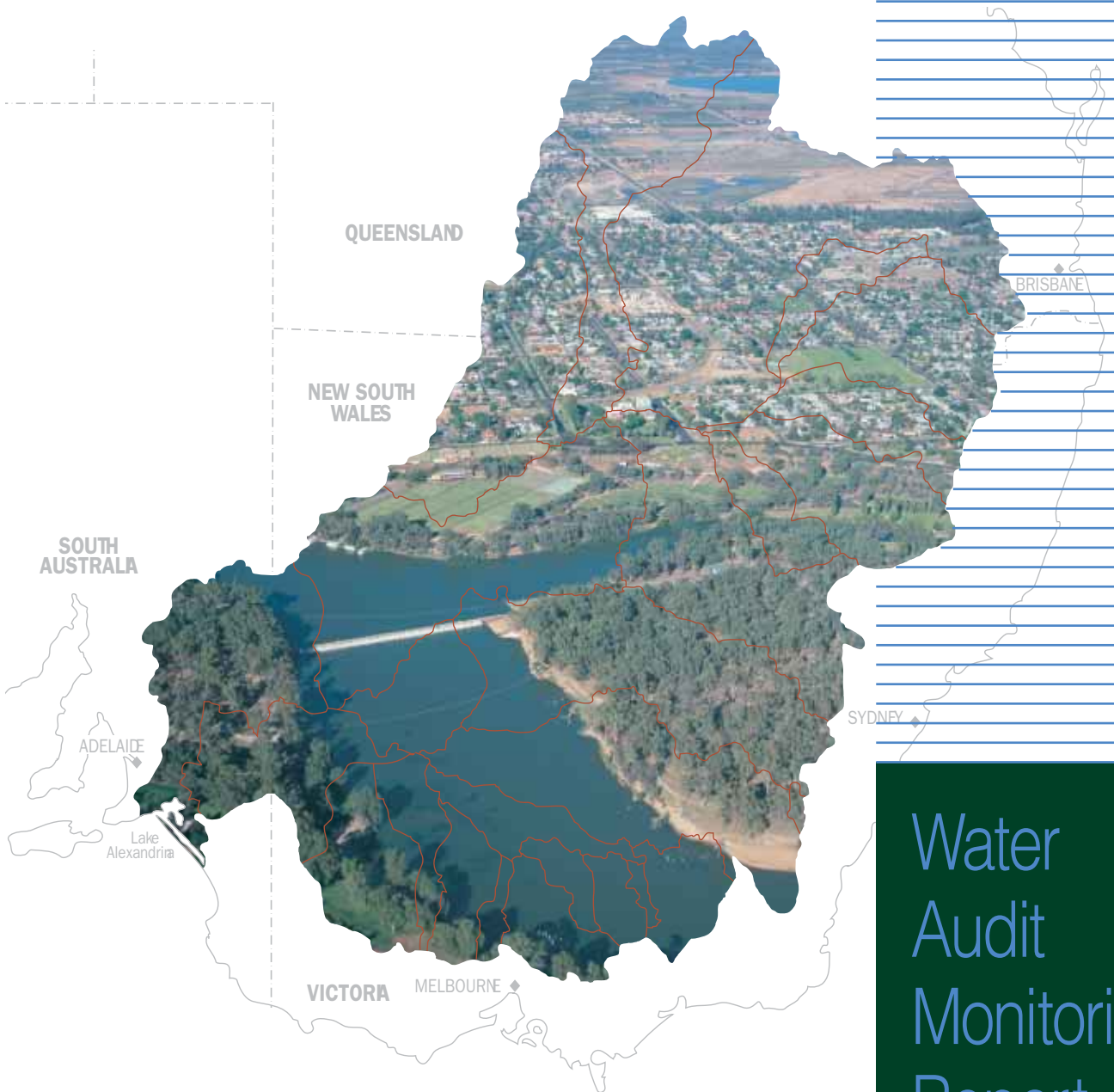


# Water Audit Monitoring Report 2002/03

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



Water  
Audit  
Monitoring  
Report  
2002/03

**June 2004**



## Integrated catchment management in the Murray-Darling Basin

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

### Our values

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

#### *Courage*

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

#### *Inclusiveness*

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

#### *Commitment*

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

#### *Respect and honesty*

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

#### *Flexibility*

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

#### *Practicability*

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

#### *Mutual obligation*

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

### Our principles

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

#### *Integration*

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

#### *Accountability*

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

#### *Transparency*

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

#### *Effectiveness*

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

#### *Efficiency*

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

#### *Full accounting*

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

#### *Informed decision-making*

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

#### *Learning approach*

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

# *Water Audit Monitoring Report 2002/03*

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

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***Water Audit  
Monitoring  
Report  
2002/03***

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J U N E 2 0 0 4

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# 1. Introduction

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

This report outlines the water usage within the Murray-Darling Basin for the 2002/03 water year, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

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

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

In addition to detailing water use, this report also contains information on the States' implementation of management rules in designated river valleys that impact on water use within the Basin. Each State has provided a description of their major activities occurring in 2002/03 and further actions that each State plans to undertake over the coming years (Sections 4 to 8).

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

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

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

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

**Table 1. 2002/03 Cap Compliance by States**

<i>State/Territory</i>	<i>2002/03 Cap Compliance</i>
<b>New South Wales</b>	
Border Rivers	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The IAG could not audit the NSW Border Rivers Cap as a Cap is yet to be defined. The Commission meeting 77 – 16 December 2003 requested that NSW and Queensland finalise the water sharing and environmental flow rules for the Border Rivers so that NSW can submit a Cap proposal to the IAG in 2004 for its Border Rivers with an appropriate allowance for the Pindari Dam. The 2002/03 diversion was 137 GL.
Gwydir	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2002/03 diversion in the Gwydir valley was 238 GL, well below its annual target of 435 GL. This resulted in a cumulative debit of 29 GL, which does not exceed the trigger for a Special Audit. However, the IAG has some concern with the reliability of the modelling and was not able to form a view as to whether or not the valley has exceeded the Cap trigger requiring a Special Audit.
Namoi/Peel	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance for the Namoi. A climate-diversion relationship is available for Peel and an IQQM model is under development. The 2002/03 of 294 GL exceeds the annual Cap target of 256 GL. However the cumulative Cap debit since 1997/98 of 42 GL is below the trigger of 64 GL for a Special Cap Audit.
Macquarie/Castlereagh/Bogan	An IQQM (Interim) model submitted for audit and yet to be approved by the Commission is available to determine the Cap compliance. The 2002/03 diversion was 411 GL. However, the IAG was unable to assess the Cap compliance for the Macquarie valley because the Cap target for 2002/03 was not made available.
Barwon-Darling/Lower Darling	Council Meeting 29 – 25 August 2000 decided to combine the Barwon-Darling and Lower Darling into a single designated river valley for Cap accounting purpose. An IQQM (Interim) for the Barwon-Darling and MSM (Interim) for the Lower Darling, both of which are yet to approved by the Commission, are available to determine the Cap compliance. The combined Barwon-Darling/ Lower Darling Cap valley diversion of 125 GL exceeded its annual Cap target of 120 GL. However, the valley is in cumulative credit of 14 GL since 1997/98.
Lachlan	An IQQM model approved by the Commission is available to determine the Cap compliance. The Lachlan valley was declared in breach of Cap by the Commission Meeting 71 – 4 March 2003. The Lachlan valley's cumulative Cap debit of 80 GL at the end of 2002/03 exceeded the trigger of 67 GL for Special Audit. A Special Audit by the IAG conducted in February 2004 confirmed the continued Cap exceedence. Subsequently, the Commission Meeting 78 – 2 March 2004 noted that the Lachlan valley continued to be in breach of Cap. The NSW Government reported to the Council Meeting 35 – 26 March 2004 on the proposed measures to bring diversions in the Lachlan valley within the Cap limits.
Murrumbidgee	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2002/03 diversion of 1793 GL for the Murrumbidgee valley was below its Cap target of 2055 GL. The valley has a substantial cumulative Cap credit.
Murray	The MSM (Interim) model yet to be audited and approved by the Commission is available to determine Cap compliance. The 2002/03 diversion of 879 GL for the Murray valley exceeded its annual Cap of 483 GL. However, the valley has a 120 GL cumulative Cap credit.

**Table 1. 2002/03 Cap Compliance by State (continued)**

<i>State/Territory</i>	<i>2002/03 Cap Compliance</i>
<b>Victoria</b>	
Goulburn/Broken/Loddon	A computer model known as Goulburn Simulation model (GSM) submitted for audit and yet to be approved by the Commission is available to determine Cap compliance. The 2002/03 diversion of 1076 GL for the Goulburn/Broken/Loddon system was above its Cap target of 1033 GL. However the valley's cumulative debit of 3 GL is well below 412 GL trigger for a Special Audit.
Campaspe	The GSM, which is yet to be audited and approved by the Commission, is available to determine Cap compliance. The diversion of 74 GL for the Campaspe in 2002/03 was below its Cap target of 85 GL. The valley has a cumulative credit of 32 GL.
Wimmera-Mallee	An uncalibrated model is available. Though no Cap target for 2002/03 was available, the diversion of 63 GL was below the estimated long-term Cap of 162 GL.
Murray/Kiewa/Ovens	The MSM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The 2002/03 diversion of 1744 GL for the Murray/Kiewa/Ovens Cap valley was below its Cap target of 2063 GL. Cumulatively the valley has a 449 GL credit.
<b>South Australia</b>	
Metro-Adelaide & Associated Country Areas	Metro-Adelaide & Associated Country Areas diversion was below the five-year rolling Cap up to and including 2002/03. Temporary trades of 12 GL in 2001/02 and of 11 GL in 2002/03 were allowed from the Country Towns, effectively increasing the year rolling Cap to 673 GL.
Lower Murray Swamps	The 2002/03 diversion of 99 GL for the Lower Murray Swamp equalled its Cap of 99 GL for 2002/03. The volume of diversion is assumed as the usage is not measured.
Country Towns	The 2002/03 diversion of 39.2 GL for Country Towns was marginally above its Cap target of 39 GL for 2002/03. The Country Towns valley has a cumulative credit of 56 GL.
All Other Uses of Water from the River Murray	The 2002/03 diversion of 434 GL for the <i>All Other Uses of Water from the River Murray</i> was below its Cap target of 449 GL for 2002/03.
<b>Queensland</b>	
Condamine/Balonne	Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2002/03 diversion was 123 GL.
Border Rivers/Macintyre Brook	Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2002/03 diversion was 78 GL.
Moonie	Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2002/03 diversion was 6 GL.
Warrego/Paroo	Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2002/03 diversion was 7 GL.
<b>Australian Capital Territory</b>	
	A Cap model is not yet available to determine Cap compliance. Negotiations are continuing to establish a Cap for the ACT and to establish a framework for trade between the ACT and New South Wales. The 2002/03 diversion was 40 GL.

## 2. Background

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

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

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

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

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

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

### **2.2 The Cap**

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

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

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

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

The implementation of the Cap will require considerable change to the way the water allocation system is managed across the Basin. It is likely that these changes will alter the expectations that some water users have regarding their water entitlements. In particular, there will be conflict between sleepers (those people who have never used their water entitlement) on the one hand, and those irrigators who have consistently used all their allocation on the other. New South Wales, Victoria and South Australia have established processes implementing the Cap, which will resolve these issues.

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

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

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

### 2.3 IAG Review of Cap Implementation 2002/03

At the request of the Ministerial Council, the IAG performed a review of the performance of each State and Territory in progressing the implementation of the Cap during 2002/03 (*Review of Cap Implementation 2002/03*, published by the Murray-Darling Basin Ministerial Council, March 2004, Canberra).

The present report represents the seventh in a series of annual reports and complements the report of the IAG, however the data presented herein are the final figures for the 2002/03 water year and supersede the data reported by the IAG. Most notably, the Murray-Darling Basin diversions in 2002/03 reported in this present report (**Table 2**), supersede those reported by the IAG in March 2003 (**Table 12 of that report**).

## 3. The Year in Review

### 3.1 Water Use

The data presented in this report has been collected by the relevant State agencies and collated by the MDBC. Accurate diversion data is difficult to obtain, as it requires the collection and collation of thousands of individual water use figures. **Table 2** presents the overall water usage figures for the Basin in 2002/03.

The figures indicate that Basin water use in 2002/03 was 8079 GL, representing the lowest on record (since 1983/84). Water use in South Australia was the highest on record, in Queensland the seventh lowest, in New South Wales the lowest on record, in Victoria the third lowest whilst diversions in the ACT were fourth highest on record.

Figure 1 shows the water use (by State) for the period 1983/84–2002/03 which enables a comparison of 2002/03 water use with that of previous years. Figure 2 shows the same data as Figure 1, but has the vertical axis rescaled so that the variation for States with lower overall usage is visible.

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

**Table 2. Murray-Darling Basin Diversions in 2002/03**

<i>System</i>	<i>Irrigation Diversion (GL)</i>	<i>Other Diversion<sup>1</sup> (GL)</i>	<i>Total Diversion (GL)</i>
<b>New South Wales<sup>2</sup></b>			
Border Rivers	137	1	137
Gwydir	238	0	238
Namoi/Peel	284	10	294
Macquarie/Castlereagh/Bogan	390	21	411
Barwon-Darling	19	0	19
Lower Darling	60	47	107
Lachlan	243	10	253
Murrumbidgee <sup>4</sup>	1778	15	1793
Murray	824	55	879
<b>Total New South Wales<sup>3</sup></b>	<b>3972</b>	<b>158</b>	<b>4131</b>
<b>Victoria<sup>2</sup></b>			
Goulburn	975	29	1004
Broken	23	16	39
Loddon	26	6	32
Campaspe	40	34	74
Wimmera-Mallee	0	63	63
Kiewa	9	3	12
Ovens	21	10	32
Murray	1642	59	1701
<b>Total Victoria</b>	<b>2737</b>	<b>220</b>	<b>2957</b>
<b>South Australia</b>			
Metro-Adelaide & Associated Country Areas	0	165	165
Lower Murray Swamps <sup>5</sup>	99	0	99
Country Towns	0	39	39
All Other Uses of Water from the River Murray	432	2	434
<b>Total South Australia</b>	<b>531</b>	<b>206</b>	<b>737</b>
<b>Queensland<sup>2</sup></b>			
Condamine/Balonne	113	10	123
Border Rivers	63	3	67
Macintyre Brook	11	0	11
Moonie	6	0	6
Warrego	7	0	7
Paroo	0	0	0
<b>Total Queensland<sup>6</sup></b>	<b>200</b>	<b>14</b>	<b>214</b>
<b>Australian Capital Territory<sup>7</sup></b>			
	<b>5</b>	<b>35</b>	<b>40</b>
<b>Total Basin</b>	<b>7445</b>	<b>633</b>	<b>8079</b>

1. 'Other Diversion' includes domestic & stock, town & industrial uses.

2. New South Wales, Victoria and Queensland diversions include an estimate of unregulated stream diversions.

3. An estimate of NSW floodplain diversions is not available for 2002/03.

4. Murrumbidgee valley diversions and Lowbidgee diversions are reported together.

5. Water use by Lower Murray Swamp irrigators is based on an estimate of water use. The metering of diversions is currently being implemented.

6. Floodplain diversions in Queensland of 72 GL are not included in valley totals.

7. ACT diversions are reported as a net figure. The primary usage in the ACT is for urban supply, which has a high return component (approximately 50%).



Figure 1. Murray-Darling Basin Diversions – 1983/84 to 2002/03

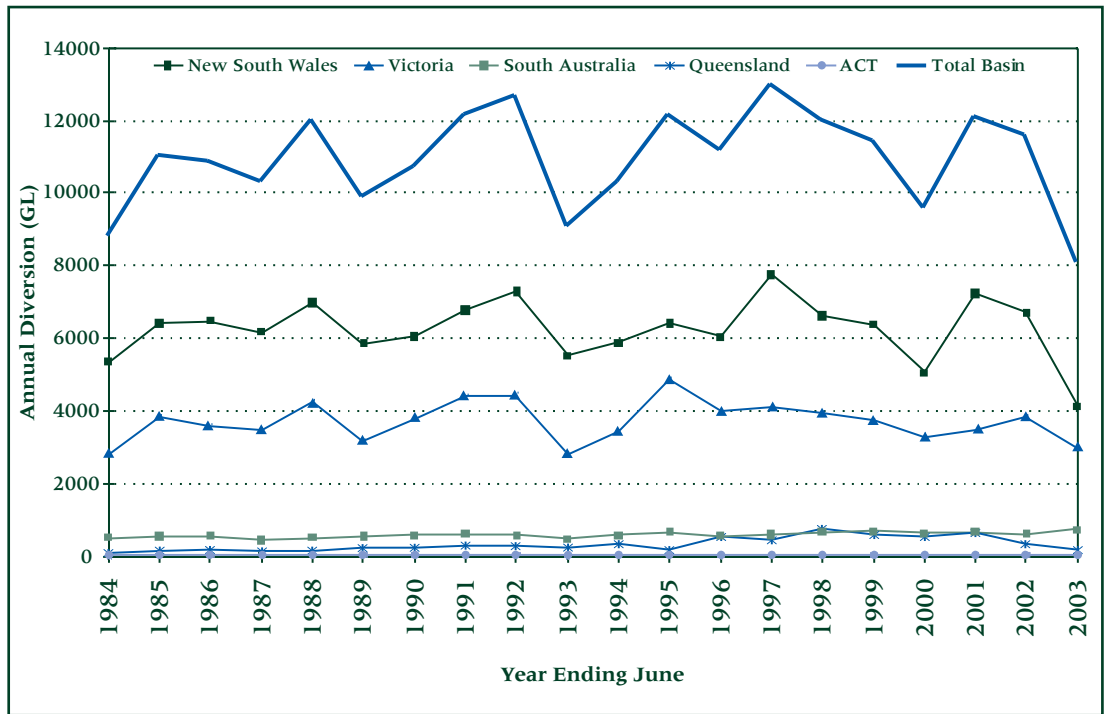
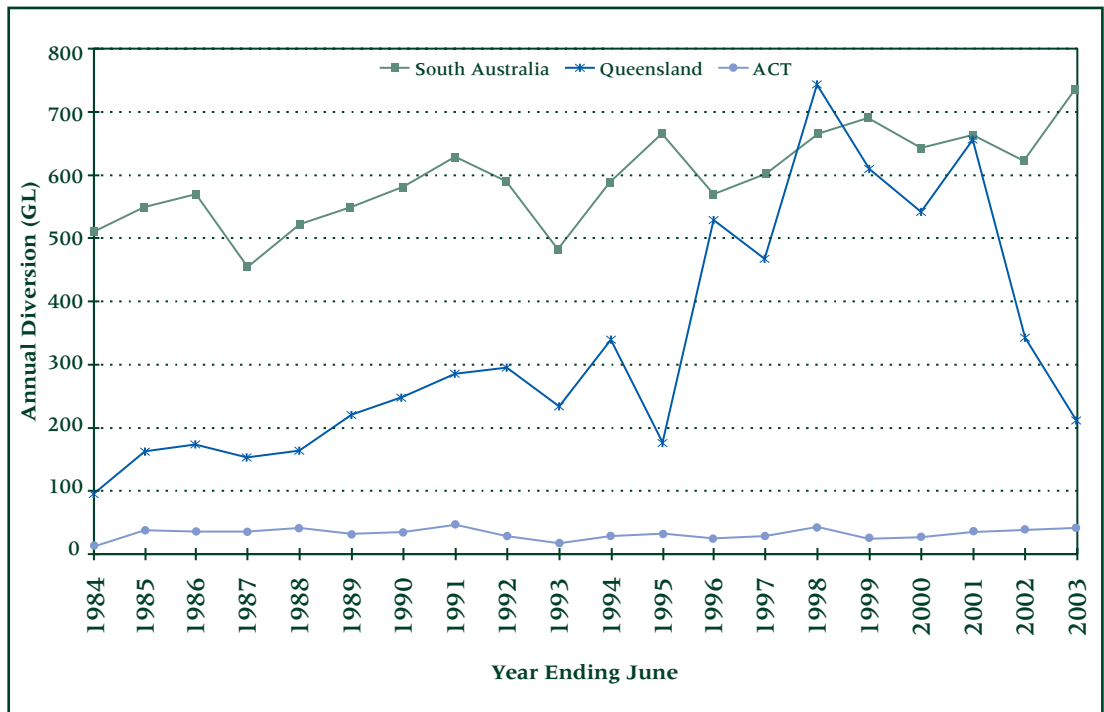


Figure 2. Murray-Darling Basin Diversions – 1983/84 to 2002/03  
(Usage under 1000 GL/yr)





### 3.2 Accuracy of Measurement

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

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

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

Analysis of reported diversions for 1996/97 to 2002/03 indicates that the accuracy of measurement has remained at 7%.

