/Balonne	545	467	366	360	162
Border Rivers/Macintyre Brook	186	123	163	288	163
Moonie	8	8	8	31	6
Nebine	0	0	0	0	0
Warrego	2	10	3	9	10
Paroo	0	0	0	0	0
Total Queensland	**741**	**609**	**541**	**688**	**341**
Australian Capital Territory	**44**	**23**	**27**	**34**	**36**
Total Basin	**12036**	**11494**	**9600**	**12124**	**11567**

APPENDIX C: Cap Register – Annual Diversions (GL) *continued*

System	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
New South Wales							
Intersecting Streams	3	3	3	3	3	3	3
Border Rivers	137	120	125	152	146	131	137
Gwydir	238	169	165	230	139	89	154
Namoi/Peel	294	173	190	234	166	142	188
Macquarie/Castlereagh/Bogan	411	219	102	224	252	75	106
Barwon-Darling/Lower Darling	127	293	186	199	17	221	159
Lachlan	253	59	36	128	73	46	40
Murrumbidgee	1793	1775	1618	2200	960	515	602
Murray	879	1312	1241	1667	602	244	341
Total New South Wales	**4135**	**4122**	**3666**	**5038**	**2358**	**1466**	**1729**
Victoria							
Goulburn/Broken/Loddon Cap valley	1076	1596	1553	1592	651	684	628
Campaspe	74	73	40	22	14	26	26
Wimmera-Mallee	60	66	50	60	19	45	11
Murray/Kiewa/Ovens Cap valley	1755	1478	1493	1578	1406	801	837
Total Victoria	**2965**	**3212**	**3136**	**3252**	**2090**	**1555**	**1503**
South Australia							
Metro-Adelaide and associated country areas	165	82	72	74	203	89	150
Lower Murray Swamps	89	67	57	59	27	15	10
Country Towns	39	35	39	40	41	37	37
All Other Purposes	443	423	453	417	355	282	288
Total South Australia	**736**	**607**	**620**	**590**	**626**	**423**	**485**
Queensland							
Condamine/Balonne	123	575	167	186	57	776	190
Border Rivers/Macintyre Brook	78	204	192	125	71	210	157
Moonie	6	26	23	2	9	41	29
Nebine	0	0	0	0	0	0	0
Warrego	7	11	11	3	21	23	6
Paroo	0	0	0	0	2	4	1
Total Queensland	**214**	**815**	**392**	**316**	**160**	**1054**	**383**
Australian Capital Territory	**40**	**28**	**27**	**32**	**25**	**16**	**19**
Total Basin	**8091**	**8785**	**7842**	**9228**	**5260**	**4514**	**4119**

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

System	Long-Term Cap	Schedule E trigger	1997–98	1998–99	1999–2000	2000–01	2001–02
New South Wales							
Intersecting Streams	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
Gwydir	344	-69	71	-35	41	-108	-30
Namoi/Peel	338	-68	27	-7	-5	-16	-30
Macquarie/Castlereagh/Bogan	468	-94	-57	196	-26	53	-20
Barwon-Darling/Lower Darling	310	-62	-49	36	35	-29	-11
Lachlan	334	-67	-5	31	-30	-27	-9
Murrumbidgee	2358	-472	-29	45	147	-26	325
Murray	1880	-376	-65	159	528	-64	-227
Total New South Wales	**6235**	**-1247**	**-142**	**423**	**638**	**-217**	**-1**
Victoria							
Goulburn/Broken/Loddon Cap valley	2034	-407	71	-45	36	110	-113
Campaspe	122	-24	34	5	2	-10	-18
Wimmera-Mallee	159	-32	-1	31	35	7	4
Murray/Kiewa/Ovens Cap valley	1702	-340	106	-67	55	46	-89
Total Victoria	**4017**	**-803**	**210**	**-76**	**128**	**153**	**-216**
South Australia							
Metro-Adelaide and associated country areas[1]	n/a	n/a	128	84	74	109	31
Lower Murray Swamps	94	-19	0	0	0	0	0
Country Towns	50	-10	15	14	13	12	3
All Other Purposes	450	-90	28	36	73	43	44
Total South Australia	**594**	**-119**	**171**	**134**	**161**	**164**	**78**
Queensland							
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	250	-50	n/a	n/a	n/a	n/a	n/a
Moonie	34	-7	n/a	n/a	n/a	n/a	n/a
Nebine	6	-1	n/a	n/a	n/a	n/a	n/a
Warrego	48	-10	n/a	n/a	n/a	n/a	n/a
Paroo	0	0	n/a	n/a	n/a	n/a	n/a
Total Queensland	**338**	**-68**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Australian Capital Territory[2]	**40**	**-8**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**11224**	**-2245**	**238**	**481**	**927**	**100**	**-139**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. Australian Capital Territory has yet to develop a Cap model. No model target (hence any cap credit) was available for 2008–09.The past credits worked out from an authority model have been recognised as part of the Cap agreement for the Australian Capital Territory.

