

# Water Audit Monitoring Report 2001/02

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



Water  
Audit  
Monitoring  
Report  
2001/02

**June 2003**

## **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.

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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 2001/02 water year, as per the requirements of Schedule F of the *Murray-Darling Basin Agreement*.

In general, the water year is July to June for the Macquarie River and all rivers to the south and October to September for rivers north of the Macquarie.

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 2001/02 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. 2001/02 Cap Compliance by State**

State / Territory	2001/02 Cap Compliance
<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 71 - 4 March 2003 directed NSW to submit a Cap proposal for the valley for assessment. The 2001/02 diversion was 197 GL.
Gwydir	An IQQM (Interim) model yet to be audited and approved by the Commission is available to determine the Cap compliance. The Gwydir valley exceeded the Cap for 2001/02 and triggered Schedule F Special Audit provisions. A Special Audit by the IAG conducted in February 2003 confirmed the Cap exceedence. Subsequently, the Commission Meeting 71 - 4 March 2003 declared the Gwydir valley in breach of Cap. The NSW Government reported to the Council Meeting 33 - 9 May 2003 on the proposed measures to bring diversions in the Gwydir valley within the Cap limits.
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 diversion for the Namoi/Peel of 359 GL for 2001/02 exceed the annual Cap target of 298 GL. However cumulative Cap debit since 1997/98 of 41 GL is below the trigger of 64 GL for a Special Cap Audit. Based upon the diversion figures and a revised modelling the IAG determined that the Namoi, which had exceeded the trigger at the end of 2000/01, no longer did so at the end of 2001/02. Subsequently, the Commission Meeting 71 - 4 March 2003 revoked the declarations of Cap exceedence made at the Commission Meeting 63 - 12 March 2002.
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 2001/02 diversion of 582 GL for the valley was above its Cap target of 565 GL. However, the valley is in cumulative Cap credit of 111 GL since 1997/98.
Barwon-Darling/Lower Darling	The 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 219 GL exceeded its annual Cap of 187 GL. However, the cumulative debit of 35 GL since 1997/98 is below the trigger of 62 GL for a Special Audit. Based upon the determination by the IAG that the valley is no longer in the breach of Cap, the Commission Meeting 70 - 10 December 2002 revoked declarations of Cap exceedence made at the Commission Meeting 63 - 12 March 2002.
Lachlan	An IQQM model approved by the Commission is available to determine the Cap compliance. The Lachlan valley exceeded the Cap for 2001/02 and triggered Schedule F Special Audit provisions. A Special Audit by the IAG conducted in February 2003 confirmed the Cap exceedence. Subsequently, the Commission Meeting 71 - 4 March 2003 declared the Lachlan valley in breach of Cap. The NSW Government reported to the Council Meeting 33 - 9 May 2003 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 2001/02 diversion of 2348 GL for the Murrumbidgee valley was below its Cap target of 2687 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 2001/02 diversion of 2113 GL for the Murray valley just equalled its annual Cap of 2113 GL. The valley has a substantial cumulative Cap credit.
<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 2001/02 diversion of 1700 GL for the Goulburn/Broken/Loddon system was above its Cap of 1615 GL. However the valley is still in credit.
Campaspe	The GSM, which is yet to be audited and approved by the Commission, is available to determine the Cap compliance. The diversion of 124 GL for the Campaspe in 2001/02 was above its Cap target of 105 GL for the year but the valley is still in cumulative credit.
Wimmera-Mallee	An uncalibrated model is available. Though no Cap target for 2001/02 was available, the diversion of 93 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 2001/02 diversion of 1916 GL for the Murray/Kiewa/Ovens Cap valley was below its Cap target of 1941 GL. Cumulatively the valley is in 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 2001/02. A temporary trade of 12 GL was allowed from the Country Towns effectively increasing the year rolling Cap to 662 GL.
Lower Murray Swamps	The 2001/02 diversion of 100 GL for the Lower Murray Swamp equalled its Cap of 100 GL for 2001/02. The volume of diversion is assumed as the usage is not measured.
Country Towns	The 2001/02 diversion of 36 GL for Country Towns below the Cap target of 38 GL for 2001/02.
All Other Uses of Water from the River Murray	The 2001/02 diversion of 403 GL for the <i>All Other Uses of Water from the River Murray</i> was below its Cap target of 450 GL for 2001/02.
<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 2001/02 diversion was 162 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 2001/02 diversion was 164 GL.
Moonie	Queensland has not yet agreed to a Cap for the valley. A Cap model is also not yet available. The 2001/02 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 2001/02 diversion was 10 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 2001/02 diversion was 36 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 2001/02**

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 2001/02 (*Review of Cap Implementation 2001/02*, published by the Murray-Darling Basin Ministerial Council, March 2003, Canberra).

The present report represents the sixth in a series of annual reports and complements the report of the IAG, however the data presented herein are the final figures for the 2001/02 water year and supersede the data reported by the IAG. Most notably, the Murray-Darling Basin diversions in 2001/02 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 MDBBC. 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 2001/02.

The figures indicate that Basin water use in 2001/02 was 11567 GL, representing the eighth highest on record (since 1983/84). Water use in South Australia was the seventh highest on record, in Queensland the seventh highest, in New South Wales the sixth highest, in Victoria

the ninth highest whilst diversions in the ACT were fifth highest on record.

Figure 1 shows the water use (by State) for the period 1983/84 – 2001/02 which enables a comparison of 2001/02 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.

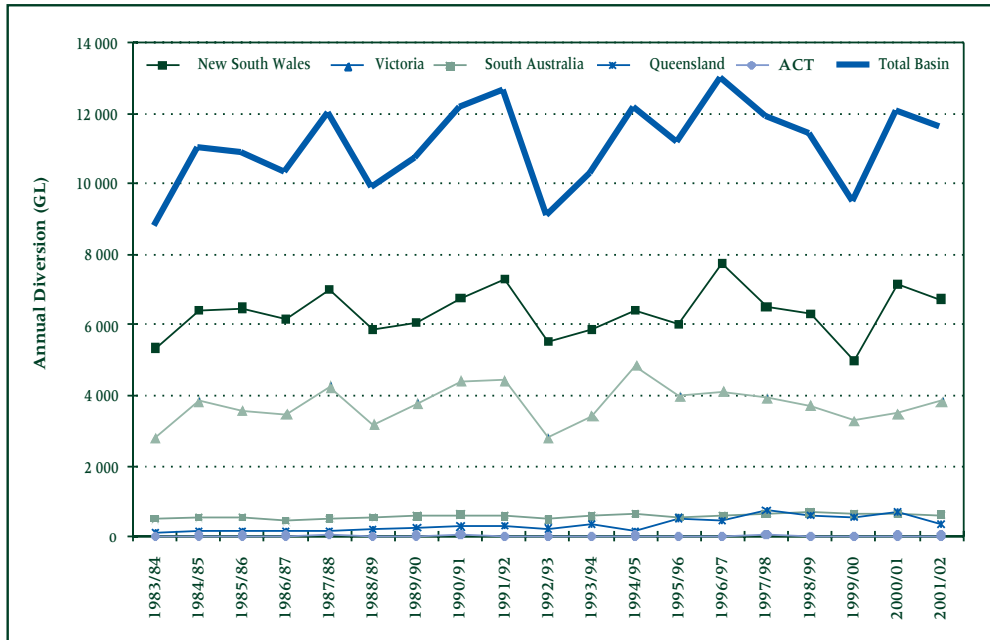
Not all diversions are metered and some diversions have to be estimated based on area irrigated or duration of diversion. Section 3.2 provides some indication as to the accuracy of the measurements.

**Table 2. Murray-Darling Basin Diversions in 2001/02**

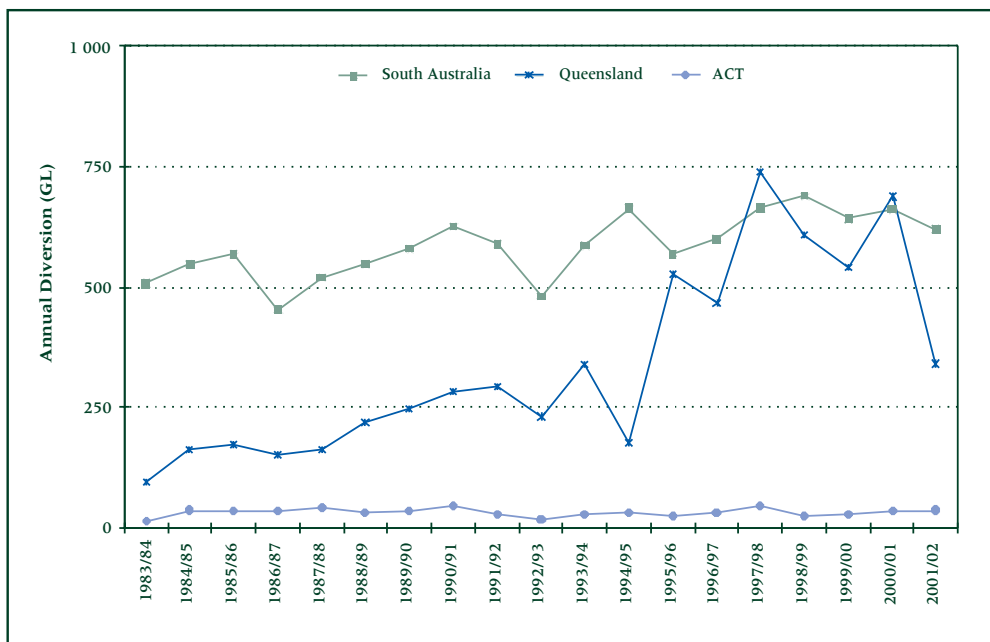
System	Irrigation Diversion (GL)	Other Diversion <sup>1</sup> (GL)	Total Diversion (GL)
<b>New South Wales<sup>2</sup></b>			
Border Rivers	196	1	197
Gwydir	460	0	460
Namoi/Peel	346	13	359
Macquarie/Castlereagh/Bogan	563	19	582
Barwon-Darling	93	0	93
Lower Darling	120	6	126
Lachlan	448	9	457
Murrumbidgee <sup>4</sup>	2334	14	2348
Murray	2005	108	2113
<b>Total NSW<sup>3</sup></b>	<b>6565</b>	<b>170</b>	<b>6735</b>
<b>Victoria</b>			
Goulburn	1560	31	1591
Broken	18	9	27
Loddon	75	7	82
Campaspe	85	39	124
Wimmera-Mallee	11	83	93
Kiewa	4	2	6
Ovens	16	10	26
Murray	1802	82	1884
<b>Total Victoria</b>	<b>3571</b>	<b>263</b>	<b>3834</b>
<b>South Australia</b>			
Metro-Adelaide & Associated Country Areas	0	82	82
Lower Murray Swamps <sup>5</sup>	100	0	100
Country Towns	0	36	36
All Other Uses of Water from the River Murray	395	9	403
<b>Total South Australia</b>	<b>494</b>	<b>127</b>	<b>621</b>
<b>Queensland<sup>2</sup></b>			
Condamine/Balonne	150	12	162
Border Rivers	148	4	152
Macintyre Brook	11	0	12
Moonie	5	0	6
Warrego	10	0	10
Paroo	0	0	0
<b>Total Queensland<sup>6</sup></b>	<b>325</b>	<b>16</b>	<b>341</b>
<b>Australian Capital Territory<sup>7</sup></b>	<b>5</b>	<b>31</b>	<b>36</b>
<b>Total Basin</b>	<b>10960</b>	<b>607</b>	<b>11567</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 2001/02.
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 2001/02**



**Figure 2. Murray-Darling Basin Diversions - 1983/84 to 2001/02 (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 is 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 2001/02 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 2001/02**

System (GL)	Diversion $\pm$ GL	Accuracy $\pm$ %	Accuracy
<b>New South Wales</b>			
Border Rivers	197	15	8%
Gwydir	460	27	6%
Namoi/Peel	359	35	10%
Macquarie/Castlereagh/Bogan	582	44	8%
Barwon-Darling	93	9	10%
Lower Darling	126	6	5%
Lachlan	457	28	6%
Murrumbidgee	2348	155	7%
Murray	2113	104	5%
<b>Total NSW</b>	<b>6735</b>	<b>424</b>	<b>6%</b>
<b>Victoria</b>			
Goulburn	1591	86	5%
Broken	27	5	18%
Loddon	82	6	8%
Campaspe	124	7	6%
Wimmera-Mallee	93	5	5%
Kiewa	6	1	19%
Ovens	26	4	16%
Murray	1884	117	6%
<b>Total Victoria</b>	<b>3834</b>	<b>233</b>	<b>6%</b>
<b>South Australia</b>			
Metro-Adelaide & Associated Country Areas	82	4	5%
Lower Murray Swamps	100	40	40%
Country Towns	36	2	5%
All Other Uses of Water from the River Murray	403	24	6%
<b>Total South Australia</b>	<b>621</b>	<b>70</b>	<b>11%</b>
<b>Queensland</b>			
Condamine/Balonne	162	24	15%
Border Rivers	152	24	16%
Macintyre Brook	12	1	7%
Moonie	6	1	21%
Warrego	10	2	19%
Paroo	0	0	25%
<b>Total Queensland</b>	<b>341</b>	<b>52</b>	<b>15%</b>
<b>Australian Capital Territory</b>			
	<b>36</b>	<b>4</b>	<b>10%</b>
<b>Total Basin</b>	<b>11567</b>	<b>782</b>	<b>7%</b>

### 3.3 Climatic Overview 2001/02

#### • Rainfall

Figure 3 shows the rainfall deciles for July 2001 to June 2002 inclusive. Below average to very much below average rainfall was observed throughout most of the Basin. Average rainfall was recorded in the north of the Basin in Queensland, in eastern highlands of NSW and in some isolated pockets of southern and south-western NSW. A very small area on the south-western margins of the Basin near the town of Barra in SA received above average rainfall. Very much below average rainfall was received in the western areas of the border between NSW and Queensland and in areas south-west of the Menindee Lakes near the border between SA and NSW.