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

**Table 3. Accuracy of Diversion Estimates in 2002/03**

<i>System</i>	<i>Diversion (GL)</i>	<i>Accuracy <math>\pm</math> GL</i>	<i>Accuracy <math>\pm</math> %</i>
<b>New South Wales</b>			
Border Rivers	137	11	8%
Gwydir	238	14	6%
Namoi/Peel	294	29	10%
Macquarie/Castlereagh/Bogan	411	31	8%
Barwon-Darling	19	2	10%
Lower Darling	107	5	5%
Lachlan	253	16	6%
Murrumbidgee	1793	118	7%
Murray	879	43	5%
<b>Total New South Wales</b>	<b>4131</b>	<b>269</b>	<b>6%</b>
<b>Victoria</b>			
Goulburn	1004	55	5%
Broken	39	6	15%
Loddon	32	3	11%
Campaspe	74	4	6%
Wimmera-Mallee	63	0	0%
Kiewa	12	2	19%
Ovens	32	5	16%
Murray	1701	111	7%
<b>Total Victoria</b>	<b>2957</b>	<b>188</b>	<b>6%</b>
<b>South Australia</b>			
Metro-Adelaide & Associated Country Areas	165	8	5%
Lower Murray Swamps	99	39	40%
Country Towns	39	2	5%
All Other Uses of Water from the River Murray	434	26	6%
<b>Total South Australia</b>	<b>737</b>	<b>76</b>	<b>10%</b>
<b>Queensland</b>			
Condamine/Balonne	123	12	10%
Border Rivers	67	5	7%
Macintyre Brook	11	1	5%
Moonie	6	2	39%
Warrego	7	1	16%
Paroo	0	0	16%
<b>Total Queensland</b>	<b>214</b>	<b>21</b>	<b>10%</b>
<b>Australian Capital Territory</b>			
	<b>40</b>	<b>4</b>	<b>9%</b>
<b>Total Basin</b>	<b>8079</b>	<b>557</b>	<b>7%</b>

### 3.3 Climatic Overview 2002/03

#### • Rainfall

Figure 3 shows the rainfall deciles for July 2002 to June 2003 inclusive. Only a few isolated pockets, near Dalby in south-east Queensland, Inverell in north-east NSW, Mt Kosciuszko in north-east Victoria, Nhill in south-west Victoria and Morgan in South Australia received average rainfall. Except for these small pockets, nearly half of the Basin received below average and half of the Basin received very much below average rainfall. A large area, near the towns of Wagga Wagga and Albury in south-east NSW and Wodonga in northern Victoria, received lowest rainfall on record. Some isolated pockets in south-east and north-west NSW also received lowest rainfall on record.

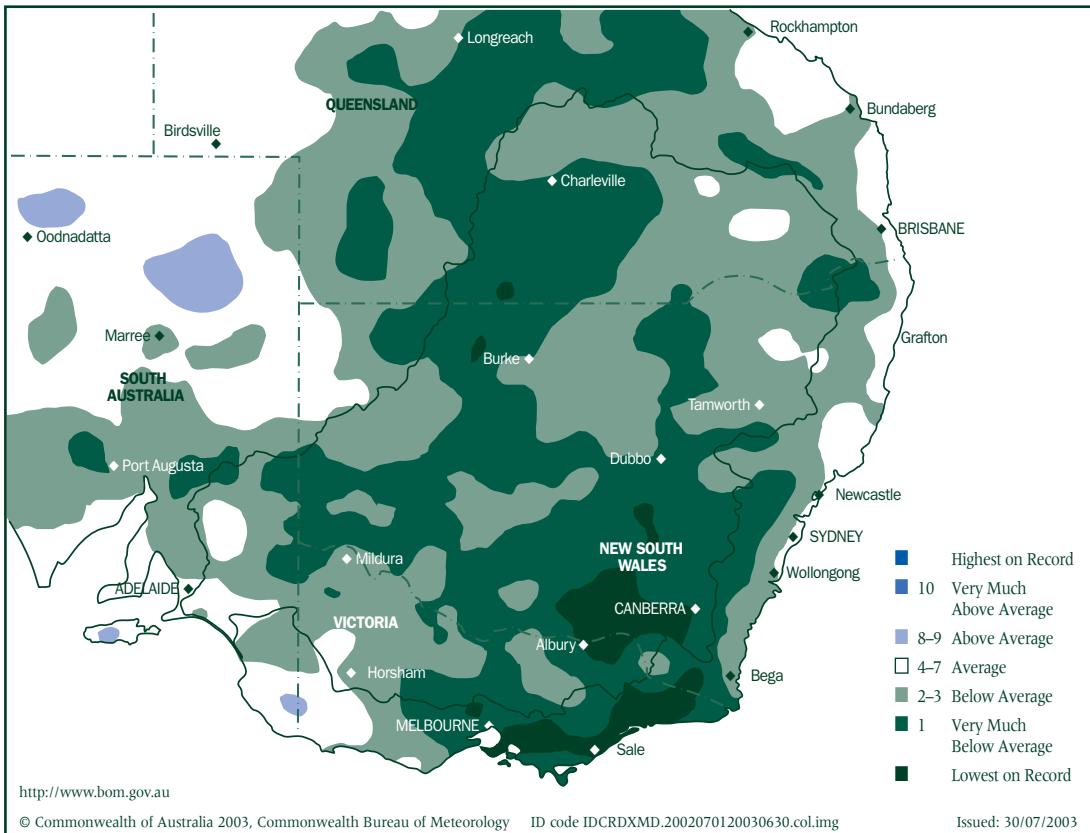
Figure 4 shows the rainfall deciles for the period of November 2002 to April 2003 inclusive. Average rainfall was observed in the north-eastern, central and south-western areas, accounting for almost half of the Basin. The remaining half of the Basin received below average to very much below average rainfall. Very much below average rainfall was received in the south-east of the Basin, covering significant catchment areas of major storages, Hume and Dartmouth. Around the towns of Charleville and Westgate in Southern Queensland also received much below average rainfall. Average rainfall was recorded in two small isolated pockets: one in the New England tablelands near the town of Inverell in NSW and other near the town of Nhill in Victoria.

#### • Temperature

Figure 5 shows the temperature anomaly (the difference between the recorded temperatures and the long-term average temperatures) for the period of July 2002 to June 2003 inclusive. Significantly higher (between 1.0 °C to +1.5°C and +1.5 °C to +2.0 °C) than average temperature conditions were observed throughout the Basin for this period, with more than half of the Basin experiencing temperature anomaly in the range of +1.5 °C to +2.0 °C.

Figure 6 shows the temperature anomaly for the period of December 2002 to February 2003 inclusive (the primary irrigation season). Significantly higher (+1.0 °C to +2.0 °C) than average temperature conditions were observed in most areas of the Basin. The north-east of the Basin experienced higher (0 °C to +1.0 °C) than average temperature conditions.

**Figure 3. Rainfall Deciles for the Murray-Darling Basin for the July 2002 to June 2003 Period**



**Figure 4. Rainfall Deciles for the Murray-Darling Basin for the November 2002 to April 2003 Period**

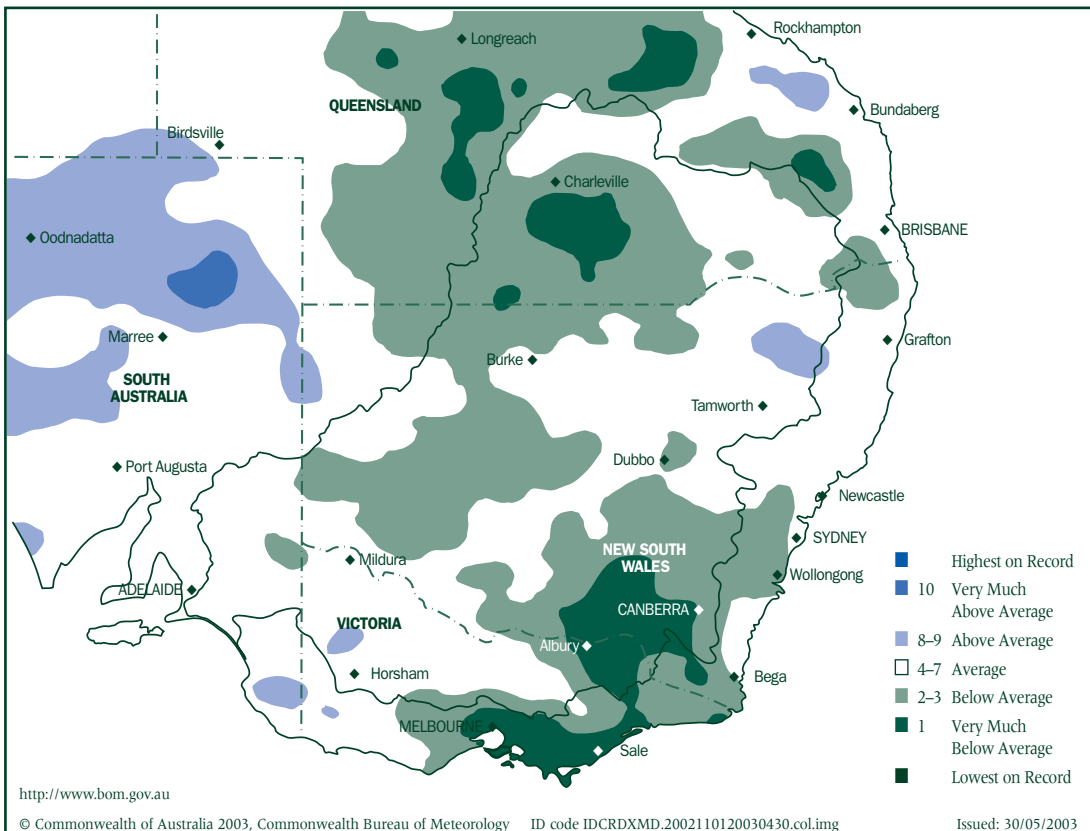


Figure 5. Temperature Anomaly for the 12-Month Period, July 2002 to June 2003

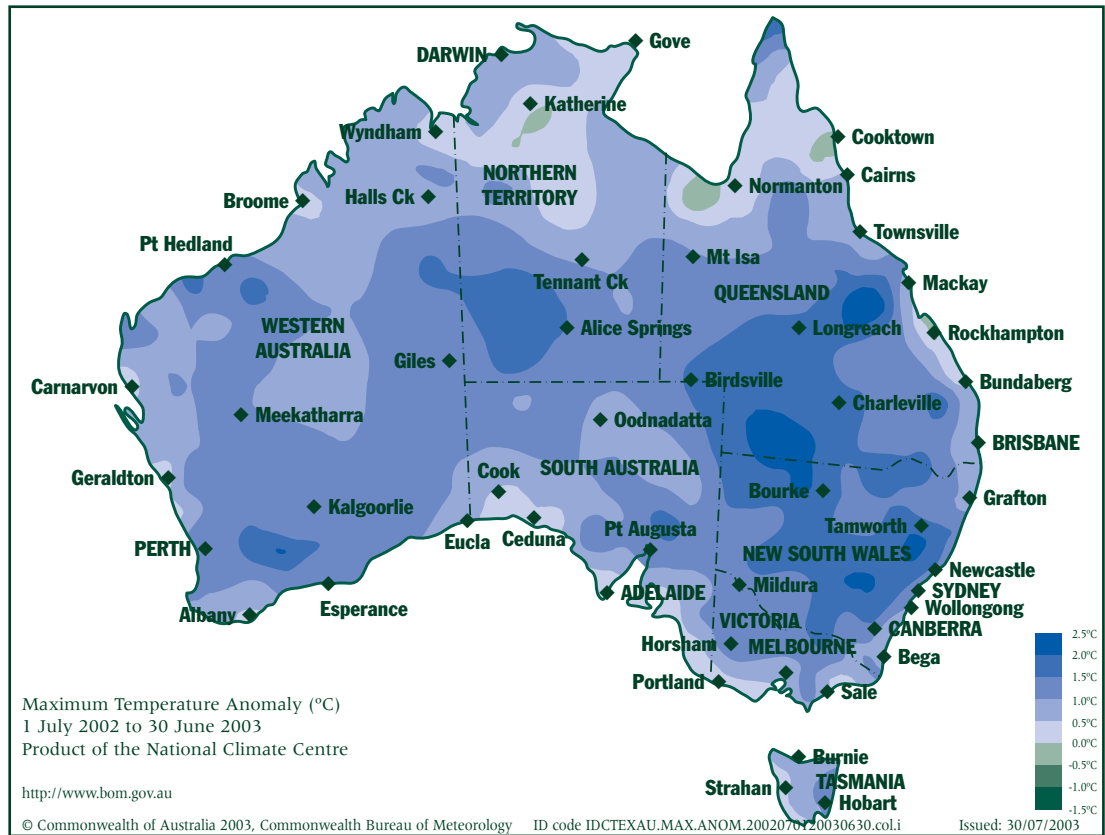
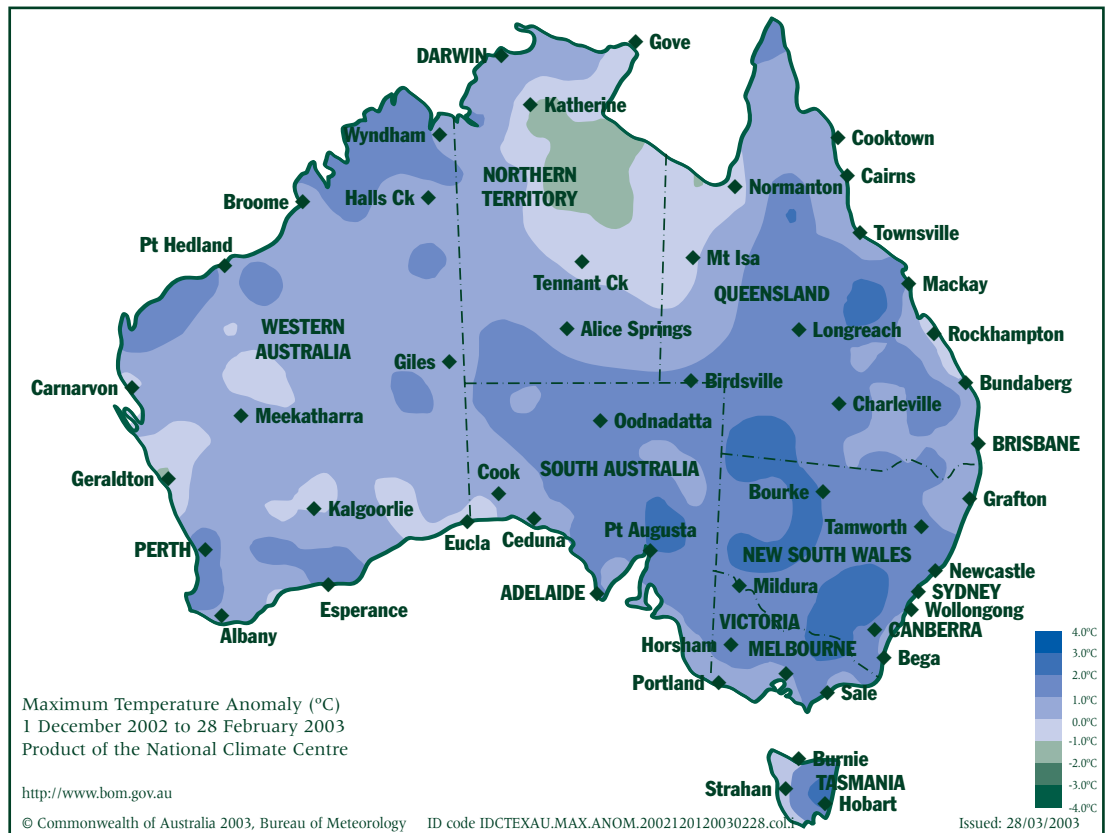


Figure 6. Temperature Anomaly for the 3-Month Period, December 2002 to February 2003



### 3.4 Definition of Cap

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

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

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

The Ministerial Council has not yet set a long-term Cap for Queensland, but will do so following the completion of the Water Resource Planning (WRP) process in that State.

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

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

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

The calculation for the Cap in South Australia is relatively straight forward; although the Cap for the fourth category of South Australian diversions described above is a long-term climate adjusted annual average of 440.6 GL and in extremely dry or wet years may deviate substantially from this value. In the calculation of the Metro-Adelaide Cap, the allocation of 650 GL over 5 years is designed to provide a water supply with 99% security to a major urban city of over 1 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 2002/03 are for the eighth water year to be covered by the Cap in the Murray-Darling Basin.

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

### 3.5 Comparison of 2002/03 Water Use with the Cap

A comparison of 2002/03 water use with the Cap for each State is as follows:

#### • New South Wales

Cap compliance in 2002/03 within New South Wales varied between valleys (**Table 4**).

The interim Cap models for most of New South Wales valleys are available now. The Lachlan model after an independent audit has been approved by the Commission under Schedule F, the first Cap model to reach that milestone. The Macquarie model is being audited. The Macquarie and Namoi Cap models are expected to be accredited by the Commission during 2003/04.

Water use in the Lachlan valley continued to exceed the Cap in 2002/03 and triggered Schedule F exceedence provisions. A supplementary audit by the IAG was conducted in February 2004, which confirmed the continued Cap exceedence in the valley. Subsequently, the New South Wales Government reported to the Ministerial Council Meeting 35 – 26 March 2004 on the reasons for Cap exceedence and the proposed measures to bring diversions in the valley within Cap limits. The Gwydir cumulative debit was 29 GL and did not exceed the trigger for a Special Audit. However, the IAG had some concern with the reliability of the modelling and consequently could not determine whether or not this valley had exceeded the Cap trigger, requiring a Special Audit. The IAG was unable to assess the Cap compliance for the Macquarie valley because the Cap target for 2002/03 was not made available. A Cap was not yet defined for the Border Rivers, therefore the IAG was unable to audit the Cap in this valley.

Diversions in the Namoi/Peel, Barwon-Darling/Lower Darling, and the Murray, although they exceeded the annual Cap target, remained either in cumulative credit or within the 20% of the average long-term diversion trigger for the Special Audit. Diversion in the Murrumbidgee valley was below its annual Cap target.



- **Victoria**

Victorian diversions were within Cap target for 2002/03 for the Kiewa/Ovens/Murray Wimmera-Mallee and Campaspe designated Cap valleys. Diversions in the Goulburn/Broken/Loddon valley although exceeded the annual Cap target, the valley remained within the Schedule F trigger for a Special Cap Audit.

Victoria has a Cap model developed for all its Cap valleys except the Wimmera-Mallee system. The Wimmera-Mallee system Cap model, though developed, has not been calibrated for 1993/94 conditions. Victoria's Goulburn Simulation Model (GSM) which covers its two Cap valleys: Goulburn/Broken/Loddon and Campaspe, is currently being audited by an independent auditor for approval under Schedule F. Victoria remains committed to the ongoing development and improvement of Cap models and implementation of Bulk Entitlements to ensure compliance with the Cap.