APPENDIX D: Cap Register – Annual Cap Credits (GL) *continued*

System	Long-Term Cap	Schedule E trigger	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
New South Wales									
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gwydir	344	-69	195	-18	-2	80	-65	-13	43
Namoi/Peel	338	-68	-19	39	63	59	-36	22	57
Macquarie/Castlereagh/Bogan	468	-94	-139	49	64	164	-132	143	39
Barwon-Darling/Lower Darling	310	-62	-5	-83	-52	18	-3	-41	-2
Lachlan	334	-67	-10	33	24	40	13	49	19
Murrumbidgee	2358	-472	323	109	-208	279	128	287	40
Murray	1880	-376	-486	265	187	42	-438	232	13
Total New South Wales	**6235**	**-1247**	**-140**	**394**	**75**	**681**	**-534**	**679**	**208**
Victoria									
Goulburn/Broken/ Loddon Cap valley	2034	-407	-71	26	108	-4	-31	92	35
Campaspe	122	-24	11	7	30	20	5	19	20
Wimmera-Mallee	159	-32	10	-1	28	-14	3	-3	12
Murray/Kiewa/Ovens Cap valley	1702	-340	155	72	95	136	38	148	-39
Total Victoria	**4017**	**-803**	**105**	**104**	**261**	**138**	**15**	**256**	**28**
South Australia									
Metro-Adelaide and associated country areas[1]			31	111	187	232	100	164	87
Lower Murray Swamps	94	-19	0	0	0	0	0	-6	-2
Country Towns	50	-10	0	5	4	2	0	0	0
All Other Purposes	450	-90	45	72	-2	31	37	72	136
Total South Australia	**594**	**-119**	**75**	**188**	**189**	**265**	**137**	**230**	**221**
Queensland									
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	250	-50	n/a	n/a	n/a	n/a	n/a	n/a	27
Moonie	34	-7	n/a	n/a	n/a	n/a	3	43	7
Nebine	6	-1	n/a	n/a	n/a	n/a	2	6	5
Warrego	48	-10	n/a	n/a	n/a	n/a	25	54	13
Paroo	0	0	n/a	n/a	n/a	n/a	0	0	0
Total Queensland	**338**	**-68**	**n/a**	**n/a**	**n/a**	**n/a**	**31**	**103**	**52**
Australian Capital Territory[2]	**40**	**-8**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**11224**	**-2245**	**40**	**686**	**525**	**1084**	**-351**	**1268**	**510**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. Australian Capital Territory has yet to develop a Cap model. No model target (hence any cap credit) was available for 2008–09.The past credits worked out from an authority model have been recognised as part of the Cap agreement for the Australian Capital Territory.