Figure 4 shows the rainfall deciles for the period of November 2001 to April 2002 inclusive. Average rainfall was observed in the northern, eastern and central 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 was received in the south-west of the Basin around

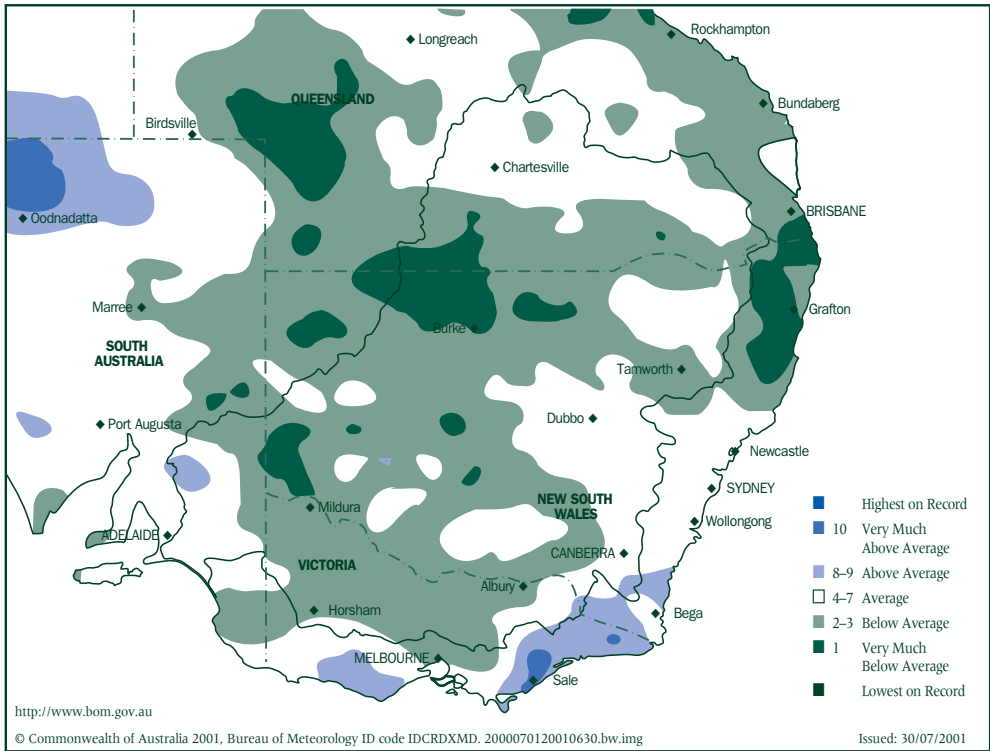
the border areas of NSW, SA and Victoria. A small area south-west of the Menindee Lakes near the border between SA and NSW received lowest rainfall on record. Above average rainfall was recorded in two small isolated pockets: one in the New England tablelands near the town of Inverell in NSW and other near the town of Charleville in Queensland.

#### • Temperature

Figure 5 shows the temperature anomaly (the difference between the recorded temperatures and the long-term average temperatures) for the period of July 2001 to June 2002 inclusive. Mildly higher (between  $0.0^{\circ}$  –  $+0.5^{\circ}\text{C}$  and  $+0.5^{\circ}$  –  $+1.0^{\circ}\text{C}$ ) than average temperature conditions were observed throughout most of the Basin for this period.

Figure 6 shows the temperature anomaly for the period of December 2001 to February 2002 inclusive (the primary irrigation season). Higher ( $+1.0^{\circ}$  –  $+2.0^{\circ}\text{C}$ ) than average temperature conditions were observed in the north-east of the Basin while the central and the south-west of the Basin experienced lower (up to  $-1.0^{\circ}\text{C}$ ) than average temperature conditions.

**Figure 3. Rainfall Deciles for the Murray-Darling Basin for the July 2001 to June 2002 Period**



**Figure 4. Rainfall Deciles for the Murray-Darling Basin for the November 2001 to April 2002 Period**

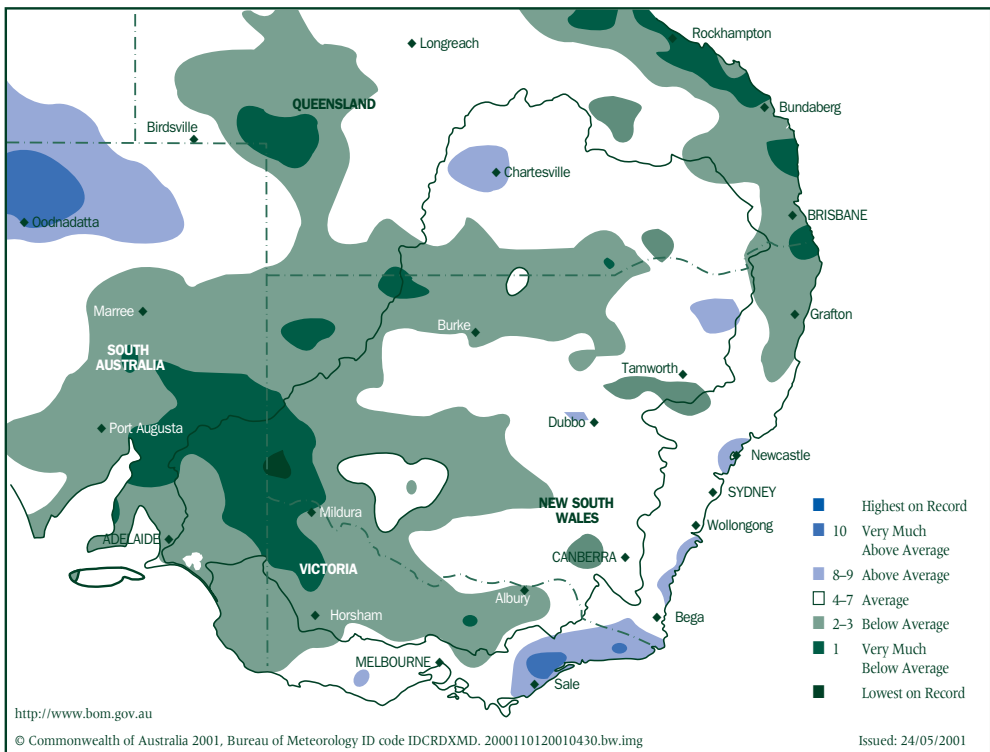


Figure 5. Temperature Anomaly for the 12 Month Period July 2001 to June 2002

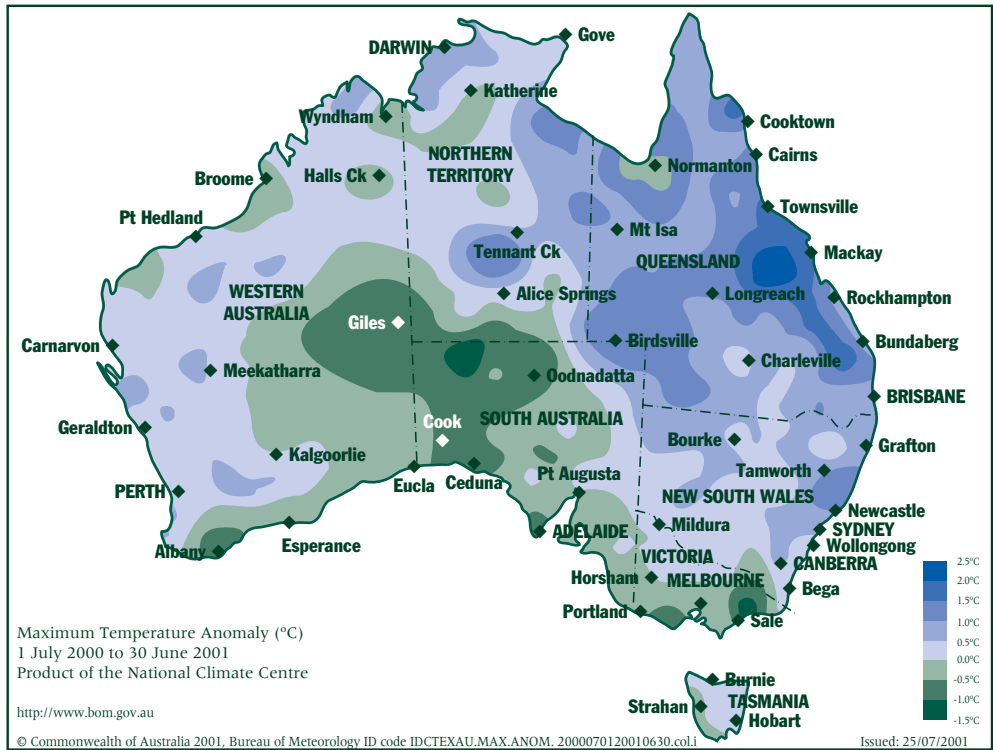
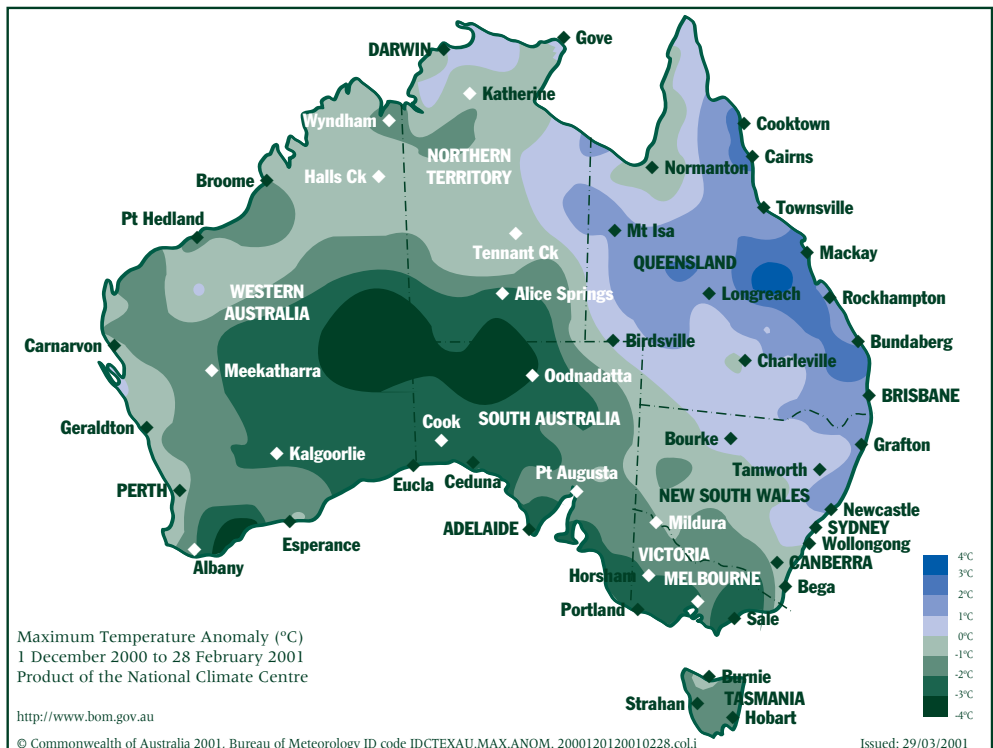


Figure 6. Temperature Anomaly for the 3 Month Period December 2001 to February 2002



### 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 2001/02 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 2001/02 Water Use with the Cap**

A comparison of 2001/02 water use with the Cap for each State is as follows:

- **New South Wales**

Cap compliance in 2001/02 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 model is expected to be accredited by the Commission during 2003/04. The Namoi and Barwon-Darling models are expected to be submitted for audit soon.

Water use in the Lachlan and Gwydir designated river valleys exceeded Cap for 2001/02 and triggered Schedule F exceedence provisions. A supplementary audit by the IAG was conducted in February 2003, which confirmed Cap exceedence in these valleys. Subsequently, the Murray-Darling Basin Commission Meeting 71 - 4 March 2003 declared the Lachlan and Gwydir Cap valleys in breach of Cap. The New South Wales Government reported to the Ministerial Council Meeting 33 - 9 May 2003 on the reasons for Cap exceedence and the proposed measures to bring diversions in these valleys within Cap limits. Following the Cap audit in 2001/02, the IAG determined that the Barwon-Darling/Lower Darling and Namoi/Peel valleys were no longer in breach of Cap. As a result of this, the declarations of Cap exceedence made at the Commission Meeting 63 - 2 March 2002 for the combined Barwon-Darling/Lower Darling Valley and the Namoi Valley were revoked at the Commission Meetings 70 - December 2002 and 71 - 4 March 2003 respectively. No annual Cap targets were available for the Border Rivers, therefore the IAG was unable to audit the Cap in this valley.

Diversions in the Macquarie and the Namoi/Peel although they exceeded the annual Cap target, remained within the 20% of the average long-term diversion trigger for the Special Audit. Diversions in the Murray and the Murrumbidgee valleys were below the annual Cap targets.

- **Victoria**

Victorian diversions were within Cap target for 2001/02 for the Kiewa/Ovens/Murray and

Wimmera-Mallee designated Cap valleys. Diversions in the Goulburn/Broken/Loddon and Campaspe Cap valleys although they exceeded the annual Cap targets, remained in cumulative credit.

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

**• South Australia**

South Australia complied with its Cap targets for 2001/02 for the Lower Murray Swamps, Country Towns, 'All Other Uses of Water from the River Murray' (Table 4) and Metro-Adelaide and Associated Country Areas (Table 5).

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 2001/02.

The revised draft Water Resource Plan (WRP) for the Border Rivers, Warrego/Paroo/Nebine and Moonie were released for public comment in July 2002. The draft WRP for the Condamine-Balonne is still under consideration of the Queensland Government. Finalisation of Cap for Queensland valleys is not expected before the end of 2003.