- **South Australia**

South Australia complied with its Cap targets for 2002/03 for the Lower Murray Swamps, 'All Other Uses of Water from the River Murray' (**Table 4**) and Metro-Adelaide and Associated Country Areas (**Table 5**). The Country Towns Cap valley was marginally above its target for 2002/03. However, this valley has a substantial cumulative Cap credit.

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

- **Queensland**

Cap definition in Queensland has yet to be completed and therefore it is not possible to provide a statement pertaining to Cap performance for the Queensland catchments for 2002/03.

The Water Resource Plan (WRP) for the Border Rivers, Warrego/Paroo/Nebine and Moonie were finalised and became subordinate legislations following the gazettal in December 2003.

The revised draft WRP for the Condamine-Balonne was released in December 2003 for public comment. Finalisation of Cap for Queensland valleys is not expected before the end of 2005.

- **Australian Capital Territory**

Cap implementation in the ACT is yet to be completed.

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

**Table 4** presents a comparison of actual diversions to the annual Cap targets for New South Wales, Victoria, South Australia (except Metro-Adelaide & Associated Country Areas), Queensland and the Australian Capital Territory. **Table 5** presents a comparison of actual diversions with Cap target for Metro-Adelaide & Associated Country Areas, South Australia.

**Table 4. Comparison of Diversions with Cap Levels in 2002/03**

<i>System<sup>1</sup></i>	<i>Cap Target from Cap (GL)</i>	<i>Adjustment to Cap Target for Trade<sup>1</sup> (GL)</i>	<i>Cap Target Adjusted for Trade (GL)</i>	<i>Annual Diversion (GL)</i>	<i>Cap Credit<sup>5</sup> (GL)</i>	<i>Cumulative Cap Credit since 1997/985 (GL)</i>	<i>Cap Target Exceedence Trigger (20 per cent Long-Term Cap)<sup>6</sup> (GL)</i>	<i>Cumulative Difference (Modelled minus Observed) in Storage (GL)</i>
<b>New South Wales</b>								
Border Rivers <sup>2</sup>	n/a	-13	n/a	137	n/a	n/a	-41	n/a
Gwydir	435	0	435	238	197	-29	-69	200
Namoi/Peel	256	0	256	294	-38	-42	-64	-41
Macquarie/ Castlereagh/Bogan	n/a	0	n/a	411	n/a	n/a	-94	-100
Barwon-Darling/ Lower Darling	120	0	120	125	-6	14	-62	n/a
Lachlan	252	0	252	253	-1	-80	-67	-77
Murrumbidgee	2070	-14	2055	1793	262	615	-472	229
Murray	452	31	483	879	-396	120	-385	-50
<b>Victoria</b>								
Goulburn/ Broken/Loddon <sup>3</sup>	1041	-8	1033	1076	-43	-3	-412	154
Campaspe	85	0	85	74	11	32	-24	14
Wimmera-Mallee <sup>4</sup>	n/a	n/a	n/a	63	n/a	n/a	-32	n/a
Kiewa/Ovens/Murray	2075	-13	2063	1744	318	449	-333	-360
<b>South Australia</b>								
Metro-Adelaide & Associated Country Areas <sup>7</sup>								
Lower Murray Swamps	104	-5	99	99	0	0	-21	n/a
Country Towns	50	-11	39	39	0	56	-10	n/a
All Other Uses of Water from the River Murray	441	9	449	434	15	285	-88	n/a
<b>Queensland</b>								
Condamine/Balonne <sup>4</sup>	n/a	n/a	n/a	123	n/a	n/a	n/a	n/a
Border Rivers <sup>4</sup>	n/a	n/a	n/a	67	n/a	n/a	n/a	n/a
Macintyre Brook <sup>4</sup>	n/a	n/a	n/a	11	n/a	n/a	n/a	n/a
Moonie <sup>4</sup>	n/a	n/a	n/a	6	n/a	n/a	n/a	n/a
Warrego <sup>4</sup>	n/a	n/a	n/a	7	n/a	n/a	n/a	n/a
Paroo <sup>4</sup>	n/a	n/a	n/a	0	n/a	n/a	n/a	n/a
<b>Australian Capital Territory<sup>4</sup></b>								
	n/a	n/a	n/a	40	n/a	n/a	n/a	n/a

1. Adjustment to Cap target for trade includes exchange rate adjustments to permanent interstate trade.
2. Excludes Cap Target for Pindari Dam.
3. Excludes Cap Target for Lake Mokoan.
4. n/a denotes Cap model is not completed or Cap target has not been able to be determined.
5. The sign convention is that a negative Cap credit value denotes an exceedence of the Cap target adjusted for trade in 2002/03. A negative cumulative Cap credit value indicates an exceedence of the Cap target adjusted for trade on a cumulative basis (since 1997/98).
6. Cap target exceedence trigger values are reported as negative values.
7. See **Table 5**.



**Table 5. Comparison of Diversions with Cap Levels in 2002/03 for Metro-Adelaide & Associated Country Areas, South Australia**

<i>System</i>	<i>Total Diversion in 2002/03 (GL)</i>	<i>Total Diversion – 5 Years to 2002/03 (GL)</i>	<i>5-Year Cap Diversion Target<sup>1</sup> (GL)</i>	<i>Difference between Diversion and Cap (GL)</i>
<b>South Australia</b>				
Metro-Adelaide & Associated Country Areas	165	642	673	31

1. Temporary trades from the Country Towns to the Metro-Adelaide of 12 GL during 2001/02 and 11 GL during 2002/03 were allowed as an interim measure, increasing the 5-year rolling Cap from 650 GL to 673 GL. The rules for trade with Metro-Adelaide are to be reviewed in 2004.

## 4. Review of 2002/03 Water Use in New South Wales

### 4.1 Water Management Overview

With the introduction of a new *Water Management Act* in 2000, the NSW Government committed to the development and implementation of statutory long-term water management plans. Water Sharing Plans for all of the major regulated valleys in NSW, with the exception of the NSW Border Rivers have now been made. Water Sharing Plans for a number of unregulated catchments have also been made. These Water Sharing Plans (Plans) will apply for a period of 10 years.

However, implementation of this first round of Plans has been delayed from 1 July 2003 until 1 July 2004, in response to the Federal Government's announcement of a National Plan for Water. This will align NSW with the national water reform program. The essential content of the Plans will not be renegotiated as a result of the program.

Each Plan includes a diversion management limit (the Plan limit) and rules for adjusting water sharing rules, should diversions grow beyond the limit set in the Plan. In all major regulated rivers in the Basin these Plan limits are below Cap.

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

Current assessments using preliminary computer simulation models indicate that long-term average diversions in all major NSW regulated valleys are below Cap levels, with the exception of the Border Rivers, where the Cap has yet to be determined. Management rules to bring diversions in the Barwon-Darling River above Menindee within Cap, are currently being determined. Modelling for the Darling River below Menindee, the NSW Murray, and the Gwydir valleys is currently being reviewed.

### 4.2 Water Use Overview

Very dry climatic conditions during the previous water year resulted in most NSW regulated valleys in the Murray-Darling Basin receiving very low effective allocations. Water availability for some valleys was at record low levels, including the Murrumbidgee valley (45%), the NSW Murray (22%) and the Lachlan valley (31%). High security licences, which generally only form a small component of the total valley entitlements, received their full allocations. During 2002/03, drought conditions persisted across the State, with nearly all of the NSW section of the Murray-Darling Basin being drought-declared throughout the year. Record low rainfall totals occurred in some parts of the Murray, Murrumbidgee and Snowy River catchments.

Assessment of Cap performance for the 2002/03 water year using preliminary computer simulation models, indicated that diversions for four NSW valleys were above Cap, three valleys were below Cap, and two valleys (NSW Border Rivers and the Macquarie valley) did not have Cap targets to allow assessment to be made. For the Lachlan valley, the cumulated annual Cap performances from the 1997/98 water year are above Cap by more than 20% of the long-term average.

This year, most NSW valleys have been reported using a water year that extends from July to June. The exceptions are the Namoi, Gwydir and NSW Border Rivers, where a water year from October to June has been used. Future reporting will then be for the July to June period across all valleys. All diversions reported are in accordance with the MDBC Register of Diversion Definitions to the extent that availability of information allows.

### 4.3 Border Rivers

A Continuous Accounting (CA) allocation system was introduced in the NSW Border Rivers in 2001/02. The new system provides licensees with an individual account, which can be credited with up to 100% 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 100%. In any particular season, each licensee is limited to a maximum on-allocation usage of 100%.

The NSW Border Rivers licensees commenced the season with an average of 44% of licensed entitlement in individual accounts, and received a further 7% of licensed entitlement as further resources became available during the water year. There was a net inter-valley transfer of allocated water out of the NSW Border Rivers to the Queensland Border Rivers of 13 GL. This provided a total resource availability of 124 GL (**Table 8**), not including off-allocation.

On-allocation diversions of 121 GL occurred during 2002/03. Off-allocation diversions were significantly restricted during the one, relatively minor, unregulated flow event during the year to ensure additional supplies reached Menindee Lakes to be used for Broken Hill town water supplies. Consequently, there were only 3 GL of diversions during off-allocation periods that were not debited against allocations. This provided a total diversion of 124 GL from the regulated section of the NSW Border Rivers (**Table 2**). Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 14 GL, bringing the total diversions for 2002/03 to 138 GL (**Table 2**).

Cap accounting was not performed for the 2002/03 water year, as the Cap for the NSW Border Rivers is currently being determined.

### 4.4 Gwydir

A Continuous Accounting (CA) allocation system is used in the regulated section of the Gwydir valley, which provides licensees with an individual account which can be credited with up to 150% 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 150%. In any particular season each licensee is limited to a maximum on-allocation usage of 100% of licensed entitlement, which is 528 GL (**Table 8**).

The Gwydir valley commenced the season with an average of 41% of licensed entitlement in individual accounts, and received no further allocation increases during the water year. This provided a total resource availability of 225 GL (**Table 8**), not including off-allocation.

On-allocation diversions used all water in the individual accounts, providing a closing average account balance across the valley close to zero. Off-allocation diversions were significantly restricted during the one, relatively minor, unregulated flow event during the year to ensure additional supplies reached Menindee Lakes to be used for Broken Hill town water supplies. Consequently, there were only 6 GL of diversions during off-allocation periods that were not debited against allocations. This provided a total diversion of 228 GL from the regulated section of the Gwydir valley. Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 10 GL, bringing the total diversions for 2002/03 to 238 GL (**Table 2**).

Cap accounting is performed using the Gwydir valley IQQM, which is used to estimate the Cap target. This is the diversion that would have occurred during 2002/03 with management rules and irrigation development at 1993/94 levels.

The preliminary Cap target for 2002/03 is 425 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six water years of Cap accounting, this indicates a cumulative Cap debit of 29 GL, which is within the trigger for Special Auditing of 69 GL (**Table 4**).

#### 4.5 Namoi/Peel

A Continuous Accounting (CA) allocation system is used 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 each licensee is limited to a maximum on-allocation usage of 100% of licensed entitlement, which is 265 GL. The regulated section of the Peel valley is managed using annual accounts, which are forfeited at the end of each water year. The maximum allocation is 100% of licensed entitlement, which is 314 GL.

In 2002/03 Namoi valley licensees commenced the season with an average of 82% of licensed entitlement in individual accounts, and general security licensees received no further allocation increases during the water year. The Peel valley received an allocation of 60%. This provided a total resource availability of 258 GL (**Table 8**), not including off-allocation.

On-allocation diversions in the Namoi valley of 73% of licensed entitlement occurred, providing a closing average account balance across the valley of 10% of entitlement. Diversions in the Peel valley were 22 GL. There were no off-allocation events in the Namoi or Peel valleys during 2002/03. This provided a total diversion of 216 GL from the regulated section of the valley. Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 78 GL, bringing the total diversions for 2002/03 to 294 GL (**Table 2**).

Cap accounting is performed using the Namoi valley IQQM, which is used to estimate the Cap target. This is the diversion that would have occurred during 2002/03 with management rules and irrigation development at 1993/94 levels. An IQQM for the Peel valley is currently being developed, and a climate-diversion relationship is currently used to assess preliminary Cap performance. The preliminary combined Cap target for 2002/03 is 256 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six water years of Cap accounting, this indicates a cumulative Cap debit of 42 GL, which is within the trigger for Special Auditing of 64 GL (**Table 4**).

#### 4.6 Macquarie/Castlereagh/Bogan

In the 2002/03 water year, the regulated section of the Macquarie valley received no allocations of water for general security licensed entitlement, but had 59% of licensed entitlement carried over from the 2001/02 water year. This provided a total resource availability of 432 GL (**Table 8**), not including off-allocation.

During 2002/03 376 GL of allocated water was diverted. There was no off-allocation water available during 2002/03. Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 35 GL bringing the total diversions for 2002/03 to 411 GL (**Table 2**).

Cap accounting is performed using the Macquarie valley IQQM, which is used to estimate the Cap target. This is the diversion that would have occurred during 2002/03 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2002/03 was not currently available, and was awaiting confirmation of climate data required by the Macquarie IQQM. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the previous five water years of Cap accounting, this indicates a cumulative Cap credit of 106 GL.

#### 4.7 Barwon-Darling

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

There was very little flow available for extraction during 2002/03. Diversions were suspended during the one, relatively minor, flow event during the year to ensure additional supplies reached Menindee Lakes to be used for Broken Hill town water supplies. Diversions from the Barwon-Darling River system in the 2002/03 water year totalled 19 GL (**Table 2**).

Cap accounting is performed using the Barwon-Darling valley IQQM, which is used to estimate the Cap target. This is the diversion that would have occurred during 2002/03 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2002/03 is 24 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six water years of Cap accounting, this indicates a cumulative Cap debit of 142 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 six-year period from 1997/98 this indicates a cumulative Cap debit of 53 GL, which is within the trigger for Special Auditing of 14 GL (**Table 4**).

#### 4.8 Lachlan

In the 2002/03 water year the regulated section of the Lachlan valley received an allocation of only 3% of licensed entitlement, combined with 28% of licensed entitlement carried over from the 2001/02 water year. This provided a total resource availability of 262 GL (**Table 8**), not including off-allocation.

During 2002/03, 238 GL of allocated water was diverted. There was no off-allocation access during the water year. Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 15 GL, bringing the total diversions for 2002/03 to 253 GL (**Table 2**).

Cap accounting for the Lachlan valley was performed using the Lachlan IQQM, which is the first valley-scale hydrologic model in the Murray-Darling Basin to be formally approved for Cap auditing. This model indicated a Cap target of 237 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six-year period from 1997/98, this indicates a cumulative Cap debit of 80 GL, which exceeds the trigger for special auditing of 67 GL (**Table 4**). The valley was declared in breach of Cap during 2001/02. Following the Special Audit by the IAG in February 2004, it was confirmed that the valley continued to be in breach of the Cap during 2002/03.

#### 4.9 Murrumbidgee

In the 2002/03 water year the regulated section of the Murrumbidgee valley received an initial allocation of 34% of licensed entitlement, combined with 7% of licensed entitlement carried over from the 2001/02 water year. Further allocation announcements saw the announced allocation increase to 38% in August, representing a record low allocation for the valley. This combined to provide a total resource availability of 1719 GL (**Table 8**), not including off-allocation. Due to high losses and supply difficulties during the water year, inter-valley trade of allocated water was restricted during 2002/03. Only a volume equal to the outstanding balance of water transfers in the previous year, of 13 GL, was permitted to be traded out of the Murrumbidgee valley.



During 2002/03, 1712 GL of allocated water was diverted, with 65 GL of flows returning from canal drainage systems. Diversions during periods of off-allocation resulted in 39 GL of diversions that were not debited against allocations. A further 65 GL was diverted into the Lowbidgee Flood Control and Irrigation District. This provided a total diversion for the regulated section of the Murrumbidgee valley and the Lowbidgee district of 1751 GL. Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 42 GL bringing the total diversions for 2002/03 to 1793 GL (**Table 2**).

Preliminary Cap accounting for the Murrumbidgee valley was performed using the Murrumbidgee IQQM, which indicated a trade adjusted Cap target of 2055 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six-year period from 1997/98, this indicates a cumulative Cap credit of 615 GL (**Table 4**).

#### 4.10 Lower Darling

The Lower Darling system has a small entitlement of 48 GL, which has received a full allocation every year since the volumetric allocation scheme commenced in 1981. A further 36 GL of licensed entitlement was carried over from the 2001/02 water year. Due to the low levels in Menindee Lakes, no inter-valley transfer of allocated water into the Lower Darling was permitted. This combined to give total water resource availability in the Lower Darling of 84 GL (**Table 8**), excluding water available in off-allocation periods.

During 2002/03, 68 GL of allocated water was diverted. There was no off-allocation access during the water year. The Great Darling Anabranch also received 39 GL as part of its annual stock and domestic replenishment. This provided a total diversion for the regulated section of the Lower Darling valley of 107 GL (**Table 2**). Diversions in the unregulated sections of the catchment are not currently monitored, and no assessment has been made of diversions for 2002/03.

Preliminary Cap accounting for the Lower Darling valley was performed using the Murray Simulation Model, which indicated a trade-adjusted Cap target of 96 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six-year period from 1997/98, this indicates a cumulative Cap credit of 157 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 six-year period from 1997/98, this indicates a cumulative Cap debit of 53 GL, which is within the trigger for Special Auditing of 62 GL (**Table 4**).

#### 4.11 Murray

In the 2002/03 water year the regulated section of the Murray valley received an initial allocation of 5% of licensed entitlement, combined with 12% of licensed entitlement carried over from the 2001/02 water year. Only one further allocation increase to 10% occurred, which is a record low allocation for the valley. This provided a total resource availability of 953 GL (**Table 8**), not including off-allocation. This includes a net inter-valley transfer of allocated water into the NSW Murray valley from other NSW valleys, Victoria and South Australia of 36 GL.

During 2002/03, 851 GL of allocated water was diverted. There was no off-allocation access during the water year. Diversions in the unregulated sections of the catchment are not currently monitored, and have previously been assessed to be 28 GL, bringing the total diversions for 2002/03 to 879 GL (**Table 2**).

Preliminary Cap accounting for the Murray valley was performed using the Murray Simulation Model, which indicated a trade-adjusted Cap target of 483 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the six-year period from 1997/98, this indicates a cumulative Cap credit of 120 GL (**Table 4**).

## 5. Review of 2002/03 Water Use in Victoria

### 5.1 Overview

Details of the factors influencing net water use in each of the Victorian river valleys during 2002/03 and proposed future water management activities are given below. The 2002/03 season was characterised by extreme drought conditions experienced in the irrigation areas of northern Victoria, and catchments. Record low allocations were experienced on most regulated systems. Inflows less than previously recorded minimums were recorded at some locations.

#### 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 and Campaspe River systems are now in place. Finalisation of the Bulk Entitlement for the Broken system is anticipated during 2003/04. Finalisation of the Bulk Entitlements for the Loddon and Ovens systems is anticipated during 2004/05.

Annual diversions were limited by Victoria's seasonal allocation process. The final allocation for supplies from the Goulburn system was limited to 57% of high security entitlement, and for supplies from the Campaspe system limited to 100% of high security entitlement. Allocations in the Victorian Murray system reached 129%.

#### 5.1.2 Volumes Diverted

The volumes diverted during 2002/03 were below the Cap targets in the Murray/Kiewa/Ovens and Campaspe designated river valleys. Diversions were above the Cap target for the Goulburn/Broken/Loddon valley as noted in Section 3.5. A Cap target has not been determined for the Wimmera-Mallee valley as the model is not yet calibrated.