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

System	Long-Term Cap	Schedule E trigger	1997–98	1998–99	1999–2000	2000–01	2001–02
New South Wales							
Intersecting Streams	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
Gwydir	344	-69	71	36	77	-31	-60
Namoi/Peel	338	-68	27	20	15	-1	-31
Macquarie/Castlereagh/Bogan	468	-94	-57	139	113	167	147
Barwon-Darling/Lower Darling	310	-62	-49	-13	22	-7	-18
Lachlan	334	-67	-5	26	-5	-31	-41
Murrumbidgee	2358	-472	-29	16	163	137	461
Murray	1880	-376	-65	94	622	558	331
Total New South Wales	**6235**	**-1247**	**-142**	**281**	**919**	**791**	**790**
Victoria							
Goulburn/Broken/ Loddon Cap valley	2034	-407	71	26	62	172	59
Campaspe	122	-24	34	39	42	32	14
Wimmera-Mallee	159	-32	-1	29	65	72	76
Murray/Kiewa/Ovens Cap valley	1702	-340	106	39	93	140	50
Total Victoria	**4017**	**-803**	**210**	**134**	**262**	**415**	**200**
South Australia							
Metro-Adelaide and associated country areas[1]			128	84	74	109	31
Lower Murray Swamps	94	-19	0	0	0	0	0
Country Towns	50	-10	15	28	42	54	56
All Other Purposes	450	-90	28	64	137	180	224
Total South Australia	**594**	**-119**	**171**	**176**	**253**	**343**	**312**
Queensland							
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	250	-50	n/a	n/a	n/a	n/a	n/a
Moonie[2]	34	-7	n/a	n/a	n/a	n/a	n/a
Nebine[2]	6	-1	n/a	n/a	n/a	n/a	n/a
Warrego[2]	48	-10	n/a	n/a	n/a	n/a	n/a
Paroo[2]	0	0	n/a	n/a	n/a	n/a	n/a
Total Queensland	**338**	**-68**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Australian Capital Territory[3]	**40**	**-8**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**11224**	**-2245**	**238**	**591**	**1434**	**1549**	**1301**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. Caps for Moonie Warrego, Paroo and Nebine are annual and do not accumulate Cap credit.
3. Australian Capital Territory has yet to develop a Cap model. No model target (hence any cap credit) was available for 2008–09.The past cumulative credits worked out from an authority model have been recognised as part of the Cap agreement for the Australian Capital Territory.

APPENDIX E: Cap Register – Cumulative Cap Credits (GL) *continued*

System	Long-Term Cap	Schedule E trigger	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
New South Wales									
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gwydir	344	-69	135	116	114	194	129	116	158
Namoi/Peel	338	-68	-50	-11	52	110	74	96	153
Macquarie/Castlereagh/Bogan	468	-94	8	57	121	284	153	296	335
Barwon-Darling/ Lower Darling	310	-62	-22	-105	-157	-139	-142	-183	-186
Lachlan	334	-67	-50	-17	7	46	59	108	127
Murrumbidgee	2358	-472	784	893	685	964	1093	1379	1419
Murray	1880	-376	-155	110	297	339	-99	133	146
Total New South Wales	**6235**	**-1247**	**649**	**1043**	**1118**	**1799**	**1266**	**1945**	**2153**
Victoria									
Goulburn/Broken/ Loddon Cap valley	2034	-407	-12	14	122	118	87	179	214
Campaspe	122	-24	25	32	62	81	87	106	125
Wimmera-Mallee	159	-32	86	86	114	99	102	99	111
Murray/Kiewa/ Ovens Cap valley	1702	-340	206	277	373	509	547	695	657
Total Victoria	**4017**	**-803**	**305**	**409**	**670**	**808**	**823**	**1079**	**1107**
South Australia									
Metro-Adelaide and associated country areas[1]			31	111	187	232	100	164	87
Lower Murray Swamps	94	-19	0	0	0	0	0	-6	-8
Country Towns	50	-10	56	61	65	67	67	67	67
All Other Purposes	450	-90	269	341	339	370	407	479	616
Total South Australia	**594**	**-119**	**356**	**513**	**592**	**670**	**574**	**705**	**762**
Queensland									
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	250	-50	n/a	n/a	n/a	n/a	n/a	n/a	27
Moonie[2]	34	-7	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nebine[2]	6	-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego[2]	48	-10	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo[2]	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total Queensland	**338**	**-68**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**27**
Australian Capital Territory[3]	**40**	**-8**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**11224**	**-2245**	**1310**	**1965**	**2380**	**3277**	**2663**	**3728**	**4050**