**• 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.

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**Table 4. Comparison of Diversions with Cap Levels in 2001/02**

System <sup>1</sup>	Cap Target from Cap Model (GL)	Adjustment to Cap Target for Trade <sup>1</sup> (GL)	Cap Target Adjusted for Trade (GL)	Annual Diversion (GL)	Cap Credit <sup>2</sup> (GL)	Cumulative Cap Credit since 1997/98 <sup>3</sup> (GL)	Cap Target Exceedence Trigger (20 per cent of Long-Term Diversion Cap) <sup>4</sup> (GL)
<b>New South Wales</b>							
Border Rivers <sup>2</sup>	n/a	-9	n/a	197	n/a	n/a	-41
Gwydir	434	0	434	460	-26	-226	-69
Namoi/Peel	334	0	334	359	-25	-41	-64
Macquarie/Castlereagh/Bogan	565	0	565	582	-16	111	-94
Barwon-Darling/Lower Darling	179	8	187	219	-32	-35	-62
Lachlan	446	0	446	457	-11	-79	-67
Murrumbidgee	2655	31	2687	2348	339	386	-472
Murray	2148	-35	2113	2113	0	809	-385
<b>Victoria</b>							
Goulburn/Broken/Loddon <sup>3</sup>	1616	-1	1615	1700	-85	62	-412
Campaspe	105	0	105	124	-18	21	-24
Wimmera-Mallee <sup>4</sup>	n/a	n/a	n/a	93	n/a	n/a	-32
Kiewa/Ovens/Murray	1961	-9	1953	1916	36	174	-333
<b>South Australia</b>							
Metro-Adelaide & Associated Country Areas <sup>7</sup>							
Lower Murray Swamps	104	-4	100	100	0	0	-21
Country Towns	50	-12	38	36	2	56	-10
All Other Uses of Water from the River Murray	441	10	450	403	47	269	-88
<b>Queensland</b>							
Condamine/Balonne <sup>4</sup>	n/a	n/a	n/a	162	n/a	n/a	n/a
Border Rivers <sup>4</sup>	n/a	n/a	n/a	152	n/a	n/a	n/a
Macintyre Brook <sup>4</sup>	n/a	n/a	n/a	12	n/a	n/a	n/a
Moonie <sup>4</sup>	n/a	n/a	n/a	6	n/a	n/a	n/a
Warrego <sup>4</sup>	n/a	n/a	n/a	10	n/a	n/a	n/a
Paroo <sup>4</sup>	n/a	n/a	n/a	0	n/a	n/a	n/a
<b>Australian Capital Territory<sup>4</sup></b>	n/a	n/a	n/a	36	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 2001/02. 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 2001/02 for Metro-Adelaide & Associated Country Areas, South Australia**

System	Total Diversion in 2001/02 (GL)	Total Diversion - 5 Years to 2001/02 (GL)	5 Year Cap Diversion Target (GL)	Difference between diversion and Cap (GL)
<b>South Australia</b>				
Metro-Adelaide & Associated Country Areas	82	631	662	31

1. A temporary trade of 12 GL from the Country towns to the Metro-Adelaide was allowed as an interim measure during 2001/02 increasing the 5-year rolling Cap from 650 GL to 662 GL. The rules for trade with Metro Adelaide are to be reviewed in 2003.

## 4. Review of 2001/02 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.

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. This first round of Plans, which covers the majority of the State's water use in the Murray-Darling Basin, will commence in July 2003.

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 are kept below 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 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, and the combined Barwon-Darling and Lower Darling valley, where assessments are incomplete. 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 is currently being reviewed.

### 4.2 Water Use Overview

Favourable climatic conditions during the previous water year resulted in most NSW regulated valleys in the Murray-Darling Basin receiving effective allocations at or near 100% of licensed entitlement. The only exceptions were the Murrumbidgee valley (88%), the NSW Border Rivers (93%) and the Lachlan valley (95%). During the water year, climatic conditions for valleys in southern NSW produced generally close to, or slightly below, average rainfall. Valleys in northern NSW generally experienced slightly lower than average rainfall.

Assessment of Cap performance for the 2001/02 water year using preliminary computer simulation models indicated that diversions for four NSW valleys were above Cap, four valleys were below Cap, and one valley (NSW Border Rivers) did not have Cap targets to allow assessment to be made. For the Lachlan and Gwydir valleys, the cumulated annual Cap performances from the 1997/98 water year are above Cap by more than 20% of the long-term average.

NSW valleys are managed using a water year that extends from July to June, except for the Namoi, Gwydir and NSW Border Rivers, which are managed using a water year, which extends from October to September. 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 105% allocation. The new system allows all general security licensees to carryover any unused allocation. At any time, they may receive a new allocation increment (dependent on

resource availability) up to a maximum limit of 105%. In any particular season, each licensee is limited to a maximum on-allocation usage of 100%.

The water year in the Border Rivers runs from October to September. In the 2001/02 water year the regulated section of the NSW Border Rivers received an initial allocation of 76% of licensed entitlement, with an additional 20% of licensed entitlement made available in increments during the water year. This provided a total resource availability of 256 GL (Table 8), not including off-allocation. There was a net 9 GL inter-valley transfer of allocated water out of the NSW Border Rivers to the Queensland Border Rivers.

During 2001/02 there was a total of 139 GL of allocated water diverted, and a further 44 GL of diversions during periods of off-allocation that were not debited against allocations. This provided a total diversion from the regulated section of the Border Rivers of 183 GL. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment of 14 GL has been made of these diversions bringing the total diversion to 197 GL (Table 2).

#### 4.4 Gwydir

An allocation system called Continuous Accounting (CA) 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 continuously carryover 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).

In 2001/02 Gwydir valley licensees commenced the season with an average of 96% of licensed

entitlement in individual accounts, and received a further 24% of licensed entitlement as further resources became available during the water year. On-allocation diversions of 76% of licensed entitlement occurred, providing a closing average account balance across the valley of 45% of entitlement. There were a further 49 GL of diversions during off-allocation periods that were not debited against allocations. This provided a total diversion of 450 GL in the regulated section. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment of 10 GL has been made of these diversions for 2001/02 bringing the total diversion to 460 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 2001/02 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2001/02 is 434 GL including an estimate for the unregulated diversion. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five water years of Cap accounting, this indicates a cumulative Cap debit of 226 GL, which exceeds the trigger for Special Auditing of 69 GL (Table 4).

#### 4.5 Namoi/Peel

An allocation system called Continuous Accounting (CA) 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 continuously carryover 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 48 GL. This provides a combined entitlement of 313 GL (Table 8).

In 2001/02 Namoi valley licensees commenced the season with an average of 158% of licensed entitlement in individual accounts, and received a further 25% of licensed entitlement as further resources became available during the water year. On-allocation diversions of 97% of licensed entitlement occurred, providing a closing average account balance across the valley of 89% of entitlement. The Peel received a maximum allocation of 100%, and 15 GL was diverted. There were no off-allocation events in the Namoi valley during 2001/02, and around 3 GL of diversions, made during high flows in the Barwon-Darling that had affected the lower reaches of the Namoi River, were not debited against allocations. This provided a total diversion of 281 GL in the regulated section of the catchment. Diversions in the unregulated sections of the catchment are not currently monitored, and assessment of 78 GL has been made of these diversions for 2001/02 bringing the total diversion to 359 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 2001/02 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 2001/02 is 334 GL, including an estimate for the unregulated diversions. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five water years of Cap accounting, this indicates a cumulative Cap debit of 41 GL, which is less than Schedule F trigger of 20% of the long-term average Cap diversion.

#### **4.6 Macquarie/Castlereagh/Bogan**

In the 2001/02 water year the regulated section of the Macquarie valley received an initial allocation of 68% of licensed entitlement, combined with 51% of licensed entitlement carried over from the 2000/01 water year. Following further inflows, an additional 22% of licensed entitlement was made available. This provided a total resource availability of 957 GL (Table 8), not including off-allocation.

During 2001/02, 546 GL of allocated water was diverted in the regulated section of the catchment. There was no off-allocation water available during 2001/02. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment of 35 GL has been made of these diversions for 2001/02, bringing the total diversion to 582 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 2001/02 with management rules and irrigation development at 1993/94 levels. The preliminary Cap target for 2001/02 is 565 GL, including an estimate for the unregulated diversions. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five water years of Cap accounting, this indicates a cumulative Cap credit of 111 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.

Diversions from the Barwon-Darling River system in the 2001/02 water year totalled 93 GL (Table 2).

Cap accounting is performed using the Barwon-Darling IQQM, which is used to estimate the Cap target. This is the diversion that would have occurred during 2001/02 with management rules and irrigation development at 1993/94 levels. The

preliminary Cap target for 2001/02 is 83 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five water years of Cap accounting, this indicates a cumulative Cap debit of 208 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 five-year period from 1997/98, this indicates a cumulative Cap debit of 35 GL for the combined Barwon-Darling/Lower Darling Cap valley, which is less than 62 GL Schedule F debit trigger for Special Cap Audit (Table 4).

#### 4.8 Lachlan

In the 2001/02 water year the regulated section of the Lachlan valley received an initial allocation of 58% of licensed entitlement, combined with 36% of licensed entitlement carried over from the 2000/01 water year. No further allocation announcements were made during 2001/02. This provided a total resource availability of 631 GL (Table 8), not including off-allocation.

During 2001/02, 442 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 an assessment of 15 GL has been made of these diversions for 2001/02, bringing the total diversion in the valley to 457 GL.

Cap accounting for the Lachlan valley was performed using the Lachlan IQQM, which is the first valley model in the Murray-Darling Basin to be formally approved for Cap auditing. This model indicated a Cap target of 446 GL, including an estimate for the unregulated diversions. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five-year period from 1997/98

this indicates a cumulative Cap debit of 79 GL, which exceeds the trigger for special auditing of 67 GL (Table 4).

#### 4.9 Murrumbidgee

In the 2001/02 water year the regulated section of the Murrumbidgee valley received an initial allocation of 47% of licensed entitlement, combined with 14% of licensed entitlement carried over from the 2000/01 water year. Further allocation announcements saw the announced allocation increase to 72% in February. This combined to provide a total resource availability of 2431 GL (Table 8), not including off-allocation. This includes a net inter-valley transfer of allocated water into the Murrumbidgee valley from the Murray and Lower Darling system of 31 GL.

During 2001/02, 2250 GL of allocated water was diverted, with 130 GL of flows returning from canal drainage systems. Diversions during periods of off-allocation resulted in 58 GL of diversions that were not debited against allocations. A further 128 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 2306 GL. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment of 42 GL has been made of these diversions for 2001/02, bringing the total diversion in the valley to 2348 GL (Table 2).

Preliminary Cap accounting for the Murrumbidgee valley was performed using the Murrumbidgee IQQM, which indicated a Cap target of 2655 GL, including an estimate for the unregulated diversion and estimate for temporary trade. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five-year period from 1997/98 this indicates a cumulative Cap credit of 386 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 129% of licensed entitlement was carried over from the 2000/01 water year, and there was a net inter-valley transfer of allocated water into the Lower Darling of 8 GL from the Murrumbidgee valley and the Murray system. This combined to give total water resource availability in the Lower Darling of 118 GL (Table 8), excluding water available in off-allocation periods.

During 2001/02, 60 GL of allocated water was diverted. There was no off-allocation access during the water year. The Great Darling Anabranch also received 66 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 126 GL. Diversions in the unregulated sections of the catchment are not currently monitored, and no assessment has been made of diversions for 2001/02. Preliminary Cap accounting for the Lower Darling valley was performed using the Murray Simulation Model, which indicated a Cap target of 96 GL. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five-year period from 1997/98 this indicates a cumulative Cap credit of 173 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 five-year period from 1997/98, this indicates a cumulative Cap debit of

35 GL for the combined Barwon-Darling/Lower Darling Cap valley, which is less than 62 GL Schedule F debit trigger for Special Cap Audit (Table 4).

#### 4.11 Murray

In the 2001/02 water year, the regulated section of the Murray valley received an initial allocation of 17% of licensed entitlement, combined with 20% of licensed entitlement carried over from the 2000/01 water year. However, a particularly wet spring period saw allocation announcements increase to 100% in December, combined with the cancellation of carryover. The announced allocation was increased to 105% in February 2002, due to very dry conditions. This provided a total resource availability of 2248 GL (Table 8), not including off-allocation. This includes a net inter-valley transfer of allocated water out of the Murray valley to the other NSW valleys, Victoria and South Australia of 30 GL.

During 2001/02, 2086 GL of allocated water was diverted from the regulated sections. There was no off-allocation access during the water year. Diversions in the unregulated sections of the catchment are not currently monitored, and an assessment of 28 GL has been made of these diversions for 2001/02, bringing the total diversion in the valley to 2113 GL (Table 2).

Preliminary Cap accounting for the Murray valley was performed using the Murray Simulation Model, which indicated a Cap target of 2148 GL, including an estimate for the unregulated diversions. Under the *Murray-Darling Basin Agreement*, annual Cap performances are cumulated from the 1997/98 water year. For the five-year period from 1997/98, this indicates a cumulative Cap credit of 809 GL (Table 4).



## 5. Review of 2001/02 Water Use in Victoria

### 5.1 Overview

Details of the factors influencing net water use in each of the Victorian river valleys during 2001/02 and proposed future water management activities are given below.

#### 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 Bulk Entitlements for the Ovens, Broken and Loddon systems is anticipated during 2002/03.

Annual diversions are limited by Victoria's seasonal allocation process. As occurred in 2000/01, the final allocation for supplies from the Goulburn system was limited to 100% of high security entitlement. Allocations in the Victorian Murray system reached the maximum allowable level.

#### 5.1.2 Volumes Diverted

The volumes diverted during 2001/02 were above the Cap targets in the Goulburn/Broken/Loddon and Campaspe designated river valleys. Diversions were below the Cap target for the Murray/Kiewa/Ovens valley. A Cap target has not been determined for the Wimmera-Mallee valley as the model is not yet calibrated.

Victorian systems diverted 3834 GL from the Murray-Darling Basin during 2001/02. The total volume authorised for use was 4134 GL, which included 506 GL of losses. Approximately 2 GL of net temporary trade went interstate from Victoria during 2001/02.

The Victorian diversions equated to 93% 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 2001/02.

#### 5.1.4 Deliveries

##### • Final Deliveries & Historical Comparison

Approximately 2872 GL was delivered by Victorian systems during 2001/02. Strong demand for irrigation in the Murray system contributed to deliveries of 1491 GL in 2001/02, compared to 1241 GL the previous year. Goulburn system deliveries were also greater than 2000/01 following the announcement of higher initial allocations.