Victorian systems diverted 2957 GL from the Murray-Darling Basin during 2002/03. The total volume authorised for use was 3155 GL, which included 778 GL of losses. Approximately 10 GL of net temporary trade went interstate from Victoria during 2002/03.

The Victorian diversions equated to 94% utilisation of the total authorised volume.

#### 5.1.3 Off-Quota

Off-quota allocations were not declared at any time in Victorian river valleys during 2002/03. There was a small volume of spillage sales available in the Ovens valley.

#### 5.1.4 Deliveries

##### • Final Deliveries & Historical Comparison

Approximately 2220 GL was delivered by Victorian systems during 2002/03. The low allocation limited deliveries in the Murray system to 1296 GL in 2002/03, compared to 1491 GL the previous year. Goulburn system deliveries were also less than 2001/02 as a result of low final allocations.

#### 5.1.5 Trading

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

Approximately 9.1 GL was permanently sold interstate and to other river systems by Victorian entitlement holders. South Australia purchased 1 GL of Victorian entitlement. Victoria sold 0.2 GL to New South Wales. Further trading also occurred within systems.

Strong trading occurred on the temporary entitlement market, with 51.2 GL sold interstate and to other river systems within Victoria. Most interstate trading involved New South Wales, and resulted in an overall net outwards transfer from Victoria of water during 2002/03. There was a net transfer of water to Victoria from South Australia. The Goulburn system received a net inwards transfer of entitlement from the other Victorian systems.

### 5.1.6 Environmental Flows

The Barmah-Millewa Environmental Water Allocation was not utilised for watering the Barmah-Millewa Forest during 2002/03, however, flows were maintained through the forest to assist bird breeding following completion of over-bank transfers past the Choke.

Approximately 7.1 GL of northern Victorian wetlands allocation was diverted to the northern Victorian wetlands during 2002/03.

## 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 34% of Water Right or Licensed Volume in August 2002. The allocation reached a maximum of 57% of Water Right or Licensed Volume in March 2003. Limited resources prevented the allocation of any Sales during 2002/03. This was the fifth consecutive year of very low allocations for the Goulburn system and the lowest on record. The low allocation was supported by pumping from the dead storage of the Waranga Basin, which allowed an increase in 2002/03 irrigation deliveries without increasing 2002/03 diversions from the Goulburn River.

Lake Eildon held only 24.1% of capacity at the start of the Victorian irrigation season. The Goulburn system's primary storage was 24.2% of capacity in early August 2002, but fell to 11% by June 2003.

The volume authorised for use in the Goulburn was 704 GL, which comprised the seasonal allocation for irrigation, urban, industrial and stock entitlement holders (449 GL), temporary trade (28 GL) and system losses (228 GL). The irrigation entitlements referred to the Shepparton Irrigation Area, the Central Goulburn Irrigation Area and private diverters.

Approximately 343 GL was transferred to the Murray, Campaspe, Loddon and Wimmera-Mallee systems and the Melbourne Water supply system. Diversions during 2002/03 were 1004 GL, which was below the ten-year average for the Goulburn system.

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

The Goulburn system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance and diversions from this valley were above the 2002/03 Cap target. However, the valley is well within the cumulative Cap debit trigger for a Special Cap Audit under Schedule F.

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

## 5.3 Broken

Private diverters in the Broken River system received an initial allocation of 40% of Licensed Volume in August 2002. The maximum allocation of 100% Licensed Volume was announced in October 2002. Limited resources prevented the allocation of any Sales during 2002/03.

Lake Nillahcootie and Lake Mokoan held 48% and 42% of capacity respectively when the irrigation season opened in August 2001. Lake Nillahcootie reached 49% of capacity in September 2002, and Lake Mokoan reached 42% of capacity during August 2002.

The 39 GL total diversions were equivalent to 88% of the 44 GL volume authorised for use.



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

The Broken system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance and diversions from this valley were above the 2002/03 Cap target. However, the valley is well within the cumulative Cap debit trigger for a Special Cap Audit under Schedule F.

Bulk Entitlements for the Broken system are expected to be implemented during 2003/04.

#### 5.4 Loddon

Private diverters from the Loddon system were initially allocated 34% of Licensed Volume. Pyramid-Boort Irrigation Area customers are located in the Loddon basin, but are predominantly supplied from the Goulburn system via the Waranga Western Channel and received a 34% of Water Right allocation. The allocation reached a maximum of 57% of Water Right or Licensed Volume in March 2003.

The combined resources of Cairn Curran, Tullaroop and Laanecoorie Reservoirs were at 24% of capacity for the start of the irrigation season. The storages peaked at 25% during early August and fell to 14% of capacity in June 2003.

Loddon system private diverter irrigation usage; extraction for domestic and stock, commercial, industrial and urban purposes; and approximately 12 GL diverted to the Pyramid-Boort Irrigation Area and the Wimmera-Mallee system; accounted for total Loddon system diversions of 32.2 GL. The total diversion passed to the Pyramid-Boort Irrigation Area from the Goulburn system in 2002/03 was 180 GL.

The total authorised use in the Loddon system was 216 GL. This volume comprises entitlements for the Pyramid-Boort Irrigation Area gravity irrigators, private diverters, and urban, industrial and stock purposes. Although supplied largely from the Goulburn system, the Pyramid-Boort Irrigation Area is included among the Loddon system entitlements.

The Loddon system is included in the Goulburn/Broken/Loddon designated river valley for the assessment of Cap compliance and diversions from this valley were above the 2001/02 Cap target. However, the valley is well within the cumulative Cap debit trigger for a Special Cap Audit under Schedule F.

#### 5.5 Campaspe

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

Allocations in the Campaspe system opened at 85% of Water Right or Licensed Volume and reached 100% in March 2003. Allocations for gravity irrigators in the Rochester Irrigation Area were aligned with the Goulburn system, and reached 57% of Water Right.

The irrigation season began with Lake Eppalock holding 28% of capacity. The storage peaked at 28.4% of capacity during early July 2002 and fell to 7% in May 2003.

The 2002/03 Campaspe system authorised volume was 236 GL, which comprised gravity irrigation entitlements in the Rochester Irrigation Area and the Campaspe Irrigation District, private diverters, and urban, industrial and stock entitlements. The Rochester Irrigation Area is only included because of its physical location within the Campaspe system; diversions to the Irrigation Area are included in the Stuart Murray Canal and Cattanach Canal diversions reported for the Goulburn system.

The total Campaspe system diversions were 74 GL. A total volume of 6.4 GL (excluding channel outfalls) was supplied to the Waranga Western Channel via the Campaspe River pumps and diversions from Campaspe Irrigation District channels. The volume comprised 4.4 GL to cover net trade from the Campaspe Irrigation District, and 2.1 GL of unregulated supplement. The Campaspe Bulk Entitlement Conversion Order authorises Goulburn-Murray Water to provide up to 24.7 GL and 4 GL of regulated and unregulated supplement annually.

Bulk Entitlements for the Campaspe system have been in force since May 2000.

Diversions from the Campaspe designated river valley were below Cap target in 2002/03. The Campaspe valley has a cumulative Cap credit.

## 5.6 Wimmera-Mallee

The year 2002/03 was one of the most extreme periods of water shortage in the history of the Wimmera-Mallee region.

The Board set an allocation of 50% of dams to be filled in the 2002 winter domestic and stock season with the following critical factors in mind:

- The 2002/03 season would start in May with reservoirs holding only 146 GL (19%) of capacity.
- Filling only 33% of dams on farms in 2001/02 had led to significant hardship for customers needing water on their farms.
- Filling only 33% of dams on farms again in 2002/03 would not save enough water to guarantee supply to even house dams in the 2003/04 season in the event of another dry year.
- If 2002/03 were to be dry, supply to 50% of dams would leave enough water in Wimmera-Mallee Water reservoirs to supply town storages in the 2003/04 season as the basis for emergency supply.

The year 2002/03 saw the second lowest inflow to Wimmera-Mallee Water reservoirs on record,

i.e. since 1903, after five years of significantly below-average inflow to Wimmera-Mallee Water reservoirs. There was no week during 2002/03 in which the volume in storage increased, and by the end of 2002 the reservoirs held only 77 GL (10%) of capacity going into summer.

With such a low volume in storage, supply during summer was limited in the extreme. The following restrictions were necessary:

- Only house dams on farms in the summer domestic and stock area were able to be supplied.
- The irrigation allocation was zero, for the first time on record.
- Customers in the irrigation area received only a house dam-fill in line with other domestic and stock customers.
- Wimmera River irrigation diverters were banned from irrigating for the third year in a row.
- An allocation of 1000 ML went to the environment, or just 3% of the environmental entitlement, to sustain high value areas in the Glenelg and Wimmera catchments.
- The Glenelg River compensation flow allocation was zero.

These restrictions were aimed at preserving enough water in Wimmera-Mallee Water reservoirs to ensure supply to town storages in the 2003/04 winter season. The total diversion from the valley was 63 GL.

The 2002/03 summer was warmer than average, resulting in above average evaporation loss from reservoirs.

Even with milder conditions, the volume in storage continued to fall and plans for the 2003 winter season were developed with the following strategies as key elements of the plan:

- The start of the channel season would be delayed beyond the normal start in May, in the hope of receiving early inflow to reservoirs, which might enable at least house dams to be supplied.

- If conditions remained dry, only town storages would be filled.
- If only town storages were able to be filled, Wimmera-Mallee Water would initiate a water carting program to maintain supply to customer households across the region.

In May 2003, Wimmera-Mallee Water reservoirs held only 47 GL (6.1%) of capacity, down from 146 GL (19%) at the same time the year before and barely sufficient to enable Wimmera-Mallee Water's emergency plan based on supply to town storages to proceed.

The development of the Cap model is still in process for the Wimmera-Mallee valley. Due to a combination of pipelining, reducing distribution losses; and the low allocation levels during the current drought, the diversions have remained well within the Cap in the valley.

The bulk entitlement process for the Wimmera-Mallee system is nearing completion.

### 5.7 Kiewa

Total diversions of 12 GL were 76% of the 16 GL authorised for use. The Kiewa system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance. Diversions from this valley were below the 2002/03 Cap target.

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

### 5.8 Ovens

Extreme drought conditions resulted in implementation of restrictions to urban and irrigation users in the Ovens, King and Buffalo valleys. While Lake William Hovell spilled in September 2002, and Lake Buffalo was filled to 86% of capacity (as limited by dam safety requirements) in early December 2002, low inflows resulted in the storages commencing drawdown earlier than normal. Overall inflows

to Lakes Buffalo and William Hovell for the December 2002 to April 2003 period were less than the previously recorded minimum.

Total system diversions were 32 GL, which was 56% of the 57 GL authorised for use during 2002/03. A regression model has been developed to calculate Cap targets for the regulated Ovens system, The Ovens system is included in the Murray/Kiewa/Ovens designated river valley for the assessment of Cap compliance and diversions from this valley were less than the 2002/03 Cap target.

Development of the Bulk Entitlement for the Ovens system continued during 2002/03, and is scheduled for completion in 2004/05.

### 5.9 Murray (including Mitta Mitta)

The initial allocation for Murray system gravity irrigation customers and Mitta private diverters was 100% of Water Right or Licensed Volume plus 29% Sales. Murray Private Diverters were initially allocated 100% of Licensed Volume. These were the maximum allocations for the 2002/03 season, and are the lowest final allocations post-Dartmouth for the Murray system.

Hume Dam and Dartmouth Dam held 31% and 78% of capacity respectively at the start of the Victorian irrigation season in August. Hume Dam did not increase volume in store during 2002/03 season, and Dartmouth Dam achieved a peak volume of 84% capacity in late August 2002.

The Victorian component of the total River Murray valley authorised volume was 1770 GL. Actual usage was 1723 GL.

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

For the purposes of Cap compliance, the Murray system is included in the Murray/Kiewa/Ovens designated river valley. Diversions from this valley were well below the 2002/03 Cap target because of the low seasonal allocation.

## ***6. Review of 2002/03 Water Use in South Australia***

### **6.1 Overview**

South Australia reports diversions under four Cap components:

- Metropolitan Adelaide and Associated Country Areas;
- Country (River) Towns;
- Lower Murray Swamps; and
- All Other Uses of Water from the River Murray (sometimes referred to as Highland);

Water diversions from the River Murray in South Australia were within Cap in 2002/03, with the exception of Country Towns. The Country Towns Cap component exceeded the Cap by 0.2 GL, caused by trade out of the licence and not by an increase in diversions. However, the Country Towns Cap is in credit of 56 GL since the advent of cumulative accounting on 1 July 1997, and therefore did not trigger a Special Cap Audit.

Factors influencing water use in South Australia throughout the 2002/03 water year and an outline of future water management activities are discussed below.

### **6.2 Impacts on Water Use**

The 2002/03 water year has been a high use year for South Australia.

Weather conditions in South Australia have been dry for the 2002/03 water year and while the summer period was of average duration, a large number of days in excess of 30 degrees centigrade, no notable rainfall events and prevailing drought conditions made for higher water use conditions. The uptake of sleeper water licences has also been having an incremental increasing effect on South Australian water use, particularly in the Highland region.

Irrigator behaviour in South Australia is largely influenced by days of high evaporation rather than rainfall. The Riverland in South Australia receives annual average rainfall of less than 300 mm and most of this usually falls in the winter months.

The rain that does fall during the summer (growing) season is not generally considered a significant factor with regard to irrigation practice as both the duration and intensity of rain during this period is usually too little to yield any considerable benefit. The summer period for the 2001/02 water year was relatively mild and of shorter duration, which, coupled with good rainfall events early and late in the summer season did keep diversions down at 403 GL. Compared with last year's irrigation diversion, the 2002/03 diversion of 434 GL was higher.

Adelaide and its surrounds are supplied with water from the Mount Lofty Ranges catchments and the River Murray. The amount of water that is diverted from the river from year to year is influenced to a large degree by the weather conditions in the Mount Lofty Ranges. Inflows to storages from local catchments in the Ranges have deteriorated from last year, resulting in increased diversions from the River Murray.

### **6.3 Metropolitan Adelaide and Associated Country Areas**

The Cap for Metropolitan Adelaide is reported over a five-year rolling period of not more than 650 GL. At 165 GL, the usage of River Murray water for Metropolitan Adelaide this year is significantly up (double) on last year's and is the highest usage year in recent history. The previous four years have been reported as follows:

- 82 GL in 2001/02, minus 12 GL of temporary trade accounted on a separate licence, therefore 70 GL is the reportable figure for Cap purposes;
- 104 GL in 2000/01;
- 139 GL in 1999/00; and
- 153 GL in 1998/99.

The cumulative total for the five years to 2002/03 was 642 GL, which includes a 12 GL adjustment for the 2001/02 water year and a further adjustment of 11 GL for temporary inward trade for the current water year. These temporary trades into the Metropolitan Adelaide Cap component have been accounted for on a separate 'first use' licence to maintain the integrity of the rolling Cap for Metropolitan Adelaide.

#### **6.4 Country (River) Towns**

Water use for Country Towns in 2002/03 was 39.2 GL, which is 10.8 GL below the normal Cap allowance of 50 GL, however, due to an 11 GL Temporary Trade that was permitted out of Country Towns to Metropolitan Adelaide, the 2002/03 Cap for Country Towns was reduced to 39 GL. This resulted in the Cap being exceeded by 0.2 GL. However, given the cumulative Country Towns Cap credits of 56 GL, this transgression did not cause great concern for the Independent Audit Group and remains within acceptable Cap management principles.

South Australia will ensure that such incidents do not occur into the future with regard to our trade management and accounting practices.

#### **6.5 Lower Murray Swamps**

Improved modelling of the Lower Murray Swamps was completed in October 2000. This allowed the interim Swamps Cap to be reassessed and finalised. The interim Cap figure was established in 1993/94 at 83.4 GL and by 1999/00 had decreased to 79.1 GL due to trade out of the Swamps.

At the meeting of the Independent Audit Group of October 2000, the IAG agreed that as a result of the improved modelling, a fair and equitable Swamps Cap be finalised at a figure 103.5 GL and adjusted for trade that had already occurred. This Cap figure equates to best practice irrigation, which will be implemented progressively through a rehabilitation program.

Use is currently considered equal to allocation in the Reclaimed Swamps, but this will change as a program of meter installation continues to roll out as part of the rehabilitation program.

Swamps use for 2002/03 is 98.9 GL.

#### **6.6 All Other Uses of Water from the River Murray (Highland Irrigation)**

Highland irrigators diverted 434 GL for the 2002/03 water year, which is below the trade-adjusted Cap of 449 GL for the year. Diversions for this year represent a significant increase compared to last year's figure (403 GL). Factors attributed to this increase include: trade (particularly temporary), temperature, evaporation and growing season rainfall. The uptake and/or use of sleeper and dozer allocations may also have intensified for various market reasons.

#### **6.7 Future Water Management Activities**

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

- Development and implementation of 'Local Action Plans' and 'Land and Water Management Plans', to cover all sections of the River Murray catchment in South Australia, to ensure that improved irrigation practice and suitable farm management techniques are adopted in a coordinated manner through strong local community commitment;
- Ongoing and developing partnerships between the River Murray Catchment Water Management Board and Local Action Planning groups in implementing Local Action Plans;
- Implementation of the Catchment and Water Allocation Plans by the River Murray Catchment Water Management Board;

- Development of a new licensing system with improved audit capabilities. Stage one of this project was completed in 2000, incorporating a user-needs analysis, the development of process and data models, and the development and testing of a prototype system. Stage two, which incorporates the development of necessary aspects of the full system proposal, began early in 2002. Scheduled completion at this stage is estimated for the end of 2003;
- Continued rehabilitation of highland irrigation areas to reduce system losses and improve irrigation practice. Only the Loxton irrigation area remains to be rehabilitated. Scheduled completion is for December 2003;
- Installation of metering systems for swamp irrigation areas and implementation of revised water allocation and irrigation management practice; and
- Ongoing grower education programs.



## 7. Review of 2002/03 Water Use in Queensland

### 7.1 Management Overview

Queensland continues to develop Water Resource Plans (WRPs) and Resource Operations Plans (ROPs) for each of the valleys of the Queensland section of the Murray-Darling Basin, to advance the sustainable management of water resources. The development of these water plans is a consultative process in accordance with the *Water Act 2000* and is based on up-to-date scientific knowledge and available information.

The WRPs are aimed at achieving a balance between consumptive use and the environment, giving security of entitlement for water users whilst providing for the health of the river system. Whereas the focus of these plans is initially on surface water, it is envisaged that some plans will be amended in future to consider and incorporate groundwater in highly committed areas, as additional information and improved methods to address its sustainability become available.

A significant milestone was achieved this year with the release of three final WRPs for the Border Rivers, Moonie River and Warrego, Paroo, Bulloo and Nebine River catchments on 10 December 2003. These WRPs have now become subordinate legislation to the *Water Act 2000*. These plans were finalised after extensive community consultation since the release of the draft WRPs on 8 July 2002, consideration of almost 400 formal submissions and the Border Catchments Ministerial Forum.

A new draft WRP for the Condamine/Balonne catchment was also released on 3 December 2003 for public review and comments. The development of the draft WRP followed many months of consultation with representative community groups throughout the catchment; consideration of recommendations by an independent Scientific Review Panel headed by Professor Cullen, in a report of science underpinning the assessment of the current and future ecological condition of the Lower Balonne System (the Cullen Report); advice and proposals by the community groups including the Lower Balonne Community

Reference Group (which included downstream water users and graziers in New South Wales); review of these proposals by Professor Cullen and his team; and extensive hydrologic/hydraulic modelling as part of the process.

Extensive community consultation will occur on the draft plan, leading up to the closing date for submissions on 19 March 2004. Consultation will include briefings for targeted groups and workshops for the general public. Various issues raised in the public submissions will be considered in finalising the plan. It is anticipated that the final Condamine-Balonne WRP will be released in mid-2004.