1. Metro Adelaide has a five-year rolling Cap of 650 GL and does not accumulate Cap credit.
2. Caps for Moonie Warrego, Paroo and Nebine are annual and do not accumulate Cap credit.
3. Australian Capital Territory has yet to develop a Cap model. No model target (hence any cap credit) was available for 2008–09.The past cumulative credits worked out from an authority model have been recognised as part of the Cap agreement for the Australian Capital Territory.

APPENDIX F: Cap Register for Metropolitan Adelaide

Year	South Australia – Metropolitan Adelaide	Designated river valley and Cap		
	Diversion	Gross Metro-Adelaide and associated country areas (rolling five-year Cap is 650 GL)	First Use License	Net Metro-Adelaide and associated country areas (rolling five-year Cap is 650 GL)
1997–98	Annual diversion	153	0	153
	Diversion – 5 Years to 1997–98	555	0	555
1998–99	Annual Diversion	153	0	153
	Diversion – 5 Years to 1998–99	598	0	598
1999–2000	Annual Diversion	139	0	139
	Diversion – 5 Years to 1999–2000	577	0	577
2000–01	Annual Diversion	104	0	104
	Diversion – 5 Years to 2000–01	614	0	614
2001–02	Annual Diversion	82	12	70
	Diversion – 5 Years to 2001–02	631	12	619
2002–03	Annual Diversion	165	11	154
	Diversion – 5 Years to 2002–03	642	23	619
2003–04	Annual Diversion	82	9	73
	Diversion – 5 Years to 2003–04	572	32	539
2004–05	Annual Diversion	72	9	63
	Diversion – 5 Years to 2004–05	504	41	463
2005–06	Annual Diversion	74	16	58
	Diversion – 5 Years to 2005–06	475	57	418
2006–07	Annual Diversion	203	0	203
	Diversion – 5 Years to 2006–07	595	45	550
2007–08	Annual Diversion	89	0	89
	Diversion – 5 Years to 2007–08	520	34	486
2008–09	Annual Diversion	150	0	150
	Diversion – 5 Years to 2008–09	588	25	563

APPENDIX G: Cap Register – Annual Cap Adjustments (GL) for Environmental Use

System	2005–06	2006–07	2007–08	2008–09
New South Wales				
Intersecting Streams	0	0	0	0
Border Rivers	0	0	0	0
Gwydir	0	0	0	0
Namoi/Peel	0	0	0	0
Macquarie/Castlereagh/Bogan	0	0	-1	0
Barwon-Darling/Lower Darling	0	0	0	-11
Lachlan	0	0	0	0
Murrumbidgee	0	-20	-20	-13
Murray	0	-2	0	-3
Total New South Wales	**0**	**-22**	**-21**	**-28**
Victoria				
Goulburn/Broken/Loddon Cap valley	-18	-16	-5	-7
Campaspe	0	0	0	0
Wimmera-Mallee	0	0	0	0
Murray/Kiewa/Ovens Cap valley	-8	-7	-16	-24
Total Victoria	**-27**	**-22**	**-21**	**-31**
South Australia				
Metro-Adelaide and associated country areas	0	0	0	0
Lower Murray Swamps	0	0	0	0
Country Towns	0	0	0	0
All Other Purposes	0	0	-1	-50
Total South Australia	**0**	**0**	**-1**	**-50**
Queensland				
Condamine/Balonne	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a
Nebine	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a
Total Queensland	**n/a**	**n/a**	**n/a**	**n/a**
Australian Capital Territory	**n/a**	**n/a**	**n/a**	**n/a**
Total Basin	**-27**	**-44**	**-44**	**-109**

Australian Government

MURRAY–DARLING
BASIN AUTHORITY