#### 5.1.5 Trading

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

Approximately 43 GL was permanently sold interstate and to other river systems by Victorian entitlement holders. South Australia purchased 3 GL of Victorian entitlement, but there was no permanent trading between Victoria and New South Wales. Further trading also occurred within systems.

Strong trading occurred on the temporary entitlement market, with 162 GL sold interstate and to other river systems within Victoria. Most interstate trading involved New South Wales, and resulted in a net outwards transfer of water during 2001/02. The Goulburn system received a net inwards transfer of entitlement from the other Victorian systems.

#### 5.1.6 Environmental Flows

No releases were made from Hume Dam for watering the Barmah-Millewa forest during 2001/02.

Approximately 5.8 GL of northern Victorian wetlands allocation was diverted to the northern Victorian wetlands during 2001/02.

## 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 55% of water right or licensed volume in August 2001. The allocation reached a maximum of 100% of water right or licensed volume in October 2001. Limited resources prevented the allocation of any sales during 2001/02. This was the fourth consecutive year of record low allocations for the Goulburn system.

Lake Eildon held only 32% of capacity at the start of the Victorian irrigation season. The Goulburn system's primary storage reached 44% of capacity in November 2001, but fell to 21% by June 2002.

The volume authorised for use in the Goulburn system was 1039 GL; which comprised the seasonal allocation for irrigation, urban, industrial and stock entitlement holders (714 GL), temporary trade (18 GL) and system losses (306 GL). The irrigation entitlements referred to the Shepparton Irrigation Area, the Central Goulburn Irrigation Area and private diverters.

Approximately 544 GL was transferred to the Murray, Campaspe, Loddon and Wimmera-Mallee systems and the Melbourne water supply system. Diversions during 2001/02 were 1591 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. Diversions from this valley were above the 2001/02 Cap target. However, the valley is within Cap and maintains a cumulative Cap credit.

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 100% of licensed volume in August 2001. The maximum allocation of 100% licensed volume plus 70% sales was granted in October 2001.

Lake Nillahcootie and Lake Mokoan held 51% and 55% of capacity respectively when the irrigation season opened in August 2001. Lake Nillahcootie reached 97% of capacity in November 2001, and Lake Mokoan reached 64% of capacity during late October 2001. An outbreak of blue-green algae closed Lake Mokoan in February 2002.

The 27 GL total diversions were equivalent to 49% of the 56 GL authorised volume. The system diversions were greater than the ten-year average.

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 2001/02 Cap target. The valley is within Cap and has a cumulative Cap credit.

Bulk entitlements for the Broken system are expected to be implemented during 2003.

## 5.4 Loddon

Private diverters from the Loddon system were allocated 100% 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 100% of water right allocation.

The combined resources of Cairn Curran, Tullaroop and Laanecoorie Reservoirs were at 50% of capacity for the start of the irrigation season. The storages peaked at 52% during early November and fell to 24% of capacity in June 2002.



Loddon system private diverter irrigation usage, extraction for domestic and stock, commercial, industrial and urban purposes, and approximately 47 GL of supplement to the Pyramid-Boort Irrigation Area and the Wimmera-Mallee system accounted for total Loddon system diversions of 82 GL. The total diversion passed to the Pyramid-Boort Irrigation Area offtakes from the Goulburn system in 2001/02 was 290 GL.

The total authorised use in the Loddon system was 377 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. The valley is within Cap and has a cumulative Cap credit.

Development of bulk entitlements for the Loddon system commenced in December 2001.

## 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 180% of water right or licensed volume and remained unchanged throughout the season. Allocations for gravity irrigators in the Rochester Irrigation Area were aligned with the Goulburn system, and were 100% of water right.

The irrigation season began with Lake Eppalock holding 64% of capacity. The storage peaked at 65% of capacity during September 2001.

The 2001/02 Campaspe system authorised volume was 367 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 124 GL. A total volume of 31 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 6 GL to cover temporary trading from the Campaspe Irrigation District; 25 GL of regulated supplement; and 1 GL of unregulated supplement. The Campaspe bulk entitlement conversion order authorises Goulburn-Murray Water to provide up to 25 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 above the Cap target in 2001/02. Despite this exceedence, the Campaspe valley is still within Cap and has a cumulative Cap credit.

## 5.6 Wimmera-Mallee

Continuing record low stream-flows saw the 2001/02 season begin with storages holding only 12% of capacity. Due to this critical water storage situation, a number of key decisions were made for deliveries in the 2001 winter domestic and stock season:

- Customers were limited to filling only one-third of their dams;

- Additional supplies from the Waranga system were obtained from Goulburn-Murray Water; and
- The start of the Wimmera part of the supply system was delayed until June 2001 in the hope of early rains and improved distribution efficiency.

By mid-August 2001, Wimmera-Mallee Water storages had reached a low of 83 GL (11% of capacity), the lowest volume in WMW storages since 1968. Inflows during spring were useful, though still below average, and by November 2001 the storages peaked at 201 GL (26%), the highest volume since July 1999.

The marginally improved resource position, and extensive consultation with customer groups, led to the following allocations for the summer supply period:

- Summer domestic and stock, 50% of dams to be filled;
- Environment, 50% of environment; and
- Irrigation, 50% of allocation and no sales.

The irrigation season was shortened due to the low allocation, and was completed in late February 2002. Significant use was made of temporary transfer of water entitlements to ensure that the maximum use was made of the limited available water.

At the end of June 2001, the winter domestic and stock season had started with an allocation of 50%. The storages were holding 115 GL (15% of capacity) at the end of June 2002, compared to 89 GL (11%) twelve months earlier.

The Cap model is not yet complete for the Wimmera-Mallee valley. Diversions have remained within Cap as pipelining has significantly reduced distribution losses and there has been no new development in the valley.

Development of bulk entitlements for the Wimmera-Mallee system is continuing.

## 5.7 Kiewa

Total diversions of 6 GL were 39% of the 16 GL authorised for use. Irrigation diversions in the Kiewa system were below the ten-year rolling average during 2001/02.

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 2001/02 Cap target.

A draft stream-flow management plan for the Kiewa system has been released for public comment.

## 5.8 Ovens

Allocations are not announced for the Ovens River system as overall diversions are consistently less than total licensed volume and usage is usually satisfied by system resources. Lake William Hovell spilled in September 2001, and Lake Buffalo was filled to 87% of capacity (as limited by dam safety requirements) in early January 2002.

Total system diversions were 26 GL, which was 47% of the 55 GL authorised for use during 2001/02. A regression model is being developed to calculate Cap targets for the regulated Ovens system, but Cap targets from the model are not currently available. Ovens irrigation usage was above the ten-year average.

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 2001/02 Cap target.

Development of the bulk entitlement for the Ovens system continued during 2001/02, and is scheduled for completion in 2003.

### 5.9 Murray (including Mitta Mitta)

The initial allocation for Murray system gravity irrigation customers and private diverters was 100% of water right or licensed volume plus 74% sales. The maximum allocation of 100% of water right or licensed volume plus 100% sales was made during November 2001.

Hume Dam and Dartmouth Dam held 41% and 80% of capacity respectively for the start of the Victorian irrigation season in August. Hume Dam reached 80% of capacity during November 2001, and Dartmouth Dam achieved a peak capacity of 89% in October 2001.

The Victorian component of the total River Murray valley authorised volume was 2093 GL. Actual usage was 1927 GL, which was above the ten-year rolling average.

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 did not exceed the 2001/02 Cap target.

## 6. Review of 2001/02 Water Use in South Australia

### 6.1 Overview

South Australia reports diversions under four Cap components:

- Metropolitan Adelaide and Associated Country Areas;
- Country 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 were within Cap for each of these designated Cap components in 2001/02.

Factors influencing water use in South Australia throughout the 2001/02 water year and an outline of future water management activities are discussed below.

### 6.2 Season Conditions

The 2001/02 water-year has been an average use year for South Australia.

Weather conditions in South Australia were moderate for the 2001/02 water-year and the summer period was mild. The previous summer period was also mild but was much longer than this year's, resulting in higher diversions for 2000/01 compared with 2001/02 due to the longer period of high evapotranspiration.

The Riverland region 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 in the Riverland 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 too little to yield any substantial benefit. However, effective rainfall events did occur both early and late this summer season in the Riverland region. Coupled with the moderate conditions, the rain events resulted in reduced diversions which are reflected in the audit accounting.

Adelaide and its surrounds are supplied with water from both the Mount Lofty Ranges catchments and the River Murray. The amount of water that is diverted from the river year to year is significantly influenced by the weather conditions in the Mount Lofty Ranges. Inflows to storages from local catchments in the Mount Lofty Ranges have improved this year, resulting in decreased diversions from the River.

### 6.3 Metropolitan Adelaide and Associated Country Areas

The Cap for Metropolitan Adelaide is reported against a five-year rolling total of not more than 650 GL. As evident from Table 6, the usage of River Murray water for Metropolitan Adelaide of only 82 GL was significantly less than recent previous years. A temporary trade of 12 GL to Metro Adelaide from Country Towns was allowed, effectively increasing the 5-year rolling cap from 650 GL to 662 GL. However, this is an interim measure and negotiations are underway to manage the Metro Adelaide Cap within the set limits.

**Table 6. Metro Adelaide diversions since 1997/98.**

YEAR	DIVERSION (GL)
1997/98	153
1998/99	153
1999/00	139
2000/01	104
2001/02	82
<b>TOTAL</b>	<b>631</b>

### 6.4 Country (River) Towns

Water use for Country Towns in 2001/02 was 36 GL. This is 2 GL below the annual Cap target of 38 GL. There was a temporary trade of 12 GL out of Country Towns to Metro Adelaide, reducing the annual Cap target for Country Towns from 50 GL to 38 GL.

The Cap for Country Towns was reviewed in October 2000 due to concerns that arose about

conditions under which the Country Towns Cap was originally set. After a review by the Independent Audit Group the Country Towns Cap was confirmed as satisfactory at 50 GL per annum fully tradable.

### 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 GL and by 1999/00 had decreased to 79 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 104 GL and adjusted for trade that had already occurred.

Use is currently considered equal to allocation in the Reclaimed Swamps, however this will change as meters continue to be installed.

Swamps use for 2001/02 is considered to be equal to the current Cap value (adjusted for trade) of 100 GL.

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

The Highland diversions for 2000/01 were 421 GL, while Highland diversions for the 2001/02 water-year are approximately 403 GL. Highland irrigators diverted 403 GL or about 89% of the permanent trade adjusted Cap in 2001/02. Diversions for this year represent a significant decrease compared to last year's high use figures. Factors attributed to this decrease include: trade, industry movement, temperature, evaporation and growing season rainfall.

### 6.7 Future Water Management Activities

South Australia is committed to improvement programs and forward-moving 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 recently adopted Catchment Plan and Water Allocation Plans by the River Murray Catchment Water Management Board. The Water Allocation Plan for the River Murray places statutory obligations on irrigators to meet and report on annually specified water use efficiency targets.
- 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.
- Ongoing grower education programs.

## 7. Review of 2001/02 Water Use in Queensland

### 7.1 Management Overview

Queensland continues to develop water resource plans (WRPs) 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 water resource plans is a consultative process 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 moratorium on the issue of new licences, or development of works, to take or interfere with water, continues in the whole of the Queensland section of the Murray-Darling Basin until the water resource plans are finalised and implemented.

This year has seen significant progress with the release on 8 July 2002, of a draft Plan for the Queensland part of the Border Rivers catchment, and revised draft plans for the Moonie River and Warrego, Paroo, Bulloo & Nebine River catchments. In general, the draft Plans propose:

- End of system and other environmental flow objectives which set the overall long-term balance between consumptive use of the available resource and the volume of water to be retained in the stream for environmental purposes;
- Measurement of extractions and monitoring of flows and natural aquatic ecosystems to assess whether the long-term plan objectives are being met;
- Regulation of overland flow; and
- Conversion of existing licenses to tradable water allocations.

Public submissions on the draft Plans closed on 31 October 2002. Extensive community consultation followed the release of the draft Plans with almost 400 submissions being received. The Queensland Government is now considering the many complex issues raised in the submissions and the Plans are expected to be finalised in mid-2003.

The Resource Operations Planning (ROP) processes were commenced at the same time as the draft plans were released. The ROP process is the implementation phase of water resource plans 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. It is expected that the three ROPs will be finalised in late 2003.

More detailed information on each of the draft Plans and the current status of the planning process in the Condamine Balonne catchment is summarised as follows.

#### **Condamine-Balonne**

There continued to be concern about the long-term effects on river health caused by the current level of development, as well as questions raised about the integrity of the science and the quality of the modelling being used in the assessments on the Lower Balonne. The Queensland Government subsequently in mid-2002 commissioned an external and independent review of the science underpinning the assessment of the current and future ecological condition of the Lower Balonne. The review was undertaken by three eminent scientists, Professor Peter Cullen, Dr Richard Marchant and Professor Russell Mein, in consultation with a Community Reference Group. The report of this independent review panel was presented to the Government and the concerned public, early in 2003, and will further inform the water resource planning process for the Condamine-Balonne catchment.



In addition to incorporating various recommendations, extensive data validation and model updates are being carried out to better reflect the current development and improve the accuracy of information base. Subject to progress with community involvement, recommended by the independent review, a revised draft plan is expected to be released for formal public submissions in the second half of 2003, with the final plan expected in early 2004.

Whilst the scientific review recommendations have particular significance to this catchment, some recommendations also have potential implications for planning processes in other catchments.

### **Border Rivers**

The Draft Water Resource Plan for the Queensland part of the Border Rivers catchment is based on preserving the end-of-system flow across the Queensland–New South Wales border at Mungindi at not less than the lesser of:

- The end-of-system flow under November 1999 development conditions; and
- 60% of the end-of-system flow for the pre-development flow conditions.

Hydrologic modelling indicates that under current levels of development, the long-term end-of-system flow could be less than 60% of pre-development flows. The draft Plan proposes a transitional period where current levels of average total water extractions will be allowed to continue for up to five years after the finalisation of the Plan. This allows a reasonable period of time to evaluate whether flows under the current level of development are consistent with the Plan's end-of-system flow objective and to develop any measures that might be necessary to ensure that the objective is being met.