Generally the WRPs are a package of strategic-level proposals proposing a long-term share between consumptive use and the environment, the conversion of existing entitlements to volumetric water allocations, managing the take of overland flow water, and monitoring and reporting requirements. Extraction limits will be specified on all water entitlements in the form of maximum rates, and volumetric limits. Overland flow development (other than for stock and domestic purposes) will be controlled as assessable development under the *Integrated Planning Act 1997*. In addition, the plans provide for licensing of overland flow extractions where this is considered necessary to protect plan outcomes.

The Resource Operations Planning (ROP) processes in Queensland Murray-Darling valleys were commenced at the same time as the draft WRPs were released. The ROP process is the implementation phase of WRPs, involving the conversion of licences to tradable water allocations; and development of water sharing, infrastructure operating, water trading and environmental management rules to achieve the environmental and water allocation security outcomes specified in the WRP; as well as the details of water and natural ecosystems monitoring and reporting requirements. Community consultation on the ROPs progressed during the year, with target groups now established to provide advice on ROP issues and outcomes.

It is anticipated that the ROPs for the Queensland Murray-Darling valleys will be finalised by mid-2005.

In the meantime, a moratorium on the issue of new licences, or development of works, to take or interfere with water (including overland flow), continues in the whole of the Queensland section of the Murray-Darling Basin until the water resource plans and resource operations plans are finalised.

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

### **Condamine/Balonne**

The key elements of the draft WRP for the Condamine/Balonne include:

- no additional allocation of water in the catchment for irrigation purposes;
- an event-based environmental flow management and water sharing rules;
- in the Lower Balonne strategies to improve:
  - low flows following periods of ‘no flow’ downstream of Beardmore Dam;
  - beneficial flooding;
  - the frequency of filling of Narran Lakes;
- in the Lower Balonne, reduced daily flow extraction during environmentally important flow events by 10%, in order to provide flow outcomes for the four key ecological assets identified by the Scientific Review Panel (i.e. biota of the rivers and distributary channels of the Lower Balonne and their associated wetlands, the Narran Lakes, the National Parks of the Culgoa floodplain and the Darling River);
- increased access to other, less environmentally important, flow events to compensate for reductions;
- to limit the development of ‘sleeper’ licences to minimise the impact on existing development and the ecological outcomes of the plan;

- after a 5-year period, a reduction of 5% in daily diversion rate for water-harvesting in the Lower Balonne;
- regulation of overland flow water, including licensing of the taking of overland flow water in the Lower Balonne;
- measurement of extractions and monitoring of flows and natural aquatic ecosystems to ensure the outcomes of the plan are being met;
- establishment of Water Advisory Councils to increase community awareness and understanding of, and involvement in, the management of water resources.

### **Border Rivers**

The final WRP for the Border Rivers reflects a common end-of-system flow objective for the Border Rivers catchment of not less than 61% of the natural (simulated pre-development) flows. This replaces the proposal in the draft plan to adopt an end-of-system flow objective of not less than the lesser of 60% and/or November 1999 flow conditions.

The final plan confirms a strategic reserve of 5000 ML per annum for the Stanthorpe Shire, comprising 1500 ML per annum for town water supply and 3500 ML per annum for expansion of irrigated agriculture and associated industries.

Queensland and New South Wales continue to work together to jointly develop an Inter-Governmental Agreement for water sharing, management of environmental flows, monitoring and trading of entitlements on the Border streams. A set of principles has been developed through the Border Catchments Standing Committee and endorsed by the Border Catchment Ministerial Forum to underpin the development of the agreement. The agreement will ensure that the Border Rivers catchment is managed on a sustainable, whole-of-catchment basis.



An Interstate Water Management Working Group comprising of community and water user representatives from both sides of the border has been established to provide advice to both States on the development and implementation of the agreement. The Inter-Governmental Agreement will be developed simultaneously with New South Wales's regulated Water Sharing Plan and Queensland's Resource Operations Plan. Water sharing arrangements between the two States will ultimately be ratified by the Border Catchments Standing Committee and Ministerial Forum and given effect in each of the States' statutory plans.

### **Moonie River**

The Moonie Water Resource Plan has been finalised with a similar end-of-system flow objective to that proposed in the draft plan, i.e. at least 70% of the end-of-system pre-development flow at the Queensland–New South Wales border. Under current levels of development, the end-of-system flow is calculated at 77% of the simulated pre-development flow.

The Moonie Plan allows for increased utilisation of existing entitlements including sleeper licences, plus a strategic reserve of 100 ML per annum for town water supplies and 1100 ML per annum for any purpose. Allocation and release of the strategic reserve will be a part of the Resource Operations Planning process.

### **Warrego, Paroo, Bulloo and Nebine Rivers**

The final WRP for these catchments confirms the intention to maintain water resource development at comparatively low levels and end-of-system flow performance at relatively high levels.

The final plan confirms the end-of-valley flow objectives proposed in the draft plans, with the following percentages of simulated pre-development flow for the end-of-system flows at the Queensland–New South Wales border:

- a) for the Warrego catchment – 89 per cent
- b) for the Paroo catchment – 99 per cent
- c) for the Bulloo catchment – 99 per cent
- d) for the Nebine catchment – 87 per cent

Currently, the end-of-system flows expressed as percentages of the simulated pre-development flows are:

- a) for the Warrego catchment – 96 per cent
- b) for the Paroo catchment – 99 per cent
- c) for the Bulloo catchment – 99 per cent
- d) for the Nebine catchment – 93 per cent

The final plan preserves near natural flows in the ecologically significant Paroo and Bulloo catchments, with the strategic reserve limited to 100 ML per annum in each catchment for town water supplies, eco-tourism or similar purposes, and 500 ML per annum for any purpose in the Bulloo River catchment. (Note that the Bulloo is not part of the Murray-Darling Basin).

In the Warrego and Nebine catchments, the plan allows for the increased utilisation of existing entitlements including sleeper licences and strategic reserves of 100 ML per annum in each catchment for town water supplies, eco-tourism or similar purposes.

In addition, the final plan confirms strategic reserves of 8000 ML per annum in the Warrego and 1000 ML per annum in the Nebine for any purpose, inclusive of provision for future overland flow development.

### **Water Use Efficiency (WUE)**

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

The Queensland Government announced an extension to its Rural Water Use Efficiency Initiative during the year, with a further \$7.5 million to be made available over the next two years. This will build on the highly successful \$41 million four-year program which was due to end in December 2003. The program is well on target to surpass its original key goals of providing the equivalent of an extra 180 GL of irrigation water per year State-wide.

The key aims of the program are:

- Improved productivity and economic returns through the more efficient use of water;
- Reduced impacts on the environment;
- Development of more sustainable rural water systems and practices.

The four major elements of this initiative are:

- Adoption Programs (including a Research and Development Program) to improve water use efficiency on farms;
- Reducing water losses from storages on farm;
- Financial incentives to achieve best practice irrigation water management;
- Reducing water losses in irrigation water supply and distribution systems.

Over the next two years, approximately \$4.6 million has been set aside for the adoptions and extension program with a further \$1.6 million available for the ongoing financial incentives program to support the implementation of 'best practice' irrigation management. This will include subsidies for equipment and system modification to improve irrigation efficiency. A further \$300,000 per year will be allocated for research and development programs which may potentially link with the Co-operative Research Centre for Irrigation Futures.

The Queensland cotton industry has established three water use efficiency advisors in the Queensland Murray-Darling Basin Catchments. The publicity and general industry awareness and consequent on ground action has increased as a result of this program. The cotton industry has set

itself a target of achieving a 10% improvement in rural water use through adoption by 70% of growers of improved water management practices.

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

## 7.2 Stream Flow and Water Use Overview

Queensland reports on water use and stream flow performance based on a water year extending from 1 October to 30 September.

The pattern of low rainfalls observed in 2001/02 continued into the 2002/03 water year with below average rainfall across most of the Queensland section of the Murray-Darling Basin, particularly in the Granite Belt and far west where rainfall was less than two-thirds of average. The water year started with most of the major dams in the Queensland section of the Basin around 50% of capacity, with little to no inflows during winter in 2002. The exception was Leslie Dam in the Upper Condamine which started the year at 10% capacity. Off-stream storages (ring tanks) in the Condamine started the year at only around 30% of capacity, whilst storages in the Lower Balonne were generally dry. Storages in the Queensland section of the Border catchment were in a slightly better position at around 60% of capacity following some water-harvesting opportunity in April 2002.

The low observed rainfalls in 2002/03 were reflected in corresponding stream flows for the year with recorded flows in all catchments except the Warrego River far below the long-term mean and median flows.

- Flows in the Border Rivers continued to be well below average with total volume of flow passing Goondiwindi only around 20% of the long-term annual average of 1047 GL.
- The Condamine/Balonne catchment performed slightly better than 2001/02, but the total volume of flows below St George was still less than 10% of the long-term average of 1103 GL. Flows in the upper parts

of the catchment were almost negligible with only 1.7 GL passing Chinchilla for the year, where long-term annual average volume of flow is 561 GL.

- The Moonie catchment continued its poor records of 2001/02 with total volume of flow again less than 10% of the average annual figure of 143 GL.
- The Warrego River catchment performed similar to 2001/02 with total volume of flows around 80% of the annual average figure of 389 GL.
- The Paroo catchment delivered less than 12% of the average annual volume of flow (529 GL) for the year.

The very low stream flows have resulted in the second lowest total diversions recorded for the Queensland section of the Murray-Darling Basin since 1993/94 and a record low of 65 GL estimated water-harvesting diversions. Diversions since 1993/94 are given in **Table 6**.

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

**Table 6: Water Diversions in Queensland since 1993/94**

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

### 7.3 Condamine-Balonne

#### Condamine

Flows in the Condamine River upstream of Chinchilla Weir were limited to a small event in February/March 2003. This flow peaked at only 2000 ML/day at Cecil Plains upstream of Dalby and provided very limited water-harvesting opportunity and inflow to Chinchilla Weir. Water-harvesting diversions upstream of Chinchilla were limited to less than 4 GL and Chinchilla Weir capacity increased in the order of 5 GL. Flows below Chinchilla were limited to compensation flows passed through the outlet works of the weir.

Diversion from supplemented sections of the stream was limited, with both water supply schemes starting the year with a nil announced allocation for irrigation. Storage in the Upper Condamine Water Supply Scheme continued to decline during the year with only minimal allocation water provided from natural flow. Announced allocation was raised to 25% in the smaller Chinchilla Water Supply Scheme after limited inflow in March 2003. Total diversion from the two schemes was slightly more than 2 GL from a 26 GL total entitlement.

Unsupplemented irrigation totalled 11 GL, with more than 50% of this relating to access to Toowoomba's effluent water, some of which is discharged to watercourses for downstream use by licensed irrigators. The prolonged drought conditions have had a significant impact on unsupplemented irrigation use, with severe restriction arrangements in place to preserve base-flows in tributary streams. Urban, industrial and stock use totalled 6 GL.

## **Balonne**

The downstream section of the catchment benefited from more improved flows resulting from a significant rainfall event in the north-west of the catchment in April 2003. Inflows from the Balonne River to Beardmore Dam peaked at almost 30000 ML/day, filling Beardmore Dam and passing approximately 89 GL downstream. The peak flow downstream of St George was slightly less than 18000 ML/day. A total of 36 GL was harvested from this flow, 5 GL between Chinchilla and Beardmore storage, and 31 GL from Beardmore storage downstream.

Beardmore Dam started the 2002/03 water year at slightly less than 50% capacity and was filled from almost empty in April 2003. Only a small section of the storage in the St George Water Supply Scheme is subject to announced allocation, with the bulk of allocations working on an individual capacity share system. Under these arrangements, storage and delivery losses are assigned to individual accounts rather than holding these as a separate and shared component of the storage. With the dry outlook at the start of the year and the exceptionally dry conditions in the Balonne River, most river allocation holders elected to seasonally assign their shares upstream into the irrigation area adjacent to the dam, to avoid high delivery losses in the dry river channel downstream of Beardmore. Total supplemented diversion from the scheme was 60 GL for the year.

There is very little unsupplemented irrigation in the Balonne and diversions were limited to an estimated 1 GL upstream of Beardmore Dam. Urban, industrial and stock usage is estimated at just over 3 GL.

### **7.4 Border Rivers/Macintyre Brook**

There were no significant water-harvesting events in the Macintyre River (Border Rivers) during the year. The most significant flow occurred in late February 2003, peaking at 18 GL/day, but under the extreme drought conditions was largely

protected from water-harvesting to provide relief for downstream essential water supplies in New South Wales. Queensland provided limited water-harvesting access to this event. Further limited access was allowed in the downstream section of the catchment from the recession phase of a smaller event in May. Water-harvesting diversion for the Queensland section of the catchment is estimated at 16 GL for the year.

Total volume of flow through Goondiwindi for the year was 239 GL, with very little additional contribution (3 GL) from the Weir River downstream of Goondiwindi. Average annual volume of flow past Goondiwindi is 1047 GL.

The Dumaresq Water Management Area operates on a continuous accounting arrangement rather than announced allocations. The major storage for this scheme, Glenlyon Dam near Stanthorpe, started the year at slightly less than 50% of capacity and the average level of individual storage accounts at similar levels. There were no inflows to Glenlyon Dam during the year, with only 3 GL of allocation remaining in the Queensland share at the end of the water year. Coolmunda Dam near Inglewood, which supplies the Macintyre Brook Water Supply Scheme, started the year at around 55% capacity and with an announced allocation of 60%. This was revised to 85% following small inflows to the dam in February 2003. Coolmunda Dam was also at critical levels at the end of the water year. Total use for the two schemes was 57 GL for the year.

The balance of diversions was made up of less than 2 GL for unsupplemented irrigation and 3 GL for urban, industrial and stock. Unsupplemented irrigation use is down on previous years as a result of the prolonged drought. Access has been severely restricted throughout the year to try and preserve natural waterholes and base-flows where possible.

## 7.5 Moonie

There were several smaller flows in the Moonie throughout the year, with peaks up to 1500 ML/day in the mid-section of the catchment, but these attenuated to less than 600 ML/day at the Fenton gauging station just upstream of the Queensland–New South Wales border. The flows provided limited access for water-harvesting throughout the catchment. Diversion by the limited water-harvesting development in the Moonie has been estimated at 5 GL for the year.

A net total volume of 9 GL flowed past the Fenton gauge during the year. Average annual volume of flow at this gauging station is 143 GL.

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

## 7.6 Warrego

Flows in the Warrego were not dissimilar to the 2001/02 year with most of the flow contained in a single flow event in February 2003. Total volume of flow in this event was 308 GL, with a further 4 GL in a small flow during June and July 2003.

Water-harvesting diversion is estimated at 4 GL for the year into the estimated available 12 GL of storage.

The Cunnamulla Water Supply Scheme started the year with an announced allocation of 55% and this was revised to 100% following the flows in February 2003. Total diversion from the scheme was under 2 GL out of a total entitlement of 2.6 GL.

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

## 7.7 Paroo

The most significant flow event in the Paroo River was also in February 2003 with over 45 GL passing through Caiwarro approximately 60 km upstream of the Queensland–New South Wales border. Low flows continued in the catchment for most of the remainder of the year with a total of 60 GL passing through Caiwarro. Long-term annual average is 555 GL.

There is no water-harvesting development on the Paroo and negligible irrigation development.



## **8. Review of 2002/03 Water Use in the ACT**

### **8.1 Review of Water Use in the ACT**

Water use in the ACT was above average for 2002/03 as a result of a severe drought and hot summer. Extractions from storages for the urban supply was close to 66 GL, with returns from sewage treatment plants to the river system totalling 31 GL, resulting in net urban consumption of 35 GL. Non-urban consumption is estimated at 5 GL, giving a total net consumption of 40 GL. Consumption was significantly lower than would have been expected for the climatic conditions due to the early introduction of demand management arrangements. Domestic water restrictions were introduced on a voluntary basis on 16 November 2002 and as mandatory level one restriction on 16 December 2002. Mandatory restrictions were upgraded to level two on 29 April 2003 and level three on 1 October 2003, in line with previously published guidelines. The restrictions target reductions of 15%, 25% and 40% in urban demand. In addition, the urban water provider ACTEW has negotiated demand management agreements with significant non-domestic water users. Demand from the urban water supply has been significantly reduced as a result of the water restrictions and voluntary agreements.

### **8.2 Progress of Water Reforms in the ACT**

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

Difficulties with the installation of meters and verification of metered usage have delayed confirmation of some allocations. It is anticipated this will be finalised during 2003/04.

The ACT Government is conscious of the need to curtail the growth in the demand for water, while maintaining the ability for industry and the economy to grow. The ACT's water resources are limited, so more efficient use of existing resources is a priority.

In recognition of the importance of sustainable water management, on 5 June 2002 the ACT Legislative Assembly passed a motion about water management that gives clear direction to policies. It was agreed that:

- As far as possible, the building of further water supply dams in the ACT should be avoided;
- The water leaving the ACT via the Murrumbidgee River should be of no less quality than the water flowing into the ACT; and
- Adequate flows should be maintained in the ACT's waterways to maintain their environmental values.

The ACT Government made provision for the development of a Water Resources Strategy in its 2003/04 budget. The Strategy will be developed during the first half of 2003/04.

### **8.3 Establishment of an ACT Cap**

The ACT Government is committed to the participation in the MDBC Cap on extraction and the establishment of a Cap for the ACT. Past discussion has centred on a Cap in the 38-61 GL range and associated capacity for future trade. The ACT Chief Minister and Minister for the Environment, Mr Jon Stanhope, reinforced that commitment at the May 2003 meeting of the Murray-Darling Basin Ministerial Council. At that meeting he rejected a Cap of 38 GL and indicated the ACT would bring forward additional principles that the ACT believed should be considered when considering an ACT Cap. At the same meeting, Minister Stanhope indicated a preference for an agreement for a Cap based on an agreement with NSW. Officer level meetings to explore an ACT Cap based on an agreement with NSW have taken place.



## 9. Water Trading in the Murray-Darling Basin

### 9.1 History of Water Trading

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

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

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

**Table 7** details the total volume of intra-valley water trades and the net inter-valley and interstate water trades that occurred during the 2002/03 water year.

The sign convention used in **Table 7** is that a negative value indicates a trade out of the valley and a positive value indicates a trade into the valley. It can be seen from this, that compared to the total volumes of water traded, the inter-valley trades in 2002/03 were small and the interstate trades were smaller. Permanent inter-valley trades will result in permanent changes to the valley Caps; usually calculated as the volume of entitlement traded, multiplied by an agreed transfer factor. Temporary trades will alter the annual Cap targets, usually on a one-for-one basis. Trade will therefore affect the Caps for individual valleys but will not result in an increase in the overall Cap for the Basin.

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2002/03. However, resource constraints in the New South Wales and Victorian sections of the Murray valley restricted the supply of available water for trade.

**Table 7. Intra-Valley, Net Inter-Valley and Net Interstate Water Entitlement Transfers in 2002/03**

System	Permanent Entitlement Transfer				Temporary Entitlement Transfer				Adjustment to 2002/03 Cap Target for Temporary and Unused Permanent Trade <sup>2</sup> (ML)
	Net Inter-Valley Trade		Net Interstate Trade Inwards <sup>3</sup> (ML)	Future Adjustment to Cap from this Year's Permanent Trade <sup>1</sup> (ML)	Net Inter-Valley Trade		Adjustment to 2002/03 Cap Target for Temporary Trade (ML)		
	Total Permanent Entitlement Sold (ML)	Inwards Excluding Interstate Trade <sup>3</sup> (ML)			Total Temporary Allocation Sold (ML)	Inwards Excluding Interstate Trade <sup>3</sup> (ML)			
<b>New South Wales</b>									
Border Rivers	0	0	0	0	15783	0	-13499	-13499	-13499
Gwydir	0	0	0	0	48354	0	0	0	0
Namoi/Peel	6	0	0	0	34055	0	0	0	0
Macquarie/ Castlereagh/Bogan	383	0	0	0	4205	0	0	0	0
Barwon-Darling	0	0	0	0	0	0	0	0	0
Lower Darling	52	0	0	0	23428	0	0	0	0
Lachlan	9734	0	0	0	18635	0	0	0	0
Murrumbidgee	3343	0	0	0	198023	-14789	300	-14489	-14489
Murray	9731	0	283	254	275562	14789	21297	36086	36369
<b>Total NSW</b>	<b>23249</b>	<b>0</b>	<b>283</b>	<b>254</b>	<b>618046</b>	<b>0</b>	<b>8098</b>	<b>8098</b>	<b>8381</b>
<b>Victoria<sup>4</sup></b>									
Goulburn	8605	-940	0	-1213	81078	26764	783	27547	0
Broken	122	0	0	0	4701	0	0	0	0
Loddon	3972	-1018	0	-1313	36110	-15310	471	-14839	0
Goulburn/ Broken/Loddon	12699	-1958	0	784	121889	11454	1254	5726	6334
Campaspe <sup>6</sup>	963	2566	0	0	29163	-6982	0	0	0
Wimmera-Mallee	0	0	0	0	0	750	0	750	750
Kiewa	179	0	0	0	1763	0	0	0	0
Ovens	73	0	0	0	3149	0	0	0	0
Murray	11553	-608	-403	-1147	123631	-5222	-11206	-16428	0
Kiewa/Ovens/Murray	11805	-608	-403	-1147	128543	-5222	-13850	-19072	0
<b>Total Victoria</b>	<b>25467</b>	<b>0</b>	<b>-403</b>	<b>-362</b>	<b>401484</b>	<b>0</b>	<b>-13850</b>	<b>-19072</b>	<b>-20083</b>
<b>South Australia</b>									
Metro-Adelaide & Associated Country Areas <sup>5</sup>	0	0	0	0	0	11000	0	11000	11000
Lower Murray Swamps	0	0	0	0	400	-400	0	-400	-400
Country Towns	0	0	0	0	11000	-11000	0	-11000	-11000
All Other Uses of Water from the River Murray	13477	0	120	108	62800	400	-9001	-8601	-8481
<b>Total South Australia</b>	<b>13477</b>	<b>0</b>	<b>120</b>	<b>108</b>	<b>74200</b>	<b>0</b>	<b>-9001</b>	<b>-9001</b>	<b>-8881</b>
<b>Queensland</b>									
Condamine/Balonne	0	0	0	0	3165	0	0	0	0
Border Rivers	0	0	0	0	2845	2940	13499	16439	16439
Macintyre Brook	0	0	0	0	2940	-2940	0	-2940	-2940
Moonie	0	0	0	0	0	0	0	0	0
Warrego	0	0	0	0	0	0	0	0	0
Paroo	0	0	0	0	0	0	0	0	0
<b>Total Queensland</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8950</b>	<b>0</b>	<b>13499</b>	<b>13499</b>	<b>13499</b>
<b>Aust. Capital Territory</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Basin</b>	<b>62192</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>980791</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

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 & Associated Country Areas Cap component is non-tradable, unless the Ministerial Council determines otherwise.
6. Cap adjustment for trade with Campaspe is done to the Goulburn/Broken/Loddon valley.

## 10. Water Availability for the Year 2002/03

### 10.1 Water Availability

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

A key step in the process to implement the Cap is adjusting the States' allocation systems. To make Cap implementation more transparent, the water used in each valley has been compared with the quantity of water that has been authorised for use in that valley in 2002/03 (see **Table 11**).

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

#### 10.1.1 Volumetric Allocations

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

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

#### 10.1.2 Continuous Accounting

In the Border, Gwydir and Namoi valleys, 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 third 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 fourth column in **Table 8**.

#### 10.1.4 Carryover from the Previous Year

Carryover is available in a number of valleys in NSW. This enables unused allocation in one season to be carried over to the next, up to specified limits. Carryover differs from continuous accounting in that accounts are kept on an annual basis, rather than a continuous one. In some valleys, carryover is cancelled as allocations approach 100%. **Table 9** shows the carryover added to the valley allocation. The net carryover from the previous season is included as column 5 in **Table 8**.

#### 10.1.5 Access to Off-Allocation and Water-Harvesting

Water is made available to irrigators in regulated streams during periods when storages are spilling or there are unregulated flows by declarations of period's off-allocation. Water diverted in these periods does not count against an irrigator's allocation for the rest of the season. Historically there were no controls over the size of these diversions, other than the duration of the event and the licensed pump capacity. However, in recent years, quotas have been established in some systems and annual limits have been

imposed. Access to off-allocation has been discontinued in South Australia.

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

In both New South Wales and Queensland, the volume of water authorised for diversion by water harvesting and off-allocation is assumed to equal the volume actually diverted (see **Table 10**).

#### **10.1.6 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.

Queensland has adopted this method of reporting unregulated diversions (see **Table 10**).

New South Wales is currently moving towards replacing area licences with volumetric entitlements.

#### **10.1.7 Irrigation System Losses**

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

Murray, an allowance for system losses has been included in the water entitlement.

## **10.2 Comparison of Diversions with Water Authorised for Use**

The final column in **Table 10** lists the total volume of water that could be diverted in 2002/03, if all authorities to use water in 2002/03 were fully utilised (with the qualifications for off-allocation, water harvesting and area licences made in Sections 10.1.5 and 10.1.6). In **Table 11**, these volumes are compared with the water used in each valley and the percentage use of the water made available by the water authorities for diversion is presented.

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 11**). For example, in the Victorian river valleys, water is physically transferred from the Goulburn valley into the Campaspe and Loddon valleys via the Waranga Western Channel.

It is expected that diversion as a percentage of the water authorised to be diverted will fluctuate from year to year, depending upon the climatic conditions and the degree to which the diversions are constrained by the physical resources available. Typically the utilisation of the allocations will be higher in the drier years and lower in the wetter years, especially in the south of the Basin. It is also expected that allocations would reduce and utilisation increase, if the allocation system was tightened to prevent growth in diversions under the Cap. In this context, the 92% utilisation of Basin allocations in 2002/03 is higher than the average of 63% reported for the 5 years to 1993/94 in the 1995 report to the Ministerial Council: *An Audit of Water Use in the Murray-Darling Basin*. The 2002/03 utilisation of 92% is highest since Cap accounting started in 1997/98. This is partly due to very dry conditions during 2002/03 and partly due to tightening of allocation system. The previous year utilisations were 83% in 2001/02, 73% in 2000/01, 69% in 1999/00, 71% in 1998/99 and 76% in 1996/97 and 1997/98.

**Table 8. Water Allocated in 2002/03**

<i>System</i>	<i>Base Valley Water Entitlement<sup>1</sup></i> (GL)	<i>Announced Allocation<sup>2</sup></i> (GL)	<i>Water Available under Continuous Accounting<sup>3</sup></i> (GL)	<i>Allocation Transferred into Valley<sup>4</sup></i> (GL)	<i>Net Carryover from 2001/02</i> (GL)	<i>Total Allocated Water in Valley<sup>6</sup></i> (GL)
<b>New South Wales</b>						
Border Rivers <sup>3</sup>	266	23	137	-13	114	124
Gwydir <sup>3</sup>	528	18	225	0	207	225
Namoi/Peel <sup>3</sup>	314	54	258	0	203	258
Macquarie/Castlereagh/Bogan	683	50	—	0	382	432
Barwon-Darling <sup>7</sup>	518	0	—	0	0	0
Lower Darling	48	48	—	0	36	84
Lachlan	665	95	—	0	167	262
Murrumbidgee	2774	1539	—	-14	195	1719
Murray	2180	683	—	36	233	953
<b>Total New South Wales</b>	<b>7977</b>	<b>2511</b>	<b>620</b>	<b>8</b>	<b>1537</b>	<b>4056</b>
<b>Victoria</b>						
Goulburn	712	449	—	28	0	477
Broken	38	38	—	0	0	38
Loddon	286	179	—	-15	0	165
Campaspe	276	189	—	-7	0	182
Wimmera-Mallee	94	81	—	1	0	82
Kiewa	16	16	—	0	0	16
Ovens	53	53	—	0	0	53
Murray	1175	1377	—	-19	0	1358
<b>Total Victoria</b>	<b>2651</b>	<b>2383</b>	<b>0</b>	<b>-13</b>	<b>0</b>	<b>2370</b>
<b>South Australia</b>						
Metro-Adelaide & Associated Country Areas <sup>8, 9</sup>	130	196	—	11	0	207
Lower Murray Swamps	99	99	—	0	0	99
Country Towns	50	50	—	-11	0	39
All Other Uses of Water from the River Murray	512	512	—	-9	0	503
<b>Total South Australia</b>	<b>790</b>	<b>857</b>	<b>0</b>	<b>-9</b>	<b>0</b>	<b>848</b>
<b>Queensland</b>						
Condamine/Balonne	127	104	—	0	0	104
Border Rivers	87	52	—	16	0	69
Macintyre Brook	19	16	—	-3	0	13
Moonie	0	0	—	0	0	0
Warrego	3	3	—	0	0	3
Paroo	0	0	—	0	0	0
<b>Total Queensland</b>	<b>235</b>	<b>176</b>	<b>0</b>	<b>13</b>	<b>1</b>	<b>190</b>
<b>Aust. Capital Territory<sup>10</sup></b>	<b>40</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40</b>
<b>Total Basin</b>	<b>11694</b>	<b>5967</b>	<b>620</b>	<b>0</b>	<b>1538</b>	<b>8125</b>

1. Sum of the volumetric entitlements in valley (in NSW this is the sum of general and high security entitlements). Includes unregulated stream entitlements where these are expressed volumetrically (e.g. in Victoria).
2. The base entitlements multiplied, where appropriate, by the largest announced percentage allocation in the season. In NSW this includes high security entitlements. Includes allocation for high security entitlement.
3. In continuous accounting, individual accounts can accumulate up to a specified percentage of entitlements and can use only up to specified percentage of entitlements during a season.
4. Net temporary inter-valley entitlement transfer from **Table 7**.
5. Net Carryover from Previous Year (**see Table 9**).
6. Allocated water = announced allocation or permitted use under continuous accounting + inter-valley trade + net carryover from last season (in NSW the addition of high security entitlements are also included).
7. The entitlement of 518 GL is upper bound use. Water is allocated in the Barwon-Darling system on an event basis.
8. Indicative average annual allocation from 5-year rolling total of 650 GL.
9. Volume that could be diverted before the 5-year Cap would be exceeded in 2002/03.
10. There is no formal entitlement in ACT to date. Net diversion shown.

**Table 9. Carryovers for 2002/03**

<i>System</i>	<i>Carryover from 2001/02 (GL)</i>	<i>Carryover Cancelled in 2002/03<sup>1</sup> (GL)</i>	<i>Net Carryover from 2001/02<sup>2</sup> (GL)</i>
<b>New South Wales</b>			
Border Rivers	114	0	114
Gwydir	207	0	207
Namoi/Peel	203	0	203
Macquarie/Castlereagh/Bogan	382	0	382
Barwon-Darling	0	0	0
Lower Darling	36	0	36
Lachlan	167	0	167
Murrumbidgee	195	0	195
Murray	233	0	233
<b>Total New South Wales</b>	<b>1537</b>	<b>0</b>	<b>1537</b>
<b>Victoria</b>			
Goulburn	0	0	0
Broken	0	0	0
Loddon	0	0	0
Campaspe	0	0	0
Wimmera-Mallee	0	0	0
Kiewa	0	0	0
Ovens	0	0	0
Murray	0	0	0
<b>Total Victoria</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>South Australia</b>			
Metro-Adelaide & Associated Country Areas	0	0	0
Lower Murray Swamps	0	0	0
Country Towns	0	0	0
All Other Uses of Water from the River Murray	0	0	0
<b>Total South Australia</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Queensland</b>			
Condamine/Balonne	1	0	0
Border Rivers	0	0	0
Macintyre Brook	1	0	0
Moonie	0	0	0
Warrego	0	0	0
Paroo	0	0	0
<b>Total Queensland</b>	<b>2</b>	<b>0</b>	<b>1</b>
<b>Australian Capital Territory</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Basin</b>	<b>1539</b>	<b>0</b>	<b>1538</b>

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.



**Table 10. Water Authorised for Use in 2002/03**

<i>System</i>	<i>Total Allocated Water in Valley<sup>1</sup> (GL)</i>	<i>Access to Off-Allocation, Water-Harvesting<sup>2</sup> (GL)</i>	<i>Unregulated Stream Use Not in Allocation<sup>3</sup> (GL)</i>	<i>System Losses Not in Allocation<sup>4</sup> (GL)</i>	<i>Authorised Use in Valley<sup>5</sup> (GL)</i>
<b>New South Wales</b>					
Border Rivers	124	3	14	0	140
Gwydir	225	6	10	0	241
Namoi/Peel	258	0	78	0	336
Macquarie/Castlereagh/Bogan	432	0	35	0	468
Barwon-Darling	0	20	0	0	20
Lower Darling	84	0	39	0	123
Lachlan	262	0	15	0	277
Murrumbidgee	1719	104	42	0	1865
Murray	953	0	28	0	980
<b>Total New South Wales</b>	<b>4056</b>	<b>133</b>	<b>262</b>	<b>0</b>	<b>4452</b>
<b>Victoria</b>					
Goulburn	477	0	0	228	704
Broken	38	0	0	6	44
Loddon	165	0	0	51	216
Campaspe	182	0	0	54	236
Wimmera-Mallee	82	0	0	28	109
Kiewa	16	0	0	0	16
Ovens	53	3	0	0	57
Murray	1358	0	0	412	1770
<b>Total Victoria</b>	<b>2370</b>	<b>3</b>	<b>0</b>	<b>778</b>	<b>3152</b>
<b>South Australia</b>					
Metro-Adelaide & Associated Country Areas <sup>6</sup>	207	0	0	0	207
Lower Murray Swamps	99	0	0	0	99
Country Towns	39	0	0	0	39
All Other Uses of Water from the River Murray <sup>7</sup>	503	0	0	0	503
<b>Total South Australia</b>	<b>848</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>848</b>
<b>Queensland</b>					
Condamine/Balonne	104	39	12	0	155
Border Rivers	69	16	2	0	86
Macintyre Brook	13	0	0	0	13
Moonie	0	6	0	0	6
Warrego	3	5	1	0	8
Paroo	0	0	0	0	0
<b>Total Queensland</b>	<b>189</b>	<b>65</b>	<b>14</b>	<b>0</b>	<b>268</b>
<b>Australian Capital Territory</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>40</b>
<b>Total Basin</b>	<b>7504</b>	<b>202</b>	<b>276</b>	<b>778</b>	<b>8760</b>

1. Allocated water from **Table 8** (Figures for NSW are approximate).
2. The volume of off-allocation water used and water harvested has been reported for NSW, Queensland and Victoria.
3. Unregulated stream entitlement in Victoria is included in the base entitlement.
4. 'System Losses not in Allocation' are losses in those irrigation systems where the entitlement is defined at the farm gate and losses in the distribution system are not covered by an entitlement.
5. Water is allocated in the Barwon-Darling system on an event basis.
6. The water allocated for Metro-Adelaide & Associated Country Areas in 2002/03 is based upon the usage in the previous four years against the five-year rolling total of 650 GL.
7. Water authorised for use is not equal to the Cap component for 'All Other Uses of Water from the River Murray', as this is defined as 90% of the total licensed allocations.

**Table 11. Use of Valley Allocations in 2002/03**

<i>System</i>	<i>Diversion from Valley (GL)</i>	<i>Diverted from Other Valleys (GL)</i>	<i>Total Use in Valley (GL)</i>	<i>Authorised Use in Valley (GL)</i>	<i>Use as a Percentage of Authorised Valley Use (%)</i>
<b>New South Wales</b>					
Border Rivers <sup>1</sup>	137	0	137	140	98%
Gwydir	238	0	238	241	99%
Namoi/Peel	294	0	294	336	87%
Macquarie/Castlereagh/Bogan	411	0	411	468	88%
Barwon-Darling <sup>1</sup>	19	0	20	20	100%
Lower Darling <sup>1</sup>	107	0	107	123	87%
Lachlan	253	0	253	277	91%
Murrumbidgee	1793	0	1793	1865	96%
Murray	879	0	879	980	90%
<b>Total New South Wales</b>	<b>4131</b>	<b>0</b>	<b>4132</b>	<b>4452</b>	<b>93%</b>
<b>Victoria</b>					
Goulburn	1004	-343	661	704	94%
Broken	39	0	39	44	88%
Loddon	32	178	210	216	98%
Campaspe	74	139	213	236	90%
Wimmera-Mallee	63	2	65	109	59%
Kiewa	12	0	12	16	76%
Ovens	32	0	32	57	56%
Murray	1701	22	1723	1770	97%
<b>Total Victoria</b>	<b>2957</b>	<b>-2</b>	<b>2955</b>	<b>3152</b>	<b>94%</b>
<b>South Australia</b>					
Metro-Adelaide & Associated Country Areas <sup>2</sup>	165	0	165	207	80%
Lower Murray Swamps	99	0	99	99	100%
Country Towns	39	0	39	39	101%
All Other Uses of Water from the River Murray <sup>3</sup>	434	0	434	503	86%
<b>Total South Australia</b>	<b>737</b>	<b>0</b>	<b>737</b>	<b>848</b>	<b>87%</b>
<b>Queensland</b>					
Condamine/Balonne	123	0	123	155	79%
Border Rivers	67	0	67	86	78%
Macintyre Brook	11	0	11	13	86%
Moonie	6	0	6	6	100%
Warrego	7	0	7	8	91%
Paroo	0	0	0	0	100%
<b>Total Queensland</b>	<b>214</b>	<b>0</b>	<b>214</b>	<b>268</b>	<b>80%</b>
<b>Australian Capital Territory</b>	<b>40</b>	<b>0</b>	<b>40</b>	<b>40</b>	<b>100%</b>
<b>Total Basin</b>	<b>8079</b>	<b>-2</b>	<b>8078</b>	<b>8760</b>	<b>92%</b>

1. The authorised use in valley does not satisfactorily describe the volume of water that could be utilised for water harvesting, off-allocation and area licences on unregulated streams.
2. The volume authorised for use for Metro-Adelaide & Associated Country Areas for 2002/03 is the amount that could be used before the 5-year Cap of 650 GL would be exceeded.
3. Water authorised for use is not equal to the Cap component, as this is defined as 90% of the total licensed allocations.

## 11. Comparison of Actual Flows with Natural Flows

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

The natural flows are estimated from computer modelling studies. Many of the river models are incomplete or not yet modified, to allow these numbers to be readily calculated for 2002/03.

**Table 12** presents the 2002/03 annual flow volumes recorded and the natural flows at a number of selected key sites within the Murray-Darling Basin, whilst the impact of development can be seen graphically in Figure 7.