The draft Plan proposes a strategic reserve of 5000 ML per annum be made available in the Granite Belt, comprising 1500 ML per annum for urban water needs and 3500 ML per annum to

support the expansion of irrigated agriculture and associated industries.

Queensland and New South Wales continue to jointly develop principles to underpin the development of operational rules for water sharing; management of environmental flows; and monitoring and trading of entitlements on the Border stream. An interstate water management working group is to be established to provide advice to both States on the development of these rules. 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**

The Moonie draft Water Resource Plan proposes the end-of-system flow of not less than 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 draft Plan proposes allowance 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**

There are comparatively low levels of water resource development in these catchments and the draft Plan proposes to maintain the current end-of-valley flow performance at relatively high levels.

The draft Plan sets targets of not less than the following percentages of simulated pre-development flow for the end-of-system flows at the Queensland–New South Wales border:

- a) Warrego catchment – 89%
- b) Paroo catchment – 99%
- c) Bulloo catchment – 99%
- d) Nebine catchment – 87%

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

- a) Warrego catchment – 96%
- b) Paroo catchment – 100%
- c) Bulloo catchment – 99%
- d) Nebine catchment – 92%

In the ecologically significant Paroo and Bulloo catchments, the draft Plan proposes preserving near-natural flows with provision for a strategic reserve of 100 ML per annum for town water supplies, ecotourism and similar purposes. (Note that the Bulloo is not part of the Murray-Darling Basin).

For the Warrego and Nebine catchments, the draft Plan allows for the increased utilisation of existing entitlements including sleeper licences and strategic reserves of 100 Megalitres per annum for town water supplies.

In addition, strategic reserves of 8000 ML per annum in the Warrego and 1000 ML per annum in the Nebine are proposed 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's Rural Water Use Efficiency Initiative (RWUEI) is briefly described

below due to its significance to the overall water use figures.

The Queensland Government's Rural Water Use Efficiency Initiative is a four year program with a total commitment of \$41 million to the initiative through to July 2003 (with an extension to December 2003 recently approved). The program aims to achieve state-wide gains equivalent to approximately 180000 ML of water available annually.

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.

Approximately \$3.5 million in grants was made through the year to the following industry partners for their Adoption programs.

- Sugar represented by Queensland Cane Growers Council.
- Horticulture represented by Queensland Fruit and Vegetable Growers.
- Dairy, Lucerne and Pasture represented by Queensland Dairy Farmers' Organisation.
- Cotton and Grains represented by the Australian Cotton Cooperative Research Centre.

This brings the total grants to industry since commencement of the scheme to \$10.5 million.



Under the Research and Development program a further \$1 million per year has been allocated to fund a range of projects that address key irrigation and water use efficiency issues relevant to the industry partners.

The Financial Incentives scheme will allocate \$12 million to support the implementation of 'best practice' irrigation management. This will include subsidies for equipment and system modification to improve irrigation efficiency. To date approximately \$10.5 million has been distributed to about 4600 irrigators. Irrigators have added \$31 million to this amount to affect the improvements.

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.nrm.qld.gov.au/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.

Rainfall throughout the year has been well below average (approximately 50% of the annual average) in the northern, eastern and southern parts of the Basin in Queensland improving to approximately 80 to 90% of average in the western sections. Most of the major storages in the Queensland section of the Basin came into the water year at 30 to 50% of capacity, following a winter with very little stream-flow and pre-watering activity in September 2001. Ring tank storages in the Condamine-Balonne started the season at only 30 to 40 % of capacity following the limited water-harvesting

opportunity in the 2000/01 water year. Ring tank storage in the Border Rivers was around 60 to 70 % of capacity after some water-harvesting late in the 2000/01 season.

This year has been one of low to extremely low stream-flow in all areas of the Queensland part of the Basin.

- Flows in the Border Rivers were well down on last year with total flow passing Goondiwindi less than 50% of the long-term annual average of 900 GL.
- The Warrego River flow was almost two-thirds the long-term average (290 GL for the year compared with an annual average of 386 GL). The flow in the previous year was twice the average.
- The Condamine-Balonne catchment experienced very low flows throughout the catchment, delivering only 5% of the annual average in the Balonne of 1170 GL and less in the upper reaches.
- The Moonie catchment also had only 5% of the average annual flows of 152 GL.
- The Paroo catchment delivered less than 50% of the average annual flows of 555 GL.

The limited flows have had a severe impact on irrigation and water-harvesting diversions right across the Queensland part of the Basin, particularly in the lower Balonne where there is significant infrastructure. Flows failed to reach start thresholds. Flows and related diversions are described in detail for the various valleys as follows.

## 7.3 Condamine-Balonne

### • Condamine

Total diversion from the Condamine River upstream of Chinchilla was 60 GL. Of this approximately 18 GL was water-harvesting diversion taken from several smaller flows from November 2001 through to March 2002.

Diversion from supplemented sections of the stream was limited with the major scheme in this

section, the Upper Condamine Water Supply Scheme, starting the year with the major storage for the scheme at only 30% capacity and an announced allocation of 45%. This was revised to 65% by February 2002 as a result of small inflows to the system. Announced allocation for the smaller Chinchilla Water Supply Scheme started the year at 15% but rose to 85% by December 2001. Total diversion from the two schemes was 14 GL from a 26 GL total entitlement.

Unsupplemented irrigation totalled 20 GL, with approximately 30% of this relating to access to Toowoomba's effluent water, some of which is discharged to watercourses for downstream use by licensed irrigators. Urban, industrial and stock use totalled 8 GL.

Only 10 GL flowed past Chinchilla during the year. Average annual flow is in the order of 600 GL.

- **Balonne**

The flow situation was only marginally better at St George with several small inflows to Beardmore Dam from December 2001 to April 2002, but no overflow. Approximately 56 GL was released from the dam during the year as compensation flow to supply stock and domestic needs downstream. In mid to late April 2002, irrigators entered into an agreement to release 5 GL of additional stored water because of the critical level of downstream stock and domestic supplies.

Total diversion in the Balonne was only 102 GL for the year. This is made up of limited water-harvesting and unsupplemented irrigation upstream of Beardmore Dam - 11 GL; supplemented water supplied from the St George Water Supply Scheme - 87 GL; and essential supplies for urban, industrial and stock purposes - 4 GL.

Water accounting in the St George Water Supply Scheme is based principally on an individual capacity share system. Beardmore Dam started the year at approximately 40% capacity, with individual shares in the Dam at a similar level. Inflows during the year allowed full use of available entitlement.

## 7.4 Border Rivers/Macintyre Brook

Diversions in the Border Rivers catchment totalled 164 GL for the 2001/02 year.

The Dumaresq Water Supply Scheme moved from an announced allocation management arrangement to continuous accounting this year. The major storage for this scheme, Glenlyon Dam near Stanthorpe, started the year at slightly better than 50% of capacity and the average level of individual storage accounts at similar levels. Coolmunda Dam near Inglewood, which supplies the Macintyre Brook Water Supply Scheme, started the year at around 40% capacity and with an announced allocation of 50%. This was revised to 100% following inflows to the dam in November 2001 and March 2002. Total use for the two schemes was 57 GL for the year.

Water-harvesting opportunity was limited to two flow events during the year, a significant event in November 2001 and a much smaller event in April 2002. Water-harvesting diversion in the valley is estimated at 92 GL for the year, approximately half of which was metered and related to diversions in the supplemented section of the Dumaresq-Macintyre system. The unmetered use was primarily associated with diversions from the Weir River system.

The balance of diversions was made up of 10 GL for unsupplemented irrigation and 4 GL for urban, industrial and stock.

Total flow through Goondiwindi for the year was 422 GL with a further 18 GL contributed from the Weir River system downstream. Average annual flow past Goondiwindi is 900 GL.

## 7.5 Moonie

Stream-flow in the Moonie was very limited for the year, with a total flow past the Fenton gauge near the Queensland–New South Wales border of only 6 GL. Long-term average annual flow is 152 GL. Water-harvesting diversion was limited to only 6 GL for the water year, with start flow thresholds not being reached in the lower parts of the system. There are no supplemented water supply schemes in the Moonie.

## 7.6 Warrego/Paroo

Usage on the Warrego and Paroo Rivers was estimated at 10 GL for the year. The bulk of this usage is in the Warrego catchment with the Paroo catchment virtually undeveloped, with only 48 ML diversion.

The Cunnamulla Water Supply Scheme started the year with an announced allocation of 50% and this was revised to 100% in January 2002, following significant flows in the Warrego River. Total diversion from the scheme was 2 GL out of a total entitlement of 2.6 GL. The balance of diversions: 8 GL, was made up of water-harvesting from flows between January and March 2002, limited unsupplemented irrigation diversion and a small volume for urban and stock purposes.

A total of 293 GL flowed past the Cunnamulla gauging station for the year. Long-term flow information is not available for Cunnamulla but long-term annual average is thought to be in the order of 500 GL.

The Paroo River had a similar flow pattern to the Warrego but also benefited from an earlier small flow through November. Only 143 GL passed Caiwarro, approximately 50 km upstream of the Queensland–NSW border for the year. Long-term annual average is 555 GL.

## 8. Review of 2001/02 Water Use in the ACT

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

Water use in the ACT was slightly above the climate-adjusted target for 2001/02. Extractions from storages for the urban supply was 65.9 GL. Non-urban consumption was estimated at 5 GL, giving a total extraction of 70.9 GL. The returns from sewage treatment plants to the river system totalled 34.5 GL resulting in net total consumption of 36.4 GL.

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

Prior to 1998, there was no direct legislative control of water resources in the ACT. Indirect control was exercised through the *Land (Planning and Environment) Act 1991 (ACT)*. The *Water Resources Act 1998 (ACT)* establishes a framework for the sustainable management of water resources in the Territory. The Act was passed in late 1998 and is being progressively implemented. The Act requires the establishment of a Water Resources Management Plan, that protects environmental flows and makes provision for the sustainable management of the remaining resource, as well as requiring that the extraction of all groundwater and surface water for other than stock and domestic use will be licensed. The Act also places controls on the construction of dams and bores and allows for the trade of water

both within the Territory and outside.

Environmental Flow Guidelines which predominantly protect low flows and the variability of remaining flows have been established and implemented. A Water Resources Management Plan has been developed and implemented. Implementations are nearing completion with all licensing and permit requirements having been implemented and the bulk of licensed extraction being metered. The majority of licences, which are currently interim, will be converted to a more permanent status during 2003. It is expected that a small number of minor users, mainly urban bore owners, will continue to be discovered over the next one to two years.

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

Discussions to establish an ACT Cap are continuing. A number of options have been considered with detailed discussions centred on a Cap in the 38–61 GL range and associated capacity for future trade. Resolution of interstate trading arrangements now appears to be the largest impediment to the early establishment of an ACT Cap. Progress with trading is expected as a result of both Commission and CoAG groups working on the issue nationally.

## 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 2001/02 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 2001/02 were small and the interstate trades were negligible. 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 2001/02. 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 2001/02**

System	Permanent Entitlement Transfer				Temporary Entitlement Transfer				Adjustment to 2000/01 Cap Target for Temporary and unused Permanent Trade <sup>2</sup>
	Total Permanent Entitlement Sold (ML)	Net Inter-valley trade		Future Adjustment to Cap from this year's Permanent Trade <sup>1</sup> (ML)	Total Temporary Allocation Sold (ML)	Net Inter-valley trade		Adjustment to 2000/01 Cap Target for Temporary Trade (ML)	
		Inwards excluding Interstate Trade <sup>3</sup> (ML)	Net Interstate trade Inwards <sup>3</sup> (ML)			Inwards excluding Interstate Trade <sup>3</sup> (ML)	Net Interstate Inwards <sup>3</sup> (ML)		
<b>New South Wales</b>									
Border Rivers	0	0	0	0	10510	0	-8695	-8695	-8695
Gwydir	0	0	0	0	46749	0	0	0	0
Namoi/Peel	0	0	0	0	34233	0	0	0	0
Macquarie/ Castlereagh/Bogan	10499	0	0	0	43978	0	0	0	0
Barwon-Darling	0	0	0	0	0	0	0	0	0
Lower Darling	200	0	0	0	37157	4404	3412	7816	7816
Lachlan	4702	0	0	0	67871	0	0	0	0
Murrumbidgee	5361	0	0	0	220723	23035	8452	31487	31487
Murray	4072	0	184	165	175329	-27439	-2544	-29983	-29800
<b>Total NSW</b>	<b>24834</b>	<b>0</b>	<b>184</b>	<b>165</b>	<b>636550</b>	<b>0</b>	<b>625</b>	<b>625</b>	<b>809</b>
<b>Victoria<sup>4</sup></b>									
Goulburn	15369	-6307	0	-8136	38617	14312	3839	18151	
Broken	136	0	0	0	1322	0	0	0	
Loddon	15	303	0	391	5543	-3539	0	-3539	
Goulburn Broken Loddon	15520	-6004	0	-7745	45481	10773	3839	11800	5796
Campaspe	0	0	0	0	6348	-2812	0	0	0
Wimmera-Mallee	0	0	0	0	0	0	0	0	0
Kiewa	0	0	0	0	505	0	0	0	
Ovens	0	0	0	0	1572	0	0	0	
Murray	11938	6004	-1664	6248	62582	-7961	-5898	-13859	
Kiewa Ovens Murray	11938	6004	-1664	6248	64659	-7961	-5898	-13859	-9518
<b>Total Victoria</b>	<b>42979</b>	<b>0</b>	<b>-1664</b>	<b>-1497</b>	<b>161970</b>	<b>0</b>	<b>-2059</b>	<b>-2059</b>	<b>-3723</b>
<b>South Australia</b>									
Metro-Adelaide & Associated Country Areas <sup>5</sup>	0	0	0	0	0	12000	0	12000	12000
Lower Murray Swamps	0	0	0	0	0	0	0	0	0
Country Towns	0	0	0	0	12000	-12000	0	-12000	-12000
All Other Uses of Water from the River Murray	9396	0	1480	1332	76118	0	-7261	-7261	-5781
<b>Total South Australia</b>	<b>9396</b>	<b>0</b>	<b>1480</b>	<b>1332</b>	<b>88118</b>	<b>0</b>	<b>-7261</b>	<b>-7261</b>	<b>-5781</b>
<b>Queensland</b>									
Condamine/Balonne	0	0	0	0	14877	0	0	0	0
Border Rivers	0	0	0	0	5135	4801	8695	13496	13496
Macintyre Brook	0	0	0	0	6138	-4801	0	-4801	-4801
Moonie	0	0	0	0	0	0	0	0	0
Warrego	0	0	0	0	70	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>26220</b>	<b>0</b>	<b>8695</b>	<b>8695</b>	<b>8695</b>
<b>Australian 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>77209</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>912858</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 2001/02

### 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 2001/02 (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 2001/02 if all authorities to use water in 2001/02 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 83% utilisation of Basin allocations in 2001/02 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*.