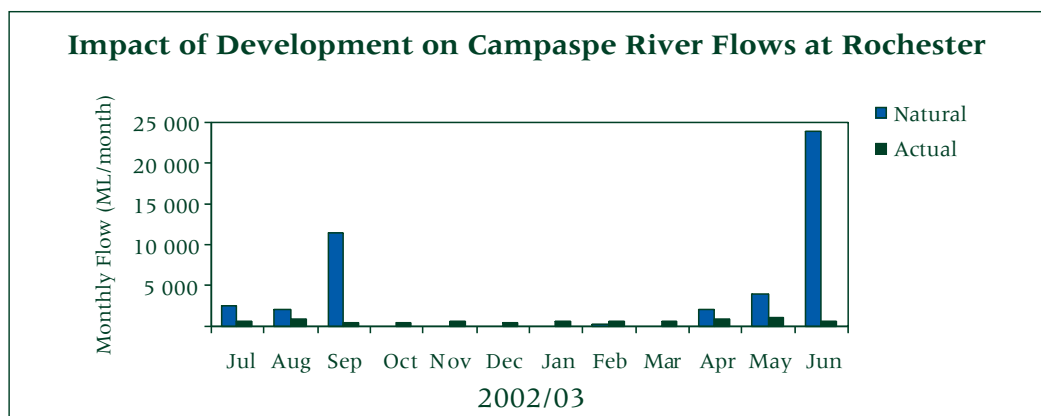
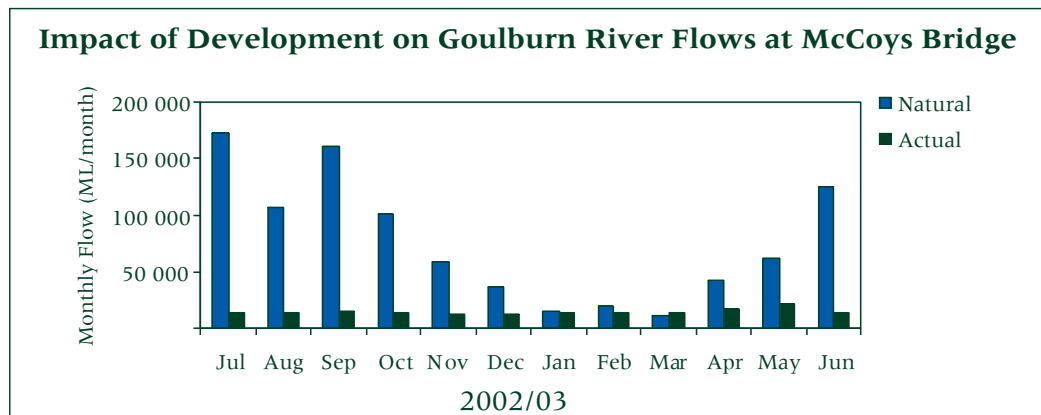
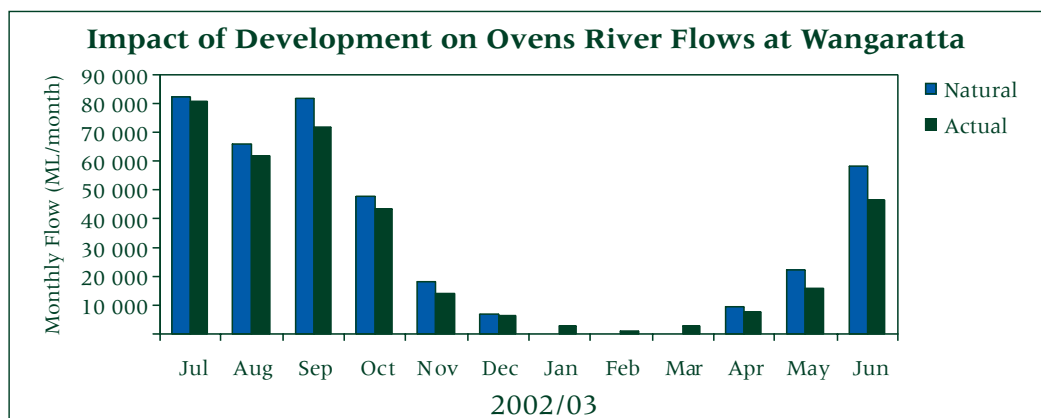
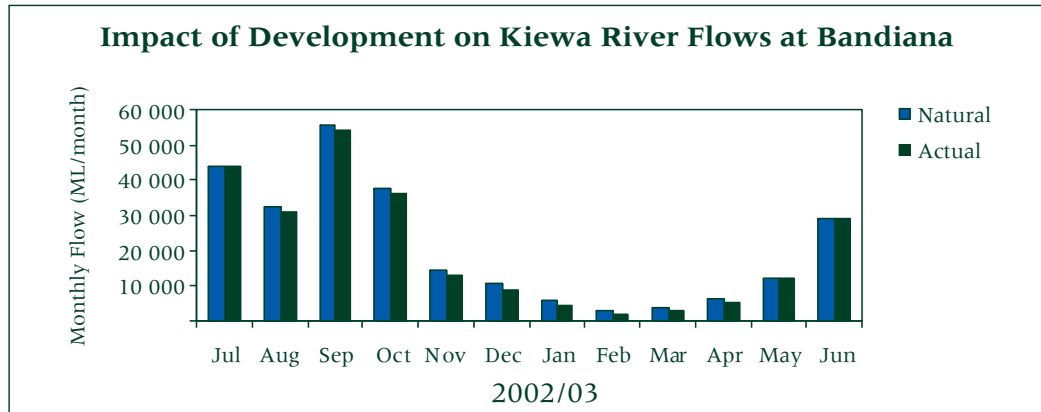
**Table 12. Comparison of 2002/03 Actual and Natural Annual Flows for Key Sites within the Murray-Darling Basin**

<i>System</i>	<i>Actual Flow (GL)</i>	<i>Natural Flow (GL)</i>	<i>Actual/Natural (%)</i>
<b>Inter-Basin Transfers</b>			
Snowy Mountain Scheme to Murrumbidgee River	552	0	—
Snowy Mountain Scheme to Murray River	904	0	—
Glenelg River Catchment to Wimmera-Mallee	n/a	n/a	—
Wannon River Catchment to Wimmera-Mallee	n/a	n/a	—
<b>New South Wales Tributaries<sup>2</sup></b>			
Barwon River at Mungindi + Boomi River	76	n/a	n/a
Inflows to Gwydir Wetland	122	n/a	n/a
Gwydir System Outflows to Barwon River	78	n/a	n/a
Namoi System Outflows to Barwon River	44	n/a	n/a
Inflows to Macquarie Marshes	76	n/a	n/a
Macquarie/Castlereagh/Bogan Outflows	14	n/a	n/a
Darling River Inflows to Menindee Lakes	89	n/a	n/a
Lachlan River at Corrong	25	n/a	n/a
Lachlan River at Booligal	31	n/a	n/a
Murrumbidgee River at Balranald	204	n/a	n/a
Lower Darling River at Burtundy	19	n/a	n/a
<b>Victorian Tributaries</b>			
Kiewa River at Bandiana	243	255	95%
Ovens River at Wangaratta	355	390	91%
Goulburn River at McCoys Bridge	171	907	19%
Campaspe River at Rochester	8	46	17%
Loddon River at Appin South	1	22	7%
Wimmera River at Horsham	0	11	4%
<b>Queensland Tributaries</b>			
Condamine/Balonne/Culgoa Flows at NSW Border	30	n/a	n/a
Macintyre River at Goondiwindi	239	n/a	n/a
Moonie River at Fenton	9	n/a	n/a
Warrego River at Cunnamulla	312	n/a	n/a
Paroo River at Caiwarro	60	n/a	n/a
<b>River Murray</b>			
Albury (Doctors Point)	4542	1714	265%
Downstream of Yarrawonga Weir	3251	n/a	n/a
Euston	2488	n/a	n/a
South Australian Border	1837	n/a	n/a
Barrages	0	n/a	n/a

1. n/a indicates data not available.

2. Operational data, which may be subject to change.

**Figure 7. Plots of Flows at Selected Sites Showing 2002/03 Actual and Natural (Modelled) Flows in Victoria**



## 12. Impoundments and Losses in Major On-Stream Storages

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

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

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

The impoundments and losses in major on-stream storages (above 10 GL capacity) within the Basin are reported in **Table 13**. The volumes reported indicate that the total volume in storage in the Basin in 2002/03 has decreased from 10116 GL to 5023 GL (20% full). Total evaporative losses for major storages within the Basin were calculated by the respective States and are reported at 824 GL, representing 3% of total storage capacity and 10% of total diversion from the Basin. The total increase in flow of 4269 GL due to release from storages, less evaporative losses, was 53% of total Basin diversion.

**Table 13. Impoundments and Losses in Major On-Stream Storages (Greater than 10 GL capacity) in 2002/03**

The lower lakes on the River Murray system, Lake Albert and Lake Alexandrina are natural lakes without any active storages and hence are not included in the table.

	Major On-Stream Storage	Completion Date	Storage Capacity (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	Percentage of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evaporation Losses (GL)	Net Reduction in Flow due to Storage (GL)
<b>Murray-Darling Basin Commission</b>									
Lower Darling	Menindee Lakes <sup>1</sup>	1960	1916	338	70	4%	-268	199	-69
Murray	Dartmouth Reservoir	1979	3906	3269	1177	30%	-2092	24	-2068
	Hume Reservoir	1936-61	3038	563	535	18%	-28	62	34
	Lake Victoria	1928	680	392	287	42%	-105	142	37
<b>Total Murray-Darling Basin Commission</b>			<b>9540</b>	<b>4563</b>	<b>2069</b>	<b>22%</b>	<b>-2494</b>	<b>427</b>	<b>-2067</b>
<b>Snowy Mountains Scheme in Murray-Darling Basin</b>									
Murrumbidgee River valley	Jounama Pondage	1968	44	25	24	55%	-1	0	-1
	Talbingo Reservoir	1971	921	891	877	95%	-14	12	-2
	Tantangara Reservoir	1960	254	26	20	8%	-6	0	-6
	Tumut Pondage	1958	53	24	10	19%	-14	0	-14
Murray River valley	Geehi Reservoir	1966	21	14	13	62%	-1	0	-1
	Tooma Reservoir	1961	28	4	3	11%	-1	0	-1
	Khancoban Pondage	1965	22	6	14	65%	8	0	8
<b>Total Snowy Mountains Scheme</b>			<b>1342</b>	<b>990</b>	<b>961</b>	<b>72%</b>	<b>-29</b>	<b>12</b>	<b>-17</b>
<b>Borders Rivers Commission</b>									
Border Rivers	Glenlyon Dam	1976	254	118	28	11%	-90	7	-84
<b>Total Border Rivers Commission</b>			<b>254</b>	<b>118</b>	<b>28</b>	<b>11%</b>	<b>-90</b>	<b>7</b>	<b>-84</b>
<b>New South Wales</b>									
Border Rivers	Pindari Reservoir	1962-96	312	168	88	28%	-80	6	-73
Gwydir	Copeton Reservoir	1976	1364	428	219	16%	-210	11	-199
Namoi/Peel	Chaffey Reservoir	1979	62	49	21	33%	-29	3	-26
	Keepit Reservoir	1960	423	114	72	17%	-43	25	-18
	Split Rock Reservoir	1987	397	264	51	13%	-213	11	-202
Macquarie/	Burrendong Reservoir	1967	1678	462	141	8%	-321	18	-302
Castlereagh/Bogan	Windamere Reservoir	1984	368	319	183	50%	-136	11	-125

**Table 13. Impoundments and Losses in Major On-Stream Storages (Greater than 10 GL capacity) in 2002/03 (continued)**

	Major On-Stream Storage	Completion Date	Storage Capacity (GL)	Volume of Storage at Beginning of Water Year (GL)	Volume of Storage at End of Water Year (GL)	Percentage of Storage Full at End of Year (%)	Increase in Volume of Storage (GL)	Evaporation Losses (GL)	Net Reduction in Flow due to Storage (GL)
<b>New South Wales (continued)</b>									
<i>Lachlan</i>	Carcoar Reservoir	1970	36	28	9	25%	-19	2	-17
	Lake Brewster	1952	153	0	0	0%	0	0	0
	Lake Cargelligo	1902	36	26	20	55%	-6	22	15
	Wyangala Reservoir	1936-71	1220	496	106	9%	-390	21	-369
<i>Murrumbidgee</i>	Blowering Reservoir	1968	1631	412	192	12%	-220	3	-217
	Burrinjuck Dam	1907-56	1028	258	72	7%	-186	11	-175
	Tombullen Off-River Storage	1980	11	n/a	n/a	n/a	n/a	n/a	n/a
	Hay Weir	1981	14	n/a	n/a	n/a	n/a	n/a	n/a
<b>Total New South Wales</b>			<b>8733</b>	<b>3025</b>	<b>1172</b>	<b>13%</b>	<b>-1853</b>	<b>145</b>	<b>-1708</b>
<b>Victoria</b>									
<i>Goulburn/Broken/Loddon</i>	Eildon Reservoir	1956	3390	713	377	11%	-336	38	-298
	Lake Mokoan	1971	365	150	77	21%	-72	74	1
	Lake Nillahcootie	1967	40	19	11	27%	-8	3	-6
	Cairn Curran Reservoir	1956	148	33	9	6%	-24	5	-19
	Tullaroop Reservoir	1959	74	20	9	12%	-11	4	-7
<i>Campaspe</i>	Lake Eppalock	1964	312	88	23	7%	-66	11	-55
	Lauriston Reservoir	1941	20	15	10	49%	-5	2	-3
	Malmsbury Reservoir	1870	18	8	1	4%	-8	2	-6
	Upper Coliban Reservoir	1903	37	11	2	4%	-9	1	-8
<i>Wimmera-Mallee</i>	Lake Bellfield	1966	79	22	10	12%	-12	1	-11
	Lake Fyans	1916	21	7	5	23%	-3	2	0
	Lake Lonsdale	1903	66	0	0	0%	0	0	0
	Lake Taylor	1923	36	15	8	22%	-7	6	-1
	Pine Lake	1928	64	2	0	0%	-2	2	0
	Tooloondo Reservoir	1953	107	4	1	1%	-3	4	1
<i>Murray/Kiewa/Ovens</i>	Wartook Reservoir	1887	29	22	19	66%	-3	5	3
	Rocky Valley Reservoir	1959	28	7	25	89%	18	2	20
	Lake Buffalo	1965	24	14	15	61%	1	2	3
	Lake William Hovell	1973	14	10	14	101%	4	1	5
<b>Total Victoria</b>			<b>4871</b>	<b>1160</b>	<b>614</b>	<b>13%</b>	<b>-546</b>	<b>165</b>	<b>-382</b>
<b>Queensland</b>									
<i>Condamine/Balonne</i>	Beardmore Dam	1972	82	37	50	61%	13	25	38
	Chinchilla Weir	1974	10	4	5	48%	1	4	5
	Cooby Dam	1942	21	12	9	43%	-2	3	1
	Jack Taylor Weir	1953-59	10	5	10	97%	5	3	8
	Leslie Dam	1985	106	12	7	6%	-6	7	1
<i>Macintyre Brook</i>	Coolmunda Dam	1968	75	37	9	12%	-28	17	-11
<b>Total Queensland</b>			<b>304</b>	<b>106</b>	<b>89</b>	<b>29%</b>	<b>-17</b>	<b>58</b>	<b>41</b>
<b>Australian Capital Territory</b>									
<i>Murrumbidgee</i>	Bendora Reservoir	1961	11	9	9	87%	0	0	0
	Corin Reservoir	1968	76	36	26	35%	-10	2	-7
	Googong Reservoir	1979	125	108	54	44%	-54	9	-45
<b>Total Australian Capital Territory</b>			<b>211</b>	<b>153</b>	<b>90</b>	<b>43%</b>	<b>-63</b>	<b>11</b>	<b>-52</b>
<b>Total Basin</b>			<b>25338</b>	<b>10116</b>	<b>5023</b>	<b>20%</b>	<b>-5093</b>	<b>824</b>	<b>-4269</b>

1. Menindee Lakes capacity revised based on 2002 survey of Lake Wetherell



## 13. Groundwater Use in the Basin

### 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 Commission related to groundwater:

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

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

### Groundwater Data for 2002/03

The GTRG supplied the estimated data for sustainable yield (SY), allocation and usage of groundwater in 2002/03 for each Groundwater Management Unit (GMU) in the Basin. The data was further supplemented and analysed using Geographical Information System (GIS) techniques to assign the groundwater data to the

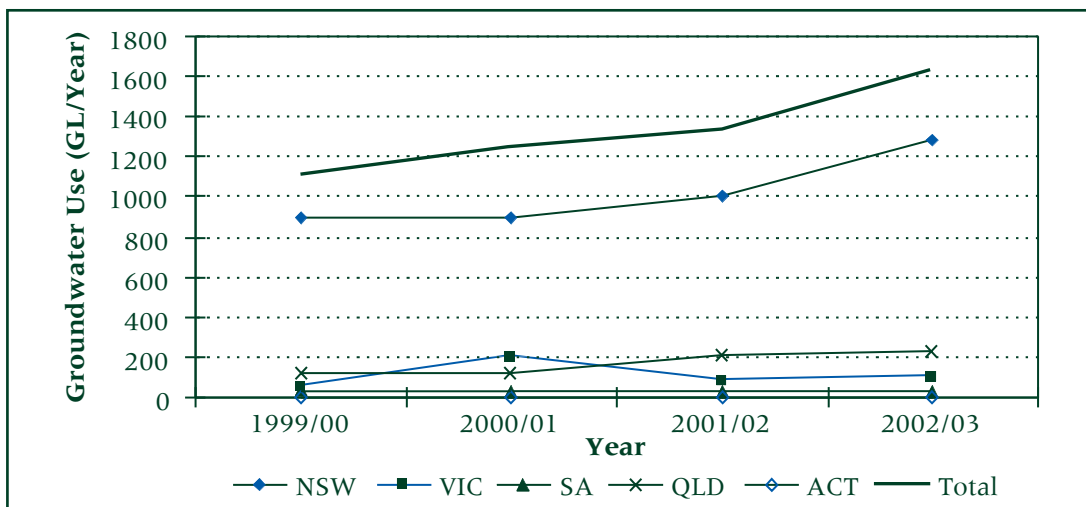
designated Cap valleys. Some errors are inevitable in the groundwater data because of the absence of precise information to apportion the aquifers to Cap valleys. However, the analysis presented in **Table 14** is valuable in itself, as it gives a snapshot of the Basin-wide status of groundwater.

The estimated sustainable yields in Groundwater Management Units (GMU) of the Basin are reported to be 2356 GL. Out of this, 2868 GL was already allocated in 2002/03, which constituted 122% of SY. The total usage of groundwater in the Basin was 1632 GL, which was 57% of allocation and 69% of SY. The groundwater usage was 20% of surface water diversion in the Basin. This reinforces the fact that groundwater is an important resource in which there is a considerable scope for future development within the current allocation. A recent report by Sinclair Knight Merz (2003) has estimated that there is strong linkage between groundwater use and surface water flows, with an average reduction in surface water flow of 600 ML for every 1000 ML of groundwater use. This highlights the importance of management of groundwater to the Cap on diversions.

### Groundwater Use since 1999/00

Figure 8 shows the use of groundwater in the Basin since 1999/00, when groundwater reporting started. It is evident from this figure that groundwater use has been steadily rising.