**Table 8. Water Allocated in 2001/02**

System	Base Valley Water Entitlement <sup>1</sup> (GL)	Announced Allocation <sup>2</sup> (GL)	Water Available Under Continuous Accounting <sup>3</sup> (GL)	Allocation Transferred into Valley <sup>4</sup> (GL)	Net Carryover from 2000/01 (GL)	Total Allocated Water in Valley <sup>6</sup> (GL)
<b>New South Wales</b>						
Border Rivers <sup>3</sup>	266	-	256	-9	0	247
Gwydir <sup>3</sup>	528	-	528	0	0	528
Namoi/Peel <sup>3</sup>	313	48	265	0	0	313
Macquarie/Castlereagh/Bogan	675	612	-	0	345	957
Barwon-Darling <sup>7</sup>	518	518	-	0	0	518
Lower Darling	48	48	-	8	62	118
Lachlan	667	417	-	0	214	631
Murrumbidgee	2773	2102	-	31	298	2431
Murray	2179	2276	-	-30	0	2246
<b>Total NSW</b>	<b>7968</b>	<b>5973</b>	<b>1049</b>	<b>1</b>	<b>919</b>	<b>7990</b>
<b>Victoria</b>						
Goulburn	714	714	-	18	0	732
Broken	38	56	-	0	0	56
Loddon	282	282	-	-4	0	279
Campaspe	290	319	-	-3	0	316
Wimmera-Mallee	99	93	-	0	0	93
Kiewa	16	16	-	0	0	16
Ovens	55	55	-	0	0	55
Murray	1200	2095	-	-14	0	2081
<b>Total Victoria</b>	<b>2694</b>	<b>3630</b>	<b>-</b>	<b>-2</b>	<b>0</b>	<b>3628</b>
<b>South Australia</b>						
Metro-Adelaide & Associated Country Areas <sup>8,9</sup>	130	113	-	12	0	125
Lower Murray Swamps	100	100	-	0	0	100
Country Towns	50	50	-	-12	0	38
All Other Uses of Water from the River Murray	515	515	-	-7	0	507
<b>Total South Australia</b>	<b>794</b>	<b>777</b>	<b>-</b>	<b>-7</b>	<b>0</b>	<b>770</b>
<b>Queensland</b>						
Condamine/Balonne	127	118	-	0	2	120
Border Rivers	87	49	-	13	0	62
Macintyre Brook	19	19	-	-5	0	14
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>189</b>	<b>-</b>	<b>9</b>	<b>2</b>	<b>199</b>
<b>Aust. Capital Territory<sup>10</sup></b>	<b>36</b>	<b>36</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>36</b>
<b>Total Basin</b>	<b>11728</b>	<b>10654</b>	<b>1049</b>	<b>0</b>	<b>921</b>	<b>12624</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 2001/02.
10. There is no formal entitlement in ACT to date. Net diversion shown.

**Table 9. Carryovers for 2001/02**

<b>System</b>	<b>Carryover from 2000/01</b>	<b>Carryover Cancelled in 2001/02<sup>1</sup> (GL)</b>	<b>Net Carryover from 2000/01<sup>2</sup> (GL)</b>	<b>Carryover to 2001/02 (GL)</b>
<b>New South Wales</b>				
Border Rivers	0	0	0	0
Gwydir	0	0	0	0
Namoi/Peel	0	0	0	0
Macquarie/Castlereagh/Bogan	345	0	345	0
Barwon-Darling	0	0	0	0
Lower Darling	62	0	62	0
Lachlan	214	0	214	0
Murrumbidgee	298	0	298	0
Murray	0	0	0	0
<b>Total NSW</b>	<b>919</b>	<b>0</b>	<b>919</b>	<b>0</b>
<b>Victoria</b>				
Goulburn	0	0	0	0
Broken	0	0	0	0
Loddon	0	0	0	0
Campaspe	0	0	0	0
Wimmera-Mallee	0	0	0	0
Kiewa	0	0	0	0
Ovens	0	0	0	0
Murray	0	0	0	0
<b>Total Victoria</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>South Australia</b>				
Metro-Adelaide & Associated Country Areas	0	0	0	0
Lower Murray Swamps	0	0	0	0
Country Towns	0	0	0	0
All Other Uses of Water from the River Murray	0	0	0	0
<b>Total South Australia</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Queensland</b>				
Condamine/Balonne	2	0	2	1
Border Rivers	0	0	0	0
Macintyre Brook	0	0	0	1
Moonie	0	0	0	0
Warrego	0	0	0	0
Paroo	0	0	0	0
<b>Total Queensland</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>Aust. Capital Territory</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Basin</b>	<b>921</b>	<b>0</b>	<b>921</b>	<b>2</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 2001/02**

System	Total Allocated Water in Valley <sup>1</sup> (GL)	Access to	Unregulated Stream Use not in Allocation <sup>3</sup> (GL)	System Losses not in Allocation <sup>4</sup> (GL)	Authorised Use in Valley <sup>5</sup> (GL)
		Off-Allocation, Water- harvesting <sup>2</sup> (GL)			
<b>New South Wales</b>					
Border Rivers	247	44	14	0	305
Gwydir	528	49	10	0	587
Namoi/Peel	313	4	78	0	394
Macquarie/Castlereagh/Bogan	957	0	35	0	993
Barwon-Darling	518	0	0	0	518
Lower Darling	118	0	50	0	168
Lachlan	631	0	15	0	646
Murrumbidgee	2431	182	42	0	2656
Murray	2246	0	28	0	2273
<b>Total NSW</b>	<b>7990</b>	<b>278</b>	<b>273</b>	<b>0</b>	<b>8541</b>
<b>Victoria</b>					
Goulburn	732	0	0	306	1039
Broken	56	0	0	0	56
Loddon	279	0	0	99	377
Campaspe	316	0	0	51	367
Wimmera-Mallee	93	0	0	39	132
Kiewa	16	0	0	0	16
Ovens	55	0	0	0	55
Murray	2081	0	0	10	2092
<b>Total Victoria</b>	<b>3628</b>	<b>0</b>	<b>0</b>	<b>506</b>	<b>4134</b>
<b>South Australia</b>					
Metro-Adelaide & Associated Country Areas <sup>6</sup>	125	0	0	0	125
Lower Murray Swamps	100	0	0	0	100
Country Towns	38	0	0	0	38
All Other Uses of Water from the River Murray <sup>7</sup>	507	0	0	0	507
<b>Total South Australia</b>	<b>770</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>770</b>
<b>Queensland</b>					
Condamine/Balonne <sup>8</sup>	120	28	21	10	179
Border Rivers <sup>8</sup>	62	92	10	0	164
Macintyre Brook	14	0	1	0	14
Moonie	0	5	0	0	6
Warrego	3	8	1	0	11
Paroo	0	0	0	0	0
<b>Total Queensland</b>	<b>199</b>	<b>132</b>	<b>32</b>	<b>10</b>	<b>374</b>
<b>Aust. Capital Territory</b>	<b>36</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>36</b>
<b>Total Basin</b>	<b>12624</b>	<b>410</b>	<b>305</b>	<b>516</b>	<b>13855</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 2001/02 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 2001/02**

<b>System</b>	<b>Diversion from valley (GL)</b>	<b>Diverted from other valleys (GL)</b>	<b>Total use in valley (GL)</b>	<b>Authorised use in valley (GL)</b>	<b>Use as a percentage of authorised valley use (%)</b>
<b>New South Wales</b>					
Border Rivers <sup>1</sup>	197	0	197	305	65%
Gwydir	460	0	460	587	78%
Namoi/Peel	359	0	359	394	91%
Macquarie/Castlereagh/Bogan	582	0	582	993	59%
Barwon-Darling <sup>1</sup>	93	0	93	518	18%
Lower Darling <sup>1</sup>	126	0	126	168	75%
Lachlan	457	0	457	646	71%
Murrumbidgee	2348	0	2348	2656	88%
Murray	2113	0	2113	2273	93%
<b>Total NSW</b>	<b>6735</b>	<b>0</b>	<b>6735</b>	<b>8541</b>	<b>79%</b>
<b>Victoria</b>					
Goulburn	1591	-544	1047	1039	101%
Broken	27	0	27	56	49%
Loddon	82	282	364	377	96%
Campaspe	124	201	325	367	89%
Wimmera-Mallee	93	13	106	132	81%
Kiewa	6	0	6	16	39%
Ovens	26	0	26	55	47%
Murray	1884	43	1927	2092	92%
<b>Total Victoria</b>	<b>3834</b>	<b>-5</b>	<b>3829</b>	<b>4134</b>	<b>93%</b>
<b>South Australia</b>					
Metro-Adelaide & Associated					
Country Areas <sup>2</sup>	82	0	82	125	66%
Lower Murray Swamps	100	0	100	100	100%
Country Towns	36	0	36	38	94%
All Other Uses of Water from the River Murray <sup>3</sup>	403	0	403	507	79%
<b>Total South Australia</b>	<b>621</b>	<b>0</b>	<b>621</b>	<b>770</b>	<b>81%</b>
<b>Queensland</b>					
Condamine/Balonne	162	0	162	179	90%
Border Rivers	152	0	152	164	92%
Macintyre Brook	12	0	12	14	81%
Moonie	6	0	6	6	100%
Warrego	10	0	10	11	93%
Paroo	0	0	0	0	100%
<b>Total Queensland</b>	<b>341</b>	<b>0</b>	<b>341</b>	<b>374</b>	<b>91%</b>
<b>Aust. Capital Territory</b>	<b>36</b>	<b>0</b>	<b>36</b>	<b>36</b>	<b>100%</b>
<b>Total Basin</b>	<b>11567</b>	<b>-5</b>	<b>11562</b>	<b>13855</b>	<b>83%</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 2001/02 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.
4. Figure of authorised use in NSW are approximate.

## 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.

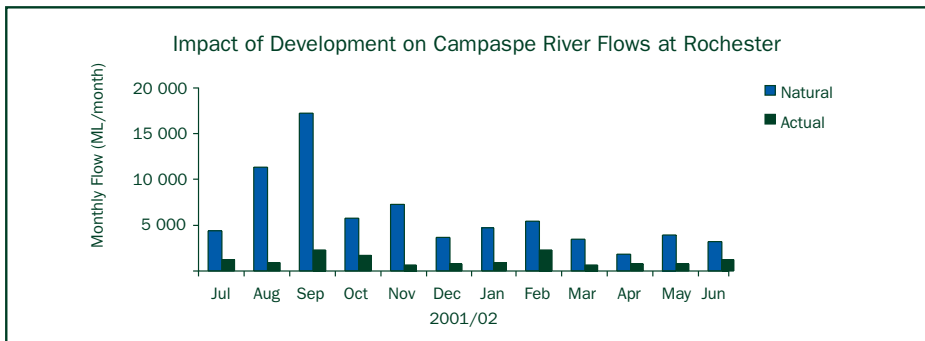
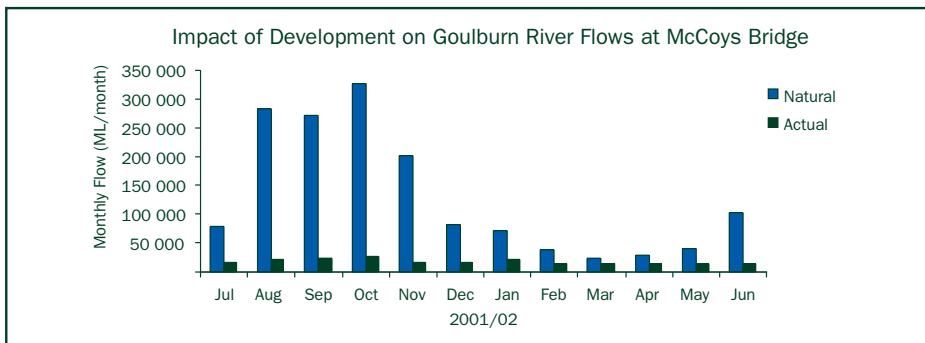
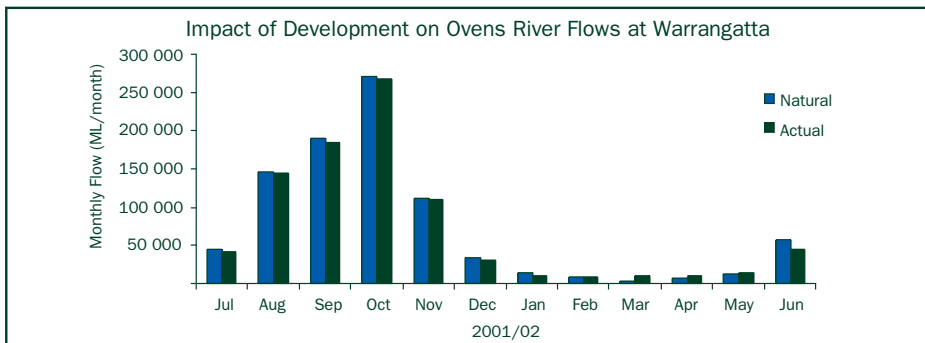
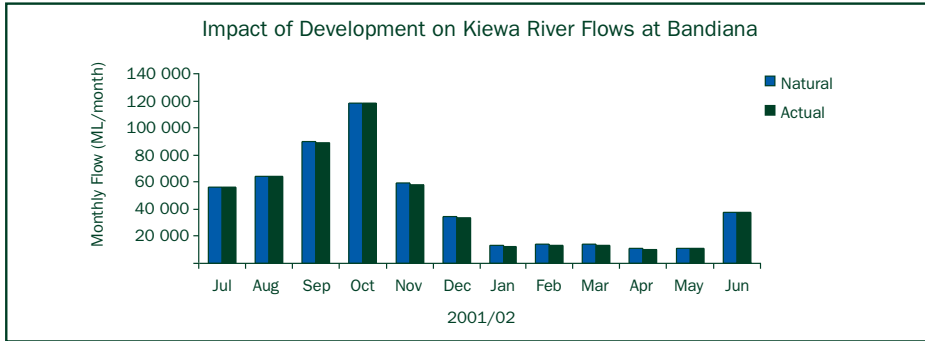
The natural flows are estimated from computer modelling studies. Many of the river models are incomplete or not yet modified, to allow these numbers to be readily calculated for 2001/02. Table 12 presents the 2001/02 annual flow volumes recorded and the natural flows at a number of selected key sites within the Murray-Darling Basin, whilst the impact of development can be seen graphically in Figure 7.