**Figure 8. Groundwater Use in the Basin since 1999/00**



**Table 14. Basin-Wide Groundwater Data for 2002/03, aligned along the designated Cap Valleys**

<i>Designated River Valley System</i>	<i>Estimated Sustainable Yield (GL/yr)</i>	<i>2002/03 Allocation (GL)</i>	<i>2002/03 Use (GL)</i>	<i>Surface Water Use (GL)<sup>1</sup></i>
<b>New South Wales</b>				
Border Rivers	9	17	10	137
Moonie	88	135	80	n/a
Gwydir	70	137	84	238
Namoi/Peel	210	504	246	294
Macquarie/Castlereagh/Bogan	164	246	119	411
Barwon-Darling	10	20	9	19
Lower Darling	n/a	n/a	n/a	107
Lachlan	402	504	255	253
Murrumbidgee	322	508	338	1793
Murray	113	289	142	879
<b>Total New South Wales</b>	<b>1389</b>	<b>2361</b>	<b>1283</b>	<b>4131</b>
<b>Victoria</b>				
Goulburn/Broken/Loddon	289	108	45	1076
Campaspe	18	27	17	74
Wimmera-Mallee	n/a	n/a	n/a	63
Kiewa/Ovens/Murray	357	84	34	1744
<b>Total Victoria</b>	<b>663</b>	<b>219</b>	<b>97</b>	<b>2957</b>
<b>South Australia</b>				
South Australian Murray Basin <sup>2</sup>	52	52	27	737
<b>Total South Australia</b>	<b>52</b>	<b>52</b>	<b>27</b>	<b>737</b>
<b>Queensland</b>				
Condamine/Balonne	220	212	213	123
Border Rivers	19	20	10	67
Macintyre Brook	n/a	1	1	11
Moonie	1	0	0	6
Warrego	5	2	1	7
Paroo	n/a	0	0	0
<b>Total Queensland</b>	<b>245</b>	<b>235</b>	<b>225</b>	<b>214</b>
<b>Australian Capital Territory</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>40</b>
<b>Total Basin</b>	<b>2356</b>	<b>2868</b>	<b>1632</b>	<b>8079</b>

1. Refer **Table 2**.
2. It is not sensible to divide SA groundwater use into designated valleys.

## 14. Conclusion

The information and data contained within this report provides a comprehensive review of consumptive water use and management for the 2002/03 water year for the Murray-Darling Basin, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

Total surface water use in the Murray-Darling Basin in 2002/03 was 8079 GL and groundwater use was 1632 GL.

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

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

Total water use in the 2002/03 water year represents an utilisation of 92% of the water allocated throughout the Basin. This compares with the 83% utilisation in 2001/02, 73% utilisation in 2000/01, 69% utilisation in 1999/00, 71% utilisation in 1998/99 and 76% utilisation in 1996/97 and 1997/98.

The accuracy of diversion measurements remained static at  $\pm 7\%$  in the 2002/03 water year in comparison to previous years.

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

Interstate water trading between New South Wales, Victoria and South Australia continued to develop in 2002/03.

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

The total volume of water in major storages within the Basin in 2002/03 decreased from 10116 GL to 5023 GL (20% full). Total evaporative losses for

major storages within the Basin were 824 GL, representing 3% of total storage capacity and 10% of total Basin diversion.

The Cap was exceeded in NSW Lachlan Cap valleys. However there was large Basin-wide Cap credit.

The estimated sustainable yield of aquifers in GMU in 2002/03 was 2356 GL. The allocation of groundwater in the Basin was 2868 GL and usage was 1632 GL.

No environmental releases were diverted to the Barmah-Millewa Forest in 2002/03.

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

It is evident from the progress to date of Cap implementation and the development towards more sustainable water use practices throughout the Murray-Darling Basin, that the continuation of a proactive 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

<b>ACTEW</b>	Australian Capital Territory Electricity and Water.
<b>announced allocation</b>	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
<b>annual allocation</b>	The annual volume of water available for diversion from a regulated stream by an entitlement holder.
<b>authorised use</b>	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.
<b>Border rivers</b>	The rivers and tributaries forming, or intersecting the border between NSW and Queensland.
<b>bulk entitlement</b>	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the <i>Water Act 1989</i> .
<b>carryover</b>	An unused entitlement from one season that can be used in the next year.
<b>channel capacity</b>	The maximum rate at which water can be delivered through a river reach or an artificial channel.
<b>COAG</b>	Council of Australian Governments.
<b>diversion</b>	The movement of water from a river system by means of pumping or gravity channels.
<b>diversion licence</b>	Specified licences issued for a specified annual volume and diversion rate.
<b>DIPNR</b>	The Department of Infrastructure, Planning and Natural Resources (of NSW).
<b>DNRME</b>	The Department of Natural Resources, Mines and Energy (of Queensland).
<b>DSE</b>	The Department of Sustainability and Environment (of Victoria).
<b>dozer allocation</b>	An allocation that is not fully utilised.
<b>DWLBC</b>	The Department for Water, Land and Biodiversity Conservation (of South Australia).
<b>EC (unit)</b>	Electrical conductivity unit 1 EC = 1 micro-Siemen per centimetre measurement at 25 °C. Commonly used to indicate the salinity of water.
<b>end-of-valley flows</b>	The flow regime at the end of a valley.
<b>floodplain harvesting</b>	The diversion of water from a floodplain into storage(s).
<b>FMIT</b>	First Mildura Irrigation Trust.
<b>Gigalitre (GL)</b>	One thousand million or 10 <sup>9</sup> litres.
<b>GL</b>	Gigalitre: one thousand million or 10 <sup>9</sup> litres.
<b>G-MW</b>	Goulburn-Murray Water (of Victoria).
<b>gravity districts</b>	Districts which use gravity to divert the flow of water from the river.

<i>high security entitlement</i>	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
<i>IAG</i>	Independent Audit Group.
<i>LV</i>	Licensed Volume.
<i>impoundment</i>	The storage of water diverted from a water course.
<i>irrigation</i>	Supplying land or crops with water by means of streams, channels or pipes.
<i>MDBC</i>	Murray-Darling Basin Commission.
<i>MDBMC</i>	Murray-Darling Basin Ministerial Council.
<i>Megalitre (ML)</i>	One million or 10 <sup>6</sup> litres.
<i>ML (ML)</i>	One Mega (million) litres. One ML is approximately the volume of an Olympic swimming pool.
<i>Ministerial Council, the</i>	Murray-Darling Basin Ministerial Council.
<i>Murray-Darling Basin Agreement</i>	The Agreement between the governments of the four Basin States and the Commonwealth. The current Agreement is the 1992 Agreement.
<i>off-allocation</i>	When unregulated tributary inflows or spills are sufficient to supply irrigation needs and downstream obligations.
<i>on-farm storage</i>	Privately owned storages used to harvest surplus flows or to store unused allocations for use in the following season.
<i>overdraw</i>	Water diverted in one season against a prospective allocation in the subsequent year.
<i>overland flow</i>	Water that runs off the land following rainfall, before it enters a watercourse, and floodwater that erupts from a watercourse or lake onto a floodplain.
<i>permanent transfer</i>	The transfer of water entitlements on a permanent basis. The right to permanent transfers allows irrigators to make long-term adjustments to their enterprise and enables new operators to enter the industry.
<i>private diverters</i>	Licensed to operate privately owned pumps or diversion channels; includes river pumpers and diverters as well as town water supplies.
<i>property right</i>	In this context, the right to ownership of allocated volumes of water.
<i>RAMSAR wetland</i>	A wetland listed on the register of internationally significant wetlands established by the Convention at Ramsar.
<i>regulated streams/ waterways</i>	Streams where users are supplied by releases from a storage. A water licence for a regulated stream specifies a base water entitlement defining the licence holder's share of the resources from a stream.
<i>riparian</i>	Of, inhabiting or situated on the bank and floodplain of a river.
<i>RIT</i>	Renmark Irrigation Trust.

<i>sales water</i>	In Victoria, water that may be purchased by an irrigator in addition to the basic water right. Access to sales water is announced each season as a percentage of water right, depending on the available resource.
<i>salinity</i>	The concentration of dissolved salts in groundwater or river water usually expressed in EC units.
<i>sleeper allocation</i>	An allocation that does not have a history of water usage.
<i>temporary transfer</i>	Water entitlements transferred on an annual basis.
<i>unregulated streams</i>	Streams that are not controlled or regulated by releases from major storages.
<i>utilisation</i>	The amount of water available for diversion that is actually diverted.
<i>water entitlement</i>	The legal right of a user to access a specified amount of water in a given period.
<i>water harvesting</i>	The diversion of water from an unregulated stream in Queensland in which the access to water is defined only by a diversion rate and a starting flow in the stream.
<b>WRP</b>	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.
<b>WMRWG</b>	Water Market Reform Working Group.
<b>WR</b>	Water Right.
<b>WUE</b>	Water Use Efficiency.



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

System	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
<b>New South Wales</b>						
Intersecting Streams	0	0	0	0	0	0
Border Rivers	0	-1593	-3505	-8474	-8695	-13499
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/Lower Darling	5393	13017	8986	21934	7816	0
Lachlan	0	0	0	0	0	0
Murrumbidgee	-33444	-38022	-113650	-21416	31487	-14489
Murray	30207	6782	105811	-12898	-33387	30868
<b>Total New South Wales</b>	<b>2156</b>	<b>-19816</b>	<b>-2358</b>	<b>-20854</b>	<b>-2779</b>	<b>2880</b>
<b>Victoria</b>						
Goulburn/Broken/ Loddon Cap valley	-2957	3456	-6531	-2101	-1036	-8243
Campaspe	0	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0	750
Murray/Kiewa/ Ovens Cap valley	17572	11736	-572	-303	-8553	-12869
<b>Total Victoria</b>	<b>14615</b>	<b>15192</b>	<b>-7103</b>	<b>-2404</b>	<b>-9589</b>	<b>-20362</b>
<b>South Australia</b>						
Metro-Adelaide & Associated Country Areas	0	0	0	0	12000	11000
Lower Murray Swamps	-2596	-3136	-4213	-4577	-4300	-5000
Country Towns	0	0	0	0	-12000	-11000
All Other Uses of Water from the River Murray	-14175	6717	11436	19802	10041	8973
<b>Total South Australia</b>	<b>-16771</b>	<b>3581</b>	<b>7223</b>	<b>15225</b>	<b>5741</b>	<b>3973</b>
<b>Queensland<sup>1</sup></b>						
Condamine/Balonne	0	0	0	0	0	0
Border Rivers/Macintyre Brook	0	1593	3505	8474	8695	13499
Moonie	0	0	0	0	0	0
Warrego	0	0	0	0	0	0
Paroo	0	0	0	0	0	0
<b>Total Queensland<sup>1</sup></b>	<b>0</b>	<b>1593</b>	<b>3505</b>	<b>8474</b>	<b>8695</b>	<b>13499</b>
<b>Australian Capital Territory<sup>1</sup></b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Basin</b>	<b>0</b>	<b>550</b>	<b>1267</b>	<b>441</b>	<b>2069</b>	<b>-9</b>

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

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

System	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
<b>New South Wales</b>						
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	166	177	144	n/a	n/a	n/a
Gwydir	555	294	408	249	432	435
Namoi/Peel	329	318	342	333	342	256
Macquarie/Castlereagh/Bogan	373	556	412	517	565	n/a
Barwon-Darling/Lower Darling	278	453	294	430	168	120
Lachlan	427	316	244	391	446	252
Murrumbidgee	2499	2519	2021	2729	2646	2055
Murray	1950	1947	1884	2090	1948	483
<b>Total New South Wales</b>	<b>6577</b>	<b>6580</b>	<b>5748</b>	<b>6739</b>	<b>6547</b>	<b>3601</b>
<b>Victoria</b>						
Goulburn/Broken/ Loddon Cap valley	1943	1650	1627	1631	1619	1033
Campaspe	132	81	75	109	105	85
Wimmera-Mallee Murray/Kiewa/ Ovens Cap valley	1833	1770	1620	1680	1959	2063
<b>Total Victoria</b>	<b>3908</b>	<b>3501</b>	<b>3322</b>	<b>3420</b>	<b>3683</b>	<b>3181</b>
<b>South Australia</b>						
Metro-Adelaide & Associated Country Areas <sup>1</sup>	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	101	100	99	99	99	99
Country Towns	50	50	50	50	38	39
All Other Uses of Water from the River Murray	426	447	452	460	451	450
<b>Total South Australia<sup>2</sup></b>	<b>577</b>	<b>598</b>	<b>601</b>	<b>609</b>	<b>588</b>	<b>587</b>
<b>Queensland</b>						
Condamine/Balonne	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
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
<b>Total Queensland</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Australian Capital Territory</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Total Basin</b>	<b>11063</b>	<b>10679</b>	<b>9672</b>	<b>10768</b>	<b>10818</b>	<b>7368</b>

1. See Appendix E.

2. Excludes Metro-Adelaide.

## Appendix C: Cap Register – Annual Diversions (GL)

System	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
<b>New South Wales</b>						
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	178	195	245	196	137
Gwydir	531	305	444	424	460	238
Namoi/Peel	301	317	343	350	359	294
Macquarie/Castlereagh/Bogan	439	374	421	501	582	411
Barwon-Darling/Lower Darling	249	414	258	483	198	125
Lachlan	429	293	301	423	457	253
Murrumbidgee	2585	2505	1875	2747	2348	1793
Murray	1886	2000	1234	2070	2113	879
<b>Total New South Wales</b>	<b>6623</b>	<b>6386</b>	<b>5070</b>	<b>7244</b>	<b>6714</b>	<b>4131</b>
<b>Victoria</b>						
Goulburn/Broken/ Loddon Cap valley	1909	1699	1553	1569	1700	1076
Campaspe	96	76	73	113	124	74
Wimmera-Mallee	184	153	116	98	93	63
Murray/Kiewa/ Ovens Cap valley	1743	1804	1555	1712	1916	1744
<b>Total Victoria</b>	<b>3932</b>	<b>3731</b>	<b>3299</b>	<b>3491</b>	<b>3834</b>	<b>2957</b>
<b>South Australia</b>						
Metro-Adelaide & Associated Country Areas	153	153	139	104	82	165
Lower Murray Swamps	101	100	99	99	99	99
Country Towns	35	36	37	38	36	39
All Other Uses of Water from the River Murray	375	400	368	421	403	434
<b>Total South Australia</b>	<b>664</b>	<b>690</b>	<b>642</b>	<b>662</b>	<b>620</b>	<b>737</b>
<b>Queensland</b>						
Condamine/Balonne	545	467	366	360	162	123
Border Rivers/Macintyre Brook	186	123	163	288	163	78
Moonie	8	8	8	31	6	6
Warrego	2	10	3	9	10	7
Paroo	0	0	0	0	0	0
<b>Total Queensland</b>	<b>741</b>	<b>609</b>	<b>541</b>	<b>688</b>	<b>341</b>	<b>214</b>
<b>Australian Capital Territory</b>	<b>44</b>	<b>23</b>	<b>27</b>	<b>34</b>	<b>36</b>	<b>40</b>
<b>Total Basin</b>	<b>12004</b>	<b>11439</b>	<b>9579</b>	<b>12119</b>	<b>11545</b>	<b>8079</b>

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

<i>System</i>	<i>Long- Term Cap</i>	<i>Schedule F Trigger</i>	<i>1997/98</i>	<i>1998/99</i>	<i>1999/00</i>	<i>2000/01</i>	<i>2001/02</i>	<i>2002/03</i>
<b>New South Wales</b>								
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	-36	-1	-51	n/a	n/a	n/a
Gwydir	344	-69	24	-11	-36	-176	-28	197
Namoi/Peel	320	-64	29	2	-1	-16	-17	-38
Macquarie/Castlereagh/Bogan	468	-94	-66	182	-10	16	-17	n/a
Barwon-Darling/Lower Darling	310	-62	28	39	36	-53	-31	-6
Lachlan	334	-67	-2	23	-56	-32	-11	-1
Murrumbidgee	2358	-472	-86	14	146	-18	298	262
Murray	1926	-385	64	-53	651	20	-166	-396
<b>Total New South Wales</b>	<b>6263</b>	<b>-1253</b>	<b>-46</b>	<b>194</b>	<b>678</b>	<b>-259</b>	<b>30</b>	<b>19</b>
<b>Victoria</b>								
Goulburn/Broken/ Loddon Cap valley	2058	-412	34	-49	74	62	-81	-43
Campaspe	122	-24	36	5	2	-4	-18	11
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/ Ovens Cap valley	1665	-333	90	-34	64	-32	42	318
<b>Total Victoria</b>	<b>4008</b>	<b>-802</b>	<b>161</b>	<b>-77</b>	<b>140</b>	<b>26</b>	<b>-57</b>	<b>286</b>
<b>South Australia</b>								
Metro-Adelaide & Associated Country Areas <sup>1</sup>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	104	-21	0	0	0	0	0	0
Country Towns	50	-10	15	14	13	12	3	0
All Other Uses of Water from the River Murray	441	-88	52	47	84	39	47	15
<b>Total South Australia</b>	<b>594</b>	<b>-119</b>	<b>66</b>	<b>61</b>	<b>98</b>	<b>51</b>	<b>50</b>	<b>15</b>
<b>Queensland</b>								
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Total Queensland</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Australian Capital Territory</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Total Basin</b>	<b>10864</b>	<b>-2173</b>	<b>181</b>	<b>178</b>	<b>915</b>	<b>-181</b>	<b>22</b>	<b>320</b>

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

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

System	Long-Term Cap	Schedule F Trigger						
			1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
<b>New South Wales</b>								
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	-36	-38	-89	n/a	n/a	n/a
Gwydir	344	-69	24	13	-23	-199	-226	-29
Namoi/Peel	320	-64	29	30	29	12	-4	-42
Macquarie/Castlereagh/Bogan	468	-94	-66	116	106	123	106	n/a
Barwon-Darling/Lower Darling	310	-62	28	68	103	51	20	14
Lachlan	334	-67	-2	21	-36	-68	-79	-80
Murrumbidgee	2358	-472	-86	-73	73	55	353	615
Murray	1926	-385	64	11	662	682	516	120
<b>Total New South Wales</b>	<b>6263</b>	<b>-1253</b>	<b>-46</b>	<b>148</b>	<b>826</b>	<b>656</b>	<b>686</b>	<b>599</b>
<b>Victoria</b>								
Goulburn/Broken/ Loddon Cap valley	2058	-412	34	-15	59	121	40	-3
Campaspe	122	-24	36	41	43	39	21	32
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/ Ovens Cap valley	1665	-333	90	57	121	89	131	449
<b>Total Victoria</b>	<b>4008</b>	<b>-802</b>	<b>161</b>	<b>83</b>	<b>223</b>	<b>249</b>	<b>192</b>	<b>478</b>
<b>South Australia</b>								
Metro-Adelaide & Associated Country Areas <sup>1</sup>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	104	-21	0	0	0	0	0	0
Country Towns	50	-10	15	28	42	54	56	56
All Other Uses of Water from the River Murray	441	-88	52	99	183	222	270	285
<b>Total South Australia</b>	<b>594</b>	<b>-119</b>	<b>66</b>	<b>127</b>	<b>225</b>	<b>276</b>	<b>326</b>	<b>341</b>
<b>Queensland</b>								
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paroo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Total Queensland</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Australian Capital Territory</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>
<b>Total Basin</b>	<b>10864</b>	<b>-2173</b>	<b>181</b>	<b>359</b>	<b>1274</b>	<b>1182</b>	<b>1204</b>	<b>1418</b>

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

## Appendix F: Cap Register for Metropolitan Adelaide

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

- Metro-Adelaide has a five-year rolling Cap of 650 GL and does not accumulate credit. A temporary trade of 12 GL has been allowed in 2002/03 as an interim measure to maintain diversions within Cap, increasing the 5-year rolling Cap to 662 GL.

## Appendix G: Barmah-Millewa Forest Environmental Account

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

Rules for operating Barmah-Millewa Forest environmental account were agreed by the Ministerial Council in March 2001. These rules allow for borrowing, payback and additional allocation to this account by the States of NSW and Victoria. The account for the 2002/03 is shown in the following table.

<i>State</i>	<i>Opening Account Balance<sup>1</sup></i> (GL)	<i>Opening Borrow by Water Users</i> (GL)	<i>New Allocation this Year<sup>2</sup></i> (GL)	<i>Account Spills<sup>3</sup></i> (GL)	<i>Usage of Allocation this Year</i> (GL)	<i>Closing Borrow by Water Users</i> (GL)	<i>Closing Account Balance<sup>4</sup></i> (GL)	<i>Additional Release this Year<sup>5</sup></i> (GL)	<i>Total Release this Year</i> (GL)
<b>NSW</b>	75	0	50	0	0	125	0	0	0
<b>Victoria</b>	25	0	50	0	0	0	75	0	0
<b>Total</b>	<b>100</b>	<b>0</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>125</b>	<b>75</b>	<b>0</b>	<b>0</b>

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