**Table 12. Comparison of 2001/02 Actual and Natural Annual Flows for Key Sites within the Murray-Darling Basin**

System	Actual Flow (GL)	Natural Flow (GL)	Actual/Natural (%)
<b>Inter-Basin Transfers</b>			
Snowy Mountain Scheme to Murrumbidgee River	392	0	-
Snowy Mountain Scheme to Murray River	325	0	-
Glenelg River Catchment to Wimmera-Mallee	n/a	n/a	n/a
Wannon River Catchment to Wimmera-Mallee	n/a	n/a	n/a
<b>New South Wales Tributaries<sup>2</sup></b>			
Barwon River at Mungindi + Boomi River	69	n/a	n/a
Inflows to Gwydir Wetland	137	n/a	n/a
Gwydir System Outflows to Barwon River	49	n/a	n/a
Namoi System Outflows to Barwon River	39	n/a	n/a
Inflows to Macquarie Marshes	210	n/a	n/a
Macquarie/Castlereagh/Bogan Outflows	53	n/a	n/a
Darling River Inflows to Menindee Lakes	214	n/a	n/a
Lachlan River at Corrong	97	n/a	n/a
Lachlan River at Booligal	107	n/a	n/a
Murrumbidgee River at Balranald	441	n/a	n/a
Lower Darling River at Burtundy	1069	n/a	n/a
<b>Victorian Tributaries</b>			
Kiewa River at Bandiana	519	525	99%
Ovens River at Wangaratta	880	904	97%
Goulburn River at McCoys Bridge	220	1551	14%
Campaspe River at Rochester	14	72	19%
Loddon River at Appin South	5	54	10%
Wimmera River at Horsham	n/a	n/a	n/a
<b>Queensland Tributaries</b>			
Condamine/Balonne/Culgoa Flows at NSW Border	19	n/a	n/a
Macintyre River at Goondiwindi	422	n/a	n/a
Moonie River at Fenton	6	n/a	n/a
Warrego River at Cunnamulla	293	n/a	n/a
Paroo River at Caiwarro	143	n/a	n/a
<b>River Murray</b>			
Albury (Doctors Point)	4127	3332	124
Downstream of Yarrawonga Weir	2869	4082	70
Euston	1937	n/a	n/a
South Australian Border	2273	n/a	n/a
Barrages	591	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 2001/02 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 2001/02 has decreased from 15476 GL to 10165 GL (40% full). Total evaporative losses for major storages within the Basin were calculated by the respective States and are reported at 1377 GL, representing 5% of total storage capacity and 12% of total diversion from the Basin. The total increase in flow of 3934 GL due to release from storages less evaporative losses was 34% of total Basin diversion.



**Table 13. Impoundments and Losses in Major On-Stream Storages (greater than 10 GL capacity) in 2001/02**

	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>									
<i>Lower Darling</i>	Menindee Lakes <sup>1</sup>	1960	1999	1976	395	20%	-1580	531	-1049
<i>Murray</i>	Dartmouth Reservoir	1979	3906	3138	3269	84%	132	7	139
	Hume Reservoir	1936-61	3038	1253	563	19%	-689	84	-605
	Lake Victoria	1928	680	360	392	58%	32	122	154
<b>Total Murray-Darling Basin Commission</b>			<b>9623</b>	<b>6726</b>	<b>4620</b>	<b>48%</b>	<b>-2106</b>	<b>744</b>	<b>-1361</b>
<b>Snowy Mountains Scheme in Murray-Darling Basin</b>									
<i>Murrumbidgee River Valley</i>	Jounama Pondage	1968	44	24	25	57%	1	0	1
	Talbingo Reservoir	1971	921	917	891	97%	-26	8	-18
	Tantangara Reservoir	1960	254	20	26	10%	6	0	6
	Tumut Pondage	1958	53	35	24	45%	-11	0	-11
<i>Murray River Valley</i>	Geehi Reservoir	1966	21	14	14	66%	0	0	0
	Tooma Reservoir	1961	28	3	4	14%	1	0	1
	Khancoban Pondage	1965	22	9	6	28%	-3	0	-3
<b>Total Snowy Mountains Scheme</b>			<b>1342</b>	<b>1022</b>	<b>990</b>	<b>74%</b>	<b>-32</b>	<b>8</b>	<b>-24</b>
<b>Borders Rivers Commission</b>									
<i>Border Rivers</i>	Glenlyon Dam	1976	254	136	118	46%	-18	14	-5
<b>Total Border Rivers Commission</b>			<b>254</b>	<b>136</b>	<b>118</b>	<b>46%</b>	<b>-18</b>	<b>14</b>	<b>-5</b>
<b>New South Wales</b>									
<i>Border Rivers</i>	Pindari Reservoir	1962-96	312	289	168	54%	-121	11	-110
<i>Gwydir</i>	Copeton Reservoir	1976	1364	835	428	31%	-406	38	-368
<i>Namoi/Peel</i>	Chaffey Reservoir	1979	62	62	49	80%	-13	7	-6
	Keepit Reservoir	1960	423	281	114	27%	-166	34	-132
	Split Rock Reservoir	1987	397	390	264	67%	-126	28	-98
<i>Macquarie/Castlereagh/Bogan</i>	Burrendong Reservoir	1967	1678	1016	462	28%	-554	53	-501
	Windamere Reservoir	1984	368	332	319	87%	-13	20	6
<i>Lachlan</i>	Carcoar Reservoir	1970	36	31	28	78%	-3	4	1
	Lake Brewster	1952	153	27	0	0%	-26	40	13
	Lake Cargelligo	1902	36	35	26	73%	-9	22	13
	Wyangala Reservoir	1936-71	1220	929	496	41%	-433	47	-387
<i>Murrumbidgee</i>	Blowering Reservoir	1968	1631	860	412	25%	-448	19	-429
	Burrinjuck Dam	1907-56	1028	412	258	25%	-154	17	-137
	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 NSW</b>			<b>8733</b>	<b>5499</b>	<b>3025</b>	<b>35%</b>	<b>-2474</b>	<b>340</b>	<b>-2134</b>
<b>Victoria</b>									
<i>Goulburn/Broken/Loddon</i>	Eildon Reservoir	1956	3390	1083	711	21%	-372	53	-318
	Lake Mokoan	1971	365	203	150	41%	-53	80	27
	Lake Nillahcootie	1967	40	20	19	47%	-1	4	3
	Cairn Curran Reservoir	1956	148	75	33	22%	-42	13	-29
	Tullaroop Reservoir	1959	74	41	20	27%	-21	6	-14
<i>Campaspe</i>	Lake Eppalock	1964	312	199	88	28%	-111	23	-87
	Lauriston Reservoir	1941	20	19	15	75%	-3	1	-2
	Malmsbury Reservoir	1870	18	12	8	46%	-3	2	-1
	Upper Coliban Reservoir	1903	37	22	11	29%	-11	2	-9
<i>Wimmera-Mallee</i>	Lake Bellfield	1966	79	22	22	28%	0	2	2
	Lake Fyans	1916	21	7	7	35%	1	1	2
	Lake Lonsdale	1903	66	0	0	0%	0	2	2
	Lake Taylor	1923	36	18	15	42%	-3	4	1

Table 13. 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)
<i>Murray/Kiewa/Ovens</i>	Pine Lake	1928	64	2	2	3%	0	2	2
	Tooloondo Reservoir	1953	107	13	4	4%	-9	4	-5
	Wartook Reservoir	1887	29	11	22	75%	11	2	13
	Rocky Valley Reservoir	1959	28	23	7	26%	-15	2	-13
	Lake Buffalo	1965	24	14	9	38%	-5	2	-3
	Lake William Hovell	1973	14	14	10	72%	-4	1	-4
<b>Total Victoria</b>			<b>4871</b>	<b>1796</b>	<b>1153</b>	<b>24%</b>	<b>-643</b>	<b>209</b>	<b>-434</b>
<b>Queensland</b>									
<i>Condamine/Balonne</i>	Beardmore Dam	1972	82	36	37	45%	1	25	25
	Chinchilla Weir	1974	10	4	4	36%	-1	4	3
	Cooby Dam	1942	21	15	12	55%	-4	3	-1
	Jack Taylor Weir	1953-59	10	9	5	50%	-3	3	0
	Leslie Dam	1985	106	30	12	12%	-18	7	-11
<i>Macintyre Brook</i>	Coolmunda Dam	1968	75	31	37	49%	6	17	22
<b>Total Queensland</b>			<b>304</b>	<b>125</b>	<b>106</b>	<b>35%</b>	<b>-19</b>	<b>58</b>	<b>39</b>
<b>Australian Capital Territory</b>									
<i>Murrumbidgee</i>	Bendora Reservoir	1961	11	9	9	86%	0	0	1
	Corin Reservoir	1968	76	42	34	45%	-8	0	-8
	Googong Reservoir	1979	125	121	109	88%	-12	4	-8
<b>Total ACT</b>			<b>211</b>	<b>171</b>	<b>152</b>	<b>72%</b>	<b>-19</b>	<b>4</b>	<b>-15</b>
<b>Total Basin</b>			<b>25338</b>	<b>15476</b>	<b>10165</b>	<b>40%</b>	<b>-5311</b>	<b>1377</b>	<b>-3934</b>

1. Volume in storage may exceed storage capacity when Lakes are surcharged. Surcharge capacity is 1999 GL.
2. 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.

## 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 2001/02**

The GTRG supplied the estimated data for sustainable yield (SY), allocation and usage of groundwater in 2001/02 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 2626 GL. Out of this, 3009 GL was already allocated in 2001/02, which constituted 115% of SY. The total usage of groundwater in the Basin was 1329 GL, which was 44% of allocation and 51% of SY. The groundwater usage was 11% 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 (SKM) 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.

**Table 14 . Basin-wide groundwater data for 2001/02 aligned along the designated Cap valleys**

Designated River Valley System	Estimated Sustainable Yield (GL/yr)	2000/01 Allocation (GL)	2000/01 Use (GL)	Surface Water Use (GL) <sup>1</sup>
<b>New South Wales</b>				
Border Rivers	16	18	16	197
Moonie	38	48	48	
Gwydir	71	176	101	460
Namoi/Peel	219	503	253	359
Macquarie/Castlereagh/Bogan	138	275	91	582
Barwon-Darling	5	9	9	93
Lower Darling	n/a	n/a	n/a	126
Lachlan	386	597	138	457
Murrumbidgee	321	499	278	2348
Murray	112	289	74	2113
<b>Total NSW</b>	<b>1306</b>	<b>2414</b>	<b>1007</b>	<b>6735</b>
<b>Victoria</b>				
Goulburn/Broken/Loddon	285	108	21	1700
Campaspe	17	27	12	124
Wimmera-Mallee <sup>2</sup>	331	57	26	93
Kiewa/Ovens/Murray	336	78	24	1916
<b>Total Victoria</b>	<b>968</b>	<b>270</b>	<b>83</b>	<b>3834</b>
<b>South Australia</b>				
South Australian Murray Basin <sup>3</sup>	99	90	28	621
<b>Total South Australia Murray</b>	<b>99</b>	<b>90</b>	<b>28</b>	<b>621</b>
<b>Queensland</b>				
Condamine/Balonne	220	211	200	162
Border Rivers	19	20	9	152
Macintyre Brook	n/a	1	1	12
Moonie	1	0	0	6
Warrego	5	2	1	10
Paroo	n/a	0	0	0
<b>Total Queensland</b>	<b>245</b>	<b>233</b>	<b>211</b>	<b>341</b>
<b>Australian Capital Territory</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>36</b>
<b>Total Basin</b>	<b>2626</b>	<b>3009</b>	<b>1329</b>	<b>11567</b>

1. Refer Table 2.

2. 2000/01 Figures.

3. 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 2001/02 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 2001/02 was 11567 GL and groundwater use was 1329 GL.

Information on groundwater usage has been presented for the third 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 2001/02 water year represents an utilisation of 83% of the water allocated throughout the Basin. This compares with the 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 2001/02 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 2001/02.

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 2001/02 decreased from 15476 GL to 10165 GL (40% full). Total evaporative losses for major storages within the Basin was 1377 GL, representing 5% of total storage capacity and 12% of total Basin diversion.

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

The estimated sustainable yield of aquifers in GMU in 2001/02 was 2626 GL. The allocation of groundwater in the Basin was 3009 GL and usage was 1329 GL.

No environmental releases were diverted to the Barmah-Millewa Forest in 2001/02.

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

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

## Glossary

<b>ACTEW</b>	Australian Capital Territory Electricity and Water.
<b><i>announced allocation</i></b>	The percentage of water entitlement declared available for diversion from a regulated stream in a season.
<b><i>annual allocation</i></b>	The annual volume of water available for diversion from a regulated stream by an entitlement holder.
<b><i>authorised use</i></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><i>Border rivers</i></b>	The rivers and tributaries forming, or intersecting the border between NSW and Queensland.
<b><i>bulk entitlement</i></b>	A perpetual entitlement to water granted to water authorities by the Crown of Victoria under the <i>Water Act 1989</i> .
<b><i>carryover</i></b>	An unused entitlement from one season that can be used in the next year.
<b><i>channel capacity</i></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><i>diversion</i></b>	The movement of water from a river system by means of pumping or gravity channels.
<b><i>diversion licence</i></b>	Specified licences issued for a specified annual volume and diversion rate.
<b>DLWC</b>	The Department of Land and Water Conservation (of NSW).
<b>DNRM</b>	The Department of Natural Resources and Mines (of Queensland).
<b>DNRE</b>	The Department of Natural Resources and Environment (of Victoria).
<b><i>dozer allocation</i></b>	An allocation that is not fully utilised.
<b>DWR</b>	The Department for Water Resources (of South Australia).
<b><i>EC (unit)</i></b>	Electrical conductivity unit 1 EC = 1 micro-Siemen per centimetre measurement at 25° Celsius. Commonly used to indicate the salinity of water.
<b><i>end-of-valley flows</i></b>	The flow regime at the end of a valley.
<b><i>floodplain harvesting</i></b>	The diversion of water from a floodplain into storage(s).
<b>FMIT</b>	First Mildura Irrigation Trust.
<b><i>gigalitre (GL)</i></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).

<i>gravity districts</i>	Districts which use gravity to divert the flow of water from the river.
<i>high security entitlement</i>	An entitlement which does not vary from year to year and is expected to be available in all but the worst droughts.
<i>IAG</i>	Independent Audit Group.
<i>LV</i>	Licensed Volume.
<i>impoundment</i>	The storage of water diverted from a water course.
<i>irrigation</i>	Supplying land or crops with water by means of streams, channels or pipes.
<i>MDBC</i>	Murray-Darling Basin Commission.
<i>MDBMC</i>	Murray-Darling Basin Ministerial Council.
<i>megalitre (ML)</i>	One million litres. One megalitre is approximately the volume of an Olympic swimming pool.
<i>Ministerial Council, the</i>	Murray-Darling Basin Ministerial Council.
<i>ML</i>	Megalitre: one million litres. One megalitre is approximately the volume of an Olympic swimming pool.
<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>sleepers allocation</i>	An allocation that does not have a history of water usage.
<i>temporary transfer</i>	Water entitlements transferred on an annual basis.
<i>unregulated streams</i>	Streams that are not controlled or regulated by releases from major storages.
<i>utilisation</i>	The amount of water available for diversion that is actually diverted.
<i>water entitlement</i>	The legal right of a user to access a specified amount of water in a given period.
<i>water harvesting</i>	The diversion of water from an unregulated stream in Queensland in which the access to water is defined only by a diversion rate and a starting flow in the stream.
<i>WRP</i>	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.
<i>WMRWG</i>	Water Market Reform Working Group.
<i>WR</i>	Water Right.
<i>WUE</i>	Water Use Efficiency.

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

System	1997/98	1998/99	1999/00	2000/01	2001/02
<b>New South Wales</b>					
Intersecting Streams	0	0	0	0	0
Border Rivers	0	-1593	-3505	-8474	-8695
Gwydir	0	0	0	0	0
Namoi/Peel	0	0	0	0	0
Macquarie/Castlereagh/Bogan	0	0	0	0	0
Barwon-Darling/Lower Darling	5393	12534	8986	20009	7816
Lachlan	0	0	0	0	0
Murrumbidgee	-30660	-37982	-113650	-30177	31487
Murray	27423	6675	104535	-2662	-35465
<b>Total NSW</b>	<b>2156</b>	<b>-20366</b>	<b>-3634</b>	<b>-21304</b>	<b>-4857</b>
<b>Victoria</b>					
Goulburn/Broken/Loddon					
Cap valley	2957	3456	-6531	-2101	-1036
Campaspe	0	0	0	0	0
Wimmera-Mallee	0	0	0	0	0
Murray/Kiewa/Ovens Cap valley	17572	11736	-572	-303	-8553
<b>Total Victoria</b>	<b>14615</b>	<b>15192</b>	<b>-7103</b>	<b>-2404</b>	<b>-9589</b>
<b>South Australia</b>					
Metro-Adelaide & Associated					
Country Areas	0	0	0	0	12000
Lower Murray Swamps	-2596	-3136	-4213	-4577	-3839
Country Towns	0	0	0	0	-12000
All Other Uses of Water from the River Murray	-14175	6717	11436	19802	9580
<b>Total South Australia</b>	<b>-16771</b>	<b>3581</b>	<b>7223</b>	<b>15225</b>	<b>5741</b>
<b>Queensland<sup>1</sup></b>					
Condamine/Balonne	0	0	0	0	0
Border Rivers/Macintyre Brook	0	1593	3505	8474	8695
Moonie	0	0	0	0	0
Warrego	0	0	0	0	0
Paroo	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>Australian Capital Territory</b>					
	0	0	0	0	0
<b>Total Basin</b>	<b>0</b>	<b>0</b>	<b>-9</b>	<b>-9</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
<b>New South Wales</b>					
Intersecting Streams	n/a	n/a	n/a	n/a	n/a
Border Rivers	166	177	144	n/a	n/a
Gwydir	559	287	408	249	434
Namoi/Peel	319	314	335	326	334
Macquarie/Castlereagh/Bogan	373	556	412	517	565
Barwon-Darling/Lower Darling	278	453	293	429	187
Lachlan	427	316	244	392	446
Murrumbidgee	2507	2522	2019	2711	2687
Murray	2175	1927	1768	2126	2113
<b>Total NSW</b>	<b>6804</b>	<b>6553</b>	<b>5625</b>	<b>6750</b>	<b>6766</b>
<b>Victoria</b>					
Goulburn/Broken/Loddon					
Cap valley	1949	1655	1637	1636	1615
Campaspe	132	81	75	109	105
Wimmera-Mallee	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens Cap valley	1867	1779	1625	1681	1953
<b>Total Victoria</b>	<b>3948</b>	<b>3515</b>	<b>3337</b>	<b>3426</b>	<b>3673</b>
<b>South Australia</b>					
Metro-Adelaide & Associated Country Areas <sup>1</sup>	n/a	n/a	n/a	n/a	n/a
Lower Murray Swamps	101	100	99	99	100
Country Towns	50	50	50	50	38
All Other Uses of Water from the River Murray	426	447	452	460	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>Queensland</b>					
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a	n/a
Moonie	n/a	n/a	n/a	n/a	n/a
Warrego	n/a	n/a	n/a	n/a	n/a
Paroo	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>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>Total Basin</b>	<b>11329</b>	<b>10666</b>	<b>9563</b>	<b>10786</b>	<b>11027</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
<b>New South Wales</b>					
Intersecting Streams	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	178	195	245	197
Gwydir	531	305	444	424	460
Namoi/Peel	301	317	343	350	359
Macquarie/Castlereagh/Bogan	439	372	421	499	582
Barwon-Darling/Lower Darling	251	448	260	498	219
Lachlan	429	293	301	423	457
Murrumbidgee	2585	2505	1875	2747	2348
Murray	1886	2000	1234	2070	2113
<b>Total NSW</b>	<b>6624</b>	<b>6418</b>	<b>5072</b>	<b>7257</b>	<b>6735</b>
<b>Victoria</b>					
Goulburn/Broken/Loddon					
Cap valley	1909	1699	1553	1569	1700
Campaspe	96	76	73	113	124
Wimmera-Mallee	184	153	116	98	93
Murray/Kiewa/Ovens Cap valley	1743	1804	1555	1712	1916
<b>Total Victoria</b>	<b>3932</b>	<b>3731</b>	<b>3299</b>	<b>3491</b>	<b>3834</b>
<b>South Australia</b>					
Metro-Adelaide &					
Associated Country Areas	153	153	139	104	82
Lower Murray Swamps	101	100	99	99	100
Country Towns	35	36	37	38	36
All Other Uses of Water					
from the River Murray	375	400	368	421	403
<b>Total South Australia</b>	<b>664</b>	<b>690</b>	<b>642</b>	<b>662</b>	<b>621</b>
<b>Queensland</b>					
Condamine/Balonne	545	467	366	360	162
Border Rivers/Macintyre Brook	186	123	163	288	163
Moonie	8	8	8	31	6
Warrego	2	10	3	9	10
Paroo	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>Australian Capital Territory</b>					
	<b>44</b>	<b>23</b>	<b>27</b>	<b>34</b>	<b>36</b>
<b>Total Basin</b>	<b>12005</b>	<b>11471</b>	<b>9581</b>	<b>12132</b>	<b>11565</b>

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

System	Long-Term Cap	Scheduled F Trigger	1997/98	1998/99	1999/00	2000/01	2001/02
<b>New South Wales</b>							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	-36	-1	-51	n/a	n/a
Gwydir	344	-69	28	-18	-35	-175	-26
Namoi/Peel	320	-64	18	-3	-8	-24	-25
Macquarie/Castlereagh/Bogan	468	-94	-66	185	-9	18	-16
Barwon-Darling/Lower Darling	310	-62	27	5	34	-69	-32
Lachlan	334	-67	-2	23	-56	-32	-11
Murrumbidgee	2358	-472	-78	17	145	-36	339
Murray	1926	-385	289	-72	534	57	0
<b>Total NSW</b>	<b>6263</b>	<b>-1253</b>	<b>179</b>	<b>135</b>	<b>552</b>	<b>-261</b>	<b>228</b>
<b>Victoria</b>							
Goulburn/Broken/Loddon							
Cap valley	2058	-412	40	-43	83	68	-85
Campaspe	122	-24	36	5	2	-4	-18
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens							
Cap valley	1665	-333	124	-25	69	-31	36
<b>Total Victoria</b>	<b>4008</b>	<b>-802</b>	<b>200</b>	<b>-63</b>	<b>154</b>	<b>33</b>	<b>-68</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
Lower Murray Swamps	104	-21	0	0	0	0	0
Country Towns	50	-10	15	14	13	12	3
All Other Uses of Water from the River Murray	441	-88	52	47	84	39	47
<b>Total South Australia</b>	<b>594</b>	<b>-119</b>	<b>66</b>	<b>61</b>	<b>98</b>	<b>51</b>	<b>49</b>
<b>Queensland</b>							
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	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
Paroo	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>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>Total Basin</b>	<b>10864</b>	<b>-2173</b>	<b>446</b>	<b>133</b>	<b>804</b>	<b>-177</b>	<b>210</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	Scheduled F Trigger	1997/98	1998/99	1999/00	2000/01	2001/02
<b>New South Wales</b>							
Intersecting Streams	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers	202	-40	-36	-38	-89	n/a	n/a
Gwydir	344	-69	28	11	-25	-200	-226
Namoi/Peel	320	-64	18	15	7	-16	-41
Macquarie/Castlereagh/Bogan	468	-94	-66	119	109	127	111
Barwon-Darling/Lower Darling	310	-62	27	32	65	-4	-35
Lachlan	334	-67	-2	21	-36	-67	-79
Murrumbidgee	2358	-472	-78	-62	83	47	386
Murray	1926	-385	289	216	751	807	807
<b>Total NSW</b>	<b>6263</b>	<b>-1253</b>	<b>179</b>	<b>314</b>	<b>867</b>	<b>694</b>	<b>922</b>
<b>Victoria</b>							
Goulburn/Broken/Loddon							
Cap valley	2058	-412	40	-3	80	148	62
Campaspe	122	-24	36	41	43	39	21
Wimmera-Mallee	162	-32	n/a	n/a	n/a	n/a	n/a
Murray/Kiewa/Ovens							
Cap valley	1665	-333	124	100	169	138	174
<b>Total Victoria</b>	<b>4008</b>	<b>-802</b>	<b>200</b>	<b>137</b>	<b>292</b>	<b>324</b>	<b>257</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
Lower Murray Swamps	104	-21	0	0	0	0	0
Country Towns	50	-10	15	28	42	54	56
All Other Uses of Water from the River Murray	441	-88	52	99	183	222	269
<b>Total South Australia</b>	<b>594</b>	<b>-119</b>	<b>66</b>	<b>127</b>	<b>225</b>	<b>276</b>	<b>325</b>
<b>Queensland</b>							
Condamine/Balonne	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Border Rivers/Macintyre Brook	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moonie	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
Paroo	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>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>Total Basin</b>	<b>10864</b>	<b>-2173</b>	<b>446</b>	<b>579</b>	<b>1383</b>	<b>1295</b>	<b>1505</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

Designated River Valley and Cap	1997/98		1998/99		1999/00		2000/01		2001/02	
	Annual Diversion	Diversion - 5 Years to 1997/98	Annual Diversion	Diversion - 5 Years to 1998/99	Annual Diversion	Diversion - 5 Years to 1999/00	Annual Diversion	Diversion - 5 Years to 2000/01	Annual Diversion	Diversion - 5 Years to 2001/02
<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

1. 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 2001/02 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 2001/02 is shown in the following table.

State	Opening Account Balance <sup>1</sup> (GL)	Opening Borrow by water users (GL)	New Allocation this year <sup>2</sup> (GL)	Account Spills <sup>3</sup> (GL)	Usage of Allocation this year (GL)	Closing Borrow by water users (GL)	Closing Account Balance <sup>4</sup> (GL)	Additional Release this year <sup>5</sup> (GL)	Total Release this year (GL)
<b>NSW</b>	0	0	75	0	0	0	75	0	0
<b>Victoria</b>	-50	0	75	0	0	0	25	0	0
<b>TOTAL</b>	<b>-50</b>	<b>0</b>	<b>150</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>100</b>	<b>0</b>	<b>0</b>

1. As at 1 July this volume has been reduced by the amount of water previously borrowed by water users and not yet paid back.
2. Comprises 50 GL high security plus 25 GL low security when Victorian irrigation allocations reaching 100% water right plus 30% sales.
3. 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.
4. 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.
5. From other allocations e.g. NSW Murray Environmental Allocation and Victorian Murray Wetlands Environmental Allocation.